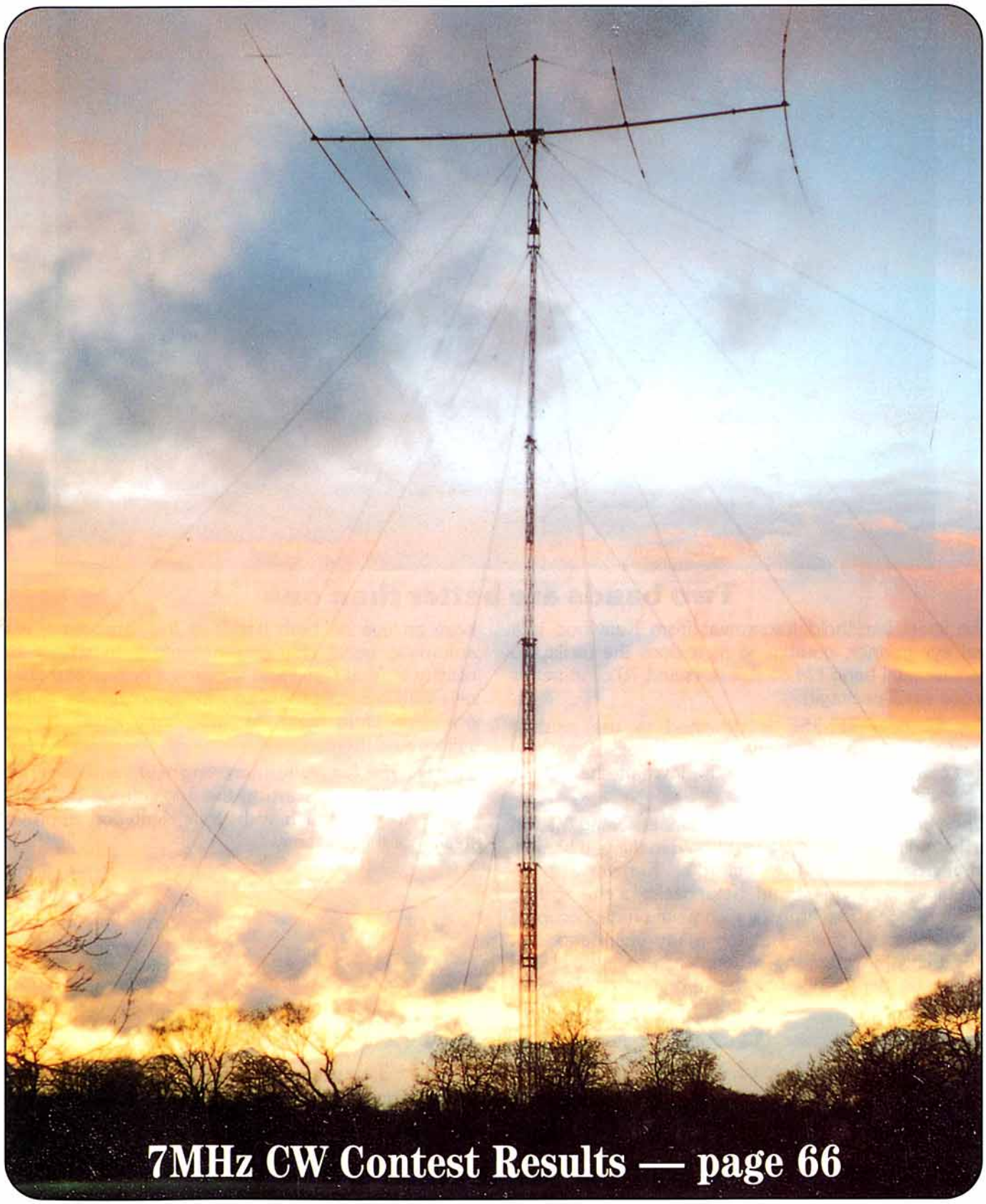
Radio Communication

Volume 66 No 7

July 1990

The Journal of the Radio Society of Great Britain



7MHz CW Contest Results — page 66

KENWOOD

Two bands are better than one

The latest handheld transceiver from Kenwood is a real eye-opener, combining as it does the facility to operate dual band FM on 2 meters and 70 centimetres in one small package.

The all new TH-75E is designed to use existing accessories from the popular TH-25E/45E range, and thus completes what must be the favourite hand held transceiver line we have seen.

When you take a serious look at what is being offered to the radio amateur today, it should make you blink in amazement. With the TH-75E, Kenwood have combined into one hand held package the sort of performance and features which would have occupied a decent size suitcase not too many years ago. Not only that, the operating convenience of the TH-75E has to be experienced to be appreciated. You can keep an eye on both bands at the same time, with automatic band changing according to where the activity is. You can operate simplex or repeater channels with correct offsets and tones. You have duplex operation cross band for "telephone style" conversation. And more.

The TH-75E is a really interesting new transceiver, and we are looking forward to the first volume shipments soon. Keep in touch with your Kenwood approved dealer for the latest news.

LOWE ELECTRONICS LTD.

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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): 0707 59015
Fax (Editorial: 0707 49503
E-mail (Telecom Gold)):
76:MSX020

Reports for *Spectrum Analysis* should be sent to the Band Editors:
HF
John Allaway, G3FKM, 10 Knightlow Road, Birmingham B17 8QB
VHF/UHF
Norman Fitch, G3FPK, 40 Eskdale Gardens, Purley, Surrey CR8 1EZ (Telecom Gold 76:MSX022)
Telex: 9312132268 (SAG)
SWL
Bob Treacher, 93 Elibank Road, Eltham, London SE9 1QJ
MICROWAVES
Mike Dixon, G3PFR, Woodstock, Gazebank, Norley, Warrington, Cheshire WA6 8LL

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Radio Communication

Volume 66 No 7

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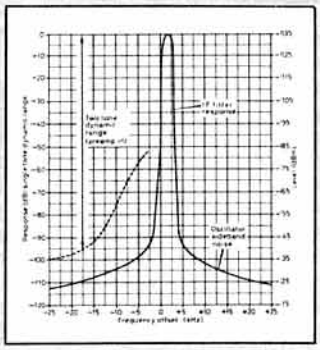
Cover picture:
G4DJX used this 3-ele beam at 100ft to gain second place as G3VER/P in the 7MHz CW Contest – page 66

Colour feature:
First 50MHz operation from Turkey – page 43



IC-781 transceiver review – page 52.

RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS

Founded 1913. Incorporated 1926. Limited by guarantee.
Member society of the International Amateur Radio Union

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

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

Headquarters and registered office:
Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE
Telex 9312 130923 (RSGB)
Electronic mail via Dialcom/Telecom Gold: 87:CQQ083
Telephone: 0707 59015. Fax: 0707 45105

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

ANNUAL SUBSCRIPTION RATES
Once-off joining fee: £1.50
Corporate members: UK and overseas (*Radio Communication* by accelerated surface post): **£25.00**
UK associate member under 18: £8.50. Family member: £9.95
UK students over 18 and under 25: £12.75 (Applications should give applicant's age at last renewal date and include evidence of student status)
Affiliated club or society/registered group (UK): £25.00 (including *Radio Communication*): **£14.95** (excluding *Radio Communication*) (Subscriptions include VAT where applicable)

Membership application forms available from RSGB HQ

Raynet Election Results

The result of the election for Zone 9 is as follows:-
Charles Bottoms, G4PIP - 8 votes
Don Sunderland, G6FHM - 51 votes
There were 4 spoilt votes.

Don Sunderland is therefore elected as Zonal Representative for Raynet Zone 9 for a three year term of office commencing 1 June 1990. Zone 9 comprises Shropshire, Staffordshire, West Midlands, Hereford and Worcester, and Warwickshire.

Raynet Vacancy

Due to the resignation of Brian Smith, G4ETN, for domestic/business reasons, there is now a vacancy for a representative in Raynet Zone 7. The Zone comprises Gloucestershire, Avon, Wiltshire, Dorset, Somerset, Devon and Cornwall.

Raynet members resident in this Zone may forward nominations for their Zonal Representative to "The Secretary (Raynet)" at RSGB HQ. Nominations should be supported by five Raynet members currently registered in the Zone, and must be received no later than 5.15 pm on Friday 31 August 1990. Included must be a declaration from the nominee that he or she is (a) normally resident in the Zone, (b) is a currently registered Raynet member, (c) is a member of the RSGB and (d) is willing to serve if elected.

Intending nominees are strongly advised to read the guidance notes on the role and duties of a Zonal Representative before submitting their application. These notes have been prepared by the Raynet Committee and are available either from the Chairman, G3YAC, QTHR or from Membership Services at RSGB HQ.

The period of appointment is normally three years. If more than one valid nomination is received, an election will be held during October.

The Novice Licence

Registration of Instructors: The Training and Education Advisory Group is now ready to commence the registration of instructors. If you have already expressed a wish to take part in Novice training through the 'Help' postcards distributed with December 89 *RadCom*, there is no need to apply as your details are already on record. Anyone who would like to instruct a group of novices, and has not responded so far, should apply for an Instructors Guide, enclosing an self addressed envelope (A5 minimum) with 24p in stamps attached. Write to RSGB Project YEAR Coordinator, Mrs Hilary Claytonsmith, G4JKS, 115 Marshalswick Lane, St Albans, Herts, AL1 4UU.

DiY Radio 2

A second pilot edition of *DIY Radio* was launched at the recent RSGB Convention. Copies are obtainable from RSGB HQ price £1.50 by post. Bona fide youth organisations can obtain copies in small quantities at no charge.

EMC Committee Vacancy

The RSGB's EMC Committee is looking for a Minutes Secretary. An amateur licence, a knowledge of EMC matters and the use of a word processor are advantageous, but not essential. The post would involve a commitment to attend 10 meetings per year held in London on weekdays commencing 6 pm. Anyone interested should contact the new chairman, Bob Peace, G8SOZ, via the EMC Helpline - 0537 59 3449.

Callsign feedback

The Licensing Advisory Committee would like to thank all those who replied to the request for input on the future of UK callsigns. Considerable interest was shown by members and many helpful comments were received. Some members obviously went to a great deal of trouble to produce detailed analyses. The LAC found all of this input most helpful in making the Society's comments on the RA's proposals.

GB2CW

A reminder that all RSGB slow morse practice transmissions have been using the special callsign GB2CW from 1 June. A list of these transmissions appears in the 1990 *RSGB Call Book*, or can be obtained from the Morse Practice Coordinator, Mike Thayne, G3GMS, 14 Tynedale Avenue, Monkseaton, Whitley Bay, Tyne and Wear, NE26 3BA.

Video Library on pause

Reg Auckland, G2PA, who has been the curator of the RSGB's Audio-Visual Library for over seven years, has had to retire from the job owing to ill health. Outstanding transactions between radio clubs and the Library are being honoured, but members are asked not to contact the Library until a successor has been found. We thank Reg for his past work and we hope his health improves shortly.

Do you have a query?

Where do you write for an answer? In most cases there is no need to write at all. 90% of the answers to your questions are to be found in the 1990 *RSGB Call Book* - 130 pages of valuable information at your fingertips.

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

• Technical queries:-
P E Chadwick, G3RZP, Three Oaks, Braydon, Swindon, Wilts SN5 OAD.

• RSGB Policy Matters (Zonal Council Member):-
Zone A:
G R Smith, G4AJJ, "Greenacres" Sawdon, Scarborough, North Yorks YO13 9DY.
Zone B:
J Allen, G3DOT, 4 Philip Avenue, Waltham, S. Humberside DN37 OQD
Zone C:
J Greenwell, G3AEZ, Eastfield, Henfold Hill, Beare Green, Dorking, Surrey RH5 4RW.
Zone D:
P E Chadwick, G3RZP, Three Oaks, Braydon, Swindon, Wiltshire SN5 OAD
Zone E:
E J Case, GW4HWR, 2 Abbey Close, Tyrhiw, Taffswell, Mid Glamorgan CF4 7RS.
Zone F:
J T Barnes, GI3USS, 95 Crawfordsburn Road, Bangor, Co. Down.
Zone G:
I D Suart, GM4AUP, 37 Meldrum Mains, Glenmavis, Airdrie, Lanarkshire ML6 OQG.

• EMC Queries:
EMC Coordinator (by telephone) - see Dec 89 and June 90 *RadComs*.
EMC Helpline - 0537 59 3449
Or via the EMC Committee Chairman.

• Specialist Committee Matters
Via the Chairmen (see May 90 *RadCom*

• Packet Enquiries:
General: Ian Suart, GM4AUP (see above)
Mailboxes: Neil Lasher, G6HIU.
Nodes: Dave Hough, G4WRW, QTHR.

• Repeaters:
Geoff Dover, G4AFJ, QTHR.

• Novice Licence:
John Case, GW4HWR (see above)

• Project YEAR
Hilary Claytonsmith, G4JKS, QTHR

• Membership Liaison
Geoffrey Smith, G4AJJ (see above)

And of course don't forget your RLO will always be able to help you with general enquiries. See May *RadCom* for a complete list.

HQ Vacancy Assistant to the Secretary / Chief Executive

To deal with a wide variety of amateur radio related matters, including answering a large amount of correspondence, keeping records, liaising with volunteers/ committees, and carrying out special projects and research.

The successful candidate should be resourceful, diplomatic and able to work under pressure. He or she should possess a first class command of English, a general knowledge of amateur radio and an appreciation of the structure and work of the Society. An Amateur Radio Licence is desirable but not essential.

Education should preferably be to degree standard and the candidate must be computer literate. Ability to program would be a distinct advantage.

Salary is negotiable.

Applications with CV to: The Secretary, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts. EN6 3JE.

G5RP Trophy - deadline

Nominations for this trophy must be with the HF Committee by 31 July. See page 5 of June's *RadCom* for full details.

Bristol GB2RS

There is a vacancy for a 144MHz GB2RS newsreader in the Bristol area. Anyone who feels he or she has good VHF coverage of the area, and is prepared to read the news bulletin on a regular basis, is asked to contact the RLO, Shaun O'Sullivan, G8VPG, as soon as possible.

Do you live in Croydon or Sutton?

We understand that the Post Office has altered postcodes in these areas of Surrey. If your postcode has changed, please advise the Society of your new code in writing and as soon as possible. This is to avoid your *RadCom* (which is pre-sorted by postcode) going astray.

GOODBYE *HAM RADIO*

I have always envied the independent amateur radio magazines. Whereas the magazines of the 135+ national societies have to cater for a very wide spectrum of interests which reflect their members' aspirations, the independent magazines are free to focus on their chosen target audience. Nor do the owners of independent magazines have to provide the large range of services and government liaison associated with being a national society.

I was sad, therefore, when one of the finest independent publications in the world - *Ham Radio Magazine* - announced that it was ceasing publication this April.

It seems like only yesterday that I remember a young-looking Skip Tenney, W1NLB, visiting London in the sixties to persuade the RSGB to act as an agent for his new venture - *Ham Radio Magazine*. Its excellence and clarity of layout, use of colour and attractive modern front covers became its keynote, not to mention its technical content.

HR made no bones about the fact that it went straight for the radio amateur who was technically minded. It became a world standard and will be very sadly missed. To Skip Tenney and all of his staff, may we thank you for a marvellous job well done and wish you every future success.

Do you really need a special event callsign

This month's news section features a new facility which in effect allows all clubs to issue themselves their own special event callsign. This is primarily to facilitate training and to encourage interest in the hobby.

The marvellous feature of this new facility is that it will allow clubs to retain their cherished callsigns, but modify them at will, 24 hours a day, 7 days a week. Thus you can put an unlicensed person on the air to send a greetings message at any club meeting, or grant yourself a rare and special prefix for public demonstrations.

Who to write to

Getting the best out of the RSGB is something very close to our hearts; after all, the RSGB is all about serving the amateur community and enabling individuals to get the best enjoyment and pleasure from the hobby.

The RSGB is often called upon to advise members how to deal with problems encountered in their everyday operations. We want you to have the best advice that either our staff or, more usually, our specialist volunteers can offer. If you need help, do study the "who to write to" item (on this page) first as it will help you to summon advice quickly.

Morse test service

The Society's Chief Morse Examiner, Neville Ianson, G3GDO, recently announced his retirement after 5 years and is helping Council to select his replacement.

In 1985 Council directed HQ staff to design a new UK Morse Test scheme and tender for Morse testing. The RSGB won the contract and this success was based on the enthusiastic support of many hundreds of volunteers from all over the UK.

From applicants with special qualifications, a Chief Examiner was selected. It was he who helped to confirm the suitability of the entire scheme. Unfortunately, at the very last minute he had to step down from the position. Neville Ianson not only stepped into the breach, but quickly took on the task of travelling all over the country, in fact from the Channel Islands to Orkney Isles, to interview prospective examiners.

Working hand in hand with Neville in those early formative days was a great pleasure. The RSGB Morse Test Service is now an established part of our efforts to bring positive cost effective services to the UK amateur community. Congratulations to Neville for a very fine job well done - he will be very hard to replace.

Congratulations *PW*

With its July issue, *Practical Wireless* celebrated its 1000th issue. We wish it, its present and past editors and its staff every future success.

David Evans, G3OUF

New UK Club Prefixes

GX	GS	GC	GN	GT	GH	GP

Spectrum Abuse

At a meeting between the Wireless Institute of Australia and the Australian licensing authority (DoTC) in February, the problem of illegal transmissions on amateur repeaters was discussed. The WIA journal, *Amateur Radio*, describes the outcome as follows:

"DoTC observed that, all too often, exasperated amateurs transgressed just as badly as these rather sick people in the manner in which they reacted to these illegal transmissions.

"The correct procedure with these illegal transmissions is to totally ignore them! Under no circumstances should you respond or comment in any way on a transmission that is not identified by a legal callsign.

"The psychologists tell us that if you respond in any way to such antisocial behaviour, the perpetrator has achieved what his warped mind seeks, may well believe his actions have been justified,and will be encouraged to continue his abnormal behaviour. Ignore him totally, and eventually he will go away."

The RSGB has been advocating this approach for many years, sadly too often in vain. Of course, whilst publicly ignoring the culprit, anyone local to him or her should gather as much information as possible and pass it to the Society's Amateur Radio Observation Service Coordinator, who is Geoff Griffiths, G3STG. He is QTHR.

Richard Burton, ex-WB6JAC, has been arrested for allegedly operating a radio transmitter without a licence. This follows an intensive investigation by Los Angeles FCC engineers acting on numerous complaints from radio amateurs. Before his arrest, FCC engineers and US Marshals confiscated $1000 worth of amateur radio gear from Burton's house.

In the mid eighties Richard Burton served seven months in prison plus five months probation for four counts of operating a transmitter without a licence. He is reported to be on $10,000 bail pending the hearing.

Hidden in the mass of information on the revised Amateur Radio Licence last month was a reference to new facilities available only to Club Licensees. Many countries in the World have special callsigns for clubs and this is now the case with the UK. However, owing to the considerable amount of history associated with certain club calls, clubs have a choice of whether to use the new prefix.

When using the new prefix, clubs may avail themselves of the additional facilities formerly only available to holders of special event (GB) callsigns. The most useful of these being the ability to allow non-licensees (visitors to the club, local dignatories, school children etc) to speak into the microphone in order to pass a short greetings message. The terms of this are:-

1 Each greetings message should not exceed 2 minutes.
2 Each person may pass only one message to each station with which the originating station is in contact.
3 A non-licensed person may speak into the microphone, but the licensed radio amateur must identify the station and operate the transmitter controls at all times.
4 Greetings messages by third parties may only be sent from and received by stations within the UK, except that international greetings messages may be passed to and from stations in the USA, Canada and the Falkland Islands. The licensee may exchange greetings as in any QSO, with any station.

The special prefixes, which may only be used by clubs holding a Club Licence, are as follows:-

England	- GX
Scotland	- GS
Wales	- GC
Northern Ireland	- GN
Isle of Man	- GT
Jersey	- GH
Guernsey	- GP

Clubs will find that the new prefix will be in great demand on the air and there should be few occasions when a special event callsign need be applied for, and no 28 day wait.

Although it is mandatory to use the prefix when using the greetings message facility, there is no reason why it should not be used for most of the time. When not using the enhanced facilities, the original prefix may still be used if desired.

An early success!

The following was received a few days after the new club licence came into force . . . .

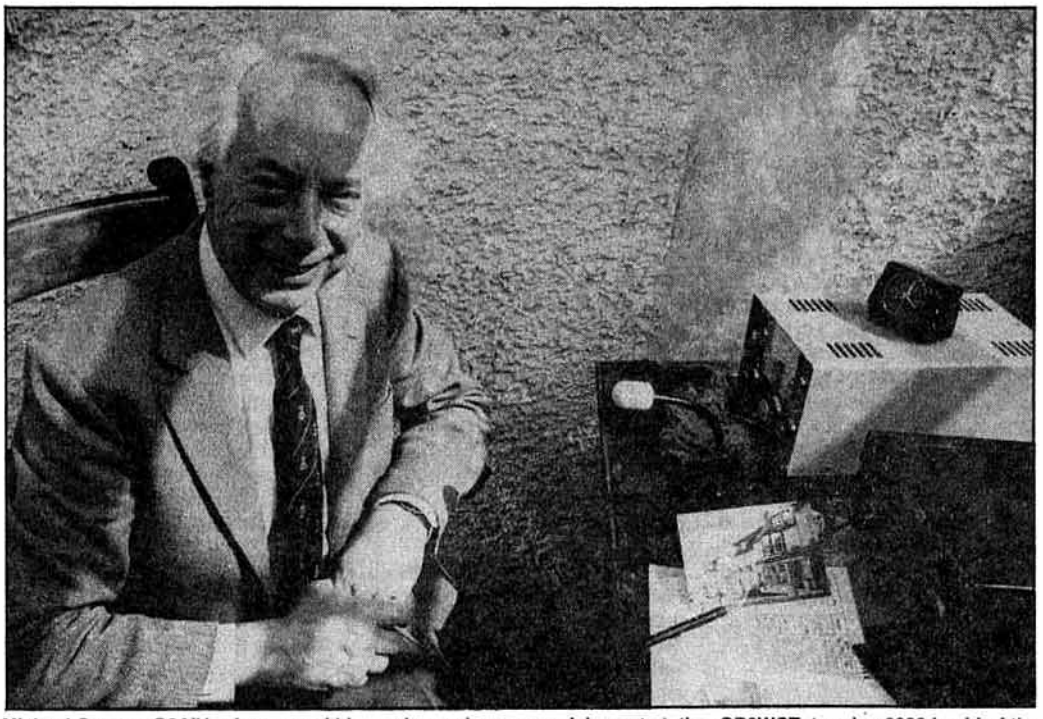
Our society was asked to put on a demonstration station on the evening of Wednesday 6 June for a local Brownie Pack who were working towards their Communicator Badge. We set up two stations on 2 metres using our club callsigns G3YDD and G6YDD.

After a brief talk about Amateur Radio and the equipment, six Brownies went off mobile with G4JSN while the rest stayed with me, G4CNY, at their Headquarters.

Now for the important bit! Thanks to the new licence regulations and the use of the "GX" prefix the Brownies were able to send greetings messages to one another via our two club stations. This produced a great deal of interest. The fact that these young girls, all aged between 7 and 10 years, could actually be involved will without doubt help them with their Communicator Badge and, we hope, help Amateur Radio to attract more young people.

It is obvious by the work you are doing that the RSGB recognises the need to encourage young people into Amateur Radio. We certainly hope that your endeavours are successful.

Stuart Jesson G4CNY.



Michael Carson, G2AIV, who opened his garden and ran a special event station GB0WCT, to raise £800 in aid of the Wessex Cancer Trust.

An Important Message for Packet Mailbox Users

The following is the text of a letter to the Society from the head of the Radiocommunications Agency section dealing with amateur radio.

Over the last few months the Department has been made aware of a number of instances where the packet radio mode has been used for the transmission of messages which are far removed from the licence condition concerning self-training and messages relating to technical investigations or remarks of a personal character.

I am sure that you are equally aware as to the type of messages I mean. Included amongst them are messages inciting others to join in a particular dispute. the second type of message that I have in mind is where amateurs offer items for sale via packet radio.

I need not remind you that the terms and conditions of the Wireless Telegraphy Act licence are that amateurs must use the facility for self training and that where messages are addressed to other licensed amateurs they must relate solely to technical investigations or remarks of a personal character. The terms in this licence do, of course, reflect into the dispensation for amateur radio under the Telecommunications Act licence. The Department's Radio Investigation Service cannot give very much time to amateur radio because of its other priorities but it has followed up individual instances where messages do not conform to licence conditions. However, I think it would be helpful if the RSGB would issue a general reminder to amateurs generally and mailbox operators in particular about the terms and conditions of the licence and some guidance in good practice in mailbox operation. For example, we would regard it as reasonable for a mailbox operator to review the content of messages, and refuse to forward and delete those he considers unacceptable.

Frankly, if the sort of traffic described above continues or increases then the Department would have to give serious consideration to the continuation of the packet radio network in its present form. I hope, therefore, that we can look to the Society to give a positive lead in this area.

Ever since packet radio was included in the UK licence, the Society has given advice to users of mailboxes through its Packet Working Group. In particular, a set of draft guidelines was produced by the PWG some time ago and was published on the packet radio network as well as in *Connect International*. Since then, the guidelines have been examined by the Society's Council and Licensing Advisory Committee, and improvements have been adopted. On receipt of the above letter, the Society's guidelines were sent to Waterloo Bridge House for the RA's comments. As soon as a form of words is agreed, we will give the mailbox message guidelines the widest publicity, including in *RadCom*. In the meantime, anyone requiring clarification of the legality of a packet radio message should consult Packet Working Group Chairman, Ian Suart, GM4AUP, who is QTHR. Mailbox SysOps should note the RA's view (which is already RSGB policy) on dubious messages that they should "refuse to forward and delete those (they) consider unacceptable".

Scottish Tourist Board

The February, April and June *News & reports* have carried short pieces about special event stations associated with Glasgow having been designated Cultural Capital of Europe for 1990. In fact, amateur radio has played a large part in the 1990 celebrations of the whole of Scotland. Thanks to the Scottish Tourist Board (Radio Amateurs) Expedition Group, Scotland is very much on the map this year. A number of special event stations have been active at a wide variety of locations from distilleries to castles (callsigns GB2STB, GB2DWR, GB2RB, GB2RBC).

SES stations scheduled to be operational later this year include:-

- GB2NTS, at Culzean Castle, the callsign stands for National Trust for Scotland.
- GB2SSD, Edradour Distillery, Visitors Centre, Pitlochry, "smallest Scottish Distillery".
- GB2NTS, Drum Castle, Aberdeenshire
- GB4SPC, Tulliallan Castle, Scottish Police College, Kincardine, Fife,.

See page 77 for details of these and other special event stations in the UK.

Operation takes place on the LF, HF and VHF bands as follows:-

CW	3.510MHz
	7.010MHz
	10.120MHz
	14.010MHz
	21.010MHz
	28.010MHz
SSB	3.700MHz
	7.065MHz
	14.140MHz
	14.240MHz
	18.130MHz
	21.250MHz
	28.400MHz
	28.600MHz

Plus 2 metres FM and possible RTTY and packet.

GB2SSD - Scotland's Smallest Distillery – l to r Bill, GM0MDX; Barbara Sadler; Garry, GM3MQO; Paddy, GM3MTH.

The Group have available two awards, both in colour.

The *Thistle Award* can be obtained by contacting four separate STB events (see above). Log extracts or QSL cards should be sent, together with one pound or two US dollars, or equivalent, to the awards manager, GM4UQG, who is QTHR.

Once the above award has been obtained, a claim may be made for the *Supreme Tartan Banner Award* for contacting six STB event stations. This one costs one pound fifty or three US dollars, or equivalent, and should also be claimed from GM4UQG.

Annotations are available for each additional two STB stations worked. The awards are available to SWLs on a heard basis.

Further details of the Scottish Tourist Board (Radio Amateurs) Expedition Group can be obtained from Paddy, GM3MTH, who is also the QSL manager.

European Special Olympics, 20 – 27 July

The European Summer Special Olympic Games, for athletes having some form of mental retardation, are to be held in Glasgow during the week 20-27 July. Raynet is heavily involved in providing communications (see May's Raynet column). Most events are taking place in the Scottish Exhibition and Conference Centre, but other venues will be in use including Strathclyde Country Park in Motherwell.

A special event station, GB2ESO, will be operated by members of the Strathclyde Park Amateur Radio Club on all bands from 3.5 to 28MHz throughout the Games. The 1990 Special Olympics are the largest ever European Games of their type with over 2400 competitors from 30 countries.

RSGB HF Convention

This year the HF convention is on 29-30 September at a new superior location - the Penguin Hotel, Daventry, Northants.

On the Saturday, visits to BBC Daventry have been arranged; in the evening at a DX Dinner, Lawrence Howell UA0/GB4MSS will speak on the North Pole 90 Expedition. On Sunday top international speakers Einar Enderud LA1EE (Bouvet 3Y5X) and Jim Smith VK9NS (Bhutan A51JS) will describe their DXpeditions. Don Field will describe the latest software, David Yates is scheduled to give his popular lecture on high power HF antennas, Ian Shepherd will describe the DX PacketCluster. Lectures from the G-QRP Club and on DF round off the day.

RSGB Trophies and the Young Amateur of the Year Award will be presented.

For more details including BBC visit and Dinner bookings contact: Steve Telenius Lowe, G4JVG, Penworth, Tokers Green Lane, Tokers Green, Reading. Berks. RG4 9EB.

AMSAT-UK Annual Colloquium – Guildford

The Fifth Annual International Colloquium of Amateur Satellite enthusiasts will take place at the University of Surrey during July.

Attendees can expect a four day programme of information and expert advice on all aspects of satellites. The event includes a full Lecture programme, visits to the UoSAT Command Station, the Social Buffet/Dinner on the Saturday, and participation in the "Used Equipment/Fun Sale" in aid of the satellite building fund. Delegates can bring a piece of radio equipment for sale if they wish (AMSAT-UK takes 10% of the sale price for satellite funding).

Specially selected traders have been invited to attend and advise on their products. Additional traders marketing amateur satellite equipment or goods and wishing to attend should contact AMSAT-UK Secretary NOW.

Accomodation is in Student Halls, unless the supplementary charge is added. Advice on local Hotels can be obtained but no hotel bookings can be made by AMSAT-UK. Meals are three courses with tea or coffee; wine, and additional courses, are extra.

The Programme

26 July - International Day.
The recent IARU Conference will be discussed , and the question posed "What kind of satellite do YOU want for the next Phase 3D launch?" This is the only time you will be able to put your own points of view to the DESIGNERS of the next satellite(s), as they will be in attendance.

27-29 July.
Papers and Demonstrations of existing orbiters, newly launched Microsats and UoSAT, Tracking, Data gathering, Communications via Packet, SSB, CW and EME. The AMSAT-UK Shop will be open between lectures. Friday is reserved for finding out how to use satellites. The Annual General Meeting of AMSAT-UK is on Friday evening.

People already attending:- Geoff Perry (Kettering), Max White (late of RGO), Lyle Johnson (TAPR), Bob McGwier, D.Loughmiller (AMSAT-NA), Karl Meinzer (AMSAT-DL), ON6UG, James Miller, Pat Gowan, Dr Zagni, (Amsat-I), Leonid Labutin (USSR), Morag and Laurence Howell (North Pole '90), Martin Sweeting (UoSAT), Dr Gee (Chairman, AMSAT-UK), C.Van Dijk (Chairman VHF Committee IARU Reg 1), representatives from Sweden, Kuwait, Brazil, Eire, France. Canada, Portugal, Iceland, Holland, and many National Society VHF Managers from across the world.

Readers wishing to attend should apply for a Booking Form ***immediately*** as attendance is limited. Forms **must** be filed by **10 July** if accomodation is required, or 21 July for day visitors. Colloquium Papers will be published by 20 July and are available at a reasonable cost. An SASE (or 3 x IRC's) is necessary if requesting information or Booking Forms.

Enquiries and forms from Ron Broadbent, G3AAJ, AMSAT-UK, London, E12 5EQ. ONLY. Phone 081 989 6741 Answerphone after 6.30 UTC, or Fax 081 989 3430.

First of all, apologies for the delay in publishing the results to the RSGB Christmas Quiz. This was due to pressure of space in RadCom and changes in editorial staff.The winner was Mr R Staniforth, G3EGV. An RSGB 'Ham Bear' is on its way to Mr Staniforth. The second prize of a callsign jumper goes to Mr C J Langley, G3XGK; and the third prize, a callsign sweatshirt, goes to Mr C Archer, G4VFK. Congratulations to all the prize winners - and to the other competitors, better luck next year. The standard was very good indeed, so much so that the tie breaker had to be enforced.Here are the answers to the quiz, so that you can see just how well you have done . . . .

Quiz Answers

1. GCC is the callsign of Cullercoats Radio, one of British Telecom's coastal radio stations. It is located near Whitley Bay, Tyne and Wear.
2. GBR is the callsign of the VLF transmitter operating on 16kHz from Rugby. It is operated by British Telecom.
3. GBTT is the callsign of the ship "Queen Elizabeth II" operated by Cunard Lines.
4. Joseph Henry invented the relay in 1835.
5. J A Fleming invented the thermionic diode in 1904.
6. H J Round invented the tetrode valve in 1926.
7. The Varian brothers described the klystron in 1939.
8. Bardeen, Brittain and Shockley invented the transistor in 1948.
9. The letters 'RG'in RG213 stands for Radio Guide.
10. The letters 'GT' in 6L6GT show that the valve is encapsulated in a glass tube.
11. The 4X250 has glass seals, the 4CX250 is ceramic.
12. The EL84 has a 6.3 volt heater, the UL84 has a 45 volt heater.
13. The AC107 is a germanium transistor, the BC107 is made of silicon.
14. CTS and RTS are a handshake pair. CTS implies that the data communication equipment is ready, RTS implies that the data terminal equipment is ready.
15. PC-DOS is supplied with true IBM PCs, MS-DOS is the generic version supplied by Microsoft for PC clones.
16. The thyristor is unidirectional - it is essentially a gate controlled diode. The triac can conduct in both directions according to the polarity of the gate voltage.
17. The SSB power limit on 50MHz is 20dBW ERP.
18. The CW power limit on top band is 9dBW at the feed point of the antenna in use.
19. Cellnet is owned by Telecom Securicor Cellular Radio.
20. ETACS is an abbreviation for Extended Total Access Communications System.
21. The rate of V22bis is 2400 baud transmit/receive.
22. When the quiz was prepared the next SAREX was expected in October 1990. However, this is now not likely to be the case. As a consequence, answers to this question have not be counted in the results analysis.
23. The next WARC is in 1992.
24. The last JOTA was the weekend of the 20th to the 22nd of October.
25. The first JOTA was in August 1957, to celebrate the 50th anniversary of the Scouts Association.

26(a). Given a 12-0-12 volt transformer you would use a biphase half wave rectifier configuration if you wanted a 12 volt regulated output.

26(b). The peak voltage across the reservoir capacitor would be 16.97 volts.

26(c). Anti-surge fuses should be used in the primary circuit of the transformer.

27. If you wish to keep a sked with someone 300 miles away on 7MHz and you erect a dipole 20 feet above ground, the direction of the dipole will make no difference.
28. A 100 watt amplifier for 144MHz should be run at no more than 50W PEP output when using SSB.
29. A 144MHz amplifier using a QQVO6-40A valve should be run at no more than 65W PEP output when using SSB.
30. Thévenin's Theorem states that "any two-terminal network of resistors and voltage sources is equivalent to a single resistor in series with a single voltage source".
31. Lenz's Law says that "the direction of the EMF induced by a change of linked magnetic field is such as would oppose the change if allowed to produce a current in the associated circuit".
32. The Left-Hand Rule is one of Fleming's two rules relating direction of magnetic field, direction of current flow, and direction of motion.
33. The shortest version of Murphy's Law that we know is "If it can possibly go wrong, it will".
34. A 7447 is a TTL BCD to 7 segment LED decoder.
35. A 4049 is a CMOS hex inverting buffer.
36. A 6C4 is a thermionic triode valve on a B7G base.
37. A 150C2 is a 150V gas stabilising tube.
38. A 2C39 is a UHF disc seal triode valve.
39. An ORP12 is a cadmium sulphide light dependent resistor.
40. Ordinary solder is an alloy of lead and tin.
41. The laminations of a conventional transformer is usually made of iron.
42. The core of a toroidal transformer is usually made of ferrite.
43. Zinc is principally used in the galvanising process.
44. If you live in Potters Bar and wish to work a station located on Kingman Reef you would beam 339° (assuming short path propagation), and the distance between the stations is approximately 13,250km.
45. If you live in IO94GH square and want to work a station in IL27GX square you would beam 207°, and the distance between the stations is approximately 3,140km.
46. The Perseids meteor shower takes place between the 20th of July and the 18th of August each year. The peak of the shower occurs on the 12th of August. We have accepted both answers as correct.
47. The 1990 CQ WW CW Contest is over the weekend of the 24th and 25th of November.
48. The editor of DX News Sheet is Brendan McCartney, G4DYO.
49. The joint editors of Microwave Newsletter are Peter Day, G3PHO and Barry Chambers, G8AGN.
50. The highest number of radio related words that any one person found in "Merry Christmas" was 45. In analysing this section we permitted abbreviations but not callsign prefixes.

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

Y.A.G.I.S

DiY Radio takes on a new meaning when applied to the Young Amateur Group In Scotland (YAGIS). A group of enthusiastic youngsters have banded together and found themselves premises in which to hold meetings. Unfortunately, a bit of work needs to be done, and YAGIS is looking for building materials to make something out of nothing. Despite there being no electrical wiring in their part of the building at present, they aim eventually to make a radio workshop where eventually they will hold lectures and train novices. They have already held a sponsored repeater run to raise money and have other fund raising ideas in the pipeline. If any amateurs in the Glasgow area feel they can help the group - 10 of the 18 members are under 21 - then please contact Hugh, GM0HSC, QTHR.

Special Event Stations

- In response to popular demand, we have reinstated the monthly listing of special event stations. This was discontinued some months ago. One reason for this was the work involved processing complaints from those whose applications had been received too late for inclusion. It is essential to realise that, although only 28 days notice is required for the GB callsign, up to eight weeks notice is necessary to ensure inclusion in *RadCom*, especially if the event is close to the end of a month. With the new club licence conditions, we expect a downturn in the number of SES applications which should make the *RadCom* listing a more manageable size (see page 77 for list).

- Whether or not a GB callsign is to be used, event organisers seeking publicity should contact the News Editor at RSGB HQ, preferably including a relevant photograph. Owing to pressure on news space, no guarantee can be given that any event will be included.

- GB4MR will be active on Sunday 22 July for the duration of the McMichael Rally. All HF bands will be used and all contacts will receive a special QSL card. This year, the station is being operated by members of the Berkshire Downs Repeater Group, who administer GB3RD (2m), GB3BK (70cm) and GB3RU (23cm), all located near Reading. The repeater group will have a stand at the rally showing photographs and repeater coverage, and will be selling surplus equipment. See Events Diary for details of the rally.

- GB8FC will operate from the Science Museum at Wroughton at the 50th Wroughton Anniversary Air Show on 8 July, Fly-In Day on 12 August and Festival of Transport 8 - 9 September.

- GB11SQN will be at RAF Leeming 20 - 22 July to celebrate the Diamond Jubilee of 11 Squadron RAF.

- One hundred and fifty years of policing the county of Essex is being celebrated on 21/22 July. To mark the occasion, GB150PE will be operated by the Southend and District Radio Society on the Western Esplanade. Operators of the station are keen to contact as many police based amateur radio stations as possible, plus of course all other amateurs worldwide. Other activities on the Western Esplanade will include all sections of the police force, including mounted, crime prevention, under water, dogs etc. Frequencies in use by GB150PE will be 3.750, 7.075, 14.175, 21.225, and 28.475MHz, as well as FM on the 144MHz band. More information can be obtained from Brian Wood, G4RDS, tel 0702 232322.

RadCom changes

Staff

Avid readers of the "credits" on the left hand side of page 3 will have noticed that, following the sudden resignation of the Editor, Dave Bobbett in January, *RadCom* has been run by a team of senior RSGB staff and volunteers pending the recruitment of a replacement Editor.

One of those staff members, Mike Dennison, G3XDV, whose job was Assistant to the Secretary/Chief Executive, has now been appointed Managing Editor.

Marcia Brimson, has been promoted to Assistant Editor, and the Editorial Secretary is a new member of the team, Louise Hill.

Members ads

Starting this month, members ads will be listed in alphabetical order. This should make it much easier to locate the equipment you require. Don't forget, though, that most ads feature more than one item and we can only show the first one alphabetically. It is still well worth reading the lot in order to avoid missing a bargain.

- To celebrate the World Football Championships, Italian amateurs may append the suffix /I90 until 15 July.

DTI Head of Branch moves on

Mike Coolican has relinquished his post as Head of Branch in the Radiocommunications Division of the DTI to become Controller of Exports.

Mr Coolican has featured in *RadCom* several times in connection with Project YEAR. He describes the work he has done over the past 5 years as "immensely enjoyable and rewarding" and wishes to pass on his farewell and thanks through these pages. He is superseded by Stephen Spivey.

The Society would like to take this opportunity to thank Mike Coolican for his cooperation and help, particularly his enthusiastic support for Project YEAR and the Novice Licence.

IEE Conference

On 24 - 26 July, the Institution of Electrical Engineers is holding the Fifth International Conference on Radio Receivers and Associated Systems at Churchill College, Cambridge. Amongst the speakers is Peter Chadwick, G3RZP, Chairman of the RSGB's Technical and Publications Committee. Further details can be obtained from the Secretary's Office at RSGB HQ.

News in Brief

- Following representations made by the Irish radio Transmitters Society (IRTS), Class B licensees in the Irish Republic are to be granted permission to operate on both 50MHz and 70MHz, and to operate fast scan TV.

- The American magazine *Ham Radio* was sold in May to the publishers of *CQ* Magazine. The last issue of *HR* will be June 90.

- The Pakistan Amateur Radio Society (PARS) is back in business again, reflecting the increasingly healthy state of the hobby in that country. All AP licensees (now over 100) are members of PARS.

  The President is Amin Ullah Khawaja, AP2AU, and the mailing address is PO Box 65, Lahore, Pakistan.

- The space shuttle flight due to carry Ron Parise, W4SIR, has been postponed several times. It had not flown by the time this piece was written.

- The Japanese Amateur Radio League held a "promotion month" in November/ December 1989. As a result, 1274 new members were recruited bring the total membership to 160,000. JARL's latest Call Book lists some 970,000 licensees.

Help the disabled

The World Championships and Games for the Disabled will take place in Assen, Holland, from 14 to 26 July. Two amateur stations will be on the air: PI4ASN and PA6WGD. Stations working PA6WGD may apply for an award by enclosing with their QSL card DM 10, US$ 5 or equivalent to the Award Manager, PA3FFX, PO Box 407, 9400 AK ASSEN, Netherlands. All proceeds from the award will go to the development of sporting facilities for the disabled.

IARU Region I Conference Torremolinos - April 1990

Part two of a report by: Tim Hughes, G3GVV, Martin Atherton, G3ZAY, Ron Glaisher, G6LX, David Butler, G4ASR, Charles Suckling, G3WDG, Graham Shirville, G3VZV, and John Bazley, G3HCT

MICROWAVES

Two sessions of the Conference involved microwaves. A number of papers had been submitted to Committee C5 (the VHF/UHF/ Microwave Committee) which were discussed, and there were two evening meetings convened to discuss preparations for WARC 1992.

Two proposals were received to change the rules of the **October IARU Region I UHF/ Microwave Contest**. Both were accepted after slight modification and the changes are to: (a) issue certificates to section leaders on each band (instead of only the overall winners) and (b) to penalise unmarked duplicate contacts by ten times the claimed score for that contact.

Frequencies for repeater linking were discussed. It was agreed that no IARU standard was required yet as experiments were still going on. RSGB noted that in the UK, frequencies had been chosen to minimise interference with the narrowband DX segment 1296-1298MHz. A paper from Norway requesting the use of several RM 1.3GHz repeater channels for packet links was withdrawn.

Common frequencies for international working on 2.3 and 5.7GHz were discussed and no solution could be found for 2.3 where some countries do not have an allocation at 2320MHz. UBA and DARC reported that microwave ovens can cause serious interference above 2.4GHz, meaning that a move to 2400-2402 (which had been suggested at an earlier conference) was undesirable. It was decided to continue with 2320-2322MHz as the narrowband DX segment despite this not being available in some countries. The situation on 5.7GHz is much easier and the segment 5668-5670MHz which is available to most countries in Region I was ratified. All stations operating currently in the 5760-5762MHz segment were requested to move to 5668-5670MHz on 1 January 1991. On **24GHz the recommended narrow band segment** is now 24.048 to 24.050GHz.

WARC Preparations: The two WARC meetings concentrated on formulating IARU Region I's policy for WARC 1992. Since the agenda for the WARC is not yet known for definite, the policy had to cater for all bands. However, emphasis was placed on two microwave bands, 1.3 and 2.3GHz since the WARC is expected to cover 500MHz-3GHz only. The agreed proposals for these bands emphasised the need for internationally available frequencies for DX working as well as sufficient spectrum for wideband modes, especially ATV.

ATV

A number of matters concerning ATV were discussed at the Conference. The major RSGB/ BATC Technical paper defining the **transmission standards for FM ATV** on the microwave band was accepted with a few modifications and this will form a common standard specification throughout IARU Region I for this mode of transmission. BATC will publish the full specification.

The previous Conference had established the rules and organisation for our **International ATV Contest** which is held in September each year, and in the light of experience, a few changes were made to these.

THE COMMON LICENCE GROUP

In 1964, the Belgian Licensing Authorities invited 22 countries to start negotiations for reciprocal licences within Europe. Very soon after this, the RSGB and DARC commenced negotiations with their licensing authorities to obtain such licences with as many countries as possible. These arrangements took many months of work to reach an acceptable conclusion to both parties. A simpler system was required.

It was proposed and agreed at the Region I Conference at Brighton in 1981, to form a Common Licence Group to stimulate societies to make a unified approach to their administrations to achieve a common amateur licence within Region I.

In Europe, member countries of CEPT reached a multi-lateral agreement, known as CEPT T/R 61-01, available to all 26 member countries. By this system, amateurs visiting another country within CEPT, who have agreed to implement T/R 61-01, may operate without the necessity of obtaining a temporary licence. (For UK amateurs, details are in booklet BR68, issued with your licence).

The next objective of the Common Licence Group was to try to persuade CEPT to extend the temporary facilities available under T/R 61-01 to enable visiting amateurs to obtain a permanent licence if they wished. The alternative was to obtain agreement on the proposals submitted to CEPT by the Dutch PTT for a 'Harmonised Amateur Radio Examination Certificate'

(HAREC), which if implemented would enable amateurs holding such a certificate to obtain a permanent licence in other CEPT countries accepting HAREC. The examination syllabus for HAREC was drafted by a small group of experts from Holland, United Kingdom, Denmark and Germany.

Secondly, the Common Licence Group wished to extend acceptance of T/R 61-01 to non-CEPT countries.

During the recent Conference in Spain, two meetings were held by the Convenor, ON8MC, of the Common Licence Group with representatives from the following countries present: CT1, DL, EA, EI, G, HB9, I, OE, OH, ON, OY, OZ, PA0, SM, SP, SV, TF, T77, ZS, 4X8, 5B4, 5N0, 7X2, 9L1.

In the discussion that took place, it was emphasised by representatives of CEPT, that they were only prepared to agree to T/R 61-01 as a temporary licence facility and it could not under any circumstances be extended to cover the issue of permanent licences. The alternative HAREC proposal was aimed at amateurs requiring a permanent licence which it was hoped would become acceptable throughout Region I initially and then worldwide.

The HAREC syllabus reflected the highest class of licence. It was intended at a later date to introduce a form of HAREC for other classes of licence having a lower technical standard.

CEPT will be meeting shortly to agree which classes of licences currently issued meet the criteria of HAREC within Region I. Non-CEPT countries present at the meeting were encouraged to approach their administrations to ask them to consider accepting T/R 61-01 as a basis for issuing temporary licences to visitors. We were informed that CEPT would look favourably on requests of this nature.

The following recommendations were approved by the Conference:-

a) That the Common Licence Group accepts the HAREC syllabus (RR3(89)16 - version 900109) as a basis to establish a common licence within Region I.

b) That the Common Licence Group asks all societies to support any activity to extend CEPT recommendation T/R 61-01 to non-CEPT countries.

HF CONTESTS

The HF Contests Sub-Group (CSG) of the Region I HF Committee was established at the 1987 Conference. It deals with contest matters of common interest to Region I societies and liaises with IARU Regions II and III, and with other HF Contest organisers throughout the world. Twenty member societies are active in the CSG and all were present at this Conference.

The CSG dealt with a number of outstanding matters, including the deletion of a number of the ambiguous and contradictory recommendations from earlier conferences that has caused difficulties for organisers when formulating contest rules. These recommendations will now be replaced with a revised set of Contest Guidelines. Apart from reviewing the work done since its formation, the CSG made recommendations on a number of Conference papers relating to contests. These included:-

Contest rules: Several societies wanted a tighter control of rules and the enforcement of conference recommendations, and severe penalties for non-compliance. While agreeing with the good intentions behind these papers, it was noted that the CSG had already achieved progress in persuading societies to adopt rule changes to meet conference recommendations. This course was likely to obtain better long-term results than a 'big stick'. The proposals were rejected.

Contest Adjudication: The use of computer derived log checking with common software that could be used by all Region I societies was discussed, but was referred for further discussion.

Contest Frequencies: A proposal from Region III for contests on 18 and 24MHz was rejected by the CSG, as it was considered essential to keep these bands free of contest traffic. The policy of encouraging members societies to include contest free segments was endorsed. It was recommended that the bottom limit for Top band phone contests be 1840kHz and this will now be included in the Region I band plan.

Field Day events: There was a proposal that the dates of the Region I CW FD (NFD) be changed to coincide with the ARRL FD, or that Region I and ARRL find a new common date for the event. This proposal was withdrawn when it became clear that neither ARRL nor Region I was willing (or able) to change dates and there was only a minimal interest in having a common event.

New contests: New events proposed included a QRP Field Day Championship where teams of competitors in running kit, collect portable gear from a central location and race to pre-arranged sites. They then set up stations and operate for a specified time, or until their battery fails. The IARU declined to sponsor this event. The CSG were unable to recommend the adoption of a proposal for a Region I combined SWL and ARDF team contest because of costs. A proposed European Community Contest in 1992 as a Region I event also failed to obtain CSG support as the region includes many countries that are not members of the EC. There were several proposals asking for societies to include SWL sections in their contests and for separate SWL events to be organised. The CSG will do everything possible to encourage member societies to provide for SWL contest participation.

Region 1 HF Contest Championship: It was proposed to restart this event which had only been run once but had been dropped because of lack of interest. It is similar in concept to the RSGB Contest Championship, but uses a number of specified international and regional events. It was agreed that it was worth trying the event again with changed rules and better support from member societies. Rules for the championship will be published in *Radio Communication* later in the year.

CSG Chairman: G6LX was persuaded to stand for a further three-year term.

This concludes the 1990 Conference Report. The next IARU Region 1 Conference will be held in Antwerp in 1993.

Tim Hughes, G3GVV, Chairman RSGB IARU Committee; Dr. Pekka Tarjanne, Secretary General of ITU; Lou v d Nadort, PA0LOU, Chairman IARU Region 1.

RSGB NEC 90 — a success!

The "atrium-style concourse" just as the doors opened

Hands up all those who didn't know what an atrium-styled concourse was (page one of RSGB official NEC programme - April 90 *RadCom*). Well, if you were one of the 7000 who went to the RSGB National Convention and Exhibition on April 21/22, you now know that it is a bit like the shiny new shopping malls which are popping up all over the country. This was the very stylish covered area outside the new exhibition halls 6, 7 and 8; the RSGB was in Hall 7. If you were not one of those seven thousand, you missed an excellent show.

The 54,000 square feet available in the hall ensured there was ample room for the traders, specialist societies, RSGB committees, as well as a huge RSGB book and information stand. Like all of the NEC's halls, the ceiling was very high which was wonderful for the purveyors of towers but it tended to make the show look smaller than it was. However, aching feet and limbs reassured visitors that it really was the largest amateur radio exhibition in the UK.

STANDS

A wide range of sophisticated "Black boxes" was in evidence, as would be expected, on the Arrow, Procomm UK, Nevada, Dressler, Eastern Communications, and ARE stands.

Aerials were prominently displayed by Band Edge Antennas whose range of HF aerials towered above the other stands, whilst mast fixings, guy ropes, cable and other accessories could be obtained from Barenco and TAR Communications. Jaybeam had a large walk-in stand. Dee Comm's aerial farm was supported by what looked like a mass of fishing rods; in reality dozens and dozens of mobile whips.

"Simply the most successful exhibition we have ever attended" - ICS

The QRP fraternity was well served by Jandeck, Kanga Products, and the ever enthusiastic G-QRP Club. Those at the other end of the power scale will have appreciated the air spaced variable capacitors impressively displayed by CapCo who also carried their range of ATUs and loop antennas. RF Engineering Ltd, too, had everything necessary to build a customised ATU.

It seems amazing that, after so many years, Bernard Babani is still producing pocket-sized reference books for the electronics enthusiast. The range has been expanded to include amateur radio and computers, and is now huge.

Youth was represented by the Scouts and Guide stands. The former invited young visitors to try their hand at soldering, whilst the latter sold souvenirs. Both featured their participation in the Jamboree On The Air events.

Other specialist organisations present included the British Young Ladies Amateur Radio Association (BYLARA), representing ladies, young and otherwise, the RAF Amateur Radio Society (RAFARS), and the Radio Amateurs Invalid and Blind Club (RAIBC). The Royal Naval Amateur Radio Society (RNARS) stand was adorned with pictures of ships and of badges, and their morse practice facility proved popular.

SMC displayed a wide range of equipment, as did Lowe Electronics on their striking white-walled stand. Icom UK staff were available to answer questions but they left it to the other dealers present to sell Icom rigs. Navico was similarly represented.

"Our best ever rally!" - Siskin

Badger boards displayed many printed circuit boards and kits, including their *RadCom* range.

Computer buffs were well supplied by MFM Supplies, J and P Electronics and the Computer Junk Shop whose name belied the quality of their stock.

Everything for the morse man (or woman) was supplied by Kent Morse Keys. Anchor Surplus (who must be something to do with the butter mountain) had copious quantities of military surplus morse keys as well as some rather nice viewdata sets.

Packet radio was supported by many dealers, including Amdat who also demonstrated computer controlled satellite tracking equipment, and Siskin who had an offer of very cheap laptop computers in briefcases which could make a compact portable packet terminal.

The Heatherlite stand was noted for its striking pictures of disembodied heads wearing headphones.

There was a chance to meet the Editor of *Practical Wireless*, Rob Mannion, G3XFD, who, incidentally, re-joined the RSGB at the Show.

The German national Society, DARC, had a most impressive stand featuring their magazine *CQ-DL* and the work going on within the European Community towards a harmonised approach to licensing and EMC.

Other specialist traders dealt with video monitors, cameras and lenses (Astley Video Services), and meteorological instruments (R and D Electronics). Newton's engraving machine was heavily employed making badges, key fobs etc.

Those interested in radio history could leaf through Geoff Arnold's new publication *Radio Bygones*, or look at the Military Communications Exhibition.

In an article this size it is impossible to mention everyone. Suffice to say, a great many other traders and organisations were present.

VIVE LA DIFFERENCE!

The RSGB stand had a comprehensive range of books, personalised clothing, and an information desk. There were mini-stands for each of the specialist committees. The facility to meet these decision makers first hand is part of what makes the RSGB's Convention different from the other large rallies.

Another unique attraction was the large contingent from the DTI's Radiocommunications Division. Brisk trade was reported and all leaflets had disappeared by the end of Sunday.

The lecture stream on the Saturday featured acknowledged experts talking on Novice Licence Training, Construction, Frequency Synthesis, Antennas and Raynet. These were very well attended throughout.

DX

The visitor who travelled furthest to get to the show was Terry Bucknell G4AFS/VP8BFM who flew from the Falklands to Brize Norton, then drove to the NEC to arrive at 1130 on Sunday. His first acquisition? A 1990 *RSGB Callbook*.

Members of the Exhibition and Rally Committee who were largely responsible for the success of the show: l to r Robin Hewes, G3TDR, Martin Shardlow, G3SZJ, Les Hawkyard, G5HD, Ron Kingstone, G4HHB and Norman Miller, G3MVV.

THE BYLARA stand

RSGB staff and volunteers enjoy a well-earned cuppa

The HF Committee stand featuring l to r Ron Glaisher, HF Contests Committee Chairman, Chris Burbanks, G3SJJ, and Don Field, G3XTT, of the HF Committee

The Royal Naval ARS stand

Callbook Editor Brett Rider signs G7EGZ's copy

The Microwave Committee Stand

The RAYNET stand (*photo: GM4SRL*)

ICOM

NEW MULTIBAND IC-970E Base Station

Designed for the serious operator on the 144, 430 and 1200MHz bands, Icom's new IC-970E has up-to-date technology for DX, digital and satellite communications.

The IC-970E is supplied as an all mode dual-bander for 144 and 430MHz bands. Optional units expand its capabilities to 1200MHz or wideband receiving from 50-905MHz.

Communications via satellites has never been easier. The IC-970E automatically tracks uplink and downlink frequencies as the tuning control is rotated also, ten specific memory channels for satellite frequencies.

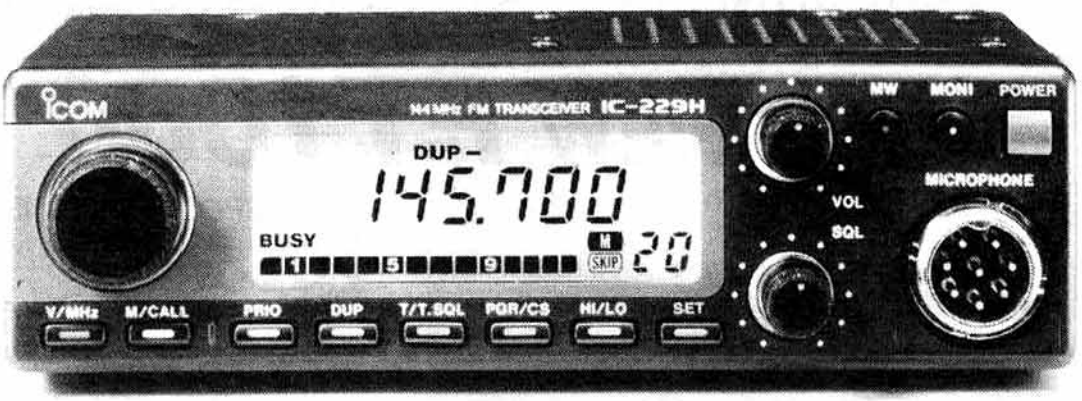
The dual-band watch allows you to receive both MAIN and SUB band audio simultaneously, multiple scanning systems on the MAIN and SUB bands plus 99 memories, an easy to read central display and Icom's DDS sytem make this one of the most comprehensive multi-band transceivers available.

For more detailed information on the IC-970E Base Station or any other Icom radio equipment contact your local authorised dealer or call Icom (UK) Ltd.

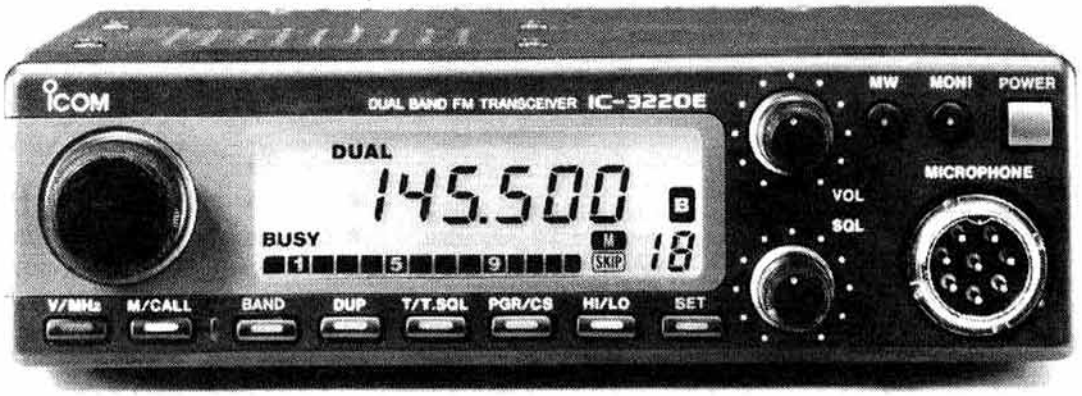
Icom (UK) Ltd.
Dept RC, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 363859. 24 Hour.

Count on us!

NEW MOBILES



IC-229E/449E
2M, FM Mobiles



IC-3220E
Dual-Band
Mobile

Icom have built a range of ultra compact FM mobile transceivers. Similar in style, easy to operate and perfect for driving safety. Advanced features include a variety of tuning steps, memories, scan functions, adjustable R.F. power, optional pager and tone squelch units for selective calling. All these models include the HM-59 hand microphone with up/down and 1750Hz tone call for repeater operation. The unique simple operation enables each function to be operated with one switch. Illuminated switches and controls give complete night time operation.

IC-229E VHF Mobile. This VHF 25 watt transceiver measure just 140(w) x 40(h) x 105(d) mm. No need to worry about installation, its small enough to fit most vehicles. Also available the IC-229H 50 watt version where extra high power is required.

IC-449E UHF Mobile. High sensitivity with GaAs FET's and 35w output power provide optimum performance with this UHF transceiver. 20 Memory channels and a programmable call channel can be used to store most used frequencies.

IC-3220E Dual Band Mobile. Enjoy complete dual-band operation. In addition to cross band duplex operation this transceiver can receive both MAIN and SUB bands simultaneously. One of the smallest dual-band mobile transceivers available, the IC-3220E has a 25 Watt output on both bands. Where higher power is required the IC-3220H offers 45 watts on the 144MHz band and 35 watts on the 430MHz band.

Icom (UK) Ltd.
Dept RC, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 363859. 24 Hour. Fax: 0227 360155.
Visa & Mastercards: Telephone orders taken by mail order, instant credit & interest-free HP.
Despatch on same day whenever possible.

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STOCKTAKING STOCKTAKING

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THE NEW FT1000

BRIEF SPECIFICATIONS

- ★ General Coverage Receiver 100kHz-30MHz
- ★ Ham bands TX 160-10m
- ★ Modes CW, USB, LSB, AM, FM, RTTY and PACKET
- ★ VFO steps 10Hz CW, SSB, RTTY, 100Hz AM, FM, PKT
- ★ Auto antenna impedance range 16.7 to 150 ohms
- ★ Selectable receiver band widths 2.4Khz, 2Khz, 500Hz, 250Hz
- ★ Dual band receiver tuning and monitoring with balance control
- ★ Power output up to 200 watts P.E.P. 50W AM
- ★ Sensitivity preamp on SSB/CW 0.25 micro volts 10dB S/N
- ★ D.D.S. Direct Digital Synthesiser
- ★ Dual selectable noise blankers with adjustable threshold
- ★ Frequency stability ± 20ppm (0 to +50°C) ± 200Hz F3 ± 0.5ppm (0 to +60°C), ± 150Hz, F3 with TXCO-1 fitted
- ★ 99 memories

ADDITIONAL FEATURES

Other features include adjustable IF width, IF shift, IF notch and APF controls. AGC presentable for fast, medium and slow + defeat, on/off selectable, preamp+adjustable attenuator -6dB, -12dB, -18dB,. Adjustable — mic gain, RF power o/p, processor and drive controls. Built in electronic keyer with adjustable speed control. Twin independent frequency displays with mode indication + much more.

FANTASTIC PERFORMANCE, REALISTIC PRICE

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

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

The FT-747GX is a compact SSB/CW/Am and (optionally) FM transceiver providing 100 watts of PEP output on all hf amateur bands, and general coverage reception continuously from 100kHz to 30MHz. A front panel mounted loudspeaker and clear, unobstructed display and control layout make this set a real joy to use. Convenient features include operator selectable coarse and fine tuning steps optimized for each mode, dual (A/B) vfos, along with twenty memory channels which store mode and skip-scan status for auto resume scanning of selectable memories. Eighteen of the memories can also store independent transmit and receive frequencies for easy recall of split-frequency operations. Wideband (6kHz) AM and narrowband (500Hz) CW IF filters are included as standard, along with a clarifier, switchable 20dB receiver attenuator and noise blanker. User programming for more advanced control by an external computer is possible through the CAT (Computer Aided Transceiver) System. The transmitter power amplifier is enclosed in its own diecast aluminium heat-sink chamber inside the transceiver, with forced-air cooling by an internal fan allowing full power FM and packet, RTTY, SSTV and AMTOR operation when used with a heavy duty power supply.

WARNING: If you buy FT747GX not designed for the U.K. market, these may not be fitted with AM/CW filters which you may not be able to obtain.

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SMC (Northern)
Nowell Lane
Industrial Estate
Leeds LS9 6JE
Leeds (0532) 350606
9-5.30 Mon-Sat
Closed Sat afternoon

CHESTERFIELD
SMC (Midlands)
102 High Street
New Whittington
Chesterfield
Chest. (0246) 453340
9.30-5.30 Tues-Sat

BIRMINGHAM
SMC (Birmingham)
504 Alum Rock Road
Alum Rock
Birmingham B8 3HX
(021-327) 1497/6313
9.00-5.00 Tues-Fri
9.00-4.00 Sat

AXMINSTER
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Axminster
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Axminster (0297) 34918
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SPECTRUM ANALYSIS

HF

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham
B17 8QB

Some of the operators at the club station YI1BGD (see text)

According to reports received the computer logging system used by at least one recent dxpedition was designed to eradicate any station from the log if its call appeared more than once per mode per band. Apparently a good idea - but is it? It often happens that the dx station has you in the log but for some reason or another (usually due to interference by "policemen" and other advisers) you are not completely certain yourself. In this case if you have a second attempt you will lose everything. No - there must be a better way...

The mystery of the QSL manager for ZD7VJ/ZD8VJ has been solved - it should be Andy, G4ZVJ, himself; his address is in "QTH Corner".

NCDXF QSL POLICY

The Winter issue of the *N.California DX Foundation Newsletter* contains a statement on NCDXF policy on QSLing. It says "NCDXF believes that part of the justification for spending Foundation funds to assist Dxpeditions is to enable dxers who work the dxpeditions to obtain QSLs. Consequently NCDXF believes that every expedition it assists should answer every QSL card, whether received direct or via the bureau, provided the sender is in the log and provided the QSO for which the QSL is requested is not a duplication of the same band and mode. Stations who send one or more self-addressed envelopes of proper size and sufficient postage deserve to have their QSLs sent to them directly. "Sufficient" means only enough stamps, ircs, or cash to cover the postage cost. All others are entitled to receive their QSLs via the bureau. A dxpedition may request donations in excess of the postage costs, but it never should require such donations. Dxpeditions may choose to answer the QSLs of stations making donations first, but they should answer all others in a reasonably expeditious manner". Amen!

DX NEWS SHEET VOICEBANK

This is a system whereby you can call 0426 925240 at any time of the day or night to hear messages put in by other dxers about stations heard and worked. This news is, of course, right up to date and can be most useful if you are waiting for a new country or expedition to appear. Of course if *you* have news of interest to other dxers you contribute by calling 0426 910240 and recording your pearl of information - what could be easier ?

MALAWI

Great news from Ron Macfarlane (GM3EAK/7Q7RM) who has written to say that amateur licences are now being issued there once again and that all his equipment has been returned. Ron will be on the air using his old Viceroy and a vertical at first but after cleaning up his three element beam this will be used. The licence stipulates that applicants must be fluent in English or Chichewa (the local language) - this may cause problems for some intending visitors. So far three stations have been approved - Les Antrobus, 7Q7LA, L.Bruzzichesi, 7Q7LB, and Ron himself.

IRAQ

Roger Collins, G1WAG, has visited the Baghdad ARC (YI1BGD) twice this year. It is part of the Union of Iraqi Students and Youth and shares premises with an astronomy group and with electronics, computing and radio-controlled modelling clubs. The station has a Drake 4 series and three element tribander which were donated by JY1, an FT201 and a Tono 5000E. Individual calls have been applied for and hopefully there will soon be issued. The club has a WAB book - so please give your WAB details. New equipment depends entirely on donations and any group or manufacturer who might be prepared to help is invited to contact Roger via RSGB. The hospitality of the club members is exceptional and it often receives visitors from Germany and the USA.

DXPEDITIONS

The **Jarvis Is** expedition landed at 2000 on 13 April and got going at 0640 on the next day. First in the log was JA1BK, the first American W6KTE, and the first European DJ6OV. The ssb site was near the shore and used a 3-element tribander at 35ft, a four band vertical, and three and seven element beams for 50MHz. The cw site was 800ft away and had three-element beams on 14 and 28MHz, and 3.5 - 28MHz and 1.8 - 7MHz verticals. The last QSO was with WB6RFI on 21 April at 1600. AH3C/KH5J made a total of 54,880 QSOs - 10,083 of which were with Europe - 7MHz (cw) 182, (ssb) 184; 14MHz (rtty) 27, (ssb) 2038, (cw) 2526; 21MHz (ssb) 2638, (cw) 1936, and 28MHz (ssb) 374, (cw) 178. The *"How's DX"* press release finishes by saying "You are the real secret to our success. Your willingness to suffer the wait in the big pile up. your patience and dx prowess make it all possible. The operators, crew and US Fish & Wildlife Service representing the Jarvis Island DXpedition 1990 sincerely appreciate your support. 73, Pete, AH3C".....

Another *"How's DX"* bulletin arrived from OH2BN early in May. This time it announced a visit to Conway Reef by N7NG, OH2BH, ZL1AMO, SM7PKK, JG2BRI, OH1RY, VE7SV and VE7CT and organised by the Yasme Foundation. This will be history by the time that this is being read - but the 66ft *Yasme* schooner will "continue its journey to other hard-to-reach Pacific locations later this year." 3D2AM was supported by the N.California DX Foundation, the Japanese *CQ* Magazine, and ICOM America.

Not quite so exotic but of interest is a trip planned by GM3YEH, GM3ZRT, and GM0KAZ to **Iona**. This will take place from 21 to 25 July and the callsign will be GM0ADX/P. QRGs to be used include 1.840, 3.520, 7.020, 14.020, 21.020, and 28.020MHz on cw and 1.920. 3.720, 7.080, 14.190,, 21.220, and 28.520MHz on ssb.

Trindade Is might still be on the air now and until the end of July. Natal DX Group members Karl, PS7KM, and Tino, PT7AA, will use ssb and cw respectively and will have two stations each with linears and beams. Callsigns were not published at the time of writing to discourage their fraudulent use.

Rumour has it that VU2NTA will be one of a large group of amateurs who will visit **Bhutan** and carry out a multi-band multi-mode operation using the callsign A51JX.

DX NEWS

The Karelain DX Club "Kivach" offers a call book of the Soviet Union QSL bureaux of all oblasts and large cities - totalling more than 400 QTHs. This costs US $5.00 or 10 ircs. It also can supply the USSR Award Directory which lists more than 50 awards, diplomas, pennants, and plaques available to amateurs outside the USSR. This costs US $6.00 or 12 ircs. The address to write to is P.O.Box 225, Petrozavodsk 185034 Karelia, USSR. The club will be using special callsign US1N in the IARU HF Championship on 14 and 15 July when it will be an international

QTH CORNER

GM0ADX/P	via bureau or to GM3ZRT.
AH3C/KH5J	Jarmo Jaakola, OH2BN, Killiettie 5-C-30, 00710, Helsinki, Finland.
ZD7VJ	Andy Chadwick, G4ZVJ, 3 Park Villas, Monkhouse, Cheadle, Stoke-on-Trent, Staffs, ST10 1HZ.
ZD8VJ	(see above).
3D2AM	Yasme Foundation, PO Box 2025, Castro Valley, Calif, 9454, USA.
3W6PY	RL8PY, PO Box 43, Temirtau, Kazakh 472310, USSR.
3M9CZ	(see above).
5W1KY	via WA3HUP, 2485 Lewisberry Rd, York Haven, Pa, 17370, USA.
701AA	via 9K2CS, Box 476, Kuwait.
7Q7LA	Les Antrobus, PO Box 454, Blantyre, Malawi.
7Q7LB	L. Bruzzichesi, PO Box 1, Thyolo, Malawi.
7Q7RM	M. Macfarlane, PO Box 472, Blantyre, Malawi.

1990 28MHz COUNTRIES TABLE

G0JZA	180	G0MXU	74
G4MUW	168 (ssb)	G4NXG/M	66
G4VVP	168 (ssb)	GM4ZIL	63
G4DXW	137	G4SJG	60
GM4OBK	122	G2AKK	55 (cw)
G4ZYQ	95	G0JSM	15
G0CKP	79		

team operating from the island of Kizhi.

The Japanese first call area has now run out of the J series of prefixes. From 23 April the new allocations 7K, 7L, 7M, and 7N have started to be used - 7J is already being used for reciprocal licences of course. 8J90XPO will be on from the International Garden and Greenery Exposition in Osaka until the end of September.

There is a new operator at ZS8MI on **Marion Is**. This is Gerard, ZS5AEN, who expects to be there for a year. The previous operator made 22,000 contacts. SM5KDM is in **Lesotho** for at least a year.He has the callsign 7P8CL and has been heard on 14.240MHz around 1730 but should also be on other bands by now. There is some more activity from **Tunisia** this time by 3V8PA who seems to prefer cw on 14.018MHz but also works on 21 and 28MHz at weekends. FR5AI/E on **Europa Is** is regularly on 14.010MHz at 1100 and then on 21.010MHz from 1300.

DL2GCA, DL2GCH, and DF2UU will visit **Iceland** between 27 July and 24 August and will be on the air using their own calls /TF. They will be on all bands from 1.8 to 50MHz. Stations in **Cyprus** will be allowed to use the 5B30 prefix for the rest of the year to mark the 30th Anniversary of independence.

DX News Sheet reports that VR6JR, VR6TC, VR6YL, and VR6KY were all due to leave **Pitcairn Is** on holiday last month. Their places as operators of the island's commercial radio station will be taken by two New Zealanders - both licensed amateurs.

JD1/JA9IAX is a meteorologist stationed on **Minami Torishima**. He will be there until 15 August and mostly likes cw.

AWARDS

Neuvosto Karjala - 70 Award

Sponsored by the Karelian DX Club "Kivach" for contacts with Karelia between 1 January 1990 and 8 July 1991. 70 points are needed - QSOs with special stations count 35 points (EV1AN, EK1NWB, RN7N, and US1N), with members of the club 20 points (UA1s NAW, NBW, NCR, NBY, NDR, NDV, NDW, NDX, NDY, NEJ, NEK, and NBS, RA1NC, and UZ1s NWA, NWB and NWO), and with other Karelian stations 10 points. Send log extract plus US $6.00 or 12 ircs to Alex N.Abramov, UA1NDR, PO Box 225, Petropavlosk-34, 185034 Karelia, USSR.

CONTESTS

European DX Contest

1200 11 August - 2400 12 August (CW)
1200 8 September - 2400 9 September (SSB)
1200 10 November - 2400 11 November (RTTY)
3.5 to 28MHz.

IARU Region 1 band plans must be observed and on cw. NO operation should take place between 3.550 - 3.800, 14.075 - 14.350, 21.100 - 21.450, and 28.100 - 29.700MHz. On phone avoid 3.650 - 3.750, 14.300 - 14.350, 21.400 - 21.450, and 28.700 - 29.700MHz. Minimum time on a band is fifteen minutes, but quick changes to work a multiplier are allowed. There are single-operator multi-band, multi-operator single and multi-transmitter classes as well as listener. Only 36h operation by single-operator entrants - rest period must be clearly marked in log. Work stations in non-European dxcc countries each of which counts as a multiplier on each band and exchange RS/T and serial number (from 001). The multipliers on 3.5MHz should be multiplied by four, on 7MHz by three, and on 14/21/28MHz by two. Extra points are gained by exchanging "QTC Traffic" and serious entrants are advised to ask for a copy of the rules (sase please). In the listener section (which is new) the same callsign (European or non-European) may only be logged once per band. The log must contain both callsigns and at least one of the control numbers. Each station logged counts one point and each QTC (max. 10 per station) one point. The multipliers in this case are the dxcc and WAE countries heard on each band. CW entries must reach WAEDC Contest Committee, PO Box 1328, D-8950 Kaufbeuren, FR Germany, by 15 September. (NB The WAE list includes Shetland Is, Bear Is, and 4U1 Vienna.)

In the **UBA SWL Competition 1989** there were nine entries from the UK out of a total of 172. In the digital mode section G6LAU scored 48,720 points to come sixth, in the cw section RS84869 scored 62,205 to come 33rd, and in the phone section RS87156 came 13th with 199,440, G1RPA was 15th with 186,340, and RS22643 18th with 175,920. Others were G6LAU (125,749), G6XOU (109,630), RS28198 (99,369), and RS91529 (22,134) points.

In the **VERON DYLC Midwinter Contest 1990** GM4YMM was second in the YL SSB category with 40,141 points. G0CVD scored 20,844, G4EZI 17,457, G0FIP 13,524 and G3KNU 11,875. G0FIP also scored 1,122 points in the YL CW section. There were no entrants in the OM class from the UK.

HF F-LAYER PROPAGATION PREDICTIONS FOR JULY 1990

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

Time / GMT	28MHz 000001111122 024680246802	24MHz 000001111122 024680246802	21MHz 000001111122 024680246802	18MHz 000001111122 024680246802	14MHz 000001111122 024680246802	10MHz 000001111122 024680246802	7MHz 000001111122 024680246802	3.5MHz 000001111122 024680246802
** EUROPE								
MOSCOW	.....	.....11.	..1222112442	313444334775	756655556788	865333233578	6421....1257	3.....24
MALTA	.....	...11...121.	2.1332223543	523554555776	977766666899	997533334689	875211111367	+52.....34
GIBRALTAR	.....	.....	1...1..1.221	31.232232553	854665555788	998654444689	8863211123 67	+53.....35
ICELAND	.....	.....	.....1.	131	411233223566	766544334567	6653211122 35	332.....2
** ASIA								
OSAKA	.....	.....	....11..1221	....21.12452	....1...1573	.....25.	.....2.	.....
HONGKONG	.....1..	....1...122.	1..111112552	2...11113675	2.....1586	254	32	.....
BANGKOK	.....111.	..1111112331	2.1112113664	41...1113786	5.....1588	3.....257	34	2
SINGAPORE	...11...122.	..1221112441	2111122224674	41..11113787	5.....1588	3.....257	35	2
NEW DELHI	...111..121.	..1221112431	2111122224674	531..1113787	73.....1589	5.....267	2.....35	2
TEHERAN	..1211112321	1.2322223552	4343222224776	6551..114788	962.....1589	84.....267	51.....35	2.....2
COLOMBO	..1111112221	1.2223223452	4222213224775	641..1114788	83.....1589	61.....267	4.....35	2
BAHRAIN	..1222212331	2133333334654	5453223335887	8651..113799	973.....1589	85.....267	62.....35	3.....2
CYPRUS	..1222212331	2124433346 53	5356555557887	867655567899	9874222357 89	8741...12478	752.....146	42.....3
ADEN	1.1222334443	3234334457 65	7564223358 88	9772..114899	985.....1589	862.....268	63.....36	3.....3
** OCEANIA								
SUVA/S	.....	.....	.....11.	..111...133.	..231....44.	...2.....11.	.....	.....
SUVA/L	3211.....53	4333.....75	2356.....85	.2671.....73	..451....15.	..12.....22.	.....	.....
WELLINGTON/S	.....	.....	...11.....21	..2211....52	..431.....62	..21.....14.	.....1.	.....
WELLINGTON/L	321.....2	5321.....15	6653.....37	5575.....67	23651....174	..32.....141	..1.....2.	.....
SYDNEY/S	.....	...111.....	1.23211....2	1125311....5	1.131....325	...1.....253	.....2.	.....
SYDNEY/L	21.....2	3212.....4	53241.....16	43362.....37	1.251.....65	...2.....53	.....2.	.....
PERTH	..12111.....	1.23322.....	32334321....	63223111....	62.....12.	3.....25.	1.....34	2
HONOLULU	.....	.....	.....11.	...11....12..	..231....1..	..22.....	.....	.....
** AFRICA								
SEYCHELLES	1.1222334433	4234334456 65	7563233358 88	9762.1114799	984.....1589	861.....268	63.....36	3.....3
MAURITIUS	..1323434543	1.3434446766	5.6423335888	7272.1113799	965.....1589	872.....268	64.....36	3.....3
NAIROBI	311323445644	5334345567 66	8665223458 89	9884.1113799	9971....1589	884.....268	651.....36	32.....3
HARARE	3..322556644	6115335568 77	8447323358 99	9766111137 99	9974.....589	8851.....268	662.....36	33.....3
CAPETOWN	...22256672.	....44356784.	653335873	1..731113786	52.51....588	8712.....268	662.....36	33.....3
LAGOS	31.222456753	5324434578 76	8656422358 98	98773....3799	9985.....589	8862.....268	663.....36	33.....3
ASCENSION Is	11..21344552	33..43446775	7731532258 98	995341..3799	99751....489	8862.....158	663.....35	33.....2
DAKAR	311121244542	5423433457 65	8756532237 88	998741..1699	99851....379	8862.....57	663.....25	33.....2
LAS PALMAS	1....11121321	31.232243553	6435655657 86	876776566898	998764344689	98743111137 8	7752.....146	442.....24
** S. AMERICA								
Sth SHETLAND	.....35452.	.....45574.	.....33587.	1113781	476	511.....157	653.....25	33.....2
FALKLAND Is	243542	1....1355764	4....2334887	71...1113789	9532.....479	8852.....147	663.....25	33.....2
R DE JANEIRO	21...1243442	532..3344664	8751132236 87	9973221.1589	99851....269	8862.....47	663.....15	33.....2
BUENOS AIRES	21.1.1132332	4312.2344554	8645.3234587	9876.2112479	99851....158	8862.....37	663.....5	33.....2
LIMA	1.....1.121	31.111121233	7523322222 46	8755411111 27	99752.....6	7862.....3	563.....	23.....
BOGOTA	1.....111	31..11111123	6412321211 36	87443211...27	89751.....5	7862.....2	463.....	.3.....
** N. AMERICA								
BARBADOS	1.....1.121	31.112121233	7523322111 56	8755421...47	99751.....16	8862.....4	663.....1	33.....
JAMAICA	1.....11	2....1...122	5311221111 25	76333111..15	78652.....3	5862.....	263.....	.3.....
BERMUDA	11	2....1...122	53.11211.135	7523211...27	88652.....5	6852.....2	363.....	.3.....
NEW YORK	.....	1.....12	41....1....24	641111.1..15	78541.....3	4752.....	252.....	.2.....
MEXICO	.....	1.....11	31.....1.112	54121..1...1	57541.....	2652.....	.32.....	.....
MONTREAL	.....	1.....11	31....1....24	6311.1....25	77531.....3	4752.....1	153.....	.2.....
DENVER	.....	.....	2.....1	3211.....1	3543.....	.452.....	.12.....	.....
LOS ANGELES	.....	.....	1.....	11.1.....	1443.....	.352.....	..2.....	.....
VANCOUVER	.....	.....	.....	11.1.....	13331.....	.242.....	..2.....	.....
FAIRBANKS	.....	.....	.....	...11.....	.1231.....	..12.....	.....	.....

The provisional mean sunspot number for May 1990, issued by the Sunspot Index Data Centre, Brussels, was 132.0. The maximum daily sunspot number was 193 on 21 May and the minimum was 59 on 2 May. The predicted smoothed sunspot numbers for July, August, September were respectively: (classical method) 141, 139 and 137; (SIDC adjusted values 131, 129 and 129.

Florence, 8Q7DC, putting the Maldive Is on the air on rtty last January. Her home call is F6FYP and she was there with Sylvio, (F6EEM, 8Q7DB). (Photo: *French DX Foundation*)

IARU HF Championship
1200 14 July - 1200 15 July
1.8 to 28MHz (No WARC bands)

Classes - single-operator, phone, cw, and mixed, and multi-operator single transmitter mixed mode only. IARU member society HQ stations send RS/T and official society abbreviation. Others send RS/T and ITU zone (UK is 27). The same station may be worked once per band/mode and mixed-mode stations once per mode *but both QSOs must be in the appropriate part of the band.* QSOs with own ITU zone and with society HQs count one point, with other zones in own continent three points, and with different continents five. The multipliers are the total number of ITU zones plus society HQ stations worked on each band (HQ stations do not count as zone multipliers as well). Entries must be postmarked no later than 15 August 1990 and official entry forms are advised - summary, logs, and cross-check sheets are available from IARU HQ, Box AAA, Newington, Con 06111, USA, - please send a large s.a.e. and some ircs. Logs may also be submitted on diskette. I can supply photocopies of the rules (sase please).

PROPAGATION

G8KG reports that once again there have been no dramatic changes on the solar front though towards the end of May there were some signs that the pattern of recent months might be changing. Indices were very low early in the month, the solar flux dipping to 121 sfu on 4th May but then rising steeply to 268 sfu by 19th May after which it remained significantly higher than the values recorded 27 days earlier. As in April, several major magnetic disturbances made hf band conditions unreliable at times.

The recent upward trend probably means that, having sagged at just the time when the peak was thought most likely to occur, the monthly and three-monthly mean values of flux are again moving upwards, though for how long remains to be seen. In the present situation the only safe prediction would seem to be that Cycle 22 will prove to be unusual!

BAND REPORTS

Conditions patchy - as reported above by Smithy - but the following sent in logs for which many thanks : FE1JUD, G2s AKK, HKU, GM3CSM, G3s GVV, KSH, LPS, MCX, YRM, G4s BLH, DXW, EHQ, GW4KGR, G4s MUW, NXG/M, GM4OBK, G4s VVP, ZYQ, and G0JZA. Cw stations listed in italics.

14MHz

0700 A35KY, FK8FI, FO5LZ, T30KY, *TA4PQ,* VK9TR, ZK1CX, ZK2KK, ZL7TZ.
0800 *3D2AM.*
0900 *HS0AC* (long patch), *5W1KY.*
1000 VR6JR, 3D2AM.
1400 1A0KM.
1800 *FK8DD.*
1900 A43KM/0, EP2HZ, *G4WYG/ST2,* 1S0XV, 3D2AM, *5R8LO,* 7O1AA.
2000 *DK2SC/9Q5.*
2100 BZ4CH, *FH3EJ,* TA5KA.
2200 *FY/G3XIZ, KL7UPS,* YI1BGD.

21MHz

0700 KH0AC, T5RR, 7O1AA.
1100 *1A0KM,* 3D2AM.
1300 AH5C/KH5J.
1400 KH8/VK2EKY.
1500 ZS9A.
1700 D68KB.
1800 *BV2TA,* BV2FB, HF0POL, HS1BV, VP2EOH, ZD9BV, 3X1SG.
1900 T5YO, VP8BXK (S. Orkney).
2000 A43KM/0, *KH6IJ,* W6, W7, *1S0XV.*
2100 *FH5EJ,* ST4/WZ6C, *S79FT, TR8XX.*
2200 *CE0ZIG,* HL9HH, W6, W7, 3C1EA.

28MHz

0800 BY1PK, T5RR.
0900 FT5XA, FK8s FI, FR, PA3CXC/ST0, VQ9LW, 4X/LY2PX, 5Z4RT/A.
1000 FD6ITD/FR, FT5XH, T5YD, YJ8M, ZL.
1100 A43KM/0, OD5RL, P29VU, *TA2B,* XU8DX, YK1AO, 4S7EP, 7Q7LA.
1400 *VS6DL,* YI1BGD.
1500 FH8CL, HV2CO, 5N3BHF/P4, 9L1US.
1600 TY1DX, V51P, ZS9A, 5H3TW, 9V1WW.
1700 *HH3TW,* S01EA, TJ1PD, V51SW, ZD9BV, 1S0XV
1800 VP8s CDK, CDR, VQ9IF, 3W6PY, 3W9CZ.

Thanks to *DX Report* (VK9NS), the *Lynx DX Group Bulletin* (EA2JGO), *DX'press*(PA3CXC), *DXNL*(DL3RK), the *Long Island DX Bulletin* (W2IYX), *DX News Sheet* (G4DYO), and the *Ex-G Radio Club Magazine*(WA8TGA).
Closing date for **September** issue will be **July 22.**

VHF/UHF

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

For most of May, the British weather was dominated by an anticyclone. It became rather 'stale' and static so, although there were some tropospheric openings, they were of short duration and not widespread. Modest auroral activity was reported and the first 144MHz Sporadic-E event of any length occurred at the eleventh hour, as far as this column is concerned. The 50MHz band provided frequent E-layer openings, with many new stations and several new countries worked.

THE VHF CONVENTION

The attendance at the VHF Convention on 12 May was similar to that in 1989. I had the pleasure of seeing many old friends as well as meeting, for the first time, many who contribute to this column. Following the President's opening address, VHF Manager Dave Butler, G4ASR, spoke about the results of the IARU Region 1 Conference, which provides a convenient lead into the next section.

TORREMOLINOS

The Conference took place between 1 and 6 April. G4ASR has prepared an article for *RadCom*, so I will only give a brief summary of topics of interest to VHF/UHF operators. First, beacons on 144MHz, and no conclusions were reached about reducing and/or moving the present sub-band. A working group will be reconvened by the German society, the DARC, and the subject will be discussed at the next VHF Managers' meeting. Meantime the RSGB will coordinate beacon planning for Region 1.

Second, Conference recommended that the mode J transponder in Oscar-13 not be used by amateurs in Region 1 due to interference with terrestrial communications. If this advice is not heeded, the IARU recommends that this transponder be permanently switched off. Third, no alterations were made to meteor scatter operating procedures, but confirmation procedures were clarified.

Fourth, bandplans. The one adopted for 50MHz is as published in the 1990 Call Book. It was decided not to give the FM channels any S-numbers but to refer to them by frequency, a practice adopted in most other parts of the world. For example, 51.510MHz would be called Channel 51. No decision about repeater standards was made but a shift of 200kHz *may* be adopted in the future.

On 144MHz, Conference agreed not to adopt an FM channel spacing of 12.5kHz as band occupancy has reduced considerably since G3OSS commenced his original study. The situation will be kept under review but it seems unlikely that any change will take place in the next five or six years. No packet radio networks will be set up in the 144-146MHz band and no access from the band to networks on other bands will be allowed. This is confirmed in footnote 1.1.(iii).

The only changes on 430MHz affecting UK amateurs are that 439.800 to 439.975MHz may now be used for digital communication links, and the frequency range for linear transponders has been extended upwards and is now 432.500 to 432.800MHz. The existing RTTY and FAX channels should be respected when installing these transponders. Finally,there have been some rule changes for contests which I assume will be covered elsewhere.

DXPEDITION NEWS

Keith Tatnall, G4ODA (LCN), has sent further details of the *Five Bells Group's* Icelandic trip, planned for 4-14 August, which was mentioned

ANNUAL VHF/UHF TABLE
January to December 1990

Callsign	50MHz		70MHz		144MHz		430MHz		1.3GHz		Total
	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Points
G6HKM	49	20	—	—	56	12	21	6	14	5	183
G1SWH	34	15	24	4	48	9	17	5	—	—	156
G0IMG	24	18	20	2	34	7	20	2	—	—	127
G0CUZ	—	—	—	—	77	19	27	4	—	—	127
G8ESB	7	2	14	1	41	4	28	4	9	4	114
G0NFH	37	3	9	2	44	9	7	2	—	—	113
G4XEN	—	—	—	—	54	19	32	3	1	2	111
G1WYC	14	11	—	—	17	13	21	8	—	—	104
G3FPK	—	—	—	—	68	16	—	—	—	—	84
GW6VZW	53	27	—	—	—	—	—	—	—	—	80
G8PYP	12	7	1	1	28	8	9	2	—	—	68
G7CLY	—	—	—	—	50	6	—	—	—	—	56
GM0GEI	29	22	—	—	—	—	—	—	—	—	51
G6ODT	—	—	—	—	25	5	14	3	—	—	47
GM0JOL	—	—	—	—	33	13	—	—	—	—	46
G4OUT	—	—	7	1	28	55	—	—	—	—	41
GW7EVG	—	—	—	—	12	6	—	—	—	—	18

British counties are those listed in the January 1990 *RadCom*, but excluding IOS; 77 in all. Up to three different stations allowed in all 12 GM regions. Do not include EI counties. Countries are the usual DXCC ones plus IT9.

last month. They have rented a cottage in QX square (IP03) but up to mid-May, detailed planning remained to be completed. TF licences were not expected until July and callsigns will be in the form of UK call/TF.

The main operation will be from IP03. On 144MHz and 432MHz they will use 3CX800 amplifiers. The VHF antenna array will be four 16-element, and the UHF array four 21-element Yagis. The frequencies will be .028 and .215 for CW and SSB respectively on each band and they will be on the VHF net on 14.345MHz to arrange skeds. A portable station on 144.128MHz will be operated from other squares using a 4CX250 PA and four 9-element Yagis; the call will be UK call/TF/P. All CW skeds on MS and EME will use 2.5 minutes periods with them taking the second period.

The likely operators are G4DHF, G4NPH, G4ODA, G4PIQ, G4YTL, G4ZHI and G8IJC. If any of those calls are heard without the /P they will be in IP03. Keith asks that once you have worked the square please do not call a different operator, but this does not apply if any of them are /P. QSLs should be sent via G4DHF or G4ODA.

Martin Dale, G6ABU (NOT), has forwarded more information about the Derbyshire Hills Contest Group's proposed operation from the Irish Republic in the 4-17 August period. The location will be their 1984 one, Ardmore Head (WFD) in IO61DW or WL02J, and the callsign will be EI2VPX/P. They have applied for a 50MHz permit and will be QRV on 70, 144, 430 and 1296MHz.

For tropo working they will use .220 on all bands, with 144.144 and 144.444MHz for CW and SSB MS skeds respectively. They will be QRV on the 14MHz VHF net throughout. The party will include G8ROU, G6HKS, G4VVZ, G1WBZ, who will look after the QSLs, and Martin. For further details, or to arrange skeds, contact either G6ABU or G4VVZ, both QTHR.

Clive O'Hennessey, GW4VVX (GWT), plans to operate again from IO78WA between 12 and 25 August, using the call GB2XS. Last year he caught four auroras in the fortnight which brought stations from all over Britain, including GJ and GU. He will operate on 144.222MHz with 160W and a 17-element Yagi. Also on 50MHz using a transverter and "wotsit?" antenna!

BEACON NEWS

Jukka Sirvio, OH6DD, the project coordinator, has sent details of the beacon OH1SIX, situated near Ikaalinen. Operation commenced on 50.025MHz on 23 September last, initially at 2W output. It now runs 50W continuously, in A1A mode, to stacked dipoles 33m AGL, the site being 157m ASL. The message is: "de OH1SIX in KP11QU" followed by 20 seconds of carrier. It was built and installed by members of the *Radio Amateur Technical Society* and the keeper is Pentti Gronlund, OH3BK. Reception reports should be sent to: RATS/OH1SIX, PO Box 88, SF-02151 Espoo, Finland.

CONTEST NOTES

Mike Sharp, G4XPE, has sent the results of the *Derby and District ARS's* 144MHz contest held on 11 March. Entries were slightly down on last year, but the average scores were higher. In the full power event, G0KYW/P (WLT) won the multi-operator section with 14,896 points, runner up being G7FXY/P (WLT) with 12,972. The single-op. part was won by G4PIQ (ESX) with 12,672 points, and G4LU (SPE) came second with 10,560.

In the low power, 30W maximum output, multi-op. event, G4RLF/P (WLT) came top with 13,344 points, G1NUS/P (SFD) being runner-up with 10,336. The single-op. section winner was G0CLP/P (DYS) with 10,922 points and G1PJM/P (SXW) came second with 8,190. If you want a copy of the results, send an SASE to DADARS at 119 Green Lane, Derby, DE11RZ. Next year's contest will be on 10 March.

CHALLENGER RESULTS

Andy Adams, GW0KZG (GNS), has reported on his two recent operations from the *RRS Challenger*, the first of which was in March. The worst North Atlantic weather for 40 years disrupted the scheduled work to the west and northwest of Ireland. "The *Challenger* struggled to the extreme edge of IO65 before the trip was abandoned."

Bad weather also interrupted their work to the west of Scotland, forcing them to seek shelter in sea lochs when conditions were at their worst. The journey north started on 15 March with operation from IO56, when QSOs were completed with G1SWH, G1KDF, G8XVJ and G3UVR. On the 16th, from IO58, Andy heard G4APA and received MS reflections from G0CUZ and G3IMV but completed with neither. He got no replies to CQ calls on 144.240MHz from IP60 on the 17th.

They left the Faroe Islands on 19 March but had to shelter from the SW storms beneath 600m cliffs on three sides. Static rain added to the misery, but some operation was possible. On the 21st, from IP71, a few local OY QSOs were made and MS reflections were heard from G0CUZ. On the 24th he operated as OY/GW0KZG/MM in IP62 and, during an aurora between 2319 and 0050, contacted GM4YXI (IO87), LA5SAA (JO29), SM5DCX (JO89), LA9T (JO59) and SM7GWU (JO78), all on CW with the beam at 60°.

The next day, in IP71, he caught an aurora at 1425 during his first afternoon off, working G, GM, LA, OZ and SM stations. Best DX were SM5DCX and G4KUX (IO94). In the early evening he again heard MS reflections from G0CUZ but never completed, even after three hours! Another short aurora from 2320 brought SM4HFI (JP70) and SM5DCX again for best DX.

On 26 March, tropo conditions were flat from IP81 and MS reflections were again copied from G3IMV and G0CUZ, but no completions resulted. From IO89 on the 29th some local SSB QSOs were made and an early evening aurora brought more GMs, G4APA, G8XVJ (IO83), G3UTS (IO94) and GI4KSO (IO64). The *Challenger* docked in Dundee on the 30th.

The April trip was far more successful, the weather remaining fine apart from a period around 10 April when operation to the NW of the Orkneys had to be cancelled. They sailed from Dundee on 4 April and up to the 9th, Andy activated IO86, JO06, JO35, JO18 and JO08 in that order. Countries worked included D,EI,G GM, GW and PA.

On the 10th, while in IO98, the big aurora began at 0600 and he started operating at 1128. By early evening they were in IO88. He contacted 108 stations in twelve countries until fade-out around 0100. Later on the 11th he worked D, G, OZ and PA stations from IO99. There were auroras every day till the 14th and on the 12th, QSOs were possible in several periods from 0300 to 2100. From IO89, around 0600, he worked SL6BHD (JO66) and from IO99, SM3COL (JO87). Later, from JO00, he had QSOs with D, G, LA, PA, SM and Y stations between 1618 and 2101.

On 13 April he operated from JO00 and JP10, auroral QSOs being made with D, G, OZ, PA and SM stations between 1700 and 2400, plus LA1K (JP53) in the early hours of the 14th. Another event was in progress when he switched on at 1600 and continued until 1730 to reappear at 2150 when the ship was in JO19. D, OZ, PA and SM were worked until 2300.

On the 15th he made a few tropo contacts with Germans from JO17 and JO16 in poor conditions. Next day, in continuing flat conditions, he completed skeds with LA6HL (JO28) and DK1KO (JO53) from JO15 and later crossed to JO24 from which his best DX were G6HKM (JO01) and DG5OAE (JO51). They docked in Den Helder on the 17th and Andy was welcomed by PA3FDQ who showed him round the club station PI5DD. Other visitors were PA3BIY, PA3BZL and PA3FOC.

They sailed from Den Helder on the 18th operating in the southern North Sea as far north as the '4' row of squares. Propagation varied from flat to occasional periods of good conditions, as on the 25th when Andy worked EI3GE (IO63) from JO03 and JO04. Radio activity finished on 30 April with another aurora in the early hours, followed by some good tropo later.

In spite of much ship borne QRM, over 1,000 QSOs were made with 13 countries, but he did not hear any LX stations. Andy wrote:"Operating standards of stations calling have remained very high, even during pile-ups, with only a handful of stations calling out of turn, when I have been forced to work on a country-by-country basis."

He made several interesting observations on propagation from the North Sea. First, there always seems to be propagation from the '5' row of squares to any coastline; the better the tropo conditions, the deeper the penetration inland. Second, propagation to the coasts

is enhanced during gales; "...possibly caused by a large amount of salt spray in the air?" Third, in good, settled conditions north/south tropo ducting is normally present.

Lastly, in poor conditions, distant CW signals become very garbled and almost impossible to read - akin to multipath propagation. However, this may not be confined to sea paths as I have also observed it on SSB signals from my QTH. This is a phenomenon I have not noticed very much in the past, so is it due to some subtle changes in the atmosphere in recent months?

50MHz

Over 500 German amateurs have applied for 50MHz permits which I understand are valid for twelve months, ERP limited, CW and SSB only, with no portable, mobile or contest operation allowed. I had a chat with SP6GVU at the VHF Convention and Andy was hopeful that some Polish amateurs might get 50MHz permits this year. Commercial equipment is not readily available but the Soviet forces left a mass of stuff behind, much of which has found its way into amateur shacks and gardens!

The UK Six Metre Group held its AGM during the VHF Convention. The new committee comprises chairman G8VR; vice-chairman GW3LDH; secretary G4UPS; treasurer G4IIL; editor G0JJL; GM4DGT, G0JHC, G0GZI, ZC4MK and G4AHN. The group publishes a quarterly newsletter and annual membership is five pounds sterling. For details, send an SASE to G4UPS or G4IIL, both QTHR.

Ray Cracknell, G2AHU (HWR), sent Report No. 7 from the 50MHz Reporting Club, covering the period from 1 September 1989 to 28 February 1990. It includes several diagrams and tables about solar activity and propagation, one showing that the observed sunspot numbers averaged about 10% below those predicted at the beginning of the period. Another shows the dramatic variation in daily SSNs through one solar revolution in February; only 57 on the 17th and up to 249 just one week later.

There are items on propagation from Britain, Sweden, Greece and Ascension Island, locating the aurora curtain, progress on Phase II of the GB3BUX beacon equipment and histograms of transequatorial, Es, and F-layer propagation to North America.

Ray's April report includes a graph of the daily sunspot numbers for January through April inclusive, drawn from data published by the Sunspot Index Data Centre in Brussels. This shows that a peak was reached in February, the March and April peaks progressively diminishing. However, it is too early to conclude that the peak of Cycle 22 occurred in February, as many forecasters had predicted.

To quote: "Sunspot numbers - and consequently solar flux - remained well below the predicted values through March and April, with only one remaining active region giving repeated peaks as it crossed the central meridian with each solar rotation - 27.4 days average. It is interesting to note that exceptionally good DX conditions to Africa cannot be recognized in terms of very high sunspot numbers/solar flux and low values of the Ap and Kp indices on 13 and 26/27 April."

In G4UPS's *6m Information Pages* for May, there is mention of another Finnish expedition to Market Reef (JP90) between 28 July and 4 August; further details awaited. Three Dutch operators planned to activate Svalbard (JQ78SG) from 27 July to 5 August, using 50.110MHz with 100W to a 6-element Yagi. The personnel are PE1MIS, PA3DCO and PA3FMK. If they cannot get the call JW5E, they will sign JW/home call. The QSL route is PO Box 9457, NL-3506 GL Utrecht, Netherlands.

Concerning possible Spanish activity, Ted wrote: "My understanding... is that the politicians have stepped in, rather like they did in Italy, and that our friends in Spain were due to have a meeting with the authorities during the week commencing 21 May." On 2 May, Ted heard CT1DTQ work RB5FLE on CW around 1800; any ideas on this one?

As promised last month, the IARC club station in Geneva was activated by Dave Court, G3SDL on 11/12 May. 4U5ITU could only come on after TV close down, so he only managed six MS QSOs in the early hours. He completed with G3RFS, G4AHN, SM7CMV, G3WOS, G3HBR and SM7AED and was the 99th country worked by British stations. The 100th was IS0 on 14 May.

In response to the May equipment inquiry, Darrell Moody, G0HVQ (GLR), says he uses a FT-29OR/transverter combination, 25W through filters and 25m of low loss cable to a 3-element Yagi. He has installed a choke balun. made from ten turns of RG58 coaxial cable around a toroid, at the antenna. This has reduced electrical interference and seems to have cleaned up the radiation pattern of the antenna. He heard his first Es signal, CT1LN, at 1635 on 28 April. The first major opening was on 2 May to CT and ZB0T, the latter worked at 1816. On the 4th, a short Es event at 1028 brought QSOs with IK5EHR (JN53) and I0AMU and I0SSW (JN61). Beacon TF3SIX was S9 on the 13th, 1045-1110, but no DX was about. On the 14th there was a combined Es opening to F and OE, and an F-layer one to ZS and V5 between 1523 and QRT time at 1745.

There was more late afternoon Es to SM0, OH3, OH5, I2 and I4 on the 15th and fleeting openings to 9H on the 16th and 17th. The 19th brought a major Es event, 1400-1815, starting with 9H, F and I, then north to OH and SM, and finally back to I. Next day Darrell worked OG2AC (KP20), OH2BUF (KP10) and OH5LK (KP30) between 0930 and 1115.

Neil Carr, G0JHC (LNH), advises patience when working ZB0T, "...as he does not like pile-ups and prefers to chat." Es events brought Is on 4 May, his first OE and D QSOs on the 11th, and Fs on the 14th, with IS0SZU heard. ZS6s were worked on the 14th and V51E was copied for two hours. The 15th saw continuous E-layer propagation to OE, D and I0 to I6 between 0645 and 1830. HB9AOZ (JN46) was, surprisingly, worked in this period. QRM from the Italian segment was horrendous.

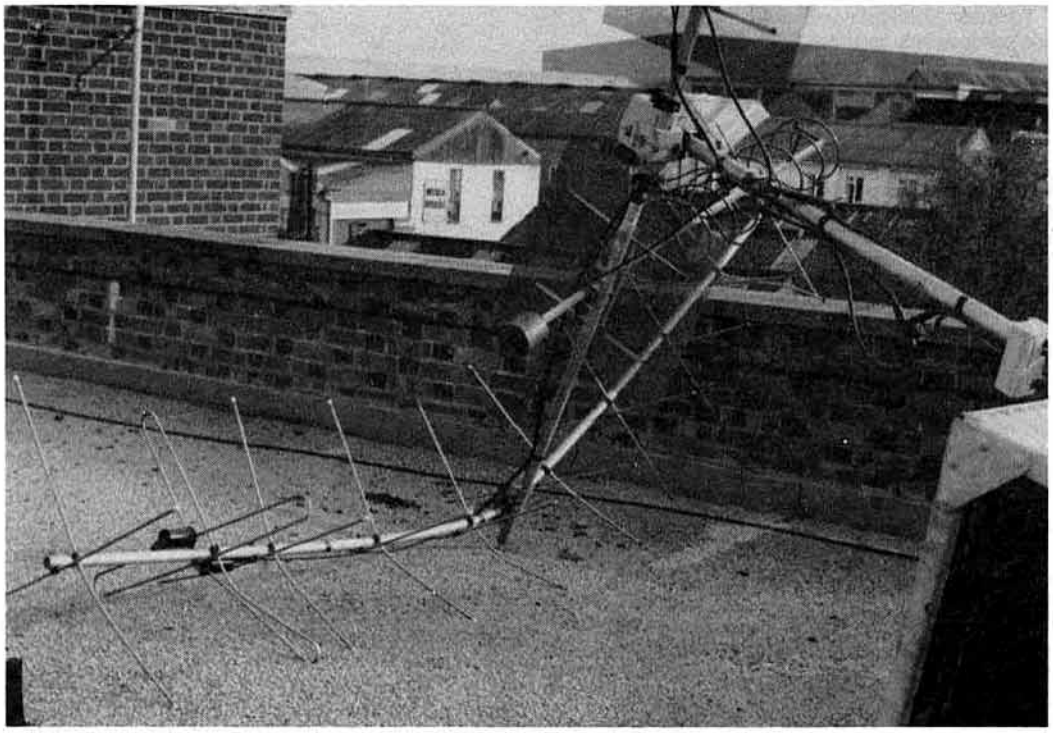
On the 18th there was a choice of auroral QSOs with GMs or more Is via Es. Next day, Z23JO was coming through with Fs and Is, while the 20th brought very selective openings to D, OE, OH, LA and SM in mid-morning, but none of the propagation to OZ and OY others were enjoying for two hours in the afternoon. There were openings to CT, LA and SM on the 21st, with very short skip to PA and north D. There was a weak 'Scottish' aurora the following evening and an early evening Es event to OE and D on the 24th resulting in a dozen new stations and three more squares.

Congratulations to John Acton, G0NFH (AVN), on passing his morse test on 9 April; he was G1DOX. He has been working lots of counties and asked if he has to start afresh in the tables with his new call? Most definitely not; carry on counting! Bob Nixon, G1KDH (LNH), contacted I4RHP (JN54) on 23 April, ZS6 and V5 on 14 May, and Is on the 15th, 17th and 19th. He heard DL9NDD on the 19th. Steve Smith, G1WYC (LCN), worked CT1WW (IN61) on 23 April for his first Es QSO this season, ZS6BMS (KG44) on 1 May, Fs on

LOCATOR SQUARES TABLE
Starting date: 1-1-1979

Callsign	50MHz	144MHz	430MHz	1.3GHz	Total
G1LSB	44	172	143	—	359
G4RGK	69	302	140	52	563
G3IMV	228	428	125	51	832
G0DAZ	137	316	122	39	614
G4KUX	—	384	120	—	504
GJ4ICD	374	263	119	59	815
G4XEN	66	295	114	5	480
G6DER	43	183	114	82	422
G4TIF	172	204	111	—	487
G6HKM	217	218	109	46	590
G1KDF	266	183	104	37	590
G0GMB	—	187	99	—	286
G4SSO	—	257	98	—	355
G4MUT	98	153	94	34	379
G8ATK	—	143	94	52	289
G8LHT	113	185	93	14	405
G1GEY	—	170	92	22	284
G4PIQ	—	261	87	—	348
G4RRA	—	280	80	—	360
G0CUZ	—	332	73	—	405
G6STI	—	152	69	24	245
G1SWH	154	153	58	—	365
G0EVT	88	209	57	—	354
GJ6TMM	109	151	52	—	312
G6ODT	—	26	47	—	73
G6UWO	—	41	44	18	103
G4VXE	147	162	42	4	355
G8PYP	122	106	32	—	260
GM4CXP	—	198	31	—	229
G6MEN	67	54	27	3	151
GM0GDL	—	83	22	—	105
G1CEI	11	77	18	—	106
G0NFH	55	76	16	8	155
GW6VZW	147	125	6	—	278
G1TCH	94	95	6	—	195
G4IJE	340	338	5	2	685
G7CLY	—	100	2	—	102
G6HCV	243	231	—	—	474
G4SWX	—	347	—	—	347
GM4YXI	—	340	—	—	340
G4DHF	—	325	—	—	325
G0JHC	270	48	—	—	318
G4YTL	—	249	—	—	249
G3FPK	—	241	—	—	241
G0LFF	83	153	—	—	236
GW4FRX	—	228	—	—	228
G1SMD	115	106	—	—	221
G4DOL	—	216	—	—	216
GM0GEI	193	—	—	—	193
G0HVQ	109	71	—	—	180
G4XBF	—	173	—	—	173
G8XTJ	44	120	—	—	164
G4TGK	—	137	—	—	137
GW4VVX	—	115	—	—	115
G1WPF	—	101	—	—	101
GM1BVT	46	22	—	—	68
G0HDZ	—	64	—	—	64
GM1ZVJ	6	48	—	—	54

No satellite, repeater or packet radio QSOs. "Band of the month" 430MHz.



Are your VHF aerials insured for storm damage? Thank goodness ours were! The Amateur Radio Insurance Scheme is a service for RSGB members only, operated by Amateur Radio Insurance Services. ARIS's address is 4a Russell Hill Road, Purley, Surrey, CR8 2LA (note new postcode); their phone number is 081-660 0820. When calling, ask for Sarah Bayliss or Jennifer Lawson.

the 4th, Fs and CT1BXT (IM59) on the 14th and I, D, OE and OH on the 15th.

John Heys, G3BDQ (SXE), made many Es QSOs in May on the 4th, 15th and 19-21st period; an assortment of I and OH stations, as well as some short skip contacts with ON, PA and GM. Brian Booth, G3SYC (YSW), reports QSOs with ZS6 on 2 and 14 May, 9H on the 12th and was also puzzled to work HB9AOZ at 1700 on the 15th, already confirmed by QSL; have they changed their no operation in TV hours rule?

G4UPS (DVN), sent a three page report covering the first 20 days of May and Ted heard/worked most of what was available. The more significant reports included; the 9L1US beacon at 1700 when G4GLT was working FE1JKK/FY; ZP6XDW working 9H on the 2nd; 5H1HK heard at 1805 and the ZD8VHF beacon at 1915 on the 3rd; the TF3SIX beacon S9+ for 90 minutes from 1025 on the 13th and for two hours from 1620 the next day; the FR5SIX beacon copied by G3JVL at 1530 on the 18th; FR5EL working G4AHN and GJ4ICD in the afternoon of the 19th and OY9JD (IP61) worked at 1440 on the 20th

Ela Martyr, G6HKM (ESX), worked Malta for the first time this year on 12 May and I0DLP (JN61) for a new country. The 14th was good with CT, F and I QSOs in the log, while the 15th was a very good day with assorted Is and a gaggle of OEs, all in new squares, plus SM7 and OZ.

Geoff Brown, GJ4ICD, has a desk top publishing set up and produces a regular Propagation Report. In his April-May issue he wrote that he was none too pleased with CT1LN on 28 April who stuck on 50.110MHz working UK stations, covering up ZP6XDW and some LUs. Please remember *that 50.110MHz should only be used for contacting other continents.* If operators persist in using it for inter-European QSOs, the weak DX will never get a look-in.

On 2 May at 1825 he worked LU2DEK but didn't bother with FE1JKK on .110; later he found out he was /FY! Geoff worked assorted Europeans on MS and Es in the first half of May, and these QSOs provided several new squares. He has over 300 squares confirmed and handed the QSLs to Ian Cornes, G4OUT, the RSGB VHF Awards Manager, at the Convention.

Steve Jones, GM0GEI (HLD), uses an IC-575A running 9W to a Create 6-element Yagi on a newly acquired Tennamast. He lists Es QSOs with many Europeans on 1 and 13-15 May and wonders if his contact with OE6DGG at 1224 on the 13th was a GM/OE first? Duncan Pettett's, GM1BVT (CTR), letter covered the period to the end of April. On the 23rd he worked I4VJB (JN64) in a short Es opening, after which an I0 called but he quickly disappeared into the noise.

From Wales, Paul Baker, GW6VZW (GWT), did very well with the numerous May Es openings to Europe. On the 14th he also heard many of the usual ZSs and worked ZS6CE (KG34) for a new square. Next day DL0TD (JN49) was a new country and he too heard HB9AOZ during TV hours. OY9JD at 1533 on the 20th was another new country and square, but Paul did not quote his latest squares total.

144MHz

The first proper Es opening occurred to southern Spain from 1635 on 29 May. Only three stations were heard, EA7s CPW, GTF and ZM in IM76 and IM87. There was a marked lack of activity this end; EA7GTF called on 144.310MHz for minutes at a time with no takers. The event lasted about 45 minutes and signals were very variable, as usual with Es. Greg Gilman, G3SCP (BFD), reported a very fleeting opening around 1130 on 17 May when he identified IW1BMW and heard an IW6.

Colin Morris, G0CUZ (WMD), congratulates GW0KZG/MM for putting on such a good show from the North Sea; he worked Andy in JO06 on 5 April, and JO24 on the 29th. He missed most of the big aurora on 10 April but did contact OE6AHD (JN76). On MS on the 6 May he was called by OH2BYJ (KP20) on the random frequency and completed in 90 minutes.

Clyde Hinton, G1TCH (DYS), last wrote when he was living in Cleveland but is now in the Chesterfield area. He has no permanent antennas aloft as another move is pending. I have entered his squares score in the table but I am not sure to which QTH they refer; the rules are that if you move within a 50km radius from the original QTH, you can add new squares worked. If you move more than that - say from London to Bristol - then you'll have to start again.

G1WYC only mentions working LA1YCA (JO38) and GM4IPK (IO99) on 1 May in the good tropo conditions. G6HKM refers to "...odd openings to Germany in the usual JO30/31 squares." Ela went county hunting in the contest on 19/20 May and worked with three Scottish regions and "...a gem when I found Brian, GI4KIS/P, in county Tyrone."

In the aurora on 10 April, GW4VVX found two new squares, IN77 and JO72, but the events on the 11th and 12th were too weak for any QSOs. Early on in the 19/20 May contest he received a tremendous signal from GM4CCC/P (IO85), but Chris faded to RS33 by the end, so he queries the mechanism. Could have been aircraft reflection as I often get very loud signals from GB3ANG by this mode. They are characterized by rapid QSB as the signal begins to build up, then at the peak it is steady for perhaps 15-30 seconds, but thereafter declines in increasingly rapid QSB.

Welcome to Gary Nicholas, GW7EVG (CWD), who wrote for the first time. He has been active since March on FM, using a Navico AMR-1000 transceiver with a five-eighths wavelength collinear antenna on a chimney, and on SSB, using an IC-202 at 3W to a 5-element Jaybeam Yagi. The good tropo conditions between 29 April and 7 May brought in stations as far away as Aberdeen.

430MHz

During the exceptional north/south propagation on 1 May, G1WYC had a QSO with GM4IPK. G6HKM managed to work GI4EIZ (ATM) on 3 May, but it took Ela seven minutes to complete it due to QSB. She collected a few counties in the contest on 5/6 May.

G6ODT reports generally low activity but Karl wrote: "If the UHF TV signals from Europe are anything to go by, there should have been many minor openings on the band." In the early mornings or in the evenings, he has received Dutch, Belgian and French TV with strong enough signals for teletext reception. In the early May contest he lists contacts with G4PIQ (ESX), GW4HRY/P (PWS), GW4BVY/P (IO81), G3CKR/P (IO93), PE0MAR/P (JO21) and G4RFR/P (DOR), all with one watt and a 23-element Cue Dee Yagi.

Rik Royall, G8ESB (YSN), mentions an FM duplex crossband QSO on 19 May with G1ZGZ (LEC), the other band being 50MHz; G6MDU joined in later. He has a regular sked on 432.20 or 432.21MHz with G6JQV (DYS) at 1800 or 1900 local time and says: "We haven't failed to get a contact for almost two years." He wishes people would mention their QTH when calling CQ, particularly on the higher bands. Many antennas are highly directional, so it would help to know where to aim them. Couldn't agree more, Rik.

THE MICROWAVES

G1KDH is active on 1.3 and 2.3GHz again from Ormskirk and is looking

for contacts on these bands. G6HKM has now got her antenna up again for 1.3GHz and CQ calls have brought two each contacts in ESX, BKS and WMD. In the contest Ela made 30 QSOs in 13 squares, best DX being to Germany at 468km. G8ESB offers YSN on 1.3GHz and skeds can be set up by calling in on the aforementioned 432MHz sked he has with G6JQV.

DEADLINES

That's all for this month and I regret there was no 70MHz news to impart. I will include data for the *Perseids* stream for MS enthusiasts next month. The deadline for September is 21 July and for October, 25 August. Don't forget I have a Telecom Gold mailbox, 76:MSX022, and that you can send reports via telex to 9312132268(SAG).

SWL

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

After the rave HF reviews of last month, things have gone a little quiet and the input has suffered this month. Even if it's an average sort of month, your news would still be most welcome.

HF BANDS

During late April and early May, there had been some good DX openings on HF, especially on 21MHz, with all continents heard in quick succession. There had been some last-minute loggings of the Jarvis Is expedition (AH3C/KH5J) and the IS0XV team from Spratly Is. Other notable loggings on the band included BV2FB, BY1BJ, DL2GAC/DU1 (Cuyo Is), K4SXT/DU3, FG5BP, FS/K2BS, FY5FO, HF0POL (South Shetlands), KA9FNL/H18, KS9F/HZ, JU1DX (Mongolia), AH6HQ/TJ, V21CH, V47KJI, ZD7DP, 3C1EA, 5B3OJE, 5Z4BI, 8J90XPO, 9L1US, 9M2LM and 9V1YC. At the time of writing, it was the turn of the group who were active from Conway Reef (3D2AM) to keep the bands alight. As they were to be active over two weekends, most listeners should have crossed that one from their wanted lists. The group sailed to the reef on the YASME schooner and it seems that other trips to exotic parts of the Pacific might be on the cards for later in 1990 using the same means of transport.
14MHz had once again provided some good DX. Some of the more interesting stations noted included A45ZP, CE0DFL (Easter Is), DL2GAC/DU8, FK8FS, HC8GR, J6LQC, PZ1EL, WZ6C/ST4, TU2UI, T5YO, UA0/GB4ICE, VK9TR, V47KTG, ZS9S (Walvis Bay), 1A0KM (Sovereign Medal of Malta, Rome - counts for DXCC), EK0AAC/4K4, 3B8FU, 7Q7JM and 7Q7LA (there should be a few more 7Q7's around as the licensing problems have eased somewhat).
28MHz had been rather 'ordinary' but FT5XA (often to be heard on an otherwise 'dead' band), HZ1AB, EL2A/OD5, S79F, TR8XX, VP2EOH, VQ9MS, V51MA (new prefix for Namibia), 3B8FV, 3DA0BK, 5H1HK, 7P8DX and 7Q7DX (operator Anwar, QSL via YB5DD) had been reported.

Moving to the LF bands, 3.5MHz had produced HH2PK, PY0FF and 6Y5IC. 7MHz had fared little better with very little of real note reported. About the best on offer was HC2NYB, HR1RMG, PZ1DV and VP2EXX.

On the 'new' bands, 18MHz had provided some good DX, in the shape of AL7I, A92BE, CE0FFD (Easter Is), FM4EP, HL1IUA, N4VHD/J3, PJ4/HB9TL, PJ6/KV4AD, WZ6C/ST4, TA2AK, VP8CBL (Rothera Base, Antarctica), 1S0XV, 3X1SG, 6Y5DB and 8P6CC.

VHF BANDS

50MHz: Some MS activity brought the band into life in early May. Several OZ's were heard here, and OE's and I's were also available for those who could get to the rig in mid-morning. At the time of compiling this piece, the band had just started to open to Europe via sporadic-E propagation. The first summer Es DX at this QTH was ZB0T who was 5x9 at 1900 on 2 May. After this, the next opening to be caught here was on the afternoon of 19 May. 9H5AB was 5x7 at 1515, followed by three Italians - I0AMU, IK0OKY and I0SSW, who was the best signal of the three here. OH2TI was 5x9 at 1607. He was quickly followed into the log by SM0LEI and SM0CHH (both in JO89). FC1JG was his usual rock-crushing signal at 1705. The 20th provided OH7AXB (KP32) at 1456. Unfortunately, arriving home late from the office had meant that any 'tea-time' weekday openings had been missed. Another to suffer from a heavy workload was David Whitaker, BRS25429, who had heard I0SSW and OE2KMM for two new countries on the band. Also on offer were some French stations in IN94 and 95 and JN05, 23 and 33. Once the band opens up again for some real DX, listeners (and others) might be interested in trying to achieve the Southern Africa Six Metre Award, which you can claim by hearing (or working) 10 different QTH Locators on the African continent, south of the Equator. Five IRCs will get you one of these. The address for claiming it is the VHF Awards Committee, Pretoria Branch, SARL, PO Box 1259, Pretoria 0001, South Africa.

144MHz: The early May contest in Europe provided the usual haul of F's, ON's and PA0's. The Society event in mid-May seemed a rather slow affair, with little real DX audible. LX1DB, and some DL's in JN39 were perhaps the best on offer, together with GM4ZUK/P from IO87. Outside of contest operation, David Whitaker caught a brief tropo lift early in May, logging Y23SB (JO53), DL's in JO42 and 52, GM4IPK (JO99) and LA1YCA/P.

432MHz: Nothing to report at all. Do any listeners still monitor happenings on this band?

ODDS 'N' ENDS

Luciano Marquardt, G1VDW, who provides some useful DX data for this column, had added a new receiver - an FRE7700 to the shack. He was also pleased with a direct QSL return from VU2TIC who provided a fine package of 'goodies' in reply to Luciano's report. Robert Small, BRS8841, mentioned QSL returns from ZY0RC (Rocas Is), V73AZ, TU2QQ (for 18/24MHz) and A15AA (Abu Ail). G4OII commented on Brad Bradbury's (BRS1066) pleasure at collecting Russian Oblasts. In eight years operating he has 182 heard and 181 worked. Two are still missing - UA8V (175) and UA0X (129). I'm sure I mentioned some activity from UA8V a few months ago! Bill McConachie (BRS88921)'s latest car registration plate is F666RST!!

HF DX Contests for July include the YV DX SSB on the 7/8th; the IARU on 14/15th, the HK DX on 21/22nd, together with the SEANET CW; and the YV DX CW on 28/29th. They should all have sections for the SWL.

DX NEWS

It seems that FR5ZU might be providing listeners with Europa Is (Juan de Nova for DXCC) this month. JX7DFA should still be on Jan Mayen this month if any SWL still needs this rarish EU country. A little further afield, JA9IAX should be on Minami Torishima signing / JD1 until mid-August if anyone needs that one. Remember that ZL's can use ZM right through 1990, and that the VR200 prefixes run that long as well.

FINALE

Let's all hope that HF conditions stay fair through the summer and that both 50 and 144MHz will have provided some juicy sporadic-E by the time you read this. All reports of activity from listeners who read this should reach me no later than **Monday 9 July** - note the early deadline.

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The TS-440S is probably the most successful HF transceiver ever made by Kenwood, and this is no surprise when you realise that it is virtually a mobile version of the TS-940S. I can't put it better than Geoff Arnold in his review of the TS-440S: "The receiver in particular is a joy to use". He was not wrong, and just ask any TS-440S owner to confirm it. All band, all mode operation, with a receiver covering 100kHz to 30MHz; the TS-440S is unbeatable at any price.

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The New HF-225 Receiver

I am delighted that the HF-225 has been a raging success world wide, and I will just quote a letter received from one of our American customers:—

"I received my Lowe HF-225 about a week ago. Since then I have enjoyed many pleasant hours listening to it. As a past owner of receivers such as the Sony ICF2010 and Grundig Satellit 650 and 500, I must say that none compare to your Lowe HF-225. Without question, for hour after hour listening, nothing compares. I especially like the Genie key pad. Why more receivers do not incorporate such intelligent rergonomics is beyond me. I also thought both the instruction manual and the short wave book were well written, with the shortwave guide particularly enjoyable."

The letter comes from Chris Williams in Massachusets, but is typical of many letters we are receiving from all over the world about the HF-225.

Technically, the HF-225 distinguishes itself by having a low phase noise synthesiser, which gives a reciprocal mixing performance not far off that of "professional" receivers costing up to ten times the price, and that's not just advertising talk, it is really true. The synthesiser actually tunes in steps of 8Hz, which betters most other receivers and gives a smooth "VFO" feel when tuning. As one user has already commented "If you tuned the HF-225 with your eyes closed, you would believe you had a £5,000 receiver on the table".

The HF-225 has a range of low cost options which extend its appeal; such as a keypad for direct frequency entry, which simply plugs into a rear panel jack; an active whip aerial; a rechargeable battery pack for portable use; and an attractive carrying case which protects the receiver whilst allowing full operational use. The new D-225 detector option is really something special, because it gives true synchronous AM detection for dragging sensible programme quality out of a signal being affected by selective fading distortion. The same option also gives narrow band (communications) FM demodulation.

Every listener these days appreciates a receiver which offers facilities for memorising favourite or regularly used frequencies, and the HF-225 offers 30 memory channels for this purpose. Using the memories has been made particularly versatile, because the operator can review the contents of the memories whilst still listening to the frequency he is using, or alternatively in the "Channel" mode, can tune through the memory channels using the main tuning knob, listening to each frequency as it appears on the display. Just like having a bank of single channel receivers under your control. Terrific for checking HF airband channels for activity.

Unlike most HF receivers on the market, the HF-225 comes complete with all filters fitted for every mode:— 2.2kHz, 4kHz, 7kHz, and 10kHz. There is also a 200Hz audio filter for CW, and if the D-225 detector is fitted, a 12kHz filter for FM. The correct filter for each mode is automatically selected by the receiver mode switch, but further selection can be made by the user from the front panel and the receiver remembers which filter was last used. True versatility and all built in at no extra cost. When selecting filters in use, the filter bandwidth is shown on the main display.

The display itself is a high contrast liquid crystal type, and shows frequency, filter bandwidth, detector lock (when D-225 is fitted), and whether the receiver is in memory mode. Automatic placing of the decimal point takes place as the receiver is tuned, so there can be no ambiguity in reading.

At the end of the day, what does the HF-225 offer you as a user? I can do no better than quote what was said by Rainer Lichte about the earlier HF-125:—"The HF-125 is a serious piece of equipment; don't be deceived by the unassuming front panel and the lack of spectacular features. The HF-125 will outperform most competitors. If you like an honest approach to receiver design, this is it. British understatement at its best".

The HF-225 is even better.

HF-225 £395 John Wilson

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TECHNICAL TOPICS

PAT HAWKER G3VA

25-AMP POWERMATE PSU (35-AMP PEAK)

Recent *TT* items have tended to emphasise the attractions of powering 12V transceivers from float-charged lead-acid vehicle batteries which can form an economical source of the high peak currents involved in SSB operation. However, with say a 100-150W transmitter and a maximum charge rate of about 4-5A, it is difficult to maintain over extended periods anything like a constant voltage supply with a high transmit duty-cycle or with FSK/CW type modes. Then even with a plastic bucket (as suggested by G3LSL in the June *TT*) there may well be objections to having a spillable acid electrolyte in the domestic environment.

There thus remains a demand for heavy current mains PSUs. With the tendency for higher-power barefoot black-boxes these need to be able to deliver up to 25A continuously and relatively droop-free peaks of around 35A. This represents a pretty tough specification for a home-built PSU and is essentially a more costly approach (unless you have suitable components on hand) than a vehicle battery. A deceptively simple-looking French design by FC1JEK in *TT*, October 1989 promised 20A maximum using components that may not be readily available in the UK.

Mark Cheeseman in *Electronics Australia* (January 1990) presents a new project in the magazine's series of 'Powermate' units; the highest power to date: this is the 'Powermate 25' capable of providing 25A continuous with maximum peaks up to 35A: **Fig 1.** It is protected by both foldback current limiting and an over-voltage crowbar circuit working with a re-settable contact breaker 'fuse'. He points out that modern practice is for amateur-radio transceivers to be designed for 13.8V operation with an external PSU which can then be used to power several rigs simultaneously provided that not more than one transmitter is operating at the same time (the receiver sections take relatively little power). While most professional computer installations use heavy-current switching-mode power units, these tend to have a rather 'noisy' output, requiring considerable filtering to reduce the noise to an acceptable level when used to power a sensitive receiver. For home constructors another problem is that it is not easy to obtain suitable high-frequency transformers which 'are difficult (read expensive) to source in small quantities.'

Another technique is to use a switching regulator-type supply with a conventional 50Hz transformer, rectifier, filter and using switching techniques to convert the unregulated DC supply to the desired voltage: 'This still has the problem of output noise and the more one tries to reduce this noise, the more the efficiency tends to suffer' — to quote Mark Cheeseman.

For these reasons, the Powermate 25 design follows similar lines to the lower current PSUs in the Powermate series except that it uses two mains transformers and two bridge rectifiers in parallel to reduce the problems and stresses that would be involved with single heavy-current components. By using two identical transformers and bridge rectifiers the load is shared equally between them.

Like the other Powermate units, it is based around the LMC723 regulator chip which provides a temperature-compensated voltage reference, error amplifier and current limiting circuitry in a single package. However, the PSU has quite a long chain of command between the 723 and the six 2N3055 pass transistors. The 723 controls directly TR9, a BD681 darlington-type device which in turn controls the base current of TR8 (MJE2955). Resistors R2/R15/R16 ensure that their respective transistors turn off when they are supposed to, as the drive supplied by the stage preceding each of these transistors is capable only of providing current to turn the next transistor 'on', not 'off'. Resistors R9-R14 effectively sum the individual voltage drops across the current equalising resistors to ensure that the current-limiting is not compromised by the failure of a single pass transistor. IC2 serves to increase the sensitivity of the current limiting device in the 723 connected to pin 2. ZD1 provides a reference voltage for the voltage-limiting crow-bar arrangement provided by TR1, TR10 and associated resistors RV2/R22/R23. A 32A contact-breaker (GEC 'Super switch' or equivalent) is opened by the crow-bar; if this happens the CB can be reset unless there is a fault condition. A short-circuit across the output should cause the output to drop to about 5A protecting the pass-transistors/transformers/bridge rectifiers. Those connecting leads required to carry up to 35A should be of substantial gauge to prevent voltage drops from mounting up.

Electronics Australia presents the Powermate 25 as a complete constructional project with a kit available from Dick Smith Electronics priced at $(A)249 without a cabinet or $(A)450 total, compared with commercial units costing around $(A)700. Among the component specifications listed are a 120mm cooling fan; six 0.1ohm 5W resistors (R3-R8); three 500ohm ten-turn trimpots; four 135mm lengths of 25 by 25mm angle aluminium — one of these is to mount each of the transistor heat sinks vertically; a thyristor (SCR) NO29 RH05 (25A), Radiospares 261-520 or equivalent. Incidentally it would seem that *EA* now reaches the UK by bulk air-mail since copies now turn up around the beginning of the month of issue. But *Ham Radio* has reverted to sea mail.

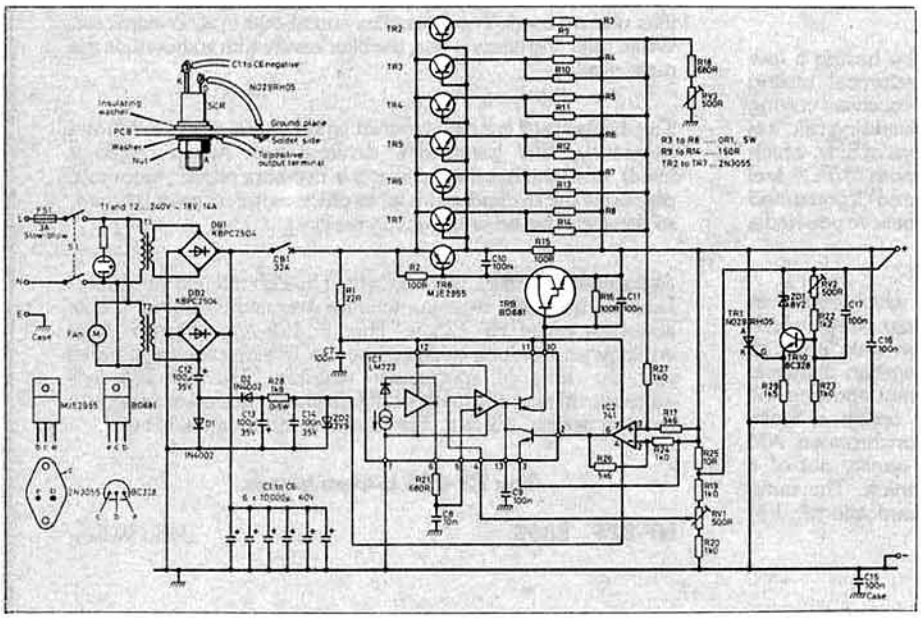


Fig 1. Circuit diagram of the 13.8V, 25A (35A peak) 'Powermate 25' power supply unit which shares the load between twin transformers and bridge rectifiers. Also shown is the suggested mounting detail for the thyristor (SCR) used as an over-voltage crowbar. As it conducts only briefly until the 32A contact-breaker (CB) opens, it can be mounted directly on the PCB. Internal or external conductors required to carry up to 35A must be suitable for this purpose.

(Electronics Australia)

COMPUTER-SIMULATED ANTENNAS

TT has referred on a number of occasions to the important development during the past decade of effective computer-software based on the so-called Numerical Electromagnetic Code (NEC) using the very sophisticated mathematical 'Method of Moments' procedure originally formulated, although not as a computer program, by R P Hartington in 1968. As I have stressed elsewhere (for example *Electronics World + Wireless World*, November 1989, pp1119-20): 'NEC has opened a new era in antenna analysis and design that is quickly overtaking the costly, time-consuming and not always reliable use of model antenna ranges, permitting the paper design of practical antennas systems, determining and modifying the directivity, gain, input impedance and radiation patterns.

'The original NEC software, developed in the USA, required the use of a mainframe computer and was thus of limited appeal to field engineers. However about 1982, the US Naval Postgraduate School in California wrote a simpler MININEC program for use with readily available personal computers.' **Fig 2.**

Successive programs have been aimed at making the programs more user-friendly, although this has usually meant accepting rather more constraints and limitations on the problems that can be tackled. One of the professionals who have been particularly active in showing how MININEC can be used by the more technically-minded amateurs and students to tackle practical problems has been Dr Brian Austin, G0GSF/ZS6BKW of Liverpool University. He has shown convincingly that, properly used, MININEC computer programs can successfully 'model' many of our basic antennas including inductively-loaded short-monopoles, capacitive end-loaded wires, simple forms of Yagi-Uda antennas based on wire elements, linear travelling-wave antennas, corner reflectors, including questions arising from the interaction of antennas with metal supporting masts. He concluded a professional paper presented at ICAP89 as follows: "MININEC can be used with confidence to model a variety of antenna configurations given its constraints in terms of the number of wires and segments available."

G0GSF has also published a long paper on the value of these programs in teaching students to understand the basic principles of antenna design and analysis: 'A simulation exercise in antenna analysis using MININEC' *(Int. J. Elect. Enging. Educ.*, Manchester University Press, 1989, pp355-366). This shows how students can achieve reliable and meaningful results using MININEC

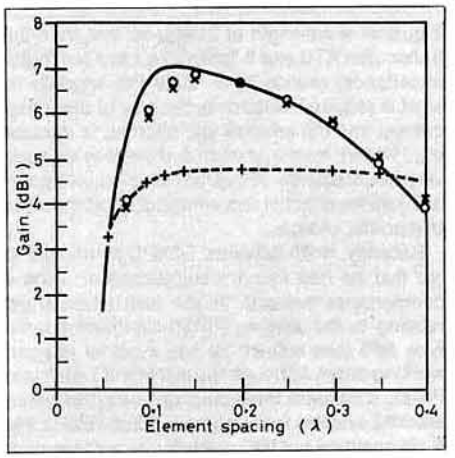


Fig 2. As part of his work on the validation of MININEC computer antenna simulation, Dr Brian Austin, G0GSF plotted the effect on forward gain of the reflector-to-radiator spacing of a two-element Yagi antenna. This diagram shows the results using MININEC (rings), the MININEC version developed by D M Pozar (crosses) and the curves based on the work by J L Lawson, W2PV (solid line) and the 1977 study by Peter Viezbicke (plus signs). The NBS study based on the use of 400MHz model antennas is clearly the odd man out giving excessively low maximum gain — a fact that was deduced many years ago by Les Moxon, G6XN from the original 1930s study by Dr George Brown (RCA) on close-spaced Yagi arrays (see *TT* January and April 1978). The MININEC and W2PV curves correspond very closely with classic theory. If the 7dB maximum gain seems high for two elements remember to subtract 2.1dB to give the answer in dBd (reference to a dipole).

software on a personal computer: 'Whereas a computer-based simulation exercise is not a substitute for full-scale measurements, the ability to model or simulate complex antennas is becoming particularly important to both student and researcher alike. Problems which were previously intractable or for which no closed-form analytical solutions existed can now be solved by iterative or other numerical techniques on the computer.'

It should perhaps be stressed that the use of MININEC software is not something that one would recommend to the average amateur experimenter who would be happier following published designs or the ideas and techniques described by Les Moxon, G6XN in *HF Antennas for all Locations* (RSGB, 1982).

Another well-known amateur who has become a firm believer in the value of MININEC programs to professional and advanced-amateur designers is Dr Ian White, G3SEK: see 'MININEC antenna modelling on a PC' *EW+WW* (December 1989, pp1214-1216). In this article he drew attention to 'an enhanced, user-friendly version of MININEC 3 is available for $80 and is the best buy for general use — details Brian Beezley, K6STI, 507½ Taylor Street, Vista, California 92084, USA.' But although convinced of the value of such software *if properly used,* G3SEK is alarmed to find that some firms have begun making claims for the performance of their antennas that appear to be based on misapplication of MININEC procedures.

Dr White writes: "One of the exhibitors at the recent RSGB National Convention advertised a compact HF beam with a gain of no less than 11dBd, with MININEC computer analysis used to prove it! I think this calls for some comment.

"The gains of HF antennas have always been notoriously difficult to measure, so it is a good thing that computer programs such as MININEC are now readily available to anyone who takes antenna design seriously. Used with care, these programs can provide gain and pattern predictions which are more accurate than any amateur measurements. The MN program (a further development of MININEC by Brian Beezley, K6STI) also makes it easy to predict the performances of antennas over 'real' ground. But take care in interpreting the results ...!

"*TT* and other commentators have gone to great pains to inform readers about inflated claims for the gains of beam antennas. For example, a VHF antenna with a gain of about 11dBd would require a boom length of almost one wavelength. Conventionally, VHF beams are measured or modelled in a free-space and gains in dBd are referenced to a half-wave dipole likewise in free space. Yet one exhibitor at the Convention/Exhibition was showing MN predictions to verify a claimed gain of 11dBd for a compact HF beam with a boom length of only 0.3λ. Is this the antenna breakthrough we've all been waiting for? Sorry, no. The answer is that the HF beam was being modelled over ground. Unless the ground conductivity is very poor indeed, *any* horizontally-polarised antenna picks up an additional 6dB of ground-reflection gain at its most favoured wave angle, compared with the same antenna in free space. In these terms, even a half-wave dipole has a gain of 6dBd!

"I would stress that this is not the fault of the antenna modelling program; MININEC programs are intended for skilled users who can take such results in their stride, and will mentally knock 6dB off all predicted gains over ground. But it seems that the apparently high gains shown on the computer printouts have brought a gleam to the eyes of the marketing man, and thus created a new fashion for what can only be regarded as artificially inflated gain figures.

"In all probability the HF beam being advertised at the NEC Convention is a good antenna, having benefited from computer-aided design. Certainly the predicted patterns looked good, and that means a lot in an HF beam array. Subtracting 6dB from the claimed gain to give the conventional free-space gain relative to a real comparison dipole brings the probable gain to about 5dB — quite respectable for a compact beam but nothing spectacularly out of the ordinary."

ARMY LOW-PROFILE LOOP ANTENNA

Quite a few compact transmitting (magnetic) loop antennas can be heard these days on the amateur bands putting out respectable signals for their small size. This approach has also been taken up recently by the Royal Signals in the form of a dismantable, rectangular loop designed and manufactured by British Aerospace (Dynamics) Ltd at Filton, Bristol.

At an IEE Colloquium, David Griffiths and Alan Baker of BAe described how this loop has been designed to provide both high-angle, near vertical incident skywave (NVIS) and effective ground-wave propagation for two-way communications between mobile sites (vehicles, helicopters etc) at ranges up to 300km (with minimum or no 'skip zone') on frequencies between 1.5 and 12MHz. Traditionally, military tactical HF communications have depended on 3-4m vertical whips which give good ground wave signals up to about 30km but very little NVIS radiation. This has meant that for ranges over about 30km it has usually been necessary to erect a low horizontal dipole; for the lower night-time frequencies resonant half-wave dipoles need a large site; short non-resonant dipoles can be used but require more complex matching units that often need considerable operator experience to achieve good results. Again, dipoles cannot be fitted to mobile platforms. A transmitting loop can overcome these problems provided that careful attention is given to the fundamental problem of the extremely low radiation resistance of any compact loop.

In their colloquium paper 'A low profile loop antenna for communications using NVIS', the authors outline the basic considerations and component selection necessary to reduce loss-resistances to a minimum; describe a capacitive-type (automatic) tuning/matching network; and the result of trials of a 2m x 1m (rectangular) loop and tuner unit fitted to a Land Rover and coupled to a standard 50W HF transceiver. The tests with this loop showed once again that it is virtually impossible to design a single loop that is effective over more than about an octave range of frequencies (eg 7/10/14MHz amateur bands). This has led to the design of a loop formed from lengths of 1¼in diameter aluminium tubes) with slide-fit joints that can be assembled either as a 2m x 1m rectangular loop usable from 2 to 10MHz (but with low-efficiency below about 5MHz) or a bigger 'night-frequency' loop (3m x 2m) for use between about 1.5 to 5MHz: see **Fig 3.**

Calculated values of the voltages across and currents through the tuner network capacitors (**Fig 4**) underline the demanding specification that must be met by these components. With 200W input to the 2m x 1m at 2MHz the peak voltage across the series capacitor (120pF) will be about 3.8kV while the shunt capacitor (1300pF) has to carry an RF current of 62 amps! With this type of all-weather loop, gas filled or vacuum capacitors become virtually essential for professional applications.

While I am not convinced that amateurs would be wise to take the British Aerospace approach (the I1ARZ approach in the February 1989 *Rad Com* seems more suitable), it is nevertheless interesting to study the results of the trials etc. With the original 2m x 1m loop, trials during the day showed that the loop achieved much the same performance as existing tactical antenna systems. However, adequate night-time performance was not achievable because of the need to use low frequencies to facilitate ionospheric reflection of NVIS waves.

It was concluded that: "the gain could be improved only by increasing the size of the loop, at the expense of mobility. Discussion with typical

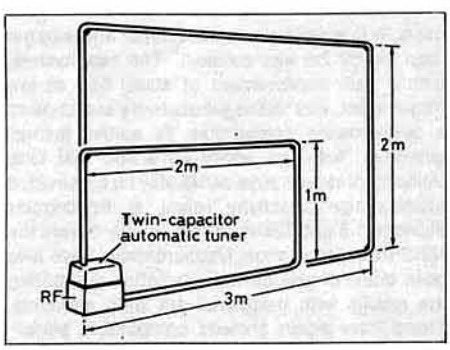


Fig 3. The British Aerospace 1.5 — 12MHz transmitting loop antenna using 1¼in diameter aluminium tubing that can be fitted together to form 2m x 1m or 3m x 2m loops etc.

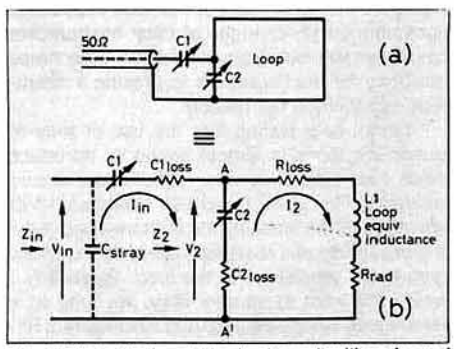


Fig 4. (a) Practical matching/tuning unit with series and shunt capacitors used as the basis of the automatic tuning unit. (b) Equivalent circuit emphasising the importance of using low-loss components.

THE 'COUNTERPOISE' REVISITED

For many years the word counterpoise virtually vanished from the vocabularies of amateur radio antenna designers. The once-popular technique of using a single or multiple wire in lieu of a direct earth (ground) connection to bring a Marconi-type (non-resonant) wire antenna into resonance largely disappeared from both amateur and professional practice except in the form of the radials of elevated ground-plane antennas. Radials, in fact, like counterpoises convert a monopole form of antenna to dipole form, though this is not always recognised by users.

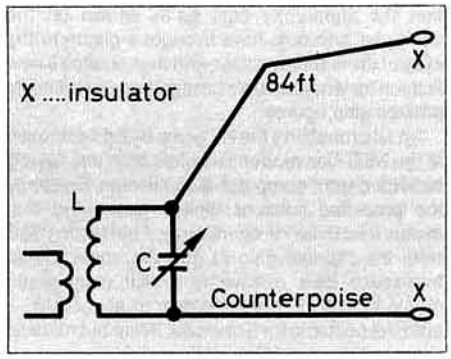
One exception to the disappearance of counterpoises is the W3EDP 84ft wire with its 17ft counterpoise (6ft on 14MHz) which seems to have been undergoing something of a revival since the *TT* references to it as the 'ageless W3EDP' in January and April, 1985: **Fig 5.** Last year, Byron Goodman, WIDX (ex-W6CAL, -W1JPE) brought to my attention the very first description of the 'W3EDP' as 'An unorthodox antenna' by Yardley Beers, W0JF (but then W3AWH) in *QST*, March 1936, pp32-33. This describes how H J Siegel (then W3EDP) had used over 1,000ft of wire in experimenting with various standard antennas. Finally he hung a 100ft roll of wire to his mast and carefully tabulated the results he achieved on 7MHz using this as an end-fed wire antenna: 'Four feet of wire was then cut off and this process repeated several times. When all his tabulations were complete, a length of 84ft seemed to stand out as best ... Not liking entirely the idea of an end-fed single wire antenna, W3EDP set about to find a counterpoise for the best results with his 84ft antenna. Going through a pruning process similar to that with the antenna itself produced a counterpoise length of 17ft as the one working best in combination with the antenna. This combination seemed to work excellently on 160, 80, 40 and 10m, but on 20m a counterpoise length of 6½ft seemed to outshine all others. (Note there was no 15m band in the 1930s).

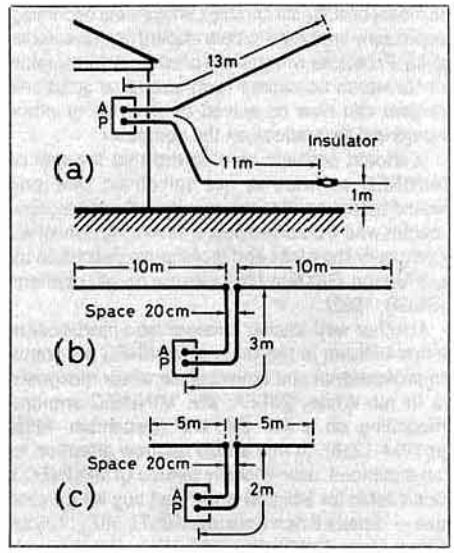
My own feeling and practice is not to regard 84ft as a 'magic' length but rather to use virtually any long length of end-fed wire and then to find a counterpoise length that results in most current RF current flowing into the antenna when the whole system is brought into resonance with the aid of an antenna tuner. I continue to be surprised at the difference in current on some bands between a counterpoise and the shortest direct earth connection possible from my upstairs 'shack'.

Undoubtedly, the 'end-fed' Marconi antenna with counterpoise remains a useful multiband antenna for those locations where it is inconvenient to erect a centre-fed dipole with open-wire feeders (with the dipole section not necessarily resonant). This may often be the case when operating from a temporary or upstairs shack where it is usually impossible to provide a true low-impedance earth connection. Even if the 'earth' is an excellent low-resistance connection from buried rods, an 11ft lead from this represents a quarter-wavelength at 21MHz so that from the transmitter ATU end it 'looks' like a top-fed (high-impedance) monopole — quite the opposite to what is required. A much better way of delivering current into the antenna will often be to insulate the 11ft wire from true earth and use it as a single-wire counterpoise. A quarter-wave counterpoise also has the effect of removing 'hot spots' from the transmitter chassis.

Recently, Keith Edwards, G3XUO mentioned to me that he had found a suggestion of using a counterpoise antenna in the instruction sheet relating to the wartime Polish clandestine radio type AP5 (see below): he has a model in good working order. Although the text of this leaflet is in Polish, it includes three diagrams of suitable wire antenna systems for use between 2 to 16MHz: **Fig 6.** He had tried out the counterpoise arrangement with his AP5 (about 7-8 watts output) and had been surprised at how effective it proved on the amateur bands.

Fig 5 (below). The 'unorthodox' multiband antenna that emerged from the experiments by W3EDP in 1936: an 84ft end-fed antenna with 17ft or (on 14MHz) 6½ft counterpoise. Fig 6 (right). The simple antenna systems that were suggested for use with the Polish 'clandestine' receiver-transmitter type AP5 which covered 2 to 16MHz. Connections A and P for the 6L6 transmitter are shown in Fig 9.





users indicated this was acceptable and a larger loop 3m by 2m was devised." The new system, with a gain improvement of about 5dB at low frequencies, was tested exhaustively and showed a performance comparable to earlier tactical antennas "with the added attraction that loop elements of various sizes can readily be constructed to maximise directivity (gain) at frequencies between 1.5 and 12MHz which readily covers the NVIS frequency range. Measurements have also been made of ground-wave radiation comparing the results with traditional 4m whip elements. These have again showed comparable performance."

A final conclusion is that "the use of gas filled variable capacitors in the matching unit will permit high-power transmitters to be used in any weather conditions. The work on loop impedance fluctuations with changes of local environment has shown that the introduction of pre-determined positions for the capacitors to provide a 'silent-tune' capability is not feasible."

I cannot help feeling that the use of slide-fit aluminium tubes is almost bound to introduce much loss-resistance after a time; nor would amateurs often strive to achieve maximum NVIS radiation. At the meeting, the authors discounted any possibility of a radiation hazard to the users, even when very close to the loop. Personally I would not want to sit very close for long to a vehicle loop when powered from 50 to 200W of RF! Nevertheless this loop does prove once again that small loops can radiate well provided always that the resistive losses do not greatly exceed the radiation resistance.

COPYING WEAK CW SIGNALS

Recent items (*TT*, April 1990, p32 and *TT*, December 1989, p38) on the work by the G-QRP Club in investigating preferred audio tones for CW, resulting in finding 450-500Hz as optimum for most operators, have encouraged Ron Taylor, G3AVQ to add some further thoughts that emphasise his belief that audio filtering should be based also on low-pass rather than narrow bandpass filters. He writes:

"The best article that I have ever come across giving the reasons for the use of a low (around 400Hz) rather than a high beat-note was 'Tunable audio filter for weak-signal communications' by Ken Holladay, K6HCP (*Ham Radio*, November 1975, pp28-34) in which he argues that most amateurs who have worked with weak CW signals have found they prefer a lower pitch as signals get weaker ... another reason is that, if there is interference, the lower-frequency signal is easier to detect due to the greater percentage differences in frequency of the wanted and most unwanted signals. He also is strongly against the use of very narrow bandwidth filters: "The human ear-brain copies signals by comparing signal against signal or signal against noise. If a narrow bandpass filter, say 200Hz wide, is used in the receiver it excludes other signals as well as some of the noise. This is fine for strong signals but causes problems with weak ones because too much bandwidth-restriction limits the amount of noise the ear has to compare with the signal. Very sharp filters also have a tendency to 'ring' making signal-to-noise comparison difficult, if not impossible, with very weak CW signals. In addition they are usually tuned to a fixed frequency so that an operator cannot optimise the frequency and bandwidth of the filter to complement his own hearing. Since the human ear is already (without a filter) capable of a 50Hz bandwidth, very narrow filters are not the best for weak CW detection except for eliminating interference." This does not apply to non-human decoding systems where a narrow filter increases the signal-to-noise ratio, as well as rejecting interference.

Certainly, as far as I am concerned, G3AVQ and K6HCP are preaching to the converted. Many years ago, probably in the 1950s, an article appeared in *QST* (by George Grammer, W1DF?) that argued very strongly in favour of low-pass audio filtering for CW reception; from time to time I have followed his advice with satisfactory results when using receivers which do not provide sufficient IF selectivity. The *QST* article pointed out that a simple low-pass filter can be formed by using a simple pi-network using (at high impedance)

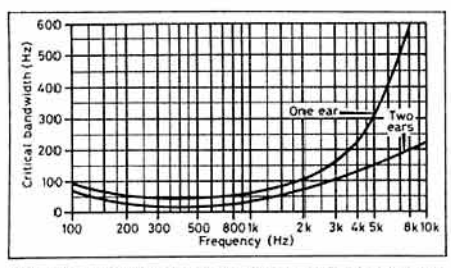


Fig 7. Critical bandwidth of the human ear(s) as a function of frequency as shown by K6HCP in *Ham Radio*, November 1975.

the winding of an audio choke or interstage (valve) audio transformer as the inductive element.

In his 1975 article, K6HCP noted some earlier tests carried out by W2IMU using a 3kHz bandwidth receiver and a signal generator. These tests showed that when a CW signal is adjusted to the same audio level as the noise (zero dB signal-to-noise ratio) the signal was 100% readable: "The input signal was then reduced to 3dB steps. Copy became more difficult but callsigns could still be accurately identified at 9 to 12dB *below* the noise level. Although the *presence* of signals 20dB below the noise could still be detected, they could not be copied. The reason why these weak signals can be copied below the noise level is that the ear-brain filter has narrowed its bandwidth to about 50Hz. **Fig 7** shows the frequency response of the experienced human ear versus its bandwidth: this also shows that 1,000Hz is *not* the optimum tone at which to copy weak CW signals even if the sensitivity of the ear is maximum at around 1,000Hz."

It is perhaps worth mentioning that modern theories of human hearing indicate that it is not possible to distinguish between two tones only 50Hz apart: see *TT*, June 1989.

A POLISH CLANDESTINE RADIO

The wartime need to establish secret radio links with the occupied countries of Europe played an historically important role in the development and miniaturisation of entirely new forms of HF/VHF/UHF communications equipment including portable 'suitcase sets' capable of providing reliable CW links for often relatively inexperienced operators over hundreds of miles and suitable for operation from mains supplies or (with vibrator units) from 6V car batteries.

TT, over the years, has provided circuit details of a number of the equipments developed at Whaddon, near Bletchley for British Intelligence; at The Frythe, Welwyn for SOE; at Berlin-Stahnsdorf for the Abwehr's 'Geheimen Funkmeldedienst' (Secret Radio Reporting Service); the 'Telephone Directory' lightweight AC/DC set designed by Duus Hansen, OZ7DU for the Danish underground; and has outlined the improvised sets used by the Dutch Inland Radio Service.

However, I have long been acutely aware that I have failed to give due credit to the excellent series of compact transmitter-receivers developed and produced at the Polish Radio Centre Workshops at Stanmore, north-west London between 1942-45, with the Polish engineer Tadeusz Heftman as the chief designer of the agent radios.

This is not the time or place in which to pay full credit to the wartime work of the Polish intelligence and resistance (home army) radio operations. It is still seldom recognised that the Poles played a key role in the early clandestine links not only with Poland but also with both the occupied and non-occupied zones of France, with French North Africa (where their French radio-operator Joseph Briatte at Station Rygor in Algiers played a particularly important role in the months leading to the 'Torch' landings in November 1942), with Belgium, and with the Balkans. But, in view of the reference in this month's item on counterpoise antennas, I take the opportunity of including the circuit diagram of the single-6L6 transmitter section used in the Polish 'A' (later 'AP') models A-1 to AP-6. These were all HF transmitter/receiver/PSU equipments in a single metal container (11 by 8.5 by 4 inches) with a close-down lid and weighing from 10 to about 13lbs: **Fig 8.** Models varied in the receiver and wave ranges. Receivers were two or three-valve 'super-gainer' type superhets with a regenerative detector (6K8/6SC7 or 6K8/6SJ7/6SC7). Transmitters with a single metal 6L6 covered either 2 to 8MHz or 2 to 16MHz according to model. Rectifier 5Z4, with provision for either mains or vibrator operation.

The AP series (and the higher power BP series with 829 double-tetrode power-amplifier) quickly gained the reputation (in 1942-43) as the best available sets of this general type and numbers were acquired by the British, French and Yugoslav agencies involved in covert radio operations and the Poles encouraged to increase production. For a single AP model the nominal 'price' was £71 but I discovered from the records at the Polish Institute and Sikorski Museum in London that in July/August 1942 the Poles supplied SOE with 20 A-1 and two B-1 equipments for a total of £1132 17s. In the summer of 1943, they provided the French D.SR/SM intelligence organisation which worked for General Giraud rather than General de Gaulle with five AP and five BP equipments for use for secret links between Algiers and metropolitan France. AP models were also supplied to British intelligence.

Tadeusz Heftman was one of the post-war founders of British Communications Corporation (BCC) at Wembley, a firm which has specialised in military communications equipment in the post-war period and is now part of the Racal group of companies (Tadeusz Heftman still lives in England). The Polish engineering team at Stanmore, including Heftman, Mieczyslaw Makowski and others, developed the A(P) series; the B(P) series with a higher-power transmitter and superhet receiver in a similar metal box to the A-series but with a separate PSU, the B1, B2 and B3 models covered 2-8MHz but the longer range BP4 covered 4-16MHz with a 6K8/6SK7/6SQ7/6SC7 receiver and 6V6/829 transmitter providing some 30W RF output; the high-power AR11 transmitter with four 807s in parallel push-pull and with 866A mercury vapour rectifiers in the PSU; and the 'pocket' battery-operated OP3 miniature receiver (1R5/1T4/1T4/1S5/1T4) and associated NP3 (push-pull 1J6) and NP3A (single 3A5) transmitters working from 67.5V and 1.5V layer batteries.

Although the AP series had no conventional meters it was well furnished with miniature neons and a pilot bulb antenna current meter that made it reasonably simple to adjust. I recall trying-out, on the air, one of the AP models in Holland in late 1944 and being much impressed with this equipment although finding the receiver suffered pretty badly from 'image' during night-time conditions, a problem that did not occur with the 'straight' regenerative receivers in most Whaddon agent sets.

In 1945, in the final months of the war, the Poles developed the prototype of what would have been the smallest transmitter-receiver of all — the AP-7 using miniature valves and the whole not much larger than a 20-pack of cigarettes; I believe there was also a BP-5 model, but do not think either of these equipments ever went into production.

After the war, I remembered the 'super-gainer' technique used in the Polish receivers and for many years used this approach, rather than a BFO/diode detector, in a superhet built around the Tobe Model H coil pack and triple-tuned IF transformers (it still works!).

NEW TECHNOLOGY AND MOBILE/PERSONAL RADIO

At the 5th International Conference on Mobile Radio and Personal Communications last December, Dr Peter Saul, G8EUX and M Jacob of Plessey Research, Caswell in a paper 'The potential for new technology in mobile/portable radio' (*IEE Conference Publication No 315*, pp99-102) suggested that the near future will see a sharp move away in this area from the classic combination of frequency modulation and superhet receivers (both stemming from the work of that most inventive American engineer Howard Armstrong): "The next decade or so will see many changes, so that by the year 2000, very few radios will conform to the principles set out by the many pioneers; instead, the designers of today will hardly be able to recognise and understand fully their progeny."

While personally I suspect that the rate of change may not be quite that fast (or as radical as they have proved to be for the Plessey Company), there are undoubtedly major changes in the pipeline, including the increasing use of digital signal processing (DSP); digital speech with digital modulation; direct frequency synthesis even at UHF; spreading use of gallium arsenide (GaAs) IC and discrete devices at high frequencies; and the use of direct-conversion rather than superhet receivers in order to facilitate the development of complete receivers on a chip.

In their paper, the authors described the advantages offered by new silicon, GaAs and interconnection technology in radio communication systems: "The radio of the future will go from the antenna to a DSP system by the shortest possible route, at the lowest cost and consuming the lowest power." They note that the time delay from

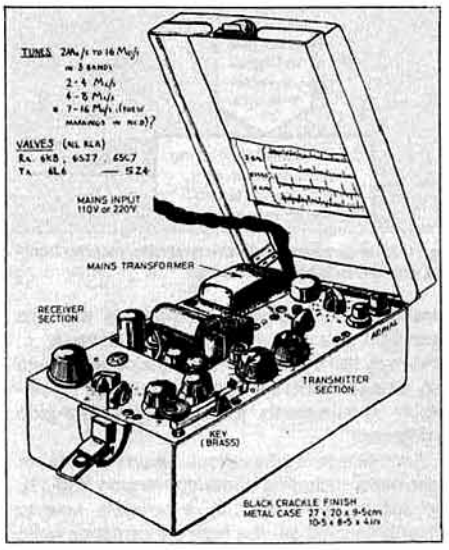


Fig 8. Drawing of G3XUO's Polish AP-5 wartime transmitter-receiver designed and built at the Polish Radio Centre Workshops, Stanmore, Middlesex (Illustration based on a drawing by G3XUO's son, David Edwards).

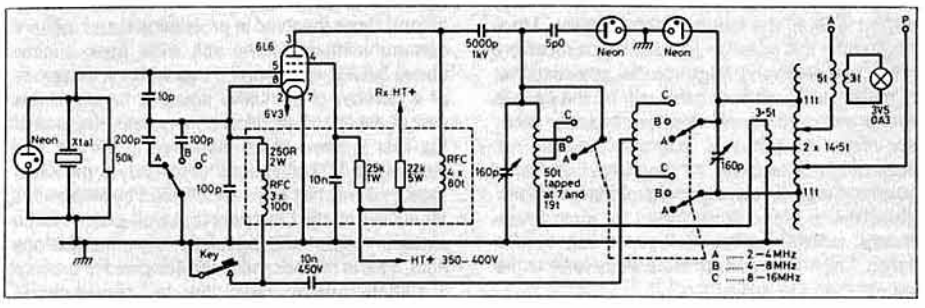


Fig 9. The single-valve transmitter section of the Polish AP5. Basically similar transmitters (some omitting the 8-16MHz band) were used in Polish models A-1, A-2, AP-3, AP-4, AP-5 and AP-6.

research to production for an advanced semiconductor technology is about five years .... In the main, a semiconductor process has a life of about five years from early availability to peak production, with a further five at the peak and a decline which may last a little longer .... for successful products in the mid-90s, today's research processes are likely to be a good choice.

In silicon bipolar technology, they suggest, the choice is now between analogue processes featuring high-voltage operation and many component options but limited speed, or the newer, very fast digital processes, such as the Plessey Process HE, a one micron geometry process with 24GHz cutoff frequency (Ft) and VLSI capability — already demonstrated in digital form at over 10GHz in a prescaler and in more complex form in a direct frequency synthesiser (DFS) with a clock frequency of 2GHz: "DFS devices (**Fig 10**) are likely to become very important in radio design, since they offer an almost entirely digital solution to frequency synthesis. The DFS itself needs no lock loop, and

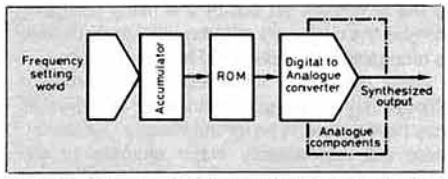


Fig 10. Basic arrangement of a direct frequency synthesiser (DFS).

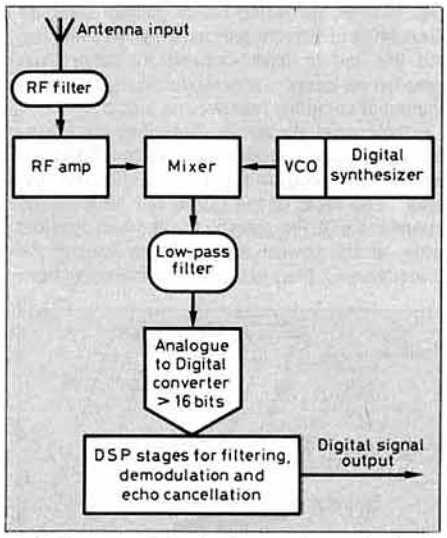


Fig 11. Arrangement of a direct-conversion receiver front-end with digital signal processing.

essentially no analogue components with the exception of a digital to analogue converter ... extremely fast frequency hopping is possible, with very close channel spacing, two mutually incompatible requirements for a phase-locked-loop synthesiser.

"After discussing the various options for receiver front-ends, including direct-conversion (**Fig 11**), the authors conclude: "It is possible now to integrate almost all of a high performance radio receiver onto a single chip; future systems may even include all the filters on the chip too. More importantly, it is possible to build these receivers at very low cost in very large volume, provided that the market size justifies it; this will be the case in cellular and cordless phones, and possibly other new areas of personal communications, not necessarily in telephony. All the above comments could have referred equally to digital transmissions, indeed this is the route intended for most future services, even where the intelligence conveyed is speech. The limitations are more likely to be in the concept than the realisation."

MORE ON CHIREIX-MESNY / ZIG-ZAG ANTENNAS

Antennas seem to follow a cyclic pattern of interest: forgotten, hardly mentioned for years and then a period of sharply mounting interest. In the February *TT*, I included diagrams of the Chireix-Mesny array of half-wave dipoles (developed by French engineers in the 1920s) and the associated simplified zig-zag form: my first mention of this basic but seldom mentioned array technique since 1977. This encouraged G3ESP to recall (*TT*, April) how a relatively compact 500MHz Chireix-Mesny array had been used by the Germans in the second world war. Next, came the May issue of *Television* (IPC) with an article 'An experimental Band IV (470-585MHz) zig-zag aerial' described by Percy Lamb: **Fig 12.**

This describes his experience with what he calls a 'double zig-zag' but what is in effect a classic Chireix-Mesny array mounted in front of a mesh reflector and providing a horizontally-polarised, broad-band receiving antenna with a measured gain of about 14dBi. The gain comes from the narrow vertical radiation pattern, akin to that of stacked dipoles. Directivity is thus sharp in the vertical plane but broad in the horizontal plane. Although designed for Band IV, sensitivity and gain is maintained well up into Band V. Percy Lamb concludes: "The performance could probably have been improved by using ⅜in aluminium strip instead of the ⅛in solid rod. The reflector's efficiency would probably have been enhanced by using ½in spacing instead of the 1in mesh. In addition a more precise matching to the feeder cable would appear to be desirable. Even without these refinements however the zig-zag configuration offers interesting possibilities when a wideband design with low horizontal directivity is to be combined with high directivity in the vertical plane." For UHF television reception the sharp vertical radiation pattern should reduce 'aircraft flutter,' a useful feature for viewers living close to air lanes.

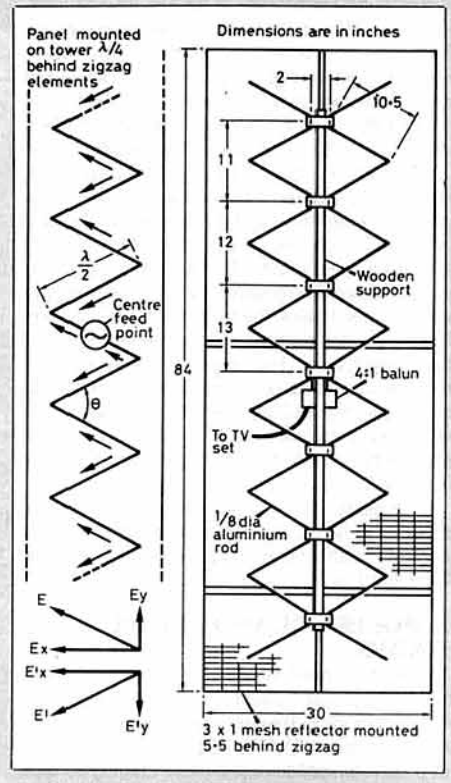


Fig 12. (a) Principles of the zig-zag antenna array. RF power fed to mid point produces horizontally polarised radiation from a vertically mounted panel since the vertical vectors cancel while the horizontal vectors add. (b) The experimental Band IV 'double zig-zag' (ie Chireix-Mesny TV receiving antenna with reflecting screen as described by Percy Lamb in Television (May 1990).

Clearly, if such an array is mounted horizontally rather than vertically, the result would be low directivity in the vertical plane and high horizontal directivity, with vertical polarisation.

VALVE LINEAR OPERATING CONDITIONS

Bob Bastow, G3BAC writes: "A number of circuits have appeared recently in *TT* and elsewhere using several paralleled valves of the PL519 type operated with high voltage, low current in the interests of better linearity. It seems worth reminding readers that unfortunately this mode requires high load impedances such that anode and stray capacitances make it virtually impossible to achieve correct LC values for the higher frequency (HF) bands. Operation with anode voltages of the order of 600V, although a bit more demanding on the current supply capability of the PSU, does enable correct LC values to be used on 28, 24 and 21MHz bands. The extra capacitance required on 7 and 3.5MHz can be made up by switching in parallel high-voltage mica capacitors."

IN BRIEF

The item 'Exploiting the millimetre bands' (*TT*, April 1990, p22) reported the current interest among those involved in professional and military communications in the still wide open spaces above 30GHz and coupled this with the existence of a number of exclusive amateur bands in this part of the spectrum. Now comes news that one of the first systems to be marketed in the UK and meeting the DTI conditions for virtually unregulated local systems has been announced by Microwave Modules Ltd, the Liverpool firm well-known in the amateur radio and specialist communications field. This is the 'Microlink 60' designed to provide a millimetre-wave radio link for closed-circuit television (CCTV) security systems over distances of up to 1km. It works in the 54-55GHz band and it is claimed that over this distance, it transmits clear colour TV pictures and two-way audio plus telemetry control signals without suffering the loss of quality experienced in rain, fog and snow with infra-red systems. It is expected that it will receive DTI type approval to MPT1415.

Bruce Sutherland, G3IES (336 Charlton Road, Bristol BS10 6JZ, telephone 0272-500742) has become sole UK agent for the 'Power Search & Store Module type PS-90' and 'Search & Store Module SS-45' which provide Tandy PRO-2004 and PRO-2005 scanning receivers with the facility to store frequencies automatically while in the search mode — a facility normally found only on high-cost scanning and surveillance receivers (eg the £950 Icom-7000). The PS-90 has two modes of operation, the simple mode of the SS-45 where the frequencies found during a search are stored in the ten monitor memories; and a more complex mode where the frequencies are stored directly in the scanner's main memory. Users can set a limit on how many searched frequencies (up to 255) will be stored. Users of scanner receivers should be aware of the dangers of breaching the terms of the Wireless Telegraphy Acts and the Interception of Communications Act which make it a criminal offence for any person *intentionally* to intercept a communication in the course of its transmission by means of a public telecommunications system. This does not, of course, apply to stations in the amateur or broadcast bands other than telecommunications services in shared bands. □

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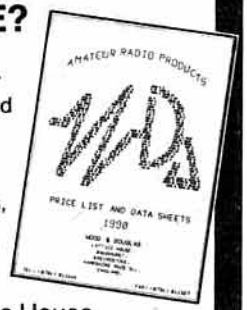

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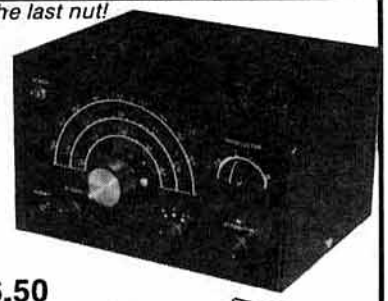

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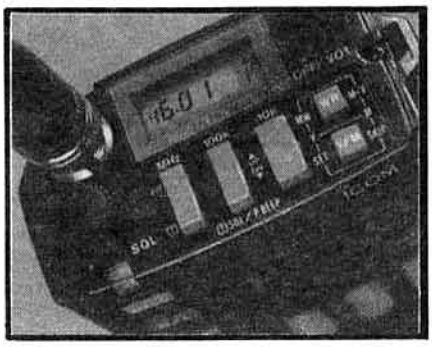

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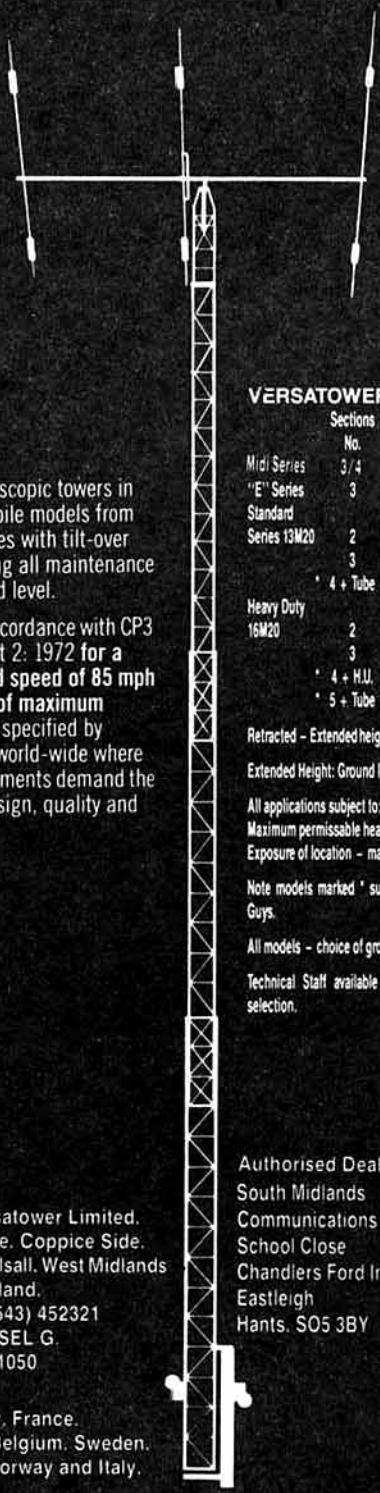

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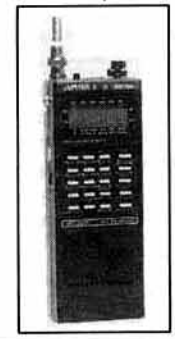

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PART 3

Tim Forrester, G4WIM, concludes this series by discussing construction, alignment and operation.

MICROPROCESSOR CONTROL

The microprocessor employed in this radio is a readily available Motorola 6805 (see **Fig 9**). This particular device was chosen for several reasons: it is fairly cheap, requires minimal extra ICs around it to make a complete system and is easy to program.

I decided from the outset that the program would be structured so that as time progressed I could add more features as required. The software as it stands provides most of the 'bells and whistles' found on Japanese radios. The reason for this is the fact that once the decision to use a microprocessor in a radio is taken, it becomes fairly trivial to make it earn its keep and perform such functions as memory scanning etc.

To ensure rapid response from the controls, the microprocessor is primarily interrupt driven, i.e. any required change in frequency demanded by either the tuning sensor or the up/down buttons is instantly acted upon.

When the radio is not being tuned, then the microprocessor reverts to scanning the front-panel controls to check for any change in settings.

The program is contained in IC37 and I can provide a fully documented source code for any prospective builders should they wish to tailor the software to their own needs.

The microprocessor has several extra circuits around it to provide interfacing for the various functions it has to provide.

IC33, IC31 and IC35 are latches which retain the data which is written to them by the microprocessor via port A of IC36. The data which these latches hold is used to program the PLL to the required frequency. IC32 is a digital-to-analogue converter which generates the 10Hz interpolation voltage for the PLL reference oscillator.

IC34 and associated components interface the PTT line, squelch, power down and microphone up/down buttons into the microprocessor. IC40 and IC41 decode the rotary sensor on the front panel to tell the microprocessor which way and how fast the control is being operated.

An interrupt is generated by TR58 if the tuning sensor is operated or the up/down buttons are operated, and also if the supply fails or is turned off to the radio. This last interrupt is the most important as it has to provide an orderly power-down of the microprocessor: it is thus always the first to be tested for when an interrupt occurs.

TR59 provides a power-on reset to wake the microprocessor up from its 'sleep' mode. All memory and frequency settings are retained in the microprocessor RAM when the radio is turned off, providing that the back-up battery has sufficient charge. Diodes D53 through to D68 provide a means of 'diode OR-ing' the switch controls into the microprocessor.

CW TRANSMIT OSCILLATOR AND DISPLAY BUFFER

This circuit (**Fig 10**) generates the CW transmit signal at a frequency of 10.6992MHz to be mixed up to the operating frequency in the same manner as FM and SSB.

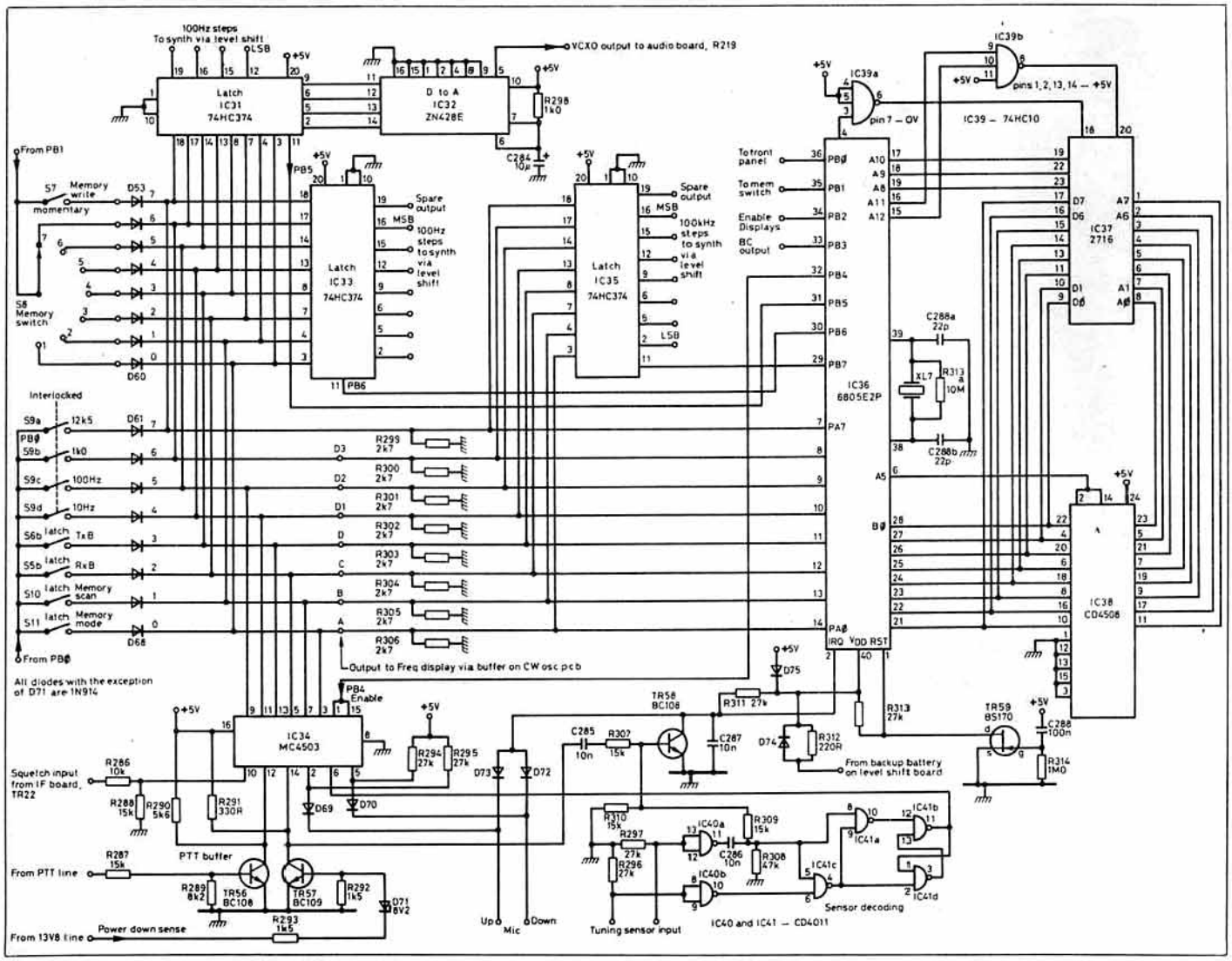


Fig 9. Microprocessor control circuit (Circuit 9).

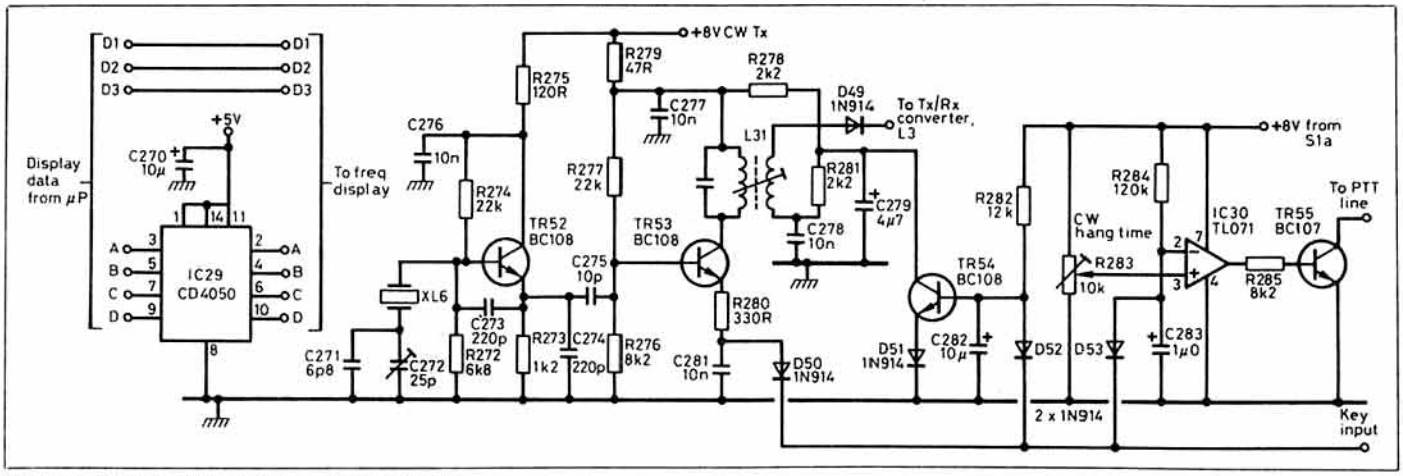


Fig 10. CW transmit oscillator and display buffer (Circuit 8).

When CW transmit is selected by depressing the morse key, 8V is applied to TR52 and 53. Also, because the key is depressed, TR54 is switched off, so permitting D49 to conduct and thereby passing the signal to the transmit/receive converter.

To prevent unwanted relay chatter between individual dots and dashes, the key line also discharges C283, causing IC30 to turn on TR55 and so holding the PTT line on transmit.

To provide extra isolation for the transmit IF signal during gaps between individual dots and dashes, the emitter of TR53 is also connected to the key. Therefore when the key is not depressed, TR53 cannot amplify the signal from TR52, which provides extra isolation. To prevent unwanted chirp, TR52 is maintained during the whole period of a CW transmission.

IC29 buffers the BCD frequency display data from the microprocessor. This is necessary as the microprocessor cannot drive more than one TTL load at a time, and the frequency display represents a load of seven TTL gates.

FREQUENCY DISPLAY

The frequency display (**Fig 11**) consists of seven individual integrated circuits. Each one has its own integral data latch and seven-segment driver.

The microprocessor first presents the BCD data to all the displays and then selects which display actually stores and displays the information by means of IC42. The microprocessor writes the relevant digit to each display in turn, starting with the LSD (10Hz). The 5V feed for the display is the same 5V rail which powers the microprocessor.

The displays used in the design are available from several suppliers, but are a little on the expensive side. A cheaper solution would be to use separate displays, drivers and latches, but this would increase the chip count and size of the display board.

DATA BUFFER AND BACK-UP BATTERY

As the microprocessor runs off 5V and the PLL runs off 8V, a level-shifting circuit is required to ensue that the PLL is correctly programmed. This function is served by IC50, 51 and 52 (**Fig 12**). This circuit also shows the back-up battery for the microprocessor RAM. It is a 3.6V nicad which is trickle-charged while the radio is in use.

FRONT PANEL AND PSU

The bulk of the front-panel wiring is shown in **Fig 13**. Note that switches S5 and S6 are latching DPCO types and the other poles of these switches are shown with the microprocessor circuit for clarity. Likewise switches S7, S8, S9, S10 and S11 are shown with the microprocessor circuit even though they are front-panel controls.

The status LEDs D79 to D85 and their associated resistors are all mounted on a small PCB directly behind the LEDs.

IC53 and 54 are both mounted on a heatsink at the rear of the radio. D77 and D76 enable an external supply to be used if required.

CONSTRUCTION

The prototype radio was constructed as a number of separate modules, each serving a particular function. This technique was chosen so that should any unit not perform as expected, it could be easily removed and modified or changed.

As can be seen from the photographs, the radio is built in a standard case manufactured by Schroff. All the major circuit boards are installed onto the centre chassis plate, with the IF, PLL, transmit/receive converter and PA being built into separate screened boxes. Filter capacitors are used to enable signals to enter and leave the various units. This is very necessary as 50 and 70MHz RF has a nasty habit of upsetting sensitive circuits.

It should also be noted that the top side of the chassis plate contains the IF, transmit/receive, and PA circuits, while the lower half contains the PLL, microprocessor and audio circuits. The units are divided up in this manner to minimize the possibility of mutual interference.

Both the front and rear panels are easily removed for access to the interwiring and the front panel wiring. I would strongly suggest that the above layout be adhered to, as otherwise the PLL and microprocessor may cause interference to the IF.

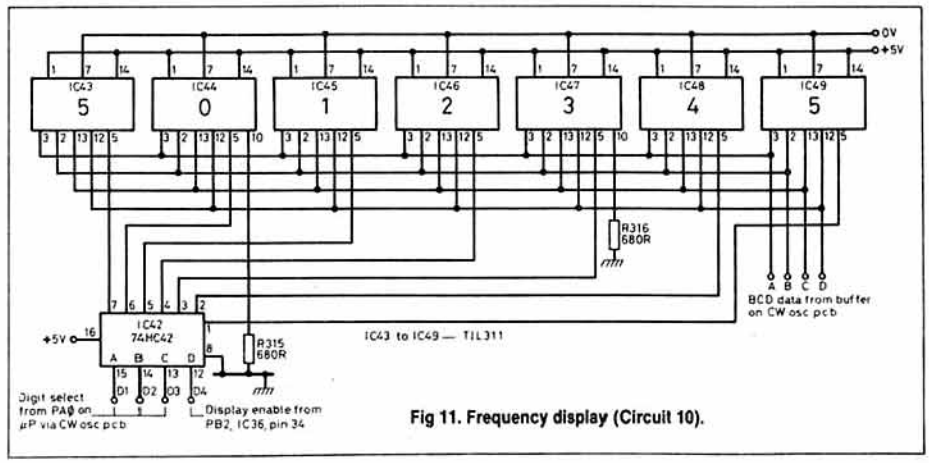


Fig 11. Frequency display (Circuit 10).

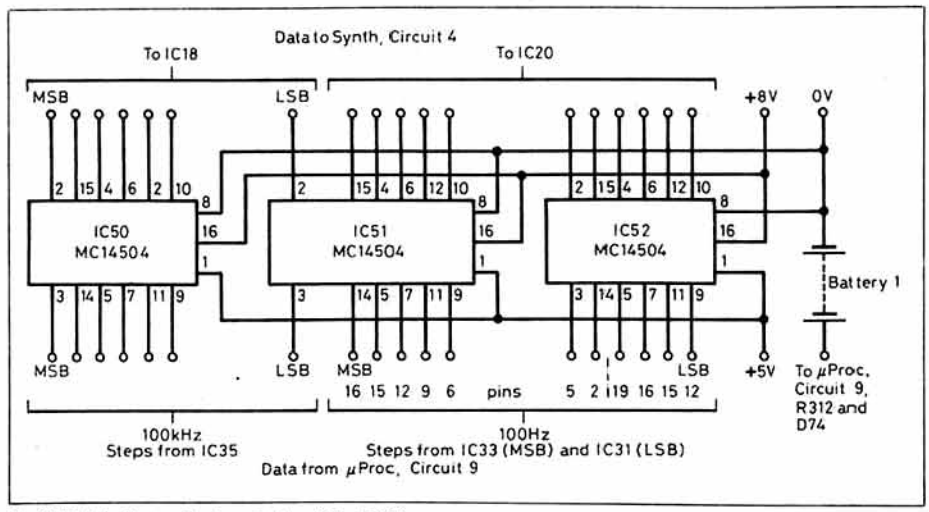


Fig 12. Data buffer and back-up battery (Circuit 11).

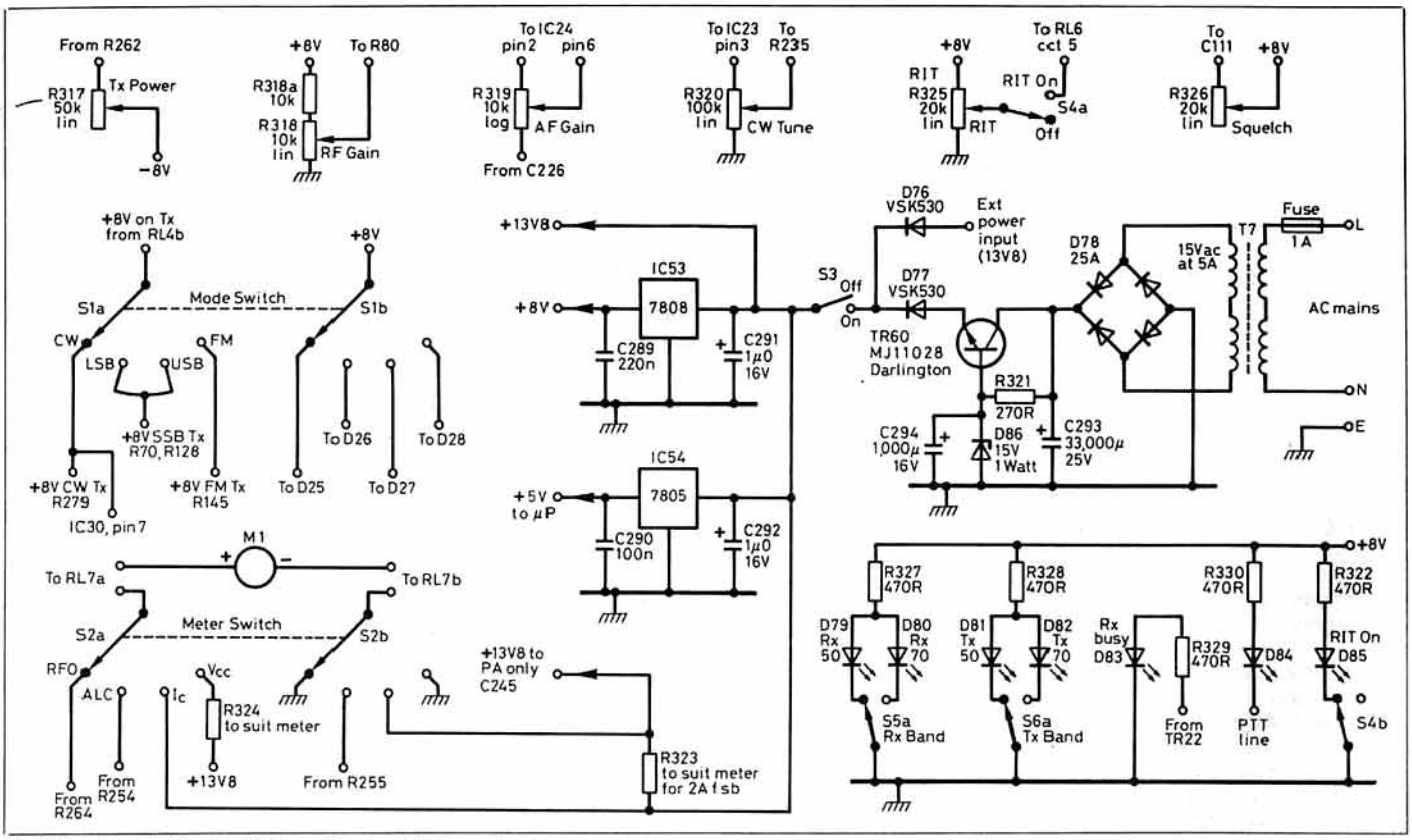


Fig 13. Front-panel wiring (push-button wiring (push-button wiring shown with microprocessor in Fig 9).

ALIGNMENT

Although this is quite a complex project, it is quite simple to align, providing care is taken with each unit to ensure that it is operating correctly. I will not give a great deal of detail, as I feel that anyone who is confident enough to build this radio will need little help in aligning it.

PLL alignment

To align this unit, it is best to first check that VCO 1 and VCO 2 can cover the correct frequency ranges, as detailed below.

VCO 1 Fmin = 20MHz with 1V on the control line.
Fmax = 29.99MHz with 7V on the control line.
VCO 2 Fmin = 59.3MHz with 2V on the control line.
Fmax = 62.6MHz with 6V on the control line.
Master VCO as VCO 2.

If all is well with the range of the VCOs then by programming 976 manually into IC20 (the inputs to both IC18 and IC20 are binary weighted, i.e. a 1, 2, 4, 8, 16 etc sequence), PLL 1 should lock up at 20MHz. Increasing N to 1975 should cause the frequency to increase to 29.99MHz.

At pin 3 of IC12, a signal ranging from 200 to 299.9kHz, depending upon the data applied to IC 20, should be present.

By programming 605 into IC18, PLL 2 should lock up at 60.5MHz. Providing VCO 2 and the master VCO have been adjusted to have similar characteristics, then PLL 2 should cause the master VCO to be mixed down to 200kHz. This signal should appear at IC12 pin 14, and the output of IC13 at pin 6 should be somewhere about mid-rail. The master VCO should have a frequency of 60.7MHz plus or minus any slight error with XL5's frequency.

As the number programmed into IC20 is gradually increased, the voltage at pin 6 of IC13 should gradually increase to a maximum when PLL 1 is programmed to 1975. Going any higher in frequency requires that PLL 1 be reset to 976 and PLL 2 increased by one to 606. Any slight tracking error between PLL 2 and the master VCO can be adjusted out by slightly adjusting the trimmer capacitors associated with the VCOs.

Transmit/receive converter alignment

It is assumed that the PLL is already aligned and working, and that a suitable receiver, or preferably transceiver, is available which can operate on 10.7MHz as a 'stand-in IF'.

The only alignment required on this PCB is that of the bandpass filters and the RF amp input circuit. Ideally a spectrum analyser or similar would be used, but good results can be achieved by merely tuning the appropriate filter for maximum response at band centre.

It is necessary before starting to align this unit to set the AGC and ALC inputs to approximately 6V; this is to ensure correct operation of TR6 and TR14.

By listening for a local signal or beacon at the IF output of the PCB, with the PLL set to the correct frequency, the bandpass filters can be adjusted for best signal reception.

L4 is adjusted for best sensitivity on 70MHz while C23 is adjusted for best sensitivity on 50MHz, with the BC input set to 13.8V.

The transmit amplifier stages can be checked by applying a 10.7MHz signal of -10dBm to the IF input. Then with the PTT line tied to 0V, approximately 100mW at the desired frequency should be produced by TR11.

It is advisable to check that the receive and transmit performance on both bands is similar. If it is not, this may indicate that the transmit amplifier stages have insufficient gain (usually at 70MHz). The gain could be balanced up by slightly increasing the emitter bypass capacitors.

Multimode IF alignment

It is assumed that both the PLL and transmit/receive converters are working correctly. With SSB receive selected, and all necessary supplies connected to the IF, adjust C125 and C126 for 10.7015 and 10.6985MHz respectively, then adjust L13, L14, L15, L16 and L17 for maximum receiver noise. If no noise is heard, check that the squelch control has been set to lift. It should now be possible to receive SSB signals, albeit with no audio power amplifier and no means of easily controlling the PLL.

To check the operation of the FM demodulator IC4, select FM receive by turning on D12 as opposed to D13 for SSB. With no signal being received, adjust the values of R90 and C103 so that a signal of approximately 100kHz is present at pin 14 of IC4. Now, with an FM signal present, adjust L18 for best signal. Also check that the squelch control works and lifts on a weak signal. This squelch signal also operates on SSB signals.

Switching to FM transmit should cause TR28 to operate, and with no modulation applied adjust RFC13 for 10.7MHz. With a suitable audio source it is now possible to adjust the FM microphone gain and deviation by means of R131 and R139 respectively.

On SSB transmit R127 sets the microphone gain, and should cause a SSB signal of the same level as the FM transmit output to be generated at the output of the IF, i.e. circa -10dBm (100µW).

At this stage it is a good idea to install the PLL, IF and transmit/receive converter into the chassis, otherwise the interwiring on the bench can get messy.

So that some initial air tests can be done, I would suggest that the microprocessor is built up and installed next. This enables a more convenient means of operating the radio, albeit in only 100Hz steps at this time. When the radio has been satisfactorily checked out on low power, then all it needs is the PA and audio circuits. The adjustments to the audio PCB require little comment, except to say that it is preferable to have all the presets set mid-way initially; this is to prevent the meter being accidentally overloaded.

Broadband PA alignment

With no RF drive applied and the PA fastened to a suitable heatsink, connect D37 to 0V, so enabling the PA. Quickly adjust the driver quiescent current to 70mA and the PA to 40mA, by means of

COMPONENT LIST

RESISTORS

R1, 5, 78, 119, 140, 153, 166, 170, 183, 184, 200, 308: 47k
R2, 8, 31, 49, 55, 87, 109, 118, 144, 168, 173, 190, 193, 198, 206, 214, 215, 322, 327, 328, 329, 330: 470
R3, 7, 9, 81, 86, 112, 156, 167, 172, 185, 192, 203, 312, 220
R4, 14, 45, 152, 169, 194: 39
R6, 107, 135, 154, 171, 182, 187, 232, 274, 277: 22k
R10, 54, 60, 61, 63, 128, 275: 120
R11, 21: 3k9
R12, 26, 42, 48, 76, 145, 151, 179, 181, 186, 228, 254, 263, 267, 268, 298: 1k
R13, 15, 43, 44, 247: 10
R16, 18: 180
R17, 150, 270: 27
R19, 64, 74, 178, 189, 280, 291: 330
R20, 23, 24, 29, 33, 34, 35, 51, 88, 188, 196, 202, 290: 5k6
R22, 36, 57, 58, 67, 72, 77, 113, 124, 125, 136, 137, 147, 160, 161, 278, 281: 2k2
R25, 22
R27, 30, 50, 56, 69, 73, 191, 257: 100
R28, 53, 111, 177, 276, 285, 289: 8k2
R32, 52: 51
R37, 172a, 176, 207, 292, 293: 1k5
R38. 4R7
R39, 46, 62, 114, 132, 133, 148, 180: 3k3
R40, 47: 560
R41, 6R8
R59, 70, 108, 146, 164: 390
R65, 66: 620
R68: 270
R69a, 73a, 80, 106, 272: 6k8
R71, 99, 110, 129, 141, 142, 162, 163, 195, 208, 209, 216, 218, 221, 230, 231, 233, 234, 238, 246, 252, 271, 286, 318a: 10k
R75, 210, 212: 150k
R79, 83, 84, 85, 248, 249, 251, 314: 1M
R82, 92, 93, 97, 100, 117, 126, 157, 158, 217, 226, 235, 237, 239, 241, 244, 265: 4k7
R89, 115: 33k
R90, 91, 104, 219, 220, 223, 225, 250: 100k
R94: 56k
R95, 159, 273: 1k2
R96, 102: 180k
R98, 101, 138, 236, 240, 287, 288, 307, 309, 310: 15k
R105, 116, 299, 300, 301, 302, 303, 304, 305, 306: 2k7
R120, 282: 12k
R127, 139, 222, 227, 229, 253, 255, 262, 283: 10k preset
R130, 197, 205: 150
R131: 1k preset
R134: 82k
R143, 279: 47
R149, 174, 294, 295, 296, 297, 311, 313: 27k
R155, 315, 316: 680
R165, 284: 120k
R199, 201: 18k
R204, 211: 1k8
R213: 68k
R224: 100k preset
R245: 1
R258: 3R3
R259, 10: 1W
R260, 261, 1: 0.5W
R264, 266, 269: 20k preset
R313a: 10M
R317: 50k lin pot
R318: 10k lin pot
R319: 10k log pot
R320: 100k lin pot.
R321, 270: 2W
R323, 324: to suit meter
R325, 326: 20k lin pot
All resistors 0.25W unless otherwise stated.
Note: R103, 121, 122, 123, 242, 243, 256 are not fitted.

CAPACITORS

C1, 19, 21, 48, 56, 57, 60, 68, 71, 75, 93, 100, 101, 108, 113, 120, 122, 123, 128, 140, 144, 149, 150, 151, 152, 157, 158, 159, 162, 165, 166, 167, 168, 170, 171, 176, 194, 199, 201, 206, 207, 213, 241, 244, 261, 262, 264, 265, 266, 267, 276, 277, 278, 281, 285, 286, 287: 10n
C2, 125, 126, 178, 216, 272: 25p var
C3, 23, 179: 10p var
C4, 29, 62, 102, 106, 109, 121, 193, 195, 198, 200, 203, 210, 215, 218, 229, 230, 231, 288, 290: 100n
C5, 110, 189, 225, 227, 283, 291, 292: 1µ 16V
C6, 7, 180, 181, 243: 56p
C8, 116, 117, 136, 137, 146, 163, 173, 279: 4µ7 16V
C9, 96, 134, 210a, 223, 235, 237, 239, 269, 270, 282, 284: 10µ16V
C10, 13, 14, 15, 16, 55, 59, 65, 67, 114, 185, 187, 192, 202: 1n
C11, 132, 183: 18p
C12, 148: 100p
C17, 31, 46, 47, 50, 51, 53, 58, 61, 63, 64, 105, 111, 233: 2n2
C18: 8p2
C20, 22, 25, 26, 27, 28, 54, 66, 69, 70, 73, 74, 77, 78, 79, 80, 81, 83, 84, 86, 87, 90, 95, 97, 98, 99, 112, 131, 133, 145, 182, 186, 188, 190, 191, 204, 205, 209, 211, 240, 258, 259, 268: 4n7
C24, 271: 6p8
C30: 150p
C32, 33, 43, 45, 253, 257: 68p
C34, 44, 107: 33p
C35, 37, 41, 42, 76, 124, 127, 217, 288a, 288b: 22p
C36, 40: 15p
C38, 89, 91, 103: 270p
C39, 242: 470p
C49, 22µ 16V
C72, 160, 161, 249, 250, 251: 82p
C82, 85, 88, 208, 248, 252: 47p
C92, 115, 118, 135, 141, 142, 143, 234: 2µ2 16V
C94, 129, 130, 147, 154, 155, 273, 274: 220p
C104: 120p select on test
C119: 330p
C139: 0.22µ
C156, 164: 39p
C169, 221, 222, 224, 226, 289: 220n
C174, 196: 470n
C175: 2µ2 paper
C184: 100µ 10V
C197, 220: 47n
C212, 214, 238: 27p
C219: 1n5
C228: 470µ 25V
C232: 100µ 25V
C236: 100µ 16V
C245: 1n F.C.
C246: 22µ 25V
C254, 255, 256: 120p
C260, 263: 2p2
C275: 10p
C293: 33,000µ 25V
C294: 1000µ 16V
Note: C52, 138, 153, 172, 177, 247, 280 are not fitted.

SEMICONDUCTORS

TR1, 29, 32: 2N3823
TR2, 3, 7, 13, 30, 35, 36, 49: BFY90
TR4, 5, 8, 40, 55: BC107
TR6: BF981
TR9, 19, 20, 25, 26, 44, 51, 57: BC109
TR10, 48: BD132
TR11: 2N3553
TR12: 2N5109
TR14, 16, 17, 18, 21: 3N201
TR15, 27: J310
TR22, 38: 2N3702
TR23, 24, 28, 31, 34, 37, 39, 41, 52, 53, 54, 56, 58: BC108
TR42: BS250
TR43, 59: BS170
TR45, 46, 47: BLY83
TR50: BD139
TR60: MJ11028
D1, 20, 22, 23, 24: BB105
D2, 6: 10V zener
D3, 4, 5, 7-15, 17, 18, 19, 21, 25-36, 38-75, 87-89: 1N914
D16: 1N4007
D37: 1N4001
D76, 77: VSK530
D78: 25A bridge rect
D79-85 red LED
D86: 15V 1W zener
IC1, 6: 78L08
IC2: SBL-1
IC3, 8, 16, 19: SL1640
IC4: SL6601
IC5, 7, 9: TL072
IC10, 14: 78L05
IC11: SP8629
IC12: CD4046
IC13, 21, 25, 26, 27: ICL7611
IC15: SP8660
IC17: NE5534AN
IC18, 20: MC145151P
IC22: R5620
IC23: CD4047
IC28: 7660
IC29: CD4050
IC30: TL071
IC31, 33, 35: 74HC374
IC32: ZN428E
IC34: MC4503
IC36: 6805E2P
IC37: 2716
IC38: CD4508
IC39: 74HC10
IC40, 41: CD4011
IC42: 74HC42
IC43-49: TIL311
IC50, 51, 52: MC14504
IC53: 7808
IC54: 7805

CRYSTALS AND FILTERS

XL1: 10.8MHz
XL2: 10.7015MHz
XL3: 10.6985MHz
XL4, 6: 10.7MHz
XL5: 10.24MHz
XL7: 4MHz
F1: 10M15D (Cirkit 20-10158)
F2: 10M22D SSB filter

INDUCTORS

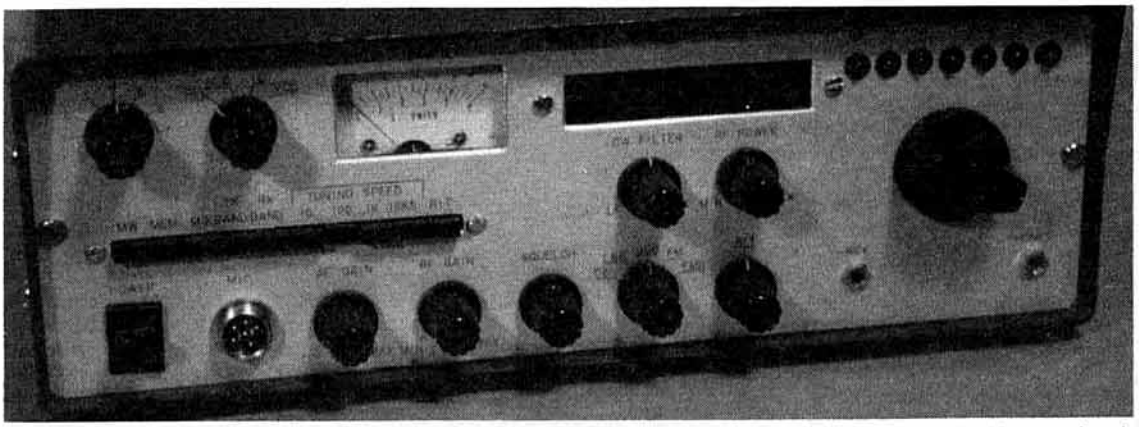
RFC1, 14, 15: 3 3
RFC3, 4, 6, 6a, 7, 9: 2 2
RFC5: 2 7
RFC8, 17, 18: 0.47
RFC10, 11: 1m
RFC12: 270
RFC13: Cirkit 35-44021
RFC16: 0.22
All RFCs are Sigma SC30 types, unless otherwise stated.
L1, 20: 6t 24SWG 4mm former tapped 2t
L2, 3, 13, 13a, 16, 18, 22, 31: Cirkit 35-00991
L4: Cirkit 35-20803 with 2t primary on 'cold end'
L5-12, 23-30: Cirkit 35-20803
L14, 15, 17: Cirkit 35-44021
L19: 12t 24SWG 4mm former tapped 3t
L21 Cirkit 35-00291
Dual screening cans Cirkit 21-09101 are required for L9 and L10, L11 and L12, L5 and L6, L7 and L8; four dual screening cans in total.
T1, 5: 2t 24SWG bifilar on Fair-rite core 26-43002402
T2, 3, 4: 2t 24SWG trifilar on Fair-rite core 26-43002402
T6: 1 + 1t primary 4t secondary 22SWG on four times
Fair-rite 26-43006301
T7 15V 1A secondary toroidal mains trans

SWITCHES AND RELAYS

S1, 2: 2 pole 4 position Mini Maka Switch
S3 DPCO toggle 5A per pole rating
S4, 5, 6, 9a, 9b, 9c, 9d, 10, 11: Latching DPCO Radiospares 333-726 with button 333-833
S7: Momentary action DPCO RS 333-710
S8: 1 pole 7 position Mini Maka Switch
S9a, b, c, d are interlocked with latching bar RS 333-625.
Mounting bar for push buttons RS 333-827. Push buttons, 10 off, RS 333-833
RL1, 2, 3, 6, 8-11: Miniature 12V SPCO RS 345-038
RL4, 5, 7: 12V DPCO RS 346-845

CONNECTORS

Molex 0.1in. PCB type



Close-up of front panel showing controls.

R266 and R269. Note that D39 and D41 should be in physical contact with TR45 and TR46 respectively.

With a wattmeter connected to the PA output, increase the drive until maximum power is achieved. The PA should easily produce over 10W output, which with ALC applied will be reduced to 7W with a low level of distortion. Check that a similar amount of power can be obtained at 50MHz (usually slightly more).

Connect the PA to RL8, so that it now feeds the low-pass filter network. With the wattmeter connected to the output, adjust R262 for a maximum of 7W on FM.

This completes the major part of the alignment, and the other minor adjustments should present no problems.

OPERATION

The controls are fairly self-explanatory, and need little comment. However, it may not be immediately apparent that it is possible to operate cross-band on two totally unrelated frequencies. The microprocessor keeps track of which frequency is used for transmit and receive. It is also possible to change frequency and band while on transmit. It would only require a minor change to the interrupt routine to prevent this being possible (if required).

By pressing in both the 1k and 12.5k tuning rate keys at the same time, a 10kHz tuning rate is attained. When a desired frequency has been reached, deselecting all tuning rate buttons will make the radio stay on it regardless of the tuning control or microphone buttons being operated.

When using the microphone buttons, the frequency in use will change either up or down by exactly the selected amount. If the button is kept depressed then it will continue to change in the desired direction at an increasing rate.

When MS is selected the radio will scan each memory frequency in turn until it finds activity, detected by the squelch lifting. It will then pause for a few seconds before continuing its scan.

The software is written so that memory frequencies can be modified by the controls, in effect acting as VFOs. They can also be directly written to by pressing MW (memory write).

All the above functions have been inspired by 'black boxes' and have been found to be useful to some extent, especially the seven 'VFOs'.

CONCLUSION

When I started this project I did not realise how much work would be involved - if I had it probably would have never even got started! However, by breaking the project down into small parts and not looking too far ahead (for fear of being overwhelmed) the radio gradually came together.

Over the past two years or so I have extensively 'air tested' it with many fellow amateurs and have been pleased with the performance and the reports I have received. That is not to say there weren't any problems in the early stages. There were several, but gradually each bug in the design was resolved.

While this design works well, if I was to start again I would have made all the changeover circuits totally electronic. This would make the radio mechanically quieter on changeover, but slightly more complex. No doubt the design can and will be improved upon as time goes by, but for now it performs very suitably.

For the past 18 months the radio has been in use 24 hours a day on 50.67MHz working as a packet network node for most of this time. During this period and to date it has proved 100% reliable.

If any prospective constructors want any help I would be very willing to assist them all I can, as I would want them to have the same sense of satisfaction on completing the project as I have had. □

PCB layouts are available from RSGB HQ on receipt of a large stamped SAE. See next month's issue for PCB ordering information.

VHF HOME CONSTRUCTION

A little while ago, the VHF Committee held a construction contest, setting a challenge to build a transceiver or transverter for the 50/70MHz bands, but we were disappointed by the small amount of interest shown. We started to wonder just how much home construction is still going on for the VHF bands. So when we asked in *RadCom* a few months ago the simple question "Is there anyone out there still building?", we were delighted to find that the answer was a resounding "Yes". We had responses from both young and old, from both recently licensed and those who had been 'at it' for years, all saying that the art of home construction was far from dead. Several points emerged from the letters:

1. Not too many people embark upon major projects like complete transceivers, tending more towards add-ons such as preamplifiers and power amplifiers.
2. Many constructors lift parts of major project designs published in *RadCom*, mixing and matching with other designs or kit modules to get the required end result. 'Technical Topics' was also widely quoted as a rich source of ideas and design elements.
3. Mods to existing equipment were very commonly undertaken.
4. Construction techniques ranged widely from tobacco tin and breadboard to full PCB, but with a distinct tendency away from PCB by the experimenter.

Perhaps this is all fairly obvious if you stop and think a little, but it does mean we can write down some tips for the intending constructor.

1. DON'T expect to find a complete published circuit to do what you want to do.
2. DO look at published designs for circuit elements which can be pulled out and used with elements from other designs to achieve the end result.
3. DON'T automatically assume that a PCB is necessary; use whatever construction technique is appropriate and aim for performance rather than looks.
4. If you're publishing a design, DO aim to break the complete project into understandable elements, and DO explain the function of each element so that others can understand.
5. Oh and by the way, using non-standard parts or difficult to obtain components is fine, but NOT if you're aiming to publish!

Mindful of all of this, the VHF Committee are keen to acknowledge achievement in home construction by means of a competition, but different in flavour from our previous try. Last time we set a specific challenge as we wanted to encourage building on the 50 and 70MHz bands, but this was obviously too restricting.

So what are your ideas on this? A postal construction competition with an open brief, other than the design must cover one or more VHF/UHF bands (50, 70, 144, 432MHz); points to be gained for originality of design, but not exclusively so — projects can use circuit elements from other designs; more points to be gained from a clear demonstration of understanding the circuit by a detailed explanation of the functioning of the elements; performance of the design to be demonstrated by the results of measurements made by the entrant (or someone independent), again explaining how the measurements are made; the most complex designs would not be assured victory — more credit would go for good, well-explained designs. Don't enter yet, but do tell us what you think, whether you might enter and what you would enter. Please write to the VHF Committee Chairman, Peter Burden, G3UBX, QTHR. Let's keep home construction alive on the VHF/UHF bands!

G3ZNU

TURKISH DELIGHT 89 — TA4/G3SDL

Dave Court, G3SDL, describes the first 50MHz activity from Turkey

In recent years I count myself as extremely fortunate in having had jobs which have taken me to many countries of the world, and which have permitted me to establish relationships with many people in radio regulatory administrations - some of whom are now extremely good friends. Of course, some are also radio amateurs. About 18 months ago I learnt that it seemed likely that an international meeting might be held in Turkey, and I started thinking whether some amateur radio activity might be included in the trip.

Ever since being licensed in July 1963 I have found a certain dubious pleasure in working DX the hard way, which is probably why until recently the band which predominated in the G3SDL log was 1.8 MHz. In summer/autumn 1988, when the trip to Turkey seemed on the distant horizon, I had still not worked TA on 160 metres. However, the 1988 COWW contest changed all that when TA2BK appeared on Top Band and seemed to work the whole world in just a few days. In consequence, the idea of operating from TA was pushed to the back of my mind.

1989 dawned, and in common with a number of Top Band DX-chasers, G3SDL arrived on 50MHz and started to chase DX seriously in about springtime - unfortunately too late for the superb openings which occurred during the 88/89 winter season. However the 6-metre bug had well and truly bitten and another 50MHz addict had been born.

In June 1989 I had to attend a meeting in Vienna where some representatives from the Turkish administration were also present. One day over coffee my thoughts wandered to 50MHz. I think I had just been told by phone that the Square Bashers' DXpedition in CT3 had started working UK stations, and there I was several hundred miles away in Vienna! Well, the gentlemen from Turkey happened to be sitting close by and the obvious question just slipped out, "Do you think it would be at all possible to operate from Turkey on 50MHz at the meeting in October?". A long pause followed and I had a mental picture of an intense network of Turkish Band I TV stations all using channel E2 in the Antalya region. I couldn't believe my ears when the reply came, "It could be all right on a one-off basis since there is no Band I TV transmitter in interference range from Antalya!"

Shortly afterwards I wrote a letter explaining my interest in 50MHz propagation and in mid-July a temporary licence arrived, covered by a letter additionally authorizing operation in the band 50-52 MHz. After recovering from the initial shock, the panic started to mount; four months is not a very long time in which to plan an expedition from scratch, summer holidays were on the horizon and I had no portable equipment to operate on 50MHz.

PREPARATIONS

For 50MHz I decided that a basic rig was required in order to keep both cost and — more importantly — weight to a minimum. After checking through *RadCom* the Tokyo High Power HT106 seemed the right choice, and in addition a two-element HB9CV was purchased. After discussing my plans over the air, Maurice, G4BAL, kindly loaned me his lightweight alloy portable mast and we were in business. With Turkey in mind, it seemed vital to have a 28MHz capability in order to participate in the 6-metre information net on 28.885 MHz. For this band (also taking due account of weight) converted CB equipment was pressed into service, together with an inverted-V dipole to be hung from the mast just under the 50MHz antenna.

A trial run proved a great success from both a holiday location at St Austell and from an expedition site at the Lizard, and it seemed that we had the basis for mounting the Turkish operation. On return from Cornwall it was decided that three additional items were required for Turkey. These were a 50MHz amplifier, a 12V DC PSU capable of powering the station and a memory keyer which would facilitate the operation of a beacon when the station could not be operated for one reason or another.

I had purchased the HT106 and HB9CV from South Midlands Communications and have always found that company extremely helpful and efficient in the past. It was therefore natural to turn to SMC for help in the provision of the additional items. True to form, they readily agreed to the proposition and loaned me the additional items.

Once the licence from Turkey

had arrived it seemed necessary to publicize the trip, and a press release was circulated in early August. Apart from the various DX news sheets, it was unfortunate that the information arrived too late for the major magazines; however, I believe that most of the serious 50MHz operators were aware of the potential TA activity. Thanks are due to Ted, G4UPS, who spread details of the operation far and wide and also made the initial arrangements with Mike, G3JVL, to construct one of his famous 5/8 vertical antennas in a form suitable for transporting in the hold of an airliner. I also thought that it would be useful to have a focal point in the UK if the 28MHz talkback did not function satisfactorily and Paul, G4IJE, kindly offered to fulfil this role. The other vital preparations for the operation were of course to arrange for the transportation of equipment and also to ensure that it could be operated once Antalya was reached.

Although having a modern international airport, Antalya has no direct scheduled airline connections with the UK. Charter flights were examined but these only seemed to be available at times which for one reason or another were unsuitable. In addition, I remembered from previous package holidays that there was a strict baggage allowance of 20kg on charter flights and no excess baggage facilities. The only possibility seemed to be to use scheduled airlines, but my previous flying experience suggested that the transit airport required careful attention. After considerable study of airline timetables I decided on a British Airways flight from Heathrow to Paris and an Air France direct flight from Paris to Antalya, with a 30kg baggage allowance.

From previous accounts in *RadCom* it also seemed advisable to check with BA in respect of the security arrangements in operation vis-a-vis the large number of electronic items to be carried. BA were very helpful; they suggested that once I'd cleared through the British Airports Authority's security arrangements there should be no further problems and advised checking in at least two hours before the flight.

All I needed to do now was to arrange the amateur operation with the hotel and to enquire about the erection of antennas. A fax was sent to the Club Hotel Sera; almost by return a fax was received saying there would be no problem in providing a top-floor room with balcony and that an antenna and mast could be erected.

We were now almost ready, and all that remained to do was to pack the equipment and antennas.

THE JOURNEY

Flight BA302 is scheduled to leave Heathrow at 6.30 in the morning. Remembering the security advice, I decided it was necessary to arrive at 4.30am - which necessitated leaving home at 3am. On arrival at Terminal 4 it was obvious that I was the only crazy individual trying to use airport facilities at such a god-forsaken hour. All the check-in desks were closed and this remained the case until 5.30am - only 1 hour before departure.

For some reason I had had premonitions of bags arriving in Bangkok rather than Antalya and I had packed with this in mind. Briefcases were forsaken and my hand baggage consisted of the 50MHz station and a laptop computer. If all the baggage was lost, I could at least operate on six! The luggage for the hold consisted of four packages - clothes and documentation for my professional activities in one suitcase, the 28MHz station, cable, tools and sundry items in another suitcase, the JVL vertical by itself and lastly the HB9CV, lightweight mast and other metal items in another package. All this came to 65kg, which was well over twice the baggage limit! Fortunately, nothing was said and I took the suitcase containing the electronics together with the hand baggage through to security. Luckily there was not much of a queue at 5.45am, and after unpacking all the equipment I was cleared through to the departure lounge. The first hurdle had been overcome and the landing in Paris was on schedule at 7.35am.

The connecting flight to Antalya was due to depart at 9.10am and this entailed transferring to another terminal; another security check was on the horizon. This time I only had the 50MHz station in the hand baggage to worry about. The holdall was placed on the X-ray machine's conveyor belt, and the French police officer's jovial face turned into an inquisitive frown. It was lucky that I could speak the language and I explained that I was en-route to set up a radio station!

We duly landed in Turkey, and with mounting anticipation I prepared to leave the aircraft. Imagine my surprise when I spied my Turkish colleagues waiting at the foot of the aircraft's steps. Clutching my hand baggage, we walked quickly to the VIP lounge - no customs, no checks! I wonder if this is a record for a foreign DX operation?! After 30 minutes or so of drinking coffee and chatting to my hosts I discovered that my worst fears were realised and that the portable mast and HB9CV had gone missing. However the JVL vertical and the 28 MHz station had arrived safely, so diversifying the luggage had certainly proved worthwhile.

ESTABLISHING THE STATION

After a decent interval I excused myself and rushed to my room to see what the TA4/G3SDL shack had to offer. The initial inspection was very encouraging; a nice desk and a convenient mains socket quite close to the balcony doors. However, the balcony did not appear to have been optimized for amateur radio purposes. It was quite small and had an overhang above, which was about the same area as the balcony. It therefore seemed vital to gain access to the roof. The station was wired together and everything appeared to be in working order after the trip. What about that roof? Back down to reception to ask about access, and there I met an extremely helpful person - Nedim Kizilirmak, the Technical Manager of the Club Hotel Sera. In an extremely short time we were on the roof, which turned out to be ideal for amateur radio purposes; amongst other things it had a network of solar panels, which were just the thing for supporting stub masts. The 50MHz JVL vertical was assembled and mounted on a 6ft mast which Nedim conjured up from somewhere, and the 28MHz dipole was temporarily erected just above the solar panels. Nedim promised that a more substantial support could be found the following day.

TA4/G3SDL IS OPERATIONAL

Although he suggested that we should have a drink, Nedim was astute enough to realise that the most important thing to me at that precise moment was to connect the feeders to the rigs to see how they performed. Just before 1540UTC, 10 hours after leaving Heathrow, TA4/G3SDL put out the first-ever call from Turkey on 50MHz. At 1545 I heard ZS3AT calling CQ on CW at 589 and the first QSO was made. At 1553 ZS3KC followed on SSB from JG77 - then the band then seemed to go flat. So far so good! The 50W into the JVL vertical seemed to be reaching Namibia at least.

The opportunity was then taken to check the SWR on ten. The first QSO on 28.885 MHz was made at 16.25 with OH9RJ, closely followed by G4YDJ, G3JVL, G4IJE and G4UPS. Unfortunately it soon became clear that something was amiss with the rig, since the modulation appeared difficult to copy. This later turned out to be a consequence of the phase-locked loop somehow becoming frequency-modulated. My apologies to all for the awful signal radiated on 28MHz, but at least the path to the UK was mostly good and provided a useful communications link for the 50MHz activity.

Back to 50MHz, and at about 1705 the band opened again with transequatorial propagation to southern Africa. Contact was made with Z23JO at 1710, closely followed by ZS6BMS and ZS6AXT and then three exotic calls one after the other - A22BW, 9Q5EE (his first QSO to the north!) and TR8CA.

By that time the early morning start, the travelling and assembling the station started to take its toll and bed was beckoning. However, contacts with nine stations in six countries had been made on the first day - not a bad start!

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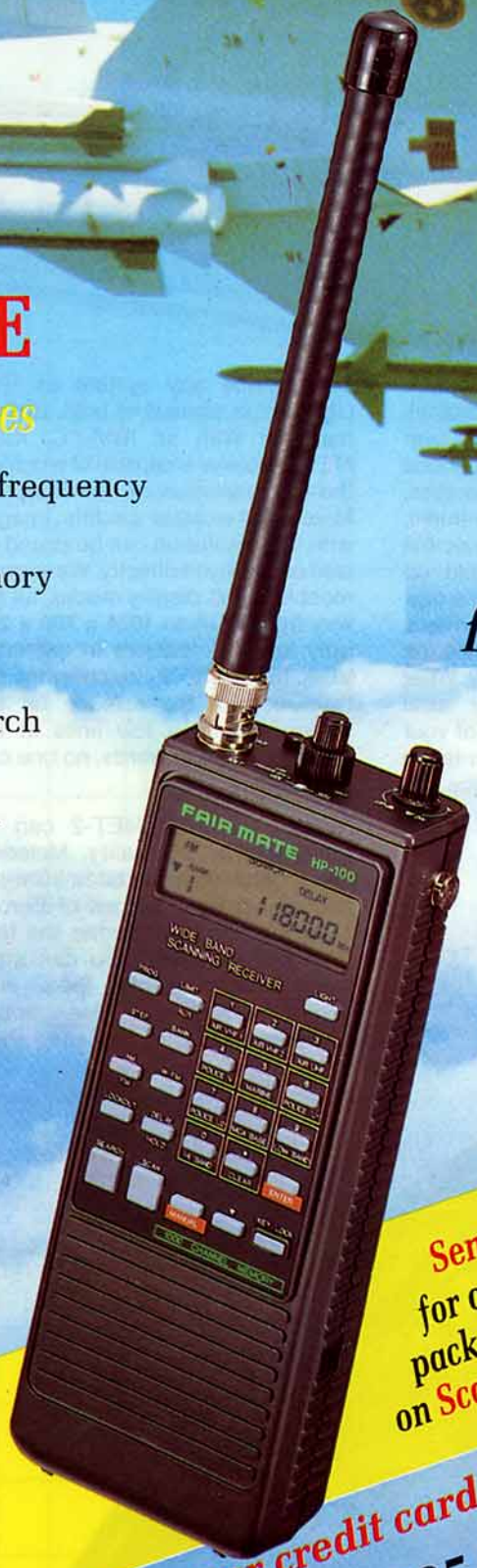

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staggering to the balcony, I was immediately aware of the beauty of the coastline. In a southerly direction the sea was about 200 yards away, and looking towards the west the beautiful Toros mountains rising to about 7000ft could be seen on the horizon. After breakfast Nedim appeared on the roof with a section of what looked like electrical conduit, about 10ft in length. Up went the 28MHz dipole in a true inverted-V form running north and south, and from 1009 through to 1229 I worked 18 stations with good reports. 50MHz opened at 1321 with TE propagation to ZS6. After 5 QSOs with ZS6 and ZS3DM, backscatter CW contacts were made with 9H1CG, 9H1BT and 9H1GB. At 1520 more firsts followed, with FR5DN at 15.20 and G3GJQ/5N0 at 1532. The first ZS4 contact was made at 1745, 1945 local time.

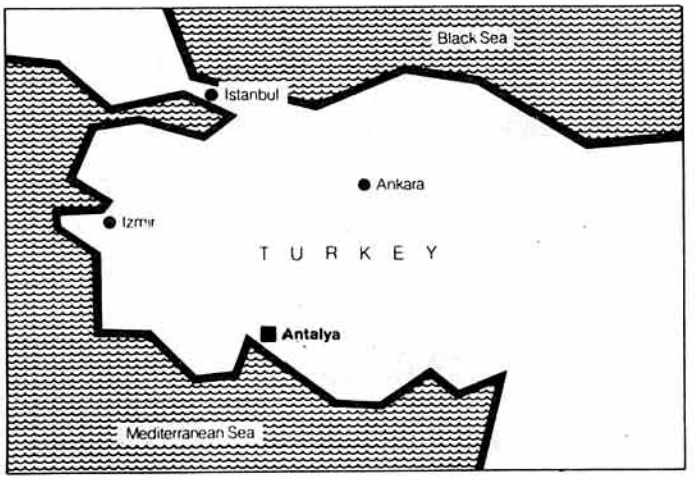
By this time a good friend and business colleague - Tom, LA7OF - had arrived and I was persuaded that the hotel's Turkish evening comprising buffet, wine and floor show (including belly dancers) should be checked out. Perhaps rather too much wine was sampled because after checking 50MHz I woke up for some inexplicable reason fully clothed at 3am. A further check on 50MHz at 0100UTC showed the band to have closed. To make matters worse Mike, ZD8MB, told me on 28MHz the next day that my beacon on 50.095MHz had peaked at S8 at about 2030 whilst running just 10W! Still, it appeared that a path existed on most days between the Mediterranean and ZD8 so perhaps another opportunity would arise.

Sunday morning was spent working stations on 28MHz but at 1335 a check on 50MHz showed the band open to ZS6, and it remained open on and off to Africa for most of the afternoon. Signals were particularly loud, with some ZS stations well over S9 for long periods. There was also a good opening between Africa and G; it was extremely frustrating to hear Roy, G3GJQ/5N0, and Kosie, ZS3E, working familiar G calls but with no signals from the UK in my RX whatsoever. I even had a three-way with ZS3E and Mike, G3SED, but we had no luck with a G/TA QSO whichever way Mike's beam was pointing.

At 2115 the ZD8VHF beacon was heard at good strength and at 2130 Mike, ZD8MB, appeared on the band and country No 10 was worked. No 11 - and perhaps the most difficult - was worked by backscatter at 2150 in the shape of SV1DH, one of our next door neighbours. Since next day was a working day, the big switch was pulled at local midnight.

MONDAY TO FRIDAY

Participating in an international meeting certainly affected the amount of time that could be spent on the air, but the opportunity of getting on 28MHz arose most mornings and lunch periods. Unfortunately 50MHz did not open at these times, although JA and VK stations were heard at good strengths on 28MHz most days. 50MHz was open via TE every evening, and the usual crop of ZS6/ZS4 stations were worked. Following agreement from the Turkish administration, two further TA4 stations appeared on the band using the G3SDL set-up. First to surface on 2 October was Eberhardt, TA4/DL7IH, and after working a group of ZS stations we heard an unfamiliar call which turned out to be 3DA0AU in Swaziland. By the time I could grab the microphone after TA4/DL71H had completed, the 3D station had disappeared into the noise - so number 12 had been missed for the time being. Next on the band was Tom, TA4/LA7OF, and again a number of ZS's and ZD8MB were worked.



The other main event of the week was the arrival of the missing beam and mast on Thursday. On Friday LA7OF and myself found enough time to erect it on the roof, so we now had some additional gain and directivity for the final weekend.

THE LAST WEEKEND

I arrived on 28MHz at 0445 on Saturday with the band open to PY, JA, ZL and VK. At this stage 50MHz seemed dead as the proverbial, but the situation started to change when G4ASR popped up on 28.885MHz at 1400UTC to tell me that he was receiving Hungarian TV on Band I via sporadic E propagation; would we get the long-awaited opening to northern Europe? I rushed to the roof to ensure the beam was pointing north-west, but alas the opening was not to be. In fact there were no openings until 1650 when FR5EL was worked, closely followed by FR5DN and other stations in southern Africa. 9Q5EE was worked again on CW at 1922.

Sunday followed a similar pattern. Many stations were worked on 28MHz from 0430 onwards, including LA7OF who had reached home safely. However, 50MHz remained quiet until 1610, when ZS4RP appeared on 50.110MHz. During the day I learnt that ZD8 and 9H had had an opening to South America the previous evening at about 2230 UTC, so it was decided to swing the beam at the appropriate time. At 1824 a welcome sound was heard; 3DA0AU. We exchanged 59 reports in both directions, making the twelfth country worked on 50MHz. Unfortunately, QSOs were now few and far between and it seemed that by now I'd worked most of the stations in southern Africa. But then a new call appeared out of the noise at 1839 - it was FR3FM, making the third station worked from Reunion. A repeat QSO took place with A22BW at 2100 and it was then time to turn the beam towards South America. Mike, ZD8MB, came up on frequency at about 2140 with the news that the band appeared open to South America. Soon a weak SSB signal appeared out of the noise, and LU8MBL was worked for No 13 and the first QSO with the South American continent. Then with the help of ZD8MB, PY2DM was identified on SSB a little lower in frequency and a QSO was eventually completed after a change to CW, making No 14. Although weak SSB signals could be heard for the next two hours, no further contacts resulted. I am sure that if more CW had been used, a different story could have been told.

The last day - Monday 9 October - arrived all too soon and I decided that, because conditions seemed to be improving, I would leave the basic 50MHz station in operation for as long as possible. Activity started on 28MHz at 0700, a little later than usual, and 50MHz tests were conducted with VK6RO and KG6DX to no avail. The last contact on 28MHz was made with W4CKD and then unfortunately it was up on to the roof to dismantle the 28MHz antenna and the 50MHz HB9CV. The packing didn't take too long and it looked like a concerted last effort could be made on 50MHz before groping around on the roof in the dark to dismantle the JVL vertical. The band opened at 1645 with a pleasant surprise. I had known ZS5AV had been trying all week to make a contact, and we finally made it with 52 reports both ways on SSB. The last contact on 50MHz was appropriately with ZS6WB at 1820. I had chatted to Hal most days on either 6 or 10 metres and he had had the most consistent DX signal into Antalya. Believe it or not, although the band remained open no other contacts resulted up until 1900 UTC (8pm local time) when the big switch was pulled for the last time and the remaining 50MHz equipment was dismantled and packed for the return journey.

ANALYSIS

Overall, 297 logged QSOs were made from Antalya on 28/50MHz with 224 different stations (SSB and CW). 109 QSOs were made on 50MHz, the remainder on 28MHz. On 50MHz, 14 countries in three continents were worked.

LAST WORDS

There are many people who must be thanked; although TA4/G3SDL was a single-handed operation, a number of organizations and individuals were involved. SMC Ltd deserve a large vote of thanks for providing the 50MHz equipment (sorry we didn't make it, Richard - oops, what a giveaway). Thanks also to Mike, G3JVL, for fabricating the 5/8 vertical and to Maurice, G4BAL, for the loan of his mast. My gratitude also to Ted, G4UPS, for spreading the word, to Paul, G4IJE, for agreeing to be the UK link-man and to Paul, G4CCZ, who spent many hours on the telephone trying to obtain information from British Airways about the missing antenna and mast. Turning to Turkey, the Turkish radio regulatory administration must be sincerely thanked for authorizing the operation and providing me with a unique insight into 50MHz propagation from the eastern Mediterranean.

Then to the Club Hotel Sera, where the General Manager - Mr A R Illez - and the Technical Manager, Mr Nedim Kizilirmak, provided me with all the necessary facilities to mount a DX operation in 5-star luxury. Indeed I would go so far as to recommend any DX group wishing to operate from Turkey to consider this location seriously for its operations. I know, incidentally, that the management of the hotel found the amateur radio activity very interesting, and an amateur radio station with a special call may even be included on the list of future leisure facilities. My thanks also go to Tom, LA7OF, for providing the QSL cards, and last but not least my XYL Susan - who has to put up with a lot from my hobby, including my absence during two weekends playing radios by the seaside.

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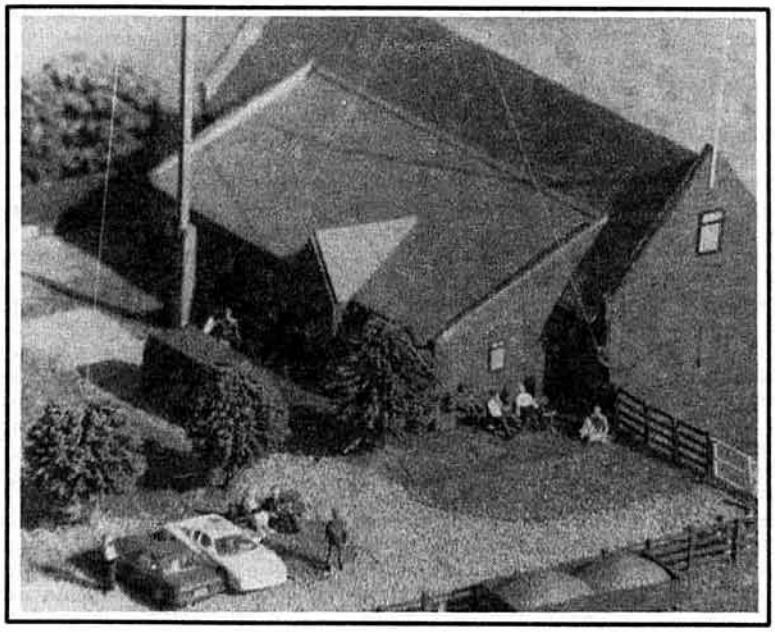

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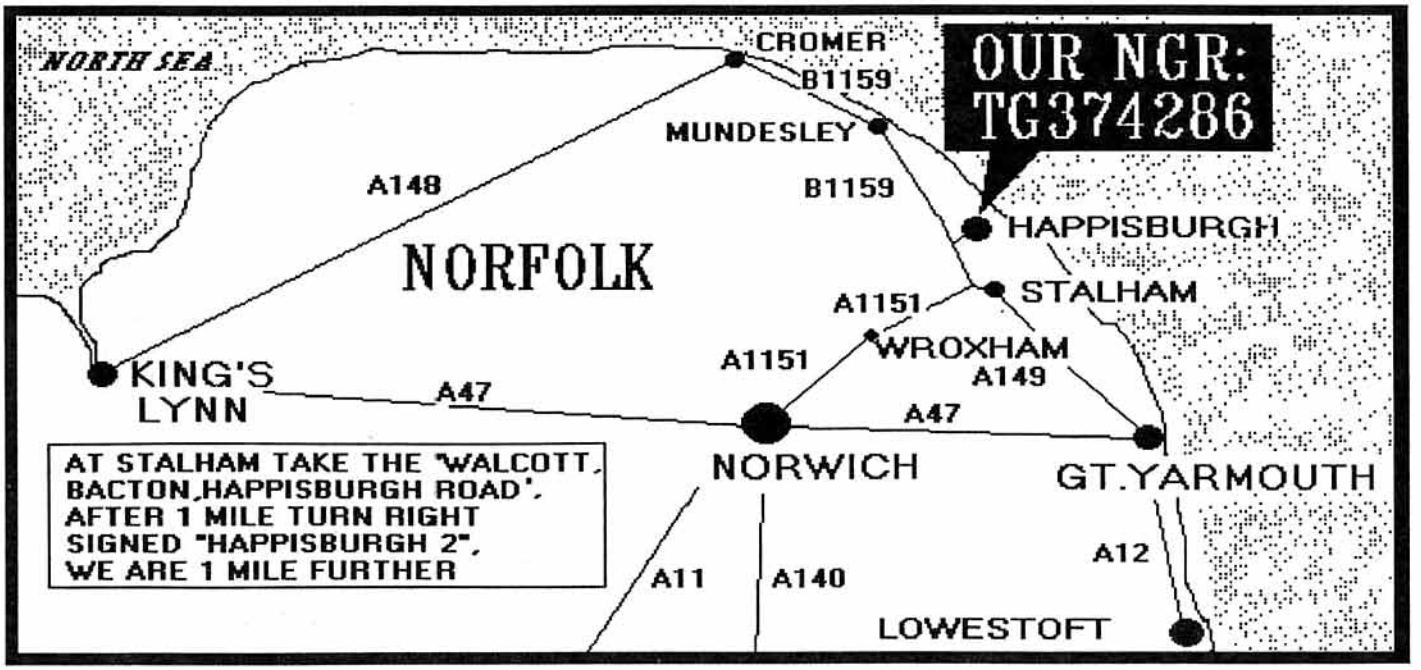


EMC Standards and Regulations

by Robin Hewes, I Eng FIEIE, G3TDR, and Alan Dearlove, G1WZZ

THE OVERVIEW

EMC (Electromagnetic Compatibility) is generally divided into two interlinked areas, namely EMI (Electromagnetic Interference) and EMS (Electromagnetic Susceptibility). EMI is defined as the degree or level of interference, from an electrical or electronic device, constructed in such a way that an adequate level of electromagnetic immunity exists in the usual electromagnetic compatibility environment, according to approved European or National Standards. Conversely, EMS is defined as the ability of an electrical or electromagnetic device to be immune to any interfering signal that is applied to it, which can influence its performance or function, according to National Standards.

Electromagnetic Interference

At present, civil EMI regulations are governed at an international level by the IEC (International Electrotechnical Commission). Within the IEC, a sub-committee known as CISPR (Committee International Special des Perturbations Radioelectriques), governs EMC matters. CISPR issues directives to an association formed by seventeen National Electrotechnical Committees, in Europe known as CENELEC (members of the European Community plus Austria, Finland, Norway, Spain, Sweden and Switzerland). The prime purpose of CENELEC is to harmonise technical matters between Committee members, and so achieve compatibility between national standards.

At a national level, regulations are controlled in Germany by the VDE (German Bundespost), in the USA, by the FCC (Federal Communications Commission), in the UK by BSI (British Standards Institute) and in Canada by the DOC (Department of Communications).

National regulations are based on recommendations published by CISPR, and as a result they are essentially similar in fundamental issues. CISPR publications determine in particular:-

(a) Field of application according to equipment type.
(b) Measurement procedures.
(c) Maximum limits.

The pertinent CISPR publications are as follows:-

(1) Publication 11 of 1975, gives the limits and methods of measurement of radio frequency characteristics of industrial, scientific and medical (ISM) radio frequency equipment, excluding surgical diathermy apparatus.
(2) Publication 12 of 1978: The limits and methods of measurement of vehicles, motor boats and spark ignited engine driven devices.
(3) Publication 13 of 1975: The limits and methods of measurement of radio interference characteristics of sound and television receivers.
(4) Publication 14 of 1985: The limits and methods of measurement of radio interference characteristics of household electrical appliances, portable tools and similar electrical apparatus.
(5) Publication 16 of 1977 contains amendments No 1 (1980) and No 2 (1983) giving the specification of radio interference measuring apparatus and methods of measurement.

Although these recommendations are included in international regulations they are not mandatory. By contrast, EC and national regulations are mandatory and equipment not designed in accordance with them must not be permitted to be operated.

A summary of the important national regulations is given in Table 1.

CISPR	CONTENTS	UK BSI	USA FCC	GERMANY VDE	EG EEC
11	Industrial scientific and medical equipment Narrowband (F>10kHz)	4890	Part 18	0871	—
12	Vehicles (Narrow and broadband interference)	833	—	0879	72/245/EEC
13	Radio and television receivers	905	Part 15	0872	75/322/EEC
14	Electrical equipment (broadband interference), household appliances, portable tools	800	Part 15	0875 Part 1 and 3	82/499/EEC
15	Electric lamps (all types)	5384		0875 Part 2	82/500/EEC
16	EMI measuring devices and procedures	727		0876 0877	
22	Computing devices	6527	Part 15J	0871A1	
—	Telecommunication			0878	
—	Energy supply/ electric trains			0873	

TABLE 1

This regulation requires test procedures for the measurement of the physical units given in Table 2.

	EMI Voltage (conducted)	Magnetic Field strength	Electrical Field strength	EMI Power
Frequency range	10kHz-30MHz (Broadband 150kHz-30MHz)	10kHz-30MHz B/band to 1GHz	30MHz-18GHz	30MHz-300MHz
Measurements with test receiver	Artificial mains network probe	Loop antenna	Rod antenna dipole	Power absorbing clamp
Test site	Shielded room (recommended) shielded room	Non-conductive field site,	Conductive open field site	Shielded room recommended
Remarks	On all phases	Main radiation direction of "device under test" - limits given as electrical field strength	Measurement with variation of antenna height; angle and polarisation	

TABLE 2

These test procedures are beyond the scope of the majority of radio amateurs, and the cost of equipment and the test sites would be prohibitive. Radio equipment manufacturers, however, should have the necessary facilities and test equipment.

While not strictly relevant, it is of interest to note that military equipment is governed by its own regulations - for instance, in NATO, MIL standards are issued by the American Department of Defence. All regulations are tailored for interference free operation under battle conditions.

Electromagnetic Susceptibility

EMS is better known to radio amateurs as RFI, that is HF or VHF interference to radio or TV reception. It occurs when an undesired signal and a wanted signal are received together. Interfering signals can enter receivers by three different routes:-

- Through the antenna terminal.
- Through the mains, loudspeaker, headphones and AF inputs/outputs.
- By radiation directly into the receiver itself.

Interfering signals can also enter other types of electrical and electronic apparatus such as audio equipment, telephones, alarm systems, and the proliferation of all types of transmitters, including broadcast, private mobile radio. Amateur and CB have increased the significance of EMS in recent years. To help alleviate the problem, it has been necessary to set standards and specifications to ensure that equipment subject to RF fields has adequate immunity.

EMS standards have been issued by CISPR in the publications described below:-

CISPR/IEC Publication 16 (1987).

CISPR specification for radio interference measuring apparatus and measuring methods.

CISPR/IEC Publication 20 (1985).

Measurement of the immunity of sound and television receivers and associated equipment in the frequency range 1.5 to 30MHz, by the current injection method. Guidance on immunity requirements for reduction of interference caused by radio transmitters in the frequency range 1.5 to 30MHz.

CISPR/IEC/SC-E (Secretariat) 35.

Limits and methods of measurement of immunity characteristics of broadcast receivers and associated equipment.

IEC Publication 315.

Methods of measurement on radio receivers for various classes of emission. Part 1: General conditions, measurements and measuring methods applying to most types of receivers (not TRF).

As with EMI, the test facilities and equipment necessary to conduct measurements for EMS limits is beyond the scope of most radio amateurs, again only equipment manufacturers would be able to conduct tests for limits of susceptibility to other radiating sources.

Progress Toward Harmonisation

Over a period of many years, the governments of many countries in Europe have introduced their own EMC regulations, so there are now different regulations from country to country. This far from perfect situation has led to the commitment of these countries to harmonise the technical requirements in a Directive of European Standards to be introduced to the 1992 Single European Market.

Technical harmonisation was started by CENELEC

in 1984 by the publishing of Harmonised Documents based on CISPR Publications with the intention that these papers should replace the different national standards. Unfortunately, this did not prove possible, as each country raised objections and CENELEC then concentrated on issuing its papers as ENs (European Standards). The members of CENELEC are not allowed to revise and re-issue their own national standards, and they are obliged to accept the European Standard as a national standard 18 months after the date of issue.

The current CISPR international standards now reflect the requirements of the Commercial EMC Regulations of the Single European Market as shown in Table 3.

Type of equipment	International standard	European RFI standard
Industrial scientific and medical	CISPR 11	pr EN 55011
Information technology	CISPR 22	EN 55022
TV and broadcast receivers RFI emission	CISPR 13 and CISPR 20	pr EN 55013 EN 55020
Household appliances	CISPR 14	EN 55014
Lighting and fluorescent lamps	CISPR 15	EN 55015

TABLE 3

N.B. pr indicates standards under preparation.

European Standards are the only technical basis for free movement of goods within the Single European Market. A Council of European Communities controls these standards as part of the Council Directives which are now national laws. The first Council Directive - relating to the suppression of RFI due to spark ignition on petrol engines fitted to motor vehicles - was issued in 1972.

The directive on EMC, requires that all RFI standardizing problems will be covered by the EMC Directive No 89/336/EEC. This directive contains 13 articles, in which "protection requirements" only are defined. It states that all electrical and electronic equipment shall be constructed such that (a), the electromagnetic disturbance it generates shall not exceed a level which would prevent radio and telecommunication equipment from operating normally, and (b), the equipment shall have an adequate level of intrinsic immunity to electromagnetic disturbance for it to operate normally. Annex III of the directive details the equipment to be considered for protection under the EMC national standards. This equipment must obviously be constructed in such a way that it has an adequate level of EMI and EMS to meet these standards.

Equipment types under consideration:-

(1) Domestic radio and television receivers.
(2) Mobile radio; land and private.
(3) Mobile radio and commercial radio telephone.
(4) Information technology (computers and peripherals).
(5) Domestic appliances and household electronic.
(6) Educational electronic.
(7) Medical and scientific.
(8) Industrial and manufacturing.
(9) Aeronautical and marine radio.
(10) Telecommunication networks and apparatus.
(11) Radio and television broadcast transmitters.
(12) Lights and fluorescent lamps.

So, how do the present and forthcoming regulations affect the radio amateur? As we all know only too well, the tracing and curing of RFI breakthrough problems in our neighbour's radio and TV equipment is very much a "do it yourself" activity - possibly with some help from the Radiocommunications Agency (DTI). However, the amateur stands little or no chance of eliminating received interference from line time bases or switch mode power supplies. The new regulations coming into force in 1992 will mean that any device that generates RFI - including TV and computer equipment - will have to be designed and manufactured to meet the new EMC directives, and hence limits on radiated EMI (RFI). Even the ordinary electric lamp bulb or its more sinister big brother, the fluorescent lamp – both well known sources of interference – will have to meet the new limits of EMI radiation by the end of 1992. By this date all manufacturers both inside and outside Europe placing an electronic or electrical device on the European market, must give an EC Declaration of Conformity on the device. This declaration is held at the disposal of the competent authority for the period of ten years. The manufacturer has to affix an "EC Conformity Mark" to the device to indicate that it meets all the EMC requirements. The new directives should be beneficial to all radio amateurs in years to come.

THE EUROPEAN COMMUNITY EMC DIRECTIVE AND ITS IMPLICATIONS FOR AMATEUR RADIO

General

As indicated above, this Directive is an integral part of establishing a single European market and is intended to provide an electromagnetic environment for the reliable operation of all electrical and electronic equipment. The objectives defined by the Directive will be mandatory. However, standards are only defined as a means of demonstrating that the objectives have been achieved and are not themselves binding. These standards are therefore adaptable to technological progress ensuring that development of new products may continue.

From 1 January 1992, all electrical and electronic equipment "placed on the market and taken into service" must comply with the objectives of the European Community EMC Directive. This will apply to new and existing designs.

Scope of the Directive

All electrical and electronic equipment is within the scope of the Directive, and the existing Directives covering domestic equipment and luminaires will be absorbed into it. (There is one exception relating to amateur radio equipment which will be discussed later). The definitions of electromagnetic disturbances, as described in the Directive, are all embracing. Standard tests for conducted and radiated emissions are well known, but immunity to electromagnetic field, mains disturbances, electrostatic discharge and lightning induced surges now have to be considered in the compliance of a product.

The Directive sets out two essential requirements:-

(1) Equipment shall not generate electromagnetic disturbances exceeding a level allowing radio and telecommunications and other apparatus to operate as intended.
(2) Equipment shall have an adequate level of intrinsic immunity from electromagnetic disturbances.

This means that your equipment must not make too much radio or electrical noise when it is working, and must also continue to operate satisfactorily when subjected to reasonably high levels of radio fields, or by electrical disturbances on either its electrical power supply or other cables.

Proof of Compliance

The following is an extract from the DTI's leaflet on EMC.

'Most manufacturers will not be able to make the necessary assessment of whether their equipment satisfies the two essential requirements and so the Directive invokes the use of (harmonised) European EMC Standards. Any equipment which complies with these relevant standards will be deemed to meet the essential requirements.

As an alternative, you as a manufacturer, are free to determine your own method of technical assessment (indeed you may have to if there is not yet a relevant EMC standard). When you make your own assessment, you are required to keep a technical file containing the details of the method used, the test results and a supporting statement by an independent, competent body. You must keep the file at the disposal of the national administration. Manufacturers of certain telecommunications terminal equipment and radio transmitters (excluding apparatus for radio amateurs) are not able to self-certify. If you market such apparatus, you will need to obtain an EC-type examination certificate from an accredited test house before certifying that your product complies with the Directive.'

Amateur Radio Equipment

The DTI recently issued a document, "Electrical Interference: A Consultative Document." The purpose of the document is to describe, and to seek views on, the DTI's proposals to implement the Directive. The RSGB has formed a small working group to coordinate the responses to the document.

As mentioned previously, certain amateur radio equipment is excluded from the requirement to meet the objectives of the Directive. The requirement for compliance does not extend to "amateur radio equipment which is not commercially available." This can have a range of interpretations.

It is obvious that true "home brewed equipment" does not have to comply, but the problem of home brew from kits of parts bought from a commercial source is an area of major concern for the RSGB. Early indications from the Consultative document states, "It is proposed that products sold commercially in kit form should have to comply when constructed in accordance with the instructions." The RSGB opposes this line.

Second-hand equipment is another concern. If sold between two radio amateurs the equipment does not have to comply (not sold commercially), but if bought from your local emporium the equipment will probably have to comply.

The RSGB has been and is spending considerable time and effort in attempting to resolve the many questions that arise from the EC EMC Directive. It is difficult for those involved to make categoric statements as circumstances are changing continually. Much work has been done on this subject by the IARU Region I EC Committee. This Committee consists of representatives from the European Community Amateur Radio Societies. Discussions are being held with members of the Commission in Brussels, but the final interpretations of the meanings and implementations can only be decided by the European Courts of Justice to whom submissions must be made if disagreement exists. ❑

ICOM IC-781 HF Transceiver

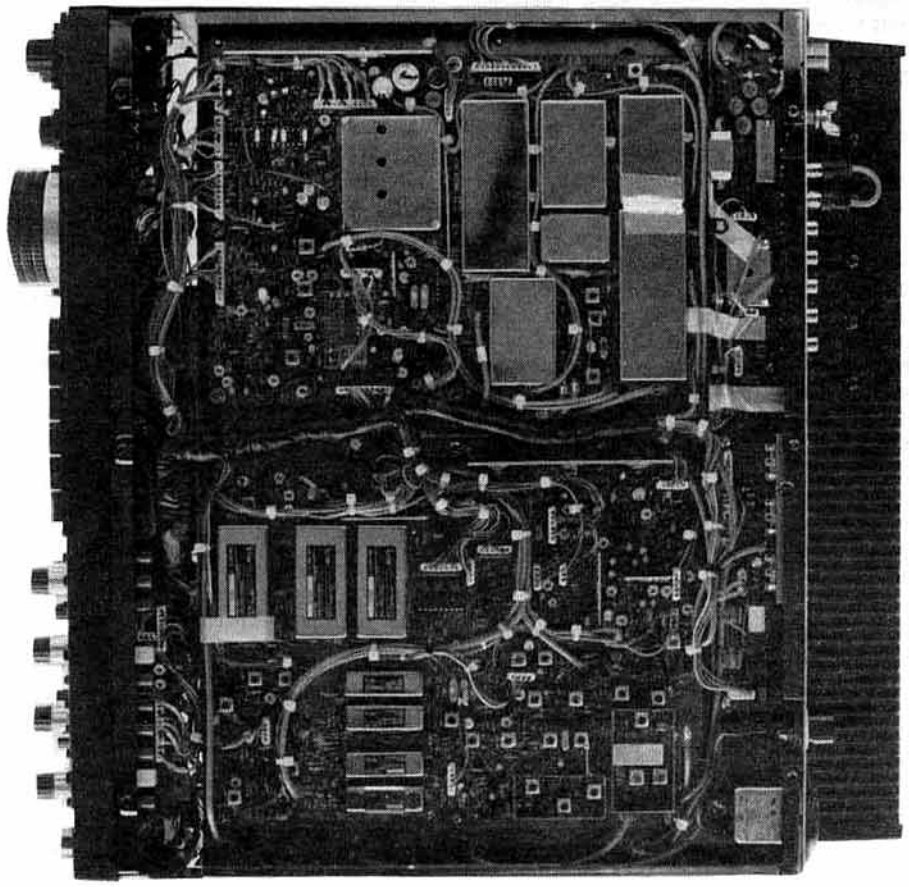
Peter Hart, G3SJX, puts this top-of-the-range transceiver through its paces.

The Icom IC-781 appeared on the market at the beginning of 1988 as Icom's top-of-the-range HF base station. It was certainly ahead of its time and even now offers more features than any other radio on the amateur market. Perhaps the most striking feature is the use of a CRT to display a host of information to the user, including a spectrum display around the receive frequency. The IC-781, and Icom's companion IC-R9000 wide range receiver, are still the only radios available today which use a CRT display.

PRINCIPAL FEATURES

The IC-781 is a mains powered base station transceiver covering LSB, USB, CW, AM, FM and RTTY (FSK) modes. 170, 425 and 850Hz RTTY FSK shifts are provided with both high tone (US/Far East) and low tone (European) standards. Most radios incorporating FSK provide only for high tone standards. The frequency coverage is 100kHz to 30MHz on receive with transmission limited to around the amateur allocations.

Tuning is in 10Hz steps at 5kHz per revolution of the main tuning knob or 1kHz steps at 100kHz per revolution. This applies to all modes. For 10Hz steps, the tuning rate increases to 10kHz per revolution when the tuning knob is rotated fast. The usual twin VFOs are provided with split and swap facilities and a useful single touch button to check and tune the TX frequency in split operation. Separate buttons select bands and the last used frequency, mode and filter on each band is stored for initial recall when that band is reselected. The band buttons also double as a keyboard for direct entry of frequency. 100 memories are provided with direct VFO from memory and transmit split operations between VFOs and memory.



The IC-781 incorporates a dual watch feature which allows the simultaneous reception of two frequencies within any one band. The two receive frequencies may be the A and B VFOs or VFO and memory, and a balance control sets the relative audio gains in the two receive paths. Two totally separate incremental tuning systems operate on the A and B VFOs or memory and provide both receiver and transmitter offset up to ± 10kHz. The offset may be added onto the VFO frequency.

Wide and narrow bandwidth IF filters are fitted for use on AM, CW and RTTY. On CW and RTTY the narrow bandwidth is 500Hz but additional 250Hz bandwidth filters in both the 9MHz and 455kHz IFs are separately selectable. Twin passband tuning at both of these IFs is provided which also gives an IF shift function. An audio filter and IF notch filter is also provided.

Other receiver functions include noise blanker with selectable width and level, selectable receive preamp and/or input attenuator, fully variable AGC speed, tone controls and all-mode squelch. An optional voice synthesizer may be fitted.

Transmit features include a 150W output PA, full/semi CW break-in, built-in electronic keyer, speech processor, VOX, transmitter monitor and thermostatic fan. On data modes the microphone may be inhibited and on CW the pitch is variable. A sub-audible tone encoder is included for FM repeater use. The meter may be switched to indicate output power, SWR directly, ALC, audio compression, PA current or voltage. An auto-ATU is built-in which will cope with mismatches up to 3:1 and will tune in less than 3 seconds. The tuning settings are stored for each band and are manually adjustable via separate band presets accessible under a top hatch.

A high resolution 5 inch CRT is used to display continuously, on the top part of the screen, the VFO frequencies to 10Hz resolution, active memory, selected filters, modes etc. The lower part of the screen gives access to a host of other information and settable parameters via two menu screens and 17 operational screens. The amber display is extremely sharp and displays up to 94 characters per line. Access to the different screens and setting of the various parameters is controlled via six function keys under the CRT in conjunction with the rotary tuning knob.

The principal screens include a spectrum scope (analyser), memory control, clock/timers and setting of scanning, terminal monitor and remote computer control parameters. The spectrum scope displays signals up to 100kHz on either side of the receive frequency. The memory screen allows 10 consecutive memory locations to be simultaneously previewed. The information displayed is memory number, frequency, mode, filter and a note tag up to 10 characters long which can be appended to each memory position (eg "IOTA net"). Scrolling through the 100 memories can be achieved using the memory up/down keys or very quickly using the rotary tuning knob.

The clock provides for two time zones with day and date, and the timer provides up to five on and off times with daily and weekly modes and an added sleep timer. Each timed period can tune to

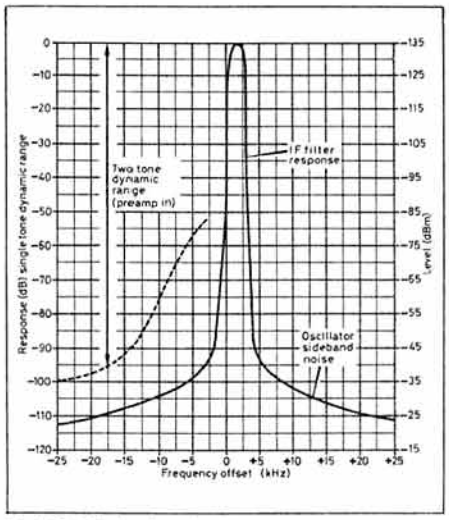


Fig 1. IC-781 effective selectivity curve on USB.

an allocated memory channel. The scanning menu screens provide scanning between limits, as a span about a centre frequency, across all used memories or across groups of specified memory channels. The scan speed is selectable and there is an additional fine setting without stopping. The scan may be stopped or paused on squelch opening with an adjustable delay.

The CRT may be used as a terminal monitor in conjunction with an external data terminal for packet, RTTY, AMTOR etc. The monitor requires RS232 level ASCII data and the code format and baud rate are selectable.

The rear panel contains a variety of connectors to interface the IC-781 to a linear amplifier, data terminals of different types, external computer control via the CT-17 level converter, transverter, external receive antenna, antenna for external receiver, large display monitor, audio input/output etc. A jack is provided for tape recording with motor control taken from the squelch.

The radio comes with a 95 page instruction manual. This is well written and gives detailed instructions on operating the radio, in particular the menu driven displays. There are brief descriptions of the circuit, maintenance and adjustments and a set of circuit diagrams are provided.

DESCRIPTION

The IC-781 is a large radio. It measures 42.5 (W) by 14.9 (H) by 41.1cm (D) and weighs 23kg. The construction is extremely solid and tightly packed with a number of PCBs, some fully shielded, mounted on a substantial frame. The CRT unit is shorter than expected and very well screened. A large fan-blown diecast heatsink runs across the full length of the rear panel and the front panel is also diecast. A larger than normal 10cm diameter speaker faces upwards in the top of the case.

The receiver is quadruple conversion on all modes except FM with IFs of 46.5MHz, 9MHz, 455kHz and 10.7MHz. The 10.7MHz IF is not used on FM. With the dual watch receiver active, the incoming received signal is fed into two parallel first mixers each supplied with a separate local oscillator (VFO A or B). The output from these mixers at 46.5MHz passes through separate PIN diode attenuators to provide the balance control function and are then combined to pass through the remainder of the IF and AF circuitry. Hence the dual watch receiver must use the same mode and filter setting for both signal paths.

On transmit, the SSB signal is generated at 455kHz, passes through the speech compressor and mixed via the 9MHz and 46.5MHz IFs to the final frequency. The PA operates from a 30V supply. Several PLLs generate the various signals needed in this radio. The main synthesizers use a combination of a PLL to give low spurious outputs and a direct digital synthesizer (DDS) to give small step sizes (10Hz) with low phase noise and fast switching (no clicks). Two lithium backup batteries are used. One battery powers the clock and lasts about two years. It is easily accessible under the top cover on the logic B board. The second battery gives memory backup and lasts about five years. It is located on the logic A board and requires a certain amount of dismantling.

MEASUREMENTS

The measurements are detailed in the table with additional comments as follows.

RECEIVER MEASUREMENTS

S-meter calibration

The S-meter calibration was the same on all modes but somewhat over optimistic. The linearity was generally good. The preamplifier gain measured 11dB.

Spurious rejection

The rejection of all the IFs and images was better than 94dB, an excellent figure. The receiver was remarkably clear of other spurious responses; the worst was at -83dB.

Strong signal performance

The receiver front-end intermodulation and blocking performance and the reciprocal mixing performance is excellent, some of the best results I have measured on any receiver. For some reason, the intermodulation performance degrades noticeably on 28MHz. However, the close-in dynamic range is very poor. The most likely reason is the signal handling capabilities of the second mixer. This really needs to be improved. The inband linearity measured with 200Hz tone spacing varied considerably with AGC speed. With fast AGC, results were very poor but improved to a mediocre -32dB at slow AGC settings. A substantial improvement could be effected by reducing the RF gain control.

Selectivity

Both 500Hz and 250Hz narrow CW filters are fitted into both the 9MHz and 455kHz IFs. These filters are independently selectable, giving the following combinations for 9MHz/455kHz bandwidths - (A) 500/500Hz, (B) 250/500, (C) 500/250 and (D) 250/250Hz. Excellent skirt selectivities were measured and it can be seen from the table that the 455kHz filters have a better shape factor than the 9MHz filters. The insertion loss varied a little between the different filter combinations, with the 9MHz 250Hz filter being the worst by about 2dB.

TRANSMITTER MEASUREMENTS

Power output

The RF power control allowed the RF output to be adjusted between 17W and 160W. This was reducible down to 7W with the drive control. The built-in power meter was remarkably accurate, generally better than 5%.

Spurious outputs

The level of all spurious outputs was very low.

SSB performances

The PA intermodulation performance was very good. The higher order products were below -60dB at ± 10kHz and below -80dB at ± 20kHz. The speech processor degraded the inband products to -20dB but the out of band products were unaffected. Suppression of the carrier and unwanted sideband was unmeasurably high.

CW keying performance

Fig 2 shows the keying waveform and Fig 3 the keying spectrum at 40 WPM. This is much better than the average rig.

Transmit-receive switching speed

The receiver recovery time is somewhat too slow for AMTOR.

ON-THE-AIR PERFORMANCE

The IC-781 was used for a period of about 6 weeks primarily to chase DX on CW and SSB on the HF bands. The receiver sounded very clean and there

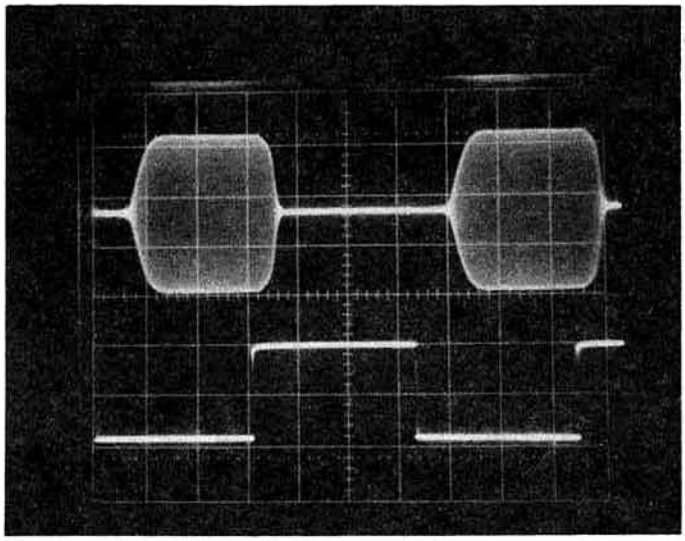


Fig 2. CW keying waveform (top) at 40WPM. Horizontal scale: 5ms per division.

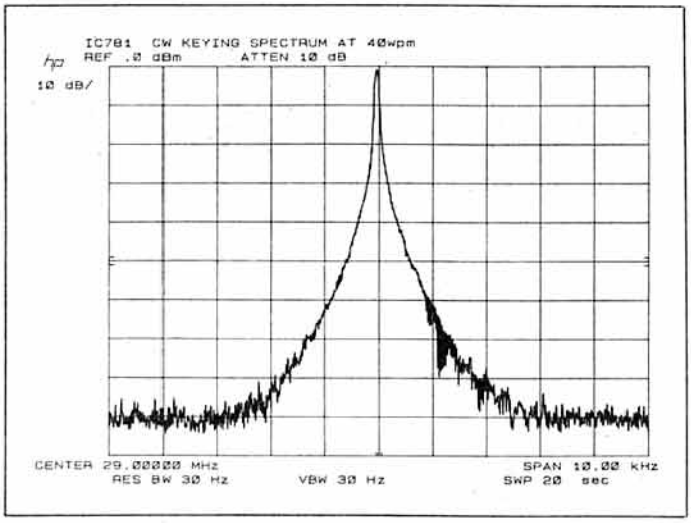


Fig 3. CW keying spectrum at 40WPM. Horizontal scale: 1kHz/division; vertical scale: 10dB/division.

ICOM IC-781 MEASURED PERFORMANCE

RECEIVER MEASUREMENTS

FREQUENCY	SENSITIVITY SSB 10dBs+n:n AMP IN	AMP OUT	Input for S9 AMP IN	AMP OUT
1.8 MHz	0.13µV (-125dBm)	0.22µV (-120dBm)	11µV	32µV
3.5 MHz	0.11µV (-126dBm)	0.2µV (-121dBm)	10µV	28µV
7 MHz	0.11µV (-126dBm)	0.22µV (-120dBm)	11µV	32µV
10 MHz	0.11µV (-126dBm)	0.25µV (-119dBm)	11µV	35µV
14 MHz	0.11µV (-126dBm)	0.25µV (-119dBm)	13µV	45µV
18 MHz	0.13µV (-125dBm)	0.28µV (-118dBm)	14µV	50µV
21 MHz	0.13µV (-125dBm)	0.28µV (-118dBm)	16µV	56µV
24 MHz	0.13µV (-125dBm)	0.28µV (-118dBm)	11µV	50µV
28 MHz	0.11µV (-126dBm)	0.25µV (-119dBm)	9µV	32µV

AM sensitivity (28MHz): 0.71µV for 10dBs+n:n at 30% mod depth
FM sensitivity (28MHz): 0.18µV for 12dB SINAD 3kHz pk deviation
AGC threshold: 0.7µV
100dB above threshold for +1.5dB audio output
AGC attack time: 1-2ms
AGC decay time: 0.1-6s variable
Max audio before clipping: 2.6W into 8ohm at 1% distortion
Inband intermodulation products: see text

INTERMODULATION (50KHZ TONE SPACING)

Frequency	AMP IN 3rd order intercept	AMP IN 2 tone dynamic range	AMP OUT 3rd order intercept	AMP OUT 2 tone dynamic range
1.8 MHz	+12dBm	98dB	+24dBm	103dB
3.5 MHz	+15dBm	101dB	+25dBm	104dB
7 MHz	+15dBm	101dB	+25dBm	103dB
14 MHz	+15dBm	101dB	+24dBm	102dB
21 MHz	+18dBm	102dB	+26dBm	103dB
28 MHz	+2dBm	92dB	+13dBm	95dB

Frequency offset	Reciprocal mixing for 3dB noise	Blocking Amp in	Blocking Amp out	TX noise WRT carrier in 2.5kHz bandwidth
3 kHz	90dB			
5 kHz	96dB	-15dBm	-8dBm	-85dB
10 kHz	103dB	-9dBm	-1dBm	-92dB
15 kHz	106dB			
20 kHz	110dB	+2dBm	+11dBm	-98dB
30 kHz	113dB	+9dBm	>+16dBm	
50 kHz	117dB	+12dBm	>+16dBm	-101dB
100 kHz	123dB	+12dBm	>+16dBm	
200 kHz	127dB	+12dBm	>+16dBm	

S-READING (14MHz)	INPUT LEVEL amp in
S1	0.9µV
S3	1.2µV
S5	1.8µV
S7	4.0µV
S9	13.0µV
S9+20	130.0µV
S9+40	1.3mV
S9+60	9.0mV

BANDWIDTH

FILTER	-6dB	-60dB	
SSB,CW(W)	2470Hz	4100Hz	
AM(W)	5850Hz	8810Hz	
AM(N)	2670Hz	4400Hz	
FM	6140Hz	8980Hz	
CW(N)A *	450Hz	860Hz	* see text
CW(N)B *	300Hz	670Hz	
CW(N)C *	270Hz	450Hz	
CW(N)D *	250Hz	420Hz	

Tone spacing (7MHz band)	3rd order intercept	2 tone dynamic range
3 kHz	-58dBm	52dB
5 kHz	-51dBm	57dB
10 kHz	-22dBm	76dB
15 kHz	+2dBm	92dB
20 kHz	+9dBm	97dB

Carrier suppression: >80dB
Sideband suppression: >80dB
Transmitter noise: see table above
Transmitter AF response at -6dB: 340-2600Hz
Transmitter AF distortion: <1%
Microphone input sensitivity: 3mV for full output
T/R switching speed (SSB): mute-TX 12ms, TX-mute 2ms, mute-RX 30ms, RX-mute 2ms

TRANSMITTER MEASUREMENTS

Frequency	CW power output	SSB(pep) power output	harmonics	Intermodulation products third order	Intermodulation products fifth order
1.8 MHz	162W	170W	-60dB	-28dB	-42dB
3.5 MHz	160W	170W	-64dB	-30dB	-44dB
7 MHz	158W	170W	-65dB	-34dB	-42dB
10 MHz	158W	170W	-62dB	-28dB	-34dB
14 MHz	160W	170W	-61dB	-30dB	-34dB
18 MHz	160W	170W	-62dB	-34dB	-36dB
21 MHz	161W	170W	-61dB	-35dB	-35dB
24 MHz	161W	170W	-64dB	-35dB	-35dB
28 MHz	162W	170W	-65dB	-30dB	-32dB

NOTE: All signal input voltages given as PD across antenna terminal. Unless stated otherwise, all measurements made on SSB with the receiver preamp switched in.
All two-tone transmitter intermodulation products quoted WRT either originating tone.

was no trace of any strong signal effects. Although the measurements predicted a close-in dynamic range problem with multiple strong signals, this situation was not experienced. The narrow CW filters were excellent and the tuning totally click-free. The performance on AM broadcast was good. FM and RTTY modes were not used. A major receiver feature is the dual watch capability which was used primarily to find the listening frequency of dxpeditions when operating split frequency. Although intended to be used only in the same band as the main receiver, the dual watch receiver will function at considerably reduced sensitivity on lower bands.

On transmit, the radio was used both with the SM-8 desk microphone and with the HM-12 fist microphone. Transmit quality reports were very good, particularly with the desk mic, and the transmission was clean and narrow. The speech processor added real punch to the transmission. Similarly on CW, the transmission was undistorted and narrow on both semi and full break-in.

The radio is very easy to use. Most features are self explanatory and require very little reference to the manual. This applies particularly to the menu driven CRT screens. Displaying memory information on the CRT is far superior to other methods and allows very easy access. I used virtually all 100 memories stored with operating frequencies of current DXpeditions, net frequencies etc and with the labels, rapid scrolling and extensive previewing any memory location could be rapidly found. The spectrum scope is novel and quite useful for spotting signals on quiet bands, avoiding big signals, optimum places for calling CQ, pile-ups etc.

The auto-atu worked well and tuned very fast, generally in less than a second.

My only complaints are small ones - the fan is noisy and the printed legends on some of the push buttons will wear off fairly rapidly. This was particularly true with early radios. Some of the buttons on the later radios now use etched legends. Frequencies outside the amateur bands are not so easy to select. There is no 1MHz step key and for general coverage use it is probably best to use keypad entry or reserve a section of memory for likely frequencies.

CONCLUSIONS

The current list price of the IC-781 is £4500 which limits its consideration to a relatively small number of dedicated enthusiasts looking for something a little special. Naturally at this price, a purchaser expects a radio which is second to none in terms of features and performance. The IC-781 is easy to use and provides more features than any other amateur transceiver. The performance ranks with the very best with the exception of the close-in intermodulation dynamic range. This performance parameter is very poor indeed, much worse than Icom's cheapest transceiver (IC725).

The dual watch receiver is very useful, but an added enhancement would be to have this functional on all frequencies and not just limited to the band used by the main receiver. The CRT is a major improvement in displaying information to the user and it seems surprising that no other radios have adopted this approach.

So what of the future? With a CRT built into the equipment, surely the next step is to display and transmit RTTY, packet, data and SSTV without the need for an external terminal unit. Such a data terminal will need a full keyboard connected to the radio. A small disc drive will be needed, more RAM and a CPU. In other words, a full PC built into the radio.

ACKNOWLEDGEMENTS

I would like to thank Icom (UK) Ltd of Herne Bay, Kent for the loan of the equipment.

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Changes, more changes!

Band planning and licence changes have come thick and fast in the last 18 months or so, at least in the UK. Predictably, as the lower bands fill, there will be a move to higher and higher frequencies - I seem to have said that somewhere before! Planning and frequency matters also seem to have occupied an inordinate amount of space in this column, but then we are users of the largest share of the spectrum available to amateurs and need to be kept abreast of the changes, for at microwave frequencies there is most to be lost. You're probably also tired of hearing about WARCs and IARU Conferences.

Out of all this, there is perhaps a need for clarification - or at least orderly summary! The last time a tabulated summary was published was at the Sandown VHF Convention, following the January 1989 changes to the UK licence. Last month's *RadCom* carried further changes, effective from 1 June, 1990. These have made some of the earlier changes obsolete or, at least, has changed them subtly. So, herewith the latest situation on the microwave bands.

Table 1 and its notes outline the UK bandplans which accomodate unattended operation and other licence changes. Note that the Novice Licence (hopefully the first issues may be in January 1991) allows operation in the 1.3 and 10GHz bands with limited power, all modes and full band access, within the limits of the bandplans.

Table 2 and its notes elaborate a little on the changes which allow the various forms of unattended operation now possible in the microwave bands.

See page 82

Table 1 UK Bandplans to accomodate unattended operation and other Licence and usage changes

Band	Beacons (1)	Digital (2)	Control	Repeater links
1.3GHz	1296.30 - 1296.40 (A) 1296.80 - 1296.990 (F)	1287.0 - 1290.0 (A)	1298.0 - 1299.0 (A/U)	1240.0 - 1240.75 *(F)(3)(4) 1299.0 - 1300.0 *(F)(5)
2.3GHz	2320.3 - 2320.4 (A/U) 2320.80 - 2320.990 (F)		2310.0 - 2310.50 (A/U)	2310.0 - 2310.50 *(F) 2355.0 - 2355.50 * (F)
3.4GHz	3456.30 - 3456.40 (A/U)	3457.0 - 3458.0 (A/U)	3457.0 - 3458.0 (A/U)	Not recommended
5.7GHz	5760.30 - 5760.40 (A/U)	5761.0 - 5762.0 (A/U)	5761.0 - 5762.0 (A/U)	**
10GHz	10100.0 - 10110.0 (WB)(A/U) 10368.0 - 10368.80 (NB)(A) 10368.0 - 10368.99 (NB)(F) 10410.0 (A/U) 10420.0 (WB)		10006.0 - 10026.0 (A/U) 10150.0 - 10170.0 (A/U)	10006.0 - 10026.0 * (F) 10150.0 - 10170.0 * (F)

A = Attended operation only (see note 1)
A/U = Attended or unattended operation
F = Formal licensing procedure required
WB = Wideband
NB = Narrowband

Notes to Table 1:

1. Attended operation, in order to comply with the spirit of the regulations, should include regular monitoring in order to avoid inconvenience to other users.

2. Maximum power for all unattended modes, as given in notes to Table 1. For attended modes, the power limits are as the normal schedule for that band.

3. Recommended (preferred) bands for fixed "trunk" digital links are still 2.3GHz and 10GHz

4. Use of this band for links may be subject to radar interference under some circumstances and in some parts of the UK. Formal application/site clearance is required for links. Frequencies between 1299 and 1300MHz have been approved by DTI. Users are requested to use channels from 1299 to 1300MHz in the first instance: 1298 to 1299MHz may carry low power amateur telemetry/telecommand signals and there is no "guard band" at 1299.00MHz.

5. Link users should employ directional antennas to minimise interference to/from other users. Vertical polarisation should be used for fixed links to minimise interference to and from existing, adjacent ATV and narrowband users. Most other band activity will use horizontal polarisation, including repeaters.

6. (*) These sub-bands are "channelised" as follows:

1.3GHz

1240.150

1240.300

1240.450 All with maximum bandwidth 150kHz

1240.600

1240.750

1299.000 Maximum bandwidth 25kHz

1299.425

1299.575 All with maximum bandwidth 150kHz

1299.725

Note: no "channelisation" necessary for low power telemetry/telecommand between 1,298MHz and 1,299MHz

2.3GHz

2310.10

2310.30

2355.10 All with maximum bandwidth 150kHz

2355.30

2364.00 Maximum bandwidth 1MHz

10GHz

10006.0 No nominated "channels" or channel bandwidths.

10026.0Can be used for experiments with very high speed digital links or to suit user needs.

10150.0 Full duplex links possible with the two sub-bands

10170.0nominated.

** Note the IARU Region 1 changes, which become effective 1 January 1991, do not involve bandplan changes, other than for 5,760MHz read 5,668MHz and for 5,762MHz read 5,670MHz. In other words the activity centres and formal beacon sub-band will still be the same frequencies, relative to the "bottom of the band", as before - just the starting frequency is different!

Table 2: Unattended personal callsign operation

Band (1)	Beacon (2)	Digital (3,4)	Control (5)
1.3GHz	1298.00 -1299.00 *	1299.00 -1300.00 *	As beacons *
2.3GHz	2310.00 - 2450.00	As beacons	As beacons
3.4GHz	3400.00 - 3475.00	As beacons	As beacons
5.7GHz	5650.00 - 5680.00	As beacons	As beacons
(6)	5755.00 - 5765.00	As beacons	As beacons
	5820.00 - 5850.00	As beacons	As beacons
10GHz	10000.00 - 10250.00	10000.00 - 10250.00	10000.00 - 10250.00
	10270.00 - 10300.00	10270.00 - 10300.00	As digital
	10400.00 - 10500.00	10400.00 - 10500.00	As digital
24GHz (7)	24000.00 - 24050.00	As beacons	As beacons
	24150.00 - 24250.00	As beacons	As beacons
47GHz and above	No restrictions on frequency	No restrictions on frequency	No restrictions on frequency

* Not in Northern Ireland

Notes to Table 2

1. Power limits, ERP (carrier or pep):
Beacons and digital: All microwave bands, 14dBW (25W)
Telemetry/telecommand: All microwave bands -20dBW (10mW)

2. Operation of a beacon is permitted ONLY after giving at least seven days WRITTEN notice of location (within 5km), period of operation, frequency, power (dBW), identity of other site users (if applicable) and shut-down procedures to the Radio Investigation Service (RIS) Manager in whose area the operation is to take place. The Manager may, before commencement of operation, prohibit unattended operation or allow it in compliance with conditions which he may specify. Such beacons must be capable of being shut down within two hours of an official demand. The beacon must be capable of sending the licensee's callsign periodically -not more than 15 minutes, but compliance with the formal IARU Region 1 recommendations is preferred.

3. Automatic digital repeater operation ie. "digipeating", is authorised from the main address without formality. Operation from a temporary alternative location can be EITHER by adding /P to the callsign and transmitting the location (within 5km) using a recognised identifier OR by giving the RIS Manager prior notice, as in 2 above. The station operator may automatically "record and retransmit" (relay) messages, provided that both source and destination are amateur. The licensee need not keep a log of callsigns using the digipeater. An identifying callsign MUST be transmitted in CW, at not more than 20wpm, at 30 minute intervals, regardless of other (digital) identification sent.

4. "Personal mailboxes" are those in which messages addressed to the licensee ONLY are recorded for his/her personal use ie. messages may not be "forwarded" on behalf of other stations. "Public" (general amateur use) bulletin board systems (BBS`s) are, however, allowed under a Notice of Variation, distributed by the RSGB on behalf of the Radiocommunications Agency.

5. Telemetry and telecommand transmitters for the purposes of "station or apparatus" control must not exceed a power of -20dBW and must not be receivable "beyond the curtilage of the premises": this may be difficult to implement and must be carefully interpreted by users.

6. As a result of these changes, the DTI will now consider applications for formal beacons in this band. Note the IARU Region 1 changes in the 5.7GHz band, effective from 1 January 1991. The narrowband communications section of this band will become 5,668MHz to 5,670MHz (see "Microwaves", June 1990).

7. ANY operation in the band 24,050 to 24,150MHz requires specific written permission. Note that the preferred narrowband frequencies in this band are now 24,048MHz to 24050MHz. This is also an IARU Region 1 recommendation.

DATACOMMS

NEIL LASHER, G6HIU
40 Farm Road, Edgware, Middx
HA8 9LT. Tel: 0836 379275

Firstly let me apologise to my regular readers for missing the deadline for last month's publication. This was due to circumstances beyond my control.

UNATTENDED 70MHz/ 1299MHz

As you will have seen from last month's *RadCom*, the amateur licence has now been amended. A major concession in the new licence is to packet radio, with unattended operation being extended to cover part of the 1.3GHz band and spot frequencies on the 70MHz band. It should also be noted that the licence states morse ID should be sent every 30 mins at a speed not exceeding 20 WPM.

TECHNOLOGY LEAVING THE UK BEHIND

Some years ago, a group of packet radio orientated amateurs decided that 9600 baud was the way forward. The dream they had was to link the whole of East Anglia using 1200MHz and 9600 baud packet links. Unfortunately their dream has yet to come true. Various reasons have been given, from "lack of equipment" to "problems with modems". It now seems that the rest of the world has made it work and, thanks to the efforts of a British amateur - James Miller, G3RUH, they are leaving us behind.

A recent communication sent to me by James shows there are now 270 active links in Japan using his modem, so the lack of activity in the UK is certainly not down to his design. He has also been informed that the Japanese *Ham Journal* June 1990 (my copy has not arrived yet) is dedicated to integrating various radios and TNCs for 9600 baud use.

Japan is not the only country; Germany has many links, as has the US. In the US, the G3RUH modem has been licensed to PacComm who have reproduced it as a surface mounted board, fully built and tested. This small board is being used in commercial applications as well as amateur stations.

The list of radios that have been modified for use with 9600Bd now tops fifty. They include models such as: FT-736R/726R/221/290/480/280/711/712/709/708/780/790/2700; IC-120/228/271/290/371/375/471/735/1200/127/2300; TR-50/750/851/7700/8300/8400/9000/9500/TS-700/780/790; TM-231/221/421/521; TW4000; C-140/C-8900.

I don't know what they all are. Some, though, are rigs for 144MHz which we do not advocate in the UK for 9600 baud, but it just shows that it is possible. I will attempt to keep you updated as details of modifications become available. I have a copy of the mod sheet for the FT-736R which is reproduced in this column.

NEC

During the RSGB Convention weekend at the National Exhibition Centre, the PWG stand had so many enquiries that at one time on Saturday afternoon we actually ran out of all handouts, as well as our voices. The response to free information and help was quite astonishing and this has led me to believe that more information about local groups is needed within this column. If you are part of a local group, please let me know about your future meetings and events so that I can give you the publicity. Remember copy dates are 6 weeks in advance of publication.

A new group called "NERDS" (North East Radio Data Communications Society) has been formed in the area from Cleveland to Northumberland. Their main interests are, as one member put it, " What you do after you get bored with sending out beacons on .650". They have produced a very good newsletter and are looking to help other amateurs in their area. For more details contact Mr A.W.Elkington, G4NXH. 27 Ainthorpe Cls, Tunstall, Sunderland, Tyne & Wear, SR3 2DA

NEW MAILBOXES FOR TCP/IP

I am glad to announce that at the last Packet Working Group meeting I was given the go-ahead to approve some mailbox Notices of Variation for TCP/IP on 144.625MHz. A few of these have now been issued and, by the time you read this, they will be on the air. At the same meeting, it was agreed to approve the Variation for the two DX Clusters which will ultimately be on 70MHz. Until we are permitted to allocate the 70MHz frequency, the DX Clusters will reside on 144MHz using low power; access can be gained from local nodes.

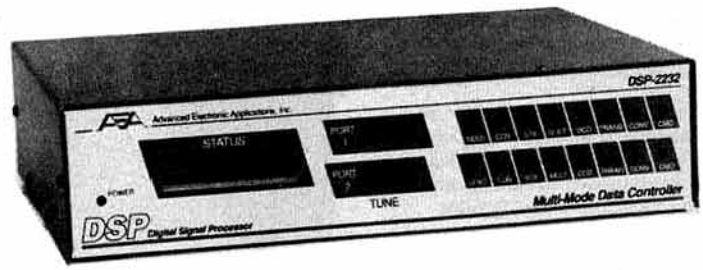
The RA (Radiocommunications Agency, formally DTI) has intimated that mailbox variations for 70 MHz and 430 MHz should be available very shortly. As soon as further details are known an invitation for application will be circulated on the packet network.

MOD OF THE MONTH

9600 with an FT-736. The purpose of this modification is to allow the rear panel data socket to feed TX FM modulator directly, and take audio from the RX discriminator. Approximately 1V p/p audio on both TX and RX at this connection corresponds with 5kHz deviation.

The modification takes an experienced engineer about an hour and a half, so take your time and double check every stage.

Parts needed are: 2 off K70140007



AEA's new multimode controller which uses digital signal processing

1μF 25Vw tant capacitor, and 0.5m of screened audio cable.

Remove FT-736R top and bottom covers. Remove chassis screws from RX unit PCB and carefully hinge PCB away from chassis.

Remove C154 from RX unit. Remove lead from pin 3 of J09 on RX unit, insulate the lead.

Solder -ve lead of 1μF cap to J09 Pin 3 on reverse (track side) of PCB. Solder inner of screened lead to +ve side of this capacitor, with screen to adjacent PCB earth plane.

Cut screened lead to suitable length and connect far end to FM scan unit on RX unit. Pin 10 (Centre) Pin 9 (screen), soldering connections to track side of PCB.

Connect -ve lead of second 1μF cap to the previous -ve connection of C154, again solder on track side of PCB of the RX unit. Connect inner of screened lead to +ve connection of this 1μF capacitor, with the screen soldered to an adjacent PCB earth plane.

Route the lead through to the TX unit, cut to a suitable length and solder the centre to the top lead of R32, soldering the screen to the adjacent metal screen.

Check all connections.

Carefully re-assemble the RX unit to the main chassis, ensuring that the leads are not damaged by the PCB. Check normal operation of the transceiver using FM with a front panel microphone fitted.

Using a 3.5mm stereo jack plug in the data socket on the rear panel, check with an oscilloscope for approximately 1V p/p audio from the data socket with 5kHz deviation FM received signal. Inject approximately 500mV RMS audio at 1kHz (nominal) into the data socket and check deviation that the TX generates. It should be 5kHz (typically 2.6kHz-7.5kHz).

Note you may find that the TX and RX on the data socket are reversed.

Beware that if you do this job yourself you are likely to invalidate the rig's guarantee.

NEW PRODUCTS

A few new products are worth a mention this month.

Kantronics have released a "Next Generation" TNC called The Data Engine. It is a high performance TNC capable of high speed operation (with optional boards), dual ports and can accommodate two internal or external modems. It has a V40 processor and a 10MHz clock speed with the advantage of EPROM sockets allowing up to half megabyte of firmware and a further half megabyte of RAM. Options available include additional 1200 baud modem, and a modem development board (for all you DIY enthusiasts). A developer's manual and additional modems are under development.

Siskin Electronics, the British agent for PacComm, now have the release version of the HandiPacket TNC. Having used one now for a couple of months, it certainly does all they state. The TNC is pocket size, runs on rechargeable batteries (10 hours of operation) and has PMS ver 3. The TNC also has built in circuitry to support handheld PTT circuits.

Other new products from Siskin include the PSK-1 satellite modem and the NB-96 System for narrowband 9600 baud packet.

ICS Electronics have sent me information of AEA's new Multi Mode Data Controllers. The DSP-1232 and DSP-2232 are using a system called DSP (Digital Signal Processing) which offers amazing flexibility. New modems are designed in software only, so that high speed data within audio passbands, satellite data modulation and new schemes as they evolve can be implemented with an inexpensive firmware upgrade. These units will be fully compatible to interface with the existing PK-232 and its driver software. Future plans are to release firmware for 2400 baud PSK modem and external modems for Microsat satellites.

Monthly forwarding league - May 1990

Times are the average number of minutes it takes between a mailbox receiving a message and the successful delivery of that message to an adjacent mailbox. The low figures show just what is achievable. The high ones reveal that unreliable, long, or congested links can drastically slow traffic down. Forwarding times for March are shown in brackets.

Top			Bottom		
GB7HIU	<> GB7HHH 11 minutes	(17)	GB7FRI	<> GB7MAC 2878 minutes	(NA)
GB7YAX	<> GB7WRG 13 minutes	(47)	GB7AVM	<> GB7HHH 8390 minutes	(94)
GB7WRG	<> GB7DAD 14 minutes	(NA)	GB7SUT	<> GB7AAA 8986 minutes	(579)

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

Firstly, a gentle reminder for all listeners to support the Society's SWL Contest on 7/8 July. The full rules appeared in the May issue of the magazine under "Contest News".

JANUARY CHALLENGE RESULTS

This year's challenge was better supported, thanks to a touch more advertising, but still the number of entrants is disappointing. Conditions on 3.5MHz were reasonably good with reception from YB and VK on several evenings, but otherwise the DX was rather weak. 1.8MHz, however, was poor (the days of fine early mornings DX seem to have gone for the present) but, having said that, Jean-Jacques Yerganian ONL383, did find PY0FF at 0109 on 9 January and K8GG/J3 at 0346 on 24 January. There was often propagation to Asiatic Russia, but otherwise, very little. The star rating undoubtedly went to 7MHz. Arthur Miller, who provided a check log this year, really sang its praises. He felt that conditions on the band were the best ever, hearing 100 countries in the first five days of January. He went on to log 140 countries during the month. All Continents were audible almost daily, and he copied stations from 35 of the 40 zones, missing out on only 19, 31, 34, 37 and 39. Three new countries were heard, in the shape of XX9JN, 3Y5X and CY0SAB.

It was good to receive a first-time CW log from G0FYP who entered under his SWL callsign of BRS86249. He did not realise the amount of DX to be heard on 3.5 and 7MHz, normally spending much time on QRP CW. Two main disappointments spoilt his month, namely not hearing JA's when stations in other parts of Europe were giving 59 reports, and not hearing A41KN on 3.5MHz when he QSYed from 7MHz.

It was also good to receive logs from G6RJZ, two from France and two from Belgium. Now for the results —

Pos'n	Station	Points
1	ONL-383	857
2	BRS8841	664
3	BRS25429	630
4	BRS52543	600
5	BRS25209	427
7	ONL-620	339
8	BRS92649	242
9	G6RJZ	220
10	F11ATZ	27
11	F11AJB	21

Check Logs: BRS32525, 62088, 88969

INTERNATIONAL MARCONI DAY FEEDBACK

G3FWE, who has provided much of the information which has appeared in the column about IMD, provided some feedback, including this photograph of the station at GB0IMD, into the success of this year's event as far as the Marconi Radio Society were concerned. Band conditions were not good, but over 600 members of the public visited GB0IMD on the Isle of Wight, and much good publicity for the hobby was broadcast by the media.

The International Marconi Day station GB0IMP

HAB

A brief note this time just to make listeners aware of the rallies this year at which there will be HAB representation. For those who are keen on collecting HAB squares the details are: 29 July — Scarborough Rally; 19 August — Red Rose Summer Rally, Bolton; 2 September — Preston Rally; also 2 September — Telford Rally; 9 September — Lincoln Hamfest; and 15 September — Scottish Convention, Glasgow. For further information contact G1SGB who is QTHR.

QSL TIPS

No room this month for Part Two of "QSL techniques", but GM4SVM provides clear evidence of how not to send an SWL report. He worked UZ9MWD on 21MHz CW at 1148 on 26.08.88 and got a 579 report. The card was signed "Roman". Lo and behold, he also received an SWL report on the same QSO also giving a 579 report from UA9-146-257, which was also signed "Roman". It is quite clear that the SWL was also the operator of UZ9MWD. This practice is commonplace amongst USSR listeners. I understand that the reason is that as part of their quest for a transmitting licence, Russian SWL's have to collect QSL cards from a certain number of DX stations. So, although the report is worthless, if you reply, you will be helping that SWL obtain his licence. Of course, it might be better for the operator to actually explain this during the QSO, but this probably goes somewhat further than "59, name Vlad, QTH Moscow"!

This is clear evidence of what I said in last month's column — try not to send a QSL card to a station who is working into the British Isles, and if you do, make sure that you include details of other QSO's so that the operator can see that the report is a valid one.

PROPAGATION — 2: THE IONOSPHERE

There are three major ionised layers in the atmosphere known as the "D", "E" and "F" layers. The effect of these layers is to bend the path of a sky wave signal, allowing it to be reflected back to earth and giving communication paths which are much longer than those provided by the ground wave.

The "D" layer is the lowest of the three at a height of about 70-90km. The layer only exists during daylight and is most intensely ionised at around midday. The "D" layer does not reflect MF or HF signals but produces absorption as the wave passes through the layer. This layer restricts long range propagation on the low frequency bands during daylight hours.

The "E" layer is above the "D" layer at about 100-120km. It reflects signals to provide propagation up to about 1,500km during daylight hours. After dark, the intensity of the "E" layer is reduced, but does not disappear completely. The layer can provide long distance MF propagation.

The "F" layer is the uppermost layer. During daylight it splits into two layers — F_1 at about 150km and F_2 at 300km. After dark, the F_1 and F_2 layers merge and the ionisation level falls slowly. This layer provides the main long distance propagation path for the HF bands with the LF bands being more effective at night. The effectiveness of the "F" layer follows a cyclic change through the year giving best results above 10MHz during the summer, and below 10MHz in winter. This layer is also affected by the activity of the sun and follows an 11 year "sunspot" cycle. At "sunspot maximum" — about now — bands up to 28MHz are liable to remain open throughout the day and night.

As well as these layers, there is Sporadic E propagation which occurs at the height of the "E" layer. This is irregular. Its effect is to produce a thin but intense ionised layer which allows signals from about 28MHz up to 144MHz to be reflected, giving long distance propagation. This is a summer phenomenon which gives short skip propagation around Europe on 28MHz, but provides excellent results on 50MHz, and occasional openings on 144MHz.
More next month.

FINALE

Next month, I hope to provide some more QSL techniques, and also take a look at ATU's, as promised a couple of months ago, and there will be Part 3 of "Propagation". If any listener has any news, views or comment (or a shack photo), it should reach me no later than Monday 9 July — **note the early deadline.**

SATELLITES

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

Last month we described the problems being experienced with some of the spacecraft which had recently been launched — UoSAT-4 (Oscar 15) and the DOVE Microsat (Oscar 17.)

The latest information on Oscar 15 is that so far command has not been re-established. Monitoring of some signals from it continues and its controllers are using all the ingenuity they can muster to bring it back into full operation.

It will be recalled that DOVE suffered a CPU crash in March when the primary transmitter on 145.825MHz became locked on in a condition where no data was being transmitted, and routine control of the Microsat proved impossible. Eventually, with the help of the moonbounce antenna array at W5UN, the CPU was reset and control regained. On the following day, the 144MHz band transmitter was turned off and the experimental S-band transmitter was activated, thus providing a downlink. It was decided not to resume any DOVE operation on the 144MHz band until a new software load could be accomplished. Dr Junior De Castro, PY2BJO, DOVE's owner, supplied an S-band receiver and antenna for use in the recovery effort. With this equipment, Bob McGwier, N4NY, Microsat command engineer, was able to verify that the phase-shift keying modulation index on the transmitter was much lower than expected. The binary data was not shifting the S-band carrier a full plus and minus 180° as it was supposed to do. When listening on a SSB receiver, the signal sounded like mostly carrier with data at a low volume. This phenomenon had been noticed by other command stations who were not able to decode it with their regular TNCs, even though they had good S-band equipment. N4NY has developed a digital signal processing technique to decode the under-modulated signals, and he expects to be able to load a new operating system on DOVE and then resume 144MHz band transmission. A full recovery is expected.

WEBERSAT-OSCAR 18

This satellite has been sending down experimental pictures satisfactorily. Weber State University is to provide software for receiving these pictures in due course which will enable colour pictures to be receivable on an IBM PC or clone.

FO 20

This still has its problems and is not always transmitting when it is expected to be doing so. Wednesday is said to be an "off day" for the satellite.

UoSAT-OSCAR 14

The gravity gradient boom, designed to lock the spacecraft to the earth's magnetic field and thus stabilise it, was deployed successfully on 22 March. The 'business end' of the spacecraft has been successfully directed towards the Earth. PacSat communication experiments have been proceeding satisfactorily and data has been received from the cosmic particle experiment.

PEGASUS LAUNCH

An experimental Pegasus rocket was sent into space on 5 April from a B-52 plane and successfully launched a 440lb satellite into a polar orbit at an altitude of 368 miles. The rocket's third stage held two canisters containing barium powder to be released over central Canada to produce a glowing space cloud. This was an experiment to enable NASA scientists to learn more about the earth's magnetosphere and ionosphere. At the time of writing, it is learned that one of the canisters has been released and gave a visible cloud over a wide area. Discharge of the second canister was delayed by bad weather but has no doubt been deployed by now. The estimated cost of the Pegasus launch was between six and eight million dollars compared to 30-100 million dollars for an Atlas or Titan launch. The launch was a milestone for aerospace technology as no winged space vehicle has ever accelerated to eight times the speed of sound as the Pegasus did. Knowledge gained from this launch will be used by NASA to begin designing a proposed X-30 jet which would take off from a ground airstrip and go directly into space. It is interesting to note that several AMSAT-NA authorities work for the company that makes Pegasus.

STS-35 SHUTTLE AMATEUR RADIO EXPERIMENT (SAREX)

The launch of the Shuttle Columbia had to be delayed from May 16, due to problems in a Freon cooling system designed to keep the temperature of electronics in the ASTRO-1 observatory payload within safe limits. The repair of a faulty cooling valve was expected to take up to three weeks if it was possible to do this on the launching pad, or longer if Columbia had to be rolled back to the Orbiter Processing Faculty for repairs. Amateur radio equipment for packet and voice will be carried on this 10-day mission. Ron Parise, WA4SIR, the payload specialist and astronomer, will be the amateur radio operator. Packet radio will be operated for about 12 hours daily and voice transmissions will depend on how much time Ron will have available. He hopes he may have an hour or so each day.

Orbital characteristics will make reception of Columbia's amateur radio signals difficult for Northern Hemisphere amateurs. All the shuttle passes over this part of the world occur during the evening hours. It has an inclination of only 28°, bringing it overhead only as far north as 40°N. If your QTH is between 35°N and 35°S, you may manage a good packet contact as the system is automated and may be turned on during the astronaut's sleep period. Uplink frequency is 144.950MHz and downlink 145.550.

AMSAT-UK NETS

We have mentioned before that AMSAT-UK runs an information net on Sunday mornings around 3,780kHz at 1015 hours local time. On the last Sunday of each month, Richard Limebear, G3RWL, gives a very comprehensive resume of the month's satellite news. The sort of information he gives is indicated by the news items reproduced above, for which your columnist extends his thanks to Richard. Those readers who are not able to listen to these AMSAT-UK nets every Sunday will find Richard's news gathering efforts very well worthwhile listening to.

ANNUAL AMSAT-UK COLLOQUIUM 26-29 JULY

A very full program has been arranged again this year. Thursday, 26 July, has been designated 'International Satellite Day', with IARU and AMSAT operations on a worldwide basis being discussed. Main speakers are from Germany, USA, UK, Japan, Brazil and Russia etc. On Friday, 27 July, there will be lectures on all aspects of amateur satellite communication, intended particularly for the average radio amateur. The evening will be given over to the AMSAT-UK Annual General Meeting and socialising at the Wates House Bar. Saturday and Sunday will be for lectures on the more technical aspects of amateur satellites by several speakers including Geoff Perry, OBE, well-known TV personality, and Laurence Howell, GM4DMA, of the North Pole 90 Expedition. On Saturday evening there will be the Colloquium buffet dinner and the fun junk sale. Full details from Ron Broadbent, G3AAJ, 94 Herongate Rd, Wanstead Park, London E12 5EQ.

RAYNET

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

DEVON OIL POLLUTION

On Saturday 12 May, a Brixham trawler, Dionne Marie, collided with the tanker Rose Bay causing 10,000 tonnes of oil to be spilt into the sea off the South Devon coast. Immediately, Department of Transport Marine Pollution Control Unit planes and ships began a spraying operation in an attempt to keep the oil offshore. Plans were also put in motion should the spraying fail.

On Wednesday 16 May, the worst fears were realised and the oil came ashore along a 10-mile stretch of the coast of the South Hams on some of Devon's most beautiful beaches, between Bigbury and Mothercombe. The local district council, based at Kingsbridge, found that they could not contact the beach clearing teams from their base owing to the cliffs. At 1400 hours, the officer in charge of the incident contacted Peter Kerton, G0EOZ, the Ivybridge and South Hams sub-controller of the West Devon RAYNET Group. Within minutes Ian Harley, G6BJJ, was contacted by pager and, following the group callout, members were at the incident control at Kingsbridge, and with the council teams on the Sedgewell, Bigbury, Challaborough, Wonwell and Mothercombe beaches, within 40 minutes.

Heavy black oiling was reported on the main beaches and the teams attempting to clear them requested men and equipment via RAYNET. At 1500 hours a planning meeting was held to arrange cover for the following day for all the existing locations plus one extra beach. The city sub-controller, Cyril Stevens, G0EFK, was meanwhile contacting group members to arrange cover and reliefs, and also alerted the surrounding group controllers in South Devon and South East Cornwall, plus the county controller George Smith, G8AOJ, in case further help would be required. By 2100 hours all was complete for the day and RAYNET stood down until the morning.

The operation restarted at 0800 hours the next morning and it was noted that the smell of the oil was reaching places between five and 10 miles away. G8AOJ relieved G0EOZ so that he could return to business and the work continued in a similar fashion to that of the previous day. There was a ministerial visit by Mr Heathcote-Amery who went to see the extent of the disaster first-hand, and, of course, the national and local press were never far away. Part of the Wonwell and Mothercombe beach was not able to be contacted directly from control, and a cross-band talk-through unit was introduced to overcome this

problem. One of the oil booms across the Erme failed, allowing more oil to be brought ashore by the high tide.

Friday 16 May saw the clifftop control moved to Battisborough above Mothercombe in order to improve communications. The local MP, Anthony Steen, was particularly interested in the work being carried out by RAYNET and, as a result, an article appeared in the local newspaper. Work for the day stopped at 1800 hours. On Saturday 19 May, the beach teams were joined by two operators from Exmouth (East Devon RAYNET Group) as the West Devon Group had to divide its resources to cover a long-standing commitment with St John's Ambulance in Plymouth for the Lord Mayor's Show. At 1600 hours RAYNET members were stood down and thanked for their magnificent effort, which allowed the work of clearing the beaches to be completed without the delays which would have occurred if messages could not have been passed directly between the control at Kingsbridge and the beaches.

RAYNET AT THE NEC

Thanks to the many RAYNET members who visited us on our stand at the NEC in April. We were particularly busy this year, and thanks go to Mike, G8CAC, and his team for looking after everything so well. The session John, G8BBW, gave in the lecture theatre also provided good feedback.

SCOTTISH SYMPOSIUM

The Scottish Symposium was held in Aviemore on Saturday 5 May. Instead of the usual full programme of 'external' speakers, this year Eric, GM3RFA, Zone 12 Representative, decided to have more 'in house' debate. This worked well, with Ian Strachan, GM4FLP, telling how he approached his REPO for equipment, and RAYNET Committee chairman Philip Howarth, G3YAC, talking about RAYNET management and coordination. After lunch, Dr Julian Broadbent, GW3UYH, controller of the North Dyfed RAYNET Group, told of some of the problems local to him, and this was followed by a 'Technical Topics' seminar covering the CAIRO system, talkthrough, packet, etc.

THE CAIRO SYSTEM

CAIRO is a scheme for using standardised signals and connectors so that just about any form of communication accessory may plug into, and operate, almost every form of radio transceiver. It is therefore just what is needed when a temporary station has to be assembled quickly in response to a user service's call for RAYNET assistance.

The acronym stands for Communications Audio Interface for Remote Operations and refers not only to the 'plug and work' compatibility which it holds, but also to the much more intriguing engineering notion behind remote operations. This respect of the scheme offers great flexibility in the layout of a station, particularly if there are physical or operational constraints to be overcome. Typically the transceiver, with its power supply and sundry equipment, may be installed 'out of harm's way' near to a well-sited aerial to minimise feeder losses, while the operators take up position some distance away. Taking typical multi-storey 'CEPO HQ' buildings as a case in point, there are many instances where the CEPO requires an operator in the comms room in the basement while it is desirable for the station's aerial to have the best takeoff from the roof. CAIRO dispenses with the otherwise inevitable long run of coaxial cable.

CAIRO can also be used when an operator has a good vehicle-mounted set-up, but has to operate from an adjacent building, tent or caravan. Details of the system are available from Dr Peter Best, G8CQH, the scheme's 'founding father' who is QTHR. He would be happy to give demonstrations of CAIRO to interested RAYNET groups.

DO WE KNOW WHERE YOU ARE?

RAYNET membership cards remain valid for either one or two years depending on the policy of any particular RAYNET group. In this time many members change their address or callsign and do not inform either their Group controller or RAYNET registrations at the RSGB. If there is a change, please make sure that your Group Controller and the RAYNET Registrations Secretary at the RSGB have your new details.

DEADLINE

Items for the September RAYNET column should reach me by Saturday 7 July.

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

TWO QRP EVENTS

In recent years there has been a growth of local QRP events across the country; these are mainly social events rather than the more traditional amateur radio rallies based upon commercial trading.

QRP BESIDE THE SEASIDE is an event organised by G3OEP and this year takes place on Saturday, 22 September at the Garnham Centre, United Reform Church, Back Chapel Lane, Gorleston, Great Yarmouth from 2 to 5pm. There will be talk-in on S22 from 1.15pm with the the callsign G3OEP. A big display of home built equipment is planned and people are invited to bring their own equipment. There are prizes for the best home built equipment and the person who travels the longest distance to attend. Admission is free and light refreshments are available. Further details may be had from David Buddery, G3OEP on Great Yarmouth 662323.

The second NORTHERN QRP CONVENTION will be on Saturday 20 October at St. Aidan's Hall, Manchester Road, Rochdale, Lancashire from 10am to 5pm. The day includes a full programme of lectures, a giant bring and buy, or swop, stall, displays of equipment, component and kit trade stalls, QRP circuit archive with photocopier, and a large social area with food and drinks including lunches. Talk-in will be available on S22 from 9am with the callsign G1IJW. The admission price of £1 includes entry to a prize draw. Those who attend are encouraged to bring home built equipment to show off or test on a provided test bench. Prizes will be awarded for equipment from the simplest to the most complex. Attenders may also like to bring items to sell or swop. This includes everything from commercial equipment right down to surplus junk and even components. A large area will be provided for trading and swopping. The G QRP Club will have a major stand selling club items, books and items of special interest to constructors.

DL AGCW SUMMER QRP CONTEST

This contest, on 21 and 22 July, is the next in a series of six monthly QRP contests run by the German CW Activity Group. The Winter and Summer contest are held each year in the third complete weekend in January and July from Saturday 1500 UTC to Sunday 1500 UTC.
The contest has 4 classes:
Class A: Below 3.5W input or 2W output, single op
Class B: Below 10W input or 5W output, single op
Class C: Below 10W input or 5W output, multi op
Class D: QRO stations over 10W input or 5W output (to contact only QRP stations)
Class E: SWL
The bands used are 160, 80, 40, 20, 15 and 10 metres and only Class C stations may operate for the full 24 hours, all other stations to take a break of 9 hours, or two breaks totalling 9 hours. Call 'CQ QRP' and exchange RST, QSO serial number and power, eg. 579 001/5. If using crystal control add an 'x' to the power suffix and if QRO use 'QRO' as the power suffix. Operation on each band must be in one class only and may be VFO or crystal controlled, with no more than three crystal frequencies per band (VXO is allowed for crystal control).
Points are awarded as follows:
For QSO with own country: 1 point
For QSO with own continent: 2 points
For QSO with DX (other continents): 3 points
Countries are as per the DXCC listing but call areas in JA, PY, VE, VK, W and ZS count as individual countries. Multipliers are awarded as follows:
For each country: 1. For each DX QSO: 1. Results per band = points x multipliers.
Total result = sum of band results. The results may be doubled for crystal control.

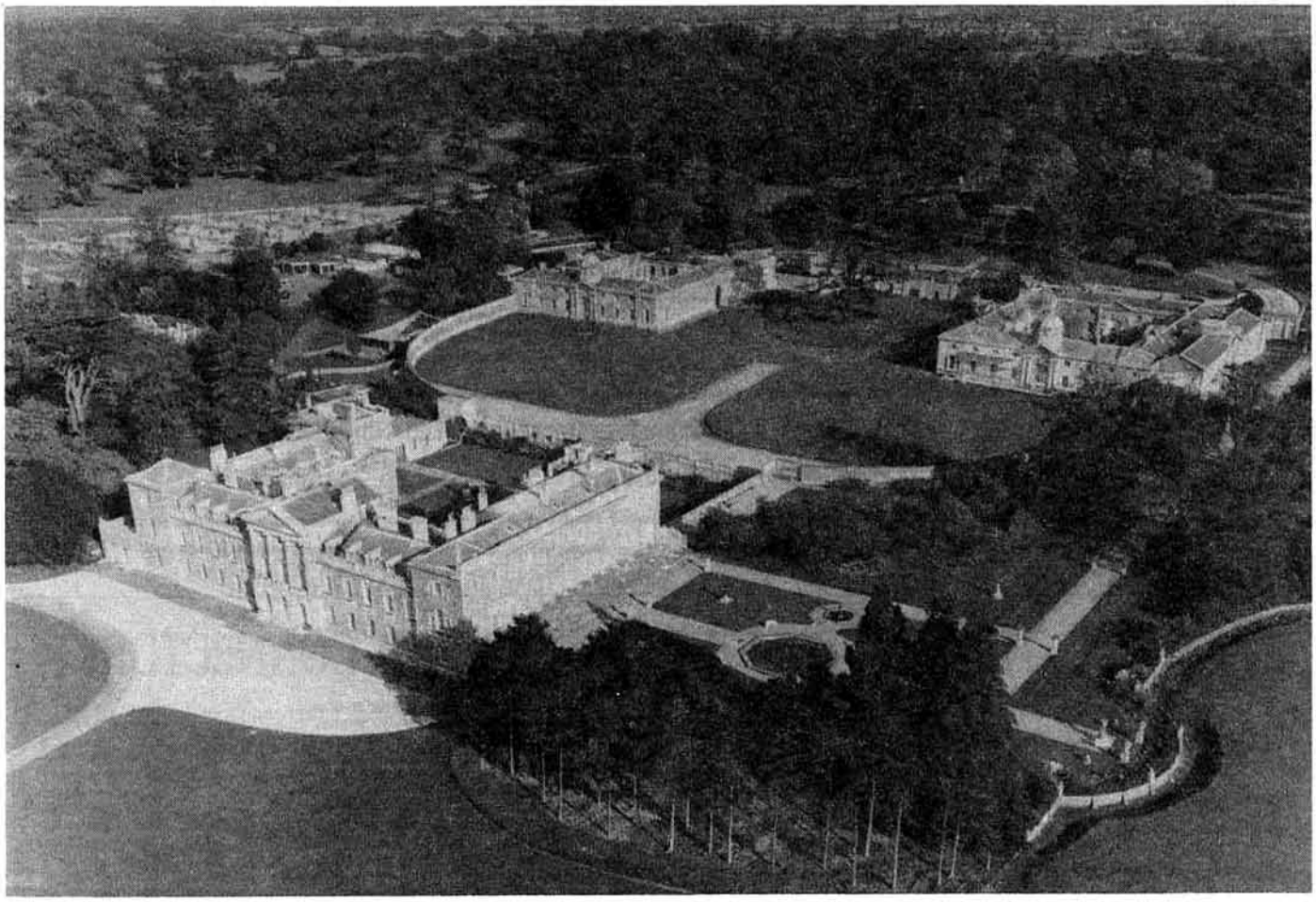
Certificates are awarded to the first three places in each class and band. There is also a G QRP Club plaque for the highest placed member. The closing date for entries is six weeks after the contest and special log sheets are available from the Contest Manager. Enclose 1 IRC with the entry if you require a list of the results. The manager is:

Dr H Weber, DL7ST,
Schlesierweg 13,
D — 3320 Salzgitter 1,
Federal Republic of Germany.

RSGB NATIONAL MOBILE RALLY

SUNDAY 5 AUGUST 1990 OPEN 10AM

WOBURN ABBEY BEDFORDSHIRE (COACH PARK SITE)



• LARGE TRADE EXHIBITION (20,000 SQ FT) • RSGB BOOKSTALL AND ENQUIRIES STAND • MEMBERS' MART • RAYNET STAND • BARTG STAND (all under cover)

Members' Mart this year will be charged at £3 per hour per table, which will enable members to sell direct. Tables will be offered on a first-come first-served basis.

A limited number of outside tables are also available — advance booking only (Martin G3SZJ, QTHR).

The RSGB makes no charge for entrance to the rally but all visitors must pay for entrance to Woburn Park, in which the rally takes place, at £2.50 per vehicle, including passengers.

Limited overnight caravan stay at £3.75 per night. Booking forms available from Norman Miller, G3MVV.

All the normal Woburn attractions will be available at small extra charges. Various bars and cafes are available nearby.

HOW TO GET TO THE WOBURN RALLY

Via the M1 — leave the M1 from north or south at junction 13, not 12 as signposted, and there follow signposts through Husborne Crawley to Woburn Abbey.

Avoid routes signposted to "The Wild Animal Kingdom" or "Game Reserve". The rally takes place in Woburn Park and correct routes are signposted to "Woburn Park" or "The Abbey". Also watch for RSGB signs. Usual talk-in facilities will be in operation by Dunstable Downs RC on 144 and 432MHz.

All enquiries regarding this event should be made to Norman Miller G3MVV, 180 Warley Hill, Brentwood, Essex, CM14 5HF, tel: 0277 225563.

FINAL REMINDER

YOUNG AMATEUR OF THE YEAR 1990

Entry forms (enclosed as a looseleaf insert with the May issue) must be sent to The Secretary (YAOTY), Radio Society of Great Britain, Lambda House, Potters Bar, EN6 3JE, NO LATER THAN 31 JULY 1990

CONTEST NEWS

7MHZ CW CONTEST RESULTS

Overall, the entry this year was down on the previous one, whether this was due to conditions or publicity is not at all clear. Looking at the comparitive figures, the number of logs received from the British Isles was slightly up but in all other sections there was a marked decrease.

Of the suggestions that have been made by contestants in letters included with their logs, the Committee will be giving serious consideration to two. These are to move the start of the Contest from 1200GMT to 1500GMT and to change the scoring system for stations working the UK. On the latter suggestion, it is proposed that all stations in the British Isles give their county and the running serial number. Counties would count as multipliers instead of country prefix. The aim is to encourage overseas participation from those amateurs that are looking for counties for various certificates, and at the same time, remove the current advantage that some British Isles' stations have to operate from Scotland/ Wales, etc, or have a G2/G5/G8 call.

As in previous years the level of log-keeping was high.

At the request of several stations a lot more information has been listed relating to antennas and equipment used by British Isles contestants. There is no doubt a beam does make a difference compared with simple antennas, the exception being G3LET placed third using a full-size ground plane.

The entrants including copies of their 'dupe sheets' made the work of checking a lot easier, particularly the computer-generated listings with alphabetical sorts that also included the serial number sent. Luckily there are more and more stations moving over to computerisation of contest activity that are prepared to take just a few more minutes of computer time to generate these lists which simplifies the checking process.

Finally, many thanks to all participants that included letters of notes with their logs and the following stations that sent in check logs. GW3SYL, G3OXC, SM0IFX, UO5SA, UA4YZ, EA/G3HKO, LY1BXF, PA3BFH, PA3AAV, SM7BDB, Y22TD, SM4BTF, SM5DAC, LB7FC, Y21UD.

Hope to see you in the 1991 Contest.

G3HCT

BRITISH ISLES

1.	GW3YDX	407895	2 El Yagi at 95ft	TS930S
2.	G3VER/P	347040	3 El Yagi at 95ft (G4DJX op)	TS830S
3.	G3LET	308790	Ground Plane	FT One
4.	G0IVZ	170520	Butternut	TS440S
5.	G3IGW	159200	Phased Loops	TR5 & R7
6.	G4ERW	153720	Inverted Vee	T4X & R4B
7.	G4RFR	141645	Dipole (G3SQX op)	TS930
8.	G3VYI	129250	132ft Wire	FT101Z
9.	G5LP	116100	Dipole	FT101ZD
10.	G4HTD	113155	Dipole	IC720A
11.	G3NKS	112575	132ft Wire	IC735
12.	G3TBK	111375	2 El Yagi at 66ft	FT102
13.	G0CKP	96250	Inverted Vee	IC735
14.	G3YEC	91000	?	?
15.	G2QT	87500	Phased Loops	1030
16.	G3OLU	63210	G5RV	TS430
17.	G3JSR	61490	1/2 G5RV	IC751A
18.	G3MPB	60030	Dipole	TS930S
19.	G3LIK	57640	W3DZZ	FT101E
20.	G4LZB	52260	G5RV	FT101ZD
21.	GW3HGJ	51800	Butternut	TS830S
22.	G0IDE	48380	Loop	Homebrew
23.	G3BPM	46125	264ft Wire	DrakeTR7
24.	G4UZN	42840	Trap Dipole	TS830S
25.	G0JNZ	42660	Dipole	FT902
26.	G2AFV	42600	Windom	IC751
27.	G4PYD	42510	Inverted Vee	107M
28.	G4KGK	41925	Dipole	FT902DM
29.	G5MY	38025	Dipole	TS830
30.	G3NKC	35820	200ft Wire	FT101ZD
31.	GW4HBK	34225	Inverted Vee	FL400
32.	G3ZDW	28800	HF6V	TS440S
33.	G3GLL	25900	HF6V	IC751A
34.	G3GMS	25450	60ft Wire	HW100
35.	G0LZL	23870	Dipole	IC740
36.	G3AWR	22880	Loop	TS940S
37.	G3ESF	16965	2 x 1/2 G5RV	TS830S
38.	GM3UM	15035	136ft Wire	FT401
39.	G4PTE	14700	HF5	IC761
40.	G3ZGC	10850	66ft Wire	IC751
41.	GW3SB	9840	W3EDP	HW101
42.	G4OTY	3920	Indoor Loop	TS530S
43.	G3GMM	2850	18AVT	TS520S

ASIA

1.	UJ8JA	10350	3-6 El Yagi	
2.	UA9FGO	9450	Ground Plane	
3.	UW9CWG	3255	Long Wire	
4.	RA9HO	1260	2 El Inverted Vee	

AFRICA

1.	EA8AB	5775	40 QSOs	7 Multipliers
2.	G4WYG/ST2	1785	17 QSOs	7 Multipliers

NORTH AMERICA

1.	JP1DMX/HI8	5400	36 QSOs	10 Multipliers

RECEIVING SECTION - BRITISH ISLES

1.	BRS1066	67620	120ft Long Wire

RECEIVING SECTION - EUROPE

1.	OK2-31097	4440	Dipole
2.	LZ1M333	2700	Loop
3.	UB5-075-145	2205	W3DZZ
4.	OK1-33424	665	Loop

RECEIVING SECTION - ASIA

1.	UA9-154-1171	2700	Ground Plane
2.	UA9-090-1058	600	Long Wire

EUROPE

1.	EA6ZY	9035	46.	SP2LNW	2275
	(2 El Yagi at 55ft	TS940S)	47.	PA3BEJ	2240
2.	DJ0MBN	7995	48.	OK3CEL	2200
	(Butternut HF6V	TS940S)	49.	EA3DWX	2120
3.	YU2OB	6650	50.	YO8CLS	2115
	(Dipole	TS530S)	51.	DF3QN	2080
4.	UB5IFN	6480	52.	UV1OL	2070
5.	EI5DI	6420	53.	ES7FU	1980
6.	UA1AUA	6240	54.	OK3CDZ	1935
7.	DL5JQ	5060	55.	YO3BWK	1890
8.	LA1IE	5040	56.	UA3YAO	1840
9.	UV3DRU	4650		UA3UDE	
10.	DJ0IF	4400		OH7MMA	
11.	SM0BVQ	4350		PA0CF	
12.	UC2WJ	4260	60.	PA2JCG	1800
13.	OZ1EUO	4250	61.	OK2BBQ	1750
14.	UA3LID	4140	62.	EA2CR	1720
15.	UB5ZBG	4050	63.	LY2BKT	1505
16.	OK1DEC	4000	64.	OK1KZ	1440
17.	DK7VW	3915		PA3EEK	
18.	SM5BDY	3905	66.	OH3MIG	1400
19.	DF5XN	3750		HB9DX	
20.	PA0DXK	3700		OH2DT	
21.	LY2PAQ	3630	69.	UW6MA	1390fs
22.	PA3DCO	3600	70.	SP4AVG	1350
	DL1OO		71.	OH7NW	1330
24.	UO5OLC	3285	72.	UB5FBN	1300
25.	PA3AWV	3240	73.	OK1OH	1280
26.	OK1DMS	3105	74.	DK7FP/P	1230
	OK2BWJ		75.	Y25IJ	1225
28.	UB5BCP	3060	76.	YO8CMB	1190
29.	DJ5GG	3040	77.	RA3DGP	1155
30.	OK1FIM	3000	78.	DL1ZQ	1015
31.	OH1MDR	2900	79.	RA1CZ	900
32.	UA4AGP	2880	80.	YU7KM	875
	Y55SC		81.	OK1DXW	840
34.	YU5GB	2860	82.	YO4ATW	810
35.	OK3CDN	2750	83.	OH1MQ	700
36.	PA3ELD	2745	84.	F6EEM	690
37.	OK1FER	2700	85.	UA3DPX	675
	F6EQV		86.	YU5DX	665
39.	PA0DIN	2640	87.	OK1KCF	600
40.	LA4XX	2600	88.	OK3YFO	575
41.	OH4MCV	2550	89.	OH5MMG	475
42.	PA2CHM	2520	90.	SM0OY	450
43.	UV3DFL	2430	91.	OK2BPG	300
44.	OK1ONI	2360	92.	OK1FTX	150
45.	EA5GGV	2295			

RULES

10GHZ CUMULATIVE CONTEST RULES

0900-2100GMT, (8 April), (6 May), (10 June), 22 July, 19 August, 9 September, 7 October.

Except where modified below, all the general rules for vhf/uhf/shf contests apply.

Entrants unable to be active for three periods are strongly encouraged to send in their logs as a record of their activity, but will not be eligible for an award. Such logs will be recorded in the results.

Entries from outside the UK will be accepted, whether or not they are RSGB members.

Stations operating from within the UK must state in their logs the National Grid Reference of all sites used.

There will be three sections: wideband, narrowband and fast-scan tv, which will be scored separately. Stations may operate in all sections if they wish. A given station may be contacted thrice, once on each mode. In the case of crossmode contacts, the contact should be included in the section appropriate to the equipment used at your end. Serial numbers start at 001 and advance by one for each contact, irrespective of section. A certificate will be awarded to the winner, runner-up, leading foreign station and fixed station in the narrow and wideband sections, and to the leading station in the tv section. In addition, the station submitting the highest scoring entry will receive the Alpha award.

During each activity period, a station may change its location once. For the purpose of this contest, the "location" is defined as any point within a 5km radius of a fixed point. Contestants may start from a new location for each activity period.

Contacts will be scored at one point per kilometre. Half-points may be claimed by both stations for a crossband contact if two-way communication cannot be established on the same band. A full contest exchange should be given on both bands. All cross-band contacts must be clearly marked as such in the respective logs.

Entries should be postmarked no later than 31 October, 1990. Please do not send in logs until after the last event. All entries and checklogs to: The VHF Contests Committee, c/o Petra Suckling G4KGC, 46 Windsor Road, Towcester, Northants. NN12 7JB.

RSGB SSB FIELD DAY 1990 RULES

1. Eligible entrants. Members or groups of members of the RSGB located in the British Isles.

2. The General Rules for RSGB HF Contests will apply.

3. Period. 1500GMT 1 September to 1500GMT 2 September 1990.

4. Sections.

(1) Open. Multi-operator. Maximum licensed power. Equipment: one transmitter and one receiver or one transceiver, PLUS an additional receiver if desired. No antenna restrictions.

(2) Restricted. Multi-operator. Maximum of 200W pep input. Equipment: one transmitter and one receiver, or one transceiver ... no additional receiver. Antenna: Only one antenna may be used, which must be a single element (eg dipole, longwire, W3DZZ, trapped vertical) having not more than two elevated support points. No part of the antenna may be more than 15m above ground level.

NOTES FOR BOTH SECTIONS.

* Standby equipment is permitted on site, but may not be connected at the same time as the main equipment.
* The use of permanent buildings or structures as antenna supports is not permitted. Trees may be used.

5. Location. Each portable station must operate from the same site for the duration of the contest, and may not be located in a permanent building.

6. Power supply. Power for all equipment may be derived only from portable generating plant, accumulators or batteries. The use of the public mains electricity supply for powering equipment or charging accumulators is not permitted.

7. Installation. No equipment or aerials may be installed or erected on the site prior to 24 hours before the start of the contest. This does not apply to the storage of equipment.

8. Contacts. Telephony only in the 3.5, 7, 14, 21 and 28MHz bands.

9. Contest call and exchange. Call 'CQ Field Day'. Exchange RS plus serial number starting from 001.

10. Points. Each complete QSO with

(a) a fixed station in IARU Region 1 . . . 2 points

(b) any station outside IARU Region 1 . . . 3 points

(c) a portable/mobile station in IARU Region 1 . . . 5 points.

IARU Region 1 countries include those in Europe, Africa, USSR, ITU Zone 39 and Mongolia. For a more precise definition refer to the RSGB Amateur Radio Operating Manual.

QSY Rule. A station making a scoring contact on a new band may not return to the previous band until ten minutes have elapsed since the previous scoring contact on that band, eg: G9ZZZ works W1AAA at 1555 on 14MHz, then QSYs to 28MHz and works PY2BBB for points. G9ZZZ may not make another scoring QSO on 14MHz until 1605.

11. Multiplier. Each DXCC Country worked on each band counts as a multiplier.

12. Final Score. The final score is given by the total number of QSO points earned on all bands added together, multiplied by the total number of multipliers worked on all bands added together.

13. Logs. Separate logs are required for each band. Each log must be accompanied by a list of the multipliers worked on that band.

Entries should be typed or written in ink on one side only of standard (A4) size paper or pre-printed log sheets, and should contain 40 QSOs per page. Columns to be headed: Time GMT; callsign of station worked; RS and serial number sent; RS and serial number received; multiplier (if new); points claimed. Computer-generated logs are welcomed provided they are formatted as above. The callsign of the operator must be shown against each contact.

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

Each entry must be accompanied by a cover sheet (HFC2 or equivalent indicating the section entered, power used and the names and callsigns of all operators, as well as the usual details of equipment and aerials).

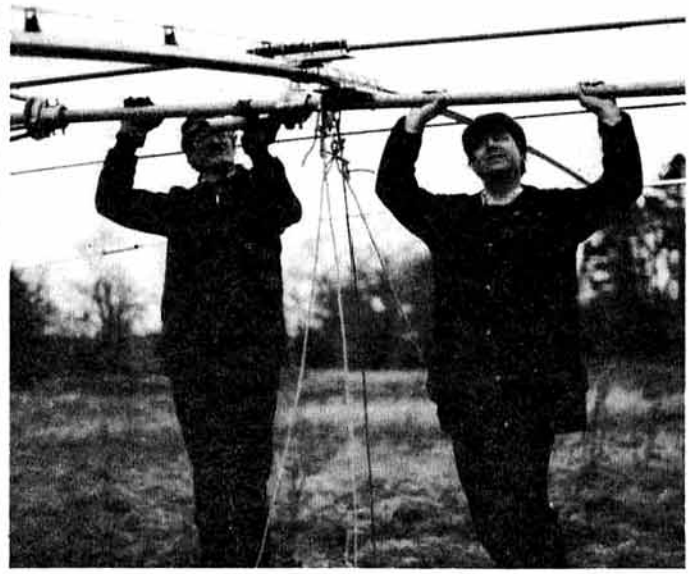
'Dupe Sheet' (Checklist of Callsigns). Entrants making more than 80 QSOs on any band are requested to include a check-list of the callsigns appearing in the log for that band, sorted into alphabetical order and with either the serial number sent or the time of contact beside the callsign.

14. Declaration. Each entry must be accompanied by the following declaration (if not printed on the cover sheet), signed and dated by the person responsible for the entry: *'I declare that this station was operated strictly in accordance with the rules and spirit of the contest, and I agree that the decision of the Council of the RSGB will be final in all cases of dispute. I have no objection to the information from my log being entered into a computer for the sole purpose of the contest adjudication.'* (Data Protection Act).

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

16. Closing Date for entries. Logs must be postmarked not later than the Monday 22 days after the end of the contest.

17. Awards. The leading station in the open section will receive the Northumbria Trophy. The leading station in the restricted section and the second and third-placed entrants in both sections will receive certificates of merit. A certificate will also the awarded to the station in each continent submitting the highest-scoring checklog.



Bob Heath, G3UJV and David Evans, G3OUF, setting up G3VER/P (see page 66).

RESULTS

LF CUMULATIVE CONTESTS 1990 RESULTS

The short evening format continues to be popular - a total of 477 logs were received, despite the poor conditions prevailing on Top Band throughout the contest period and the unpleasant weather (there were several reports of aerials seriously damaged by the wind).

Congratulations to G3TBK for retaining first place overall and also for leading 7MHz. Congratulations also to G3JJG who 'stole' second position overall from G5LP by having fewer errors, and to G3OLB and G4HTD, the leaders on 3.5MHz and 1.8MHz respectively. Special mention is due to G0IDE for his all-homebrew rig, to G3YLC for participating in an 80m session with just 2W, and to G0MFR whose fifteenth birthday fell in the middle of the series.

There were very few error-free logs this year - a number of unmarked duplicates were found, but the principal reason for the loss of points was incorrect copying of callsigns . . . . beware the station whose callsign ends in 'K'!

Several entrants enquired as to why the cumulatives do not count towards the HF Contest Championship, and others commented on the absence of many of the better-known contest operators. These two matters go hand-in-hand. The Cumulative Contests are intended primarily to offer an opportunity for contest newcomers to practise and gain experience in a comparatively relaxed atmosphere. Even so, a serious entry really does require a commitment to the full 30 hours of operating and it takes a goodly time to prepare the logs for submission afterwards. With the contests scheduled as they are, tucked in amongst AFS and several other RSGB events as well as ARRL and CQWW, it is perhaps not surprising that the 'Big Boys' pass them by, and this was in the mind of the Committee at the time the Cumulatives were devised.

Other suggestions from competitors included the addition of the County Code to the contest exchange, and delaying the start of some sessions to ensure (hopefully) improved conditions. These will duly be considered.

In conclusion, thanks to all who supported the contests and special thanks to those who included 'dupe sheets' and checklists, QSL cards or letters with their entries. Hope to see you all again next time.

G3MCX

THREE-BAND TOTALS

Posn	Callsign	Claimed	Checked
1	G3TBK *	1956	1858
2	G3JJG	1674	1659
3	G5LP	1692	1640
4	G3OXC	1599	1587
5	G4ARI	1587	1583
6	G4HTD	1614	1578
7	G4KGK	1581	1576
8	G3LIK	1572	1560
9	G4OGB	1557	1538
10	G3YAJ	1509	1496
11	G3HZL	1482	1468
12	G4BOU	1476	1407
13	G2HLU	1326	1321
14	G3OLB	1329	1316
15	G0IDE	1233	1226
16	GM3UM	1209	1203
17	G3AWR	1185	1180
18	G3ZGC	1176	1172
19	G3BPM	1182	1148
20	G3GMS	1032	1020
21	G4PYD	1023	955
22	G4JSN	822	797
23	G3LET	600	595
24	G0AIZ	717	585
25	GW4KVJ	432	424

* Certificate Winners

1.8MHZ

Posn	Callsign	8/1	16/1	24/1	1/2	9/2	Claimed	Checked
1	G4HTD *	153	ck	ck	155	174	492	482
2	G3TBK	ck	ck	125	152	174	489	451
3	G4OGB	138	145	ck	144	ck	432	427
4	G3ZGC/P	138	143	ck	ck	141	423	422
5	G3JJG	126	-	136	ck	142	411	404
6	G3GLL	131	138	-	-	132	405	401
7	G4SFO	122	129	ck	144	-	402	395
8	G0JNZ	126	-	-	134	134	402	394
9	G3YAJ	-	138	129	-	126	399	393
10	G4ENA	-	126	-	138	121	387	385
11	G4KGK	123	132	120	-	-	378	375
12	G0IDE	105	122	113	-	-	342	340
13	G3BPM	ck	114	111	ck	111	348	336
14	G3OXC	105	111	ck	-	119	339	335
15	G4ARI	87	-	108	ck	133	330	328
16	G3VYI	111	102	114	-	-	333	327
17	G3LIK	95	111	117	ck	-	333	323
18	G2HLU	99	ck	117	ck	104	324	320
19	GM3UM	ck	104	105	105	ck	318	314
20	G3HZL/P	153	149	-	-	-	309	302
21	G5LP	71	120	107	ck	-	306	298
22	G3OLB	159	-	-	80	55	297	294
23	G2AFV	-	-	108	81	99	291	288
24	G3AWR	ck	ck	99	93	90	285	282
25	G3YLC	41	123	-	90	-	336	254
26	G4PYD	-	-	85	69	96	276	250

(continued on next page)

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27	G0FKX	84	110	39	-	-	252	233
28	G4BOU	-	-	126	45	60	237	231
29	G4JSN	ck	62	57	56	ck	186	175
30	G3GMS	ck	65	53	ck	51	177	169
31	G0AIZ	-	9	-	65	62	171	136
32	G3LET	-	-	-	-	103	105	103
33	GW4KVJ	41	36	-	9	-	90	86
	EI4VIJ +	-	-	-	74	69	150	143
	PA0WDW	-	57	-	45	-	108	102
	LA1IE	-	66	-	-	-	66	66

Checklogs:- G2CIL G3BFP GM3CFS G3EAO G3HKO G3ZVW G3MCX

+ EI4VIJ operated by G3HZL

3.5MHZ

Posn	Callsign	8/1	16/1	24/1	1/2	9/2	Claimed	Checked
1	G3OLB *	212	249	ck	280	ck	747	741
2	G5LP	242	254	221	ck	ck	753	717
3	G3TBK	ck	247	227	233	-	756	707
4	G3JJG	207	246	ck	213	ck	672	666
5	G4ARI	204	-	200	258	ck	663	662
6	G3RXP	194	277	-	-	174	654	645
7	G4BOU	ck	219	198	225	ck	648	642
8	G3OXC	206	249	185	ck	ck	645	640
9	G3LIK	ck	219	205	189	-	615	613
10	G4KGK	188	221	ck	195	ck	606	604
11	G3YAJ	ck	222	180	201	ck	609	603
12	G4OGB	201	210	191	ck	ck	615	602
13	G3GLL	197	-	201	-	192	591	590
14	G3ZVW	171	225	189	-	-	609	585
15	G3LZB	ck	212	179	185	-	585	576
16	G3HZL	188	204	ck	179	-	573	571
17	G2HLU	177	189	183	ck	ck	549	549
18	G4HTD	185	186	ck	173	ck	564	544
19	G0IVZ	150	ck	195	192	ck	606	537
20	G3JSR	163	195	166	-	-	546	524
21	G0JNZ	-	173	171	-	162	522	506
22	G3WKL	147	-	167	171	-	516	485
23	G4EBK	123	-	183	-	177	492	483
24	G4XPE	154	ck	177	ck	147	483	478
25	GM3UM	162	156	ck	ck	156	474	474
26	G3AWR	159	153	141	ck	ck	453	453
27	G3GMS	149	147	ck	151	ck	450	447
28	G0IDE	153	150	140	ck	ck	447	443
29	G4PYD	-	-	149	140	146	459	435
30	GW3SB	150	137	144	ck	-	438	431
31	G3LET	-	-	261	-	144	405	405
32	GM3CFS	-	104	151	147	-	447	402
33	G4PTE	125	135	135	ck	-	399	395
34	G3BPM	147	ck	125	ck	118	405	390
35	G3ZGC/M	116	ck	125	ck	99	342	340
36	G3JSN	-	93	119	ck	101	318	313
37	G3YLC	97	-	138	-	60	330	295
38	GM4OBK	243	-	-	-	-	243	243
39	G0AIZ	18	ck	104	-	98	300	220
40	GM4WLN	-	-	107	-	92	204	199
41	GW4KVJ	51	78	-	-	-	129	129

Checklogs:- G2AFV G3BFP G3EAO G3HKO and G3MCX

7MHZ

Posn	Callsign	8/1	16/1	24/1	1/2	9/2	Claimed	Checked
1	G3TBK *	ck	-	216	262	222	711	700
2 =	G3RXP	194	-	ck	237	194	633	625
	G5LP	219	214	192	ck	ck	633	625
4	G3LIK	-	174	183	267	-	627	624
5	G0IVZ	198	ck	ck	234	191	627	623
6	G3OXC	174	189	ck	249	ck	615	612
7	G4KGK	183	-	189	225	ck	597	597
8	G3HZL	174	191	ck	230	-	600	595
9	G4ARI	ck	-	183	218	192	594	593
10	G3ZVW	201	ck	195	195	ck	594	591
11	G3JJG	209	-	183	-	197	591	589
12	G3LZB	-	ck	174	216	168	561	558
13	G3HTD	171	-	180	201	ck	558	552
14	G3BOU	ck	171	168	195	ck	591	534
15	G4IOM	155	-	180	182	-	522	517
16	G4RQI	-	159	171	186	ck	522	516
17	G4OGB	150	ck	161	198	ck	510	509
18	G3MPB	-	-	183	183	138	546	504
19	G3YAJ	-	-	152	177	171	501	500
20	G3JSR	147	-	164	176	-	525	487
21	G2HLU	141	ck	164	-	147	453	452
22	G3AWR	ck	ck	147	159	159	447	445
23	G0IDE	ck	ck	150	138	155	444	443
24	G0MFR	144	-	-	143	155	507	442
25	G4XPE	136	ck	151	ck	143	441	430
26	G3BPM	143	129	150	ck	ck	429	422
27	GM3UM	131	ck	147	ck	137	417	415
28	G3ZGC	ck	146	120	144	ck	411	410
29	G3GMS	ck	ck	149	123	132	405	404
30	GW4HBK	ck	ck	129	137	134	411	400
31	GW3SB	-	108	137	-	143	390	388
32	GM3CFS	125	-	-	139	112	381	376
33	G3WKL	122	105	147	-	-	405	374
34	G4PTE	98	-	117	134	ck	354	349
35	G4JSN	-	ck	115	107	87	318	309
36	GM4OBK	201	-	87	-	-	288	288
37	G3OLB	-	108	68	ck	105	285	281
38	G3PYD	-	-	-	156	114	288	270
39	G0AIZ	ck	78	66	-	85	246	229
40	GW4KVJ	93	-	86	30	-	213	209
41	G3LET	-	-	-	-	87	90	87
42	GM4WLN	-	-	-	79	-	90	79

Checklogs :- G3EAO G3HKO G3RWL G0IFM G3MCX

ROPOCO 1 1990 RESULTS

Perhaps it was something to do with the date of the contest, April 1st, but there seemed to be a spate of really odd post codes circulating during the contest. We have a feeling one or two of these were leg-pulls from non-entrants as they appeared early on and were copied correctly by a number of those submitting logs. As is usual during ROPOCO, the codes became more corrupted as the contest progressed and one that started as a normal six character code finished with just two letters, while another collected an extra six digits on the way - TT1DNX208SSS!.

It was surprising that a number of entrants seemed to have problems in coping with the differences between I and S, S and H and H and 5. This contributed to a loss of points in a number of logs. Several entrants got very confused with some of the 'funnies' and attempted to correct them, losing points in the process. There were comments about the large number of repeat codes that kept coming back and there were many instances where the same code was sent both ways.

Congratulations to regular ROPOCO specialist GM4OBK, Phil Catterall, who was entering his first ROPOCO from his new QTH. He had the top checked score and an error-free log to take the Verulum Silver Jubilee Trophy and a certificate. In joint second place were G3LET and G3RTE who receive certificates. They both had claimed scores higher than GM4OBK, but were amongst the many who got their dots mixed-up. There were a number of comments about the earlier start and finish times. In general the change seems to have been well received, however, there were a few complaints from those who prefer to sleep in on a Sunday morning.

G6LX

1	GM4OBK	680	+*
2	G3RTE	665	*
2	G3LET	665	*
4	G3TBK	660	
5	G5LP	655	
5	G3KTZ	655	
7	G4RFR	650	
7	G3GLL	650	
9	G3KKQ	630	
10	G3OXC	620	
11	G3NKS	610	
12	G0IVZ	590	
13	G3OLU	580	
14	G4OGB	560	
15	G4EBK	555	
16	G3SWH	550	
16	G4BON	550	
16	G3YAJ	550	
19	G3HZL	540	
20	G4KGK	535	
21	G3JSR	530	
21	G3LHJ	530	
23	G3JJZ	520	
24	G4HTD	515	
24	G3HKO	515	
26	G4DRS	510	
27	G2HLU	500	
28	G3GC	480	
29	G4XPE	450	
30	G3CQR	430	
31	G3VYI	425	
32	G4FUI	420	
32	G3AWR	420	
34	G5MY	410	
35	GW3SB	400	
36	G0IDE	395	
36	G3BPM	395	
38	GM3UM	360	
39	G0CGB	360	
39	G3JSK	360	
39	G0CGV	360	
39	G4KLQ	360	
43	G3KZJ	350	
44	G0JNZ	345	
44	G8NT	345	
46	G4BLI	340	
47	G3GMM	300	
47	G0JQN	300	
49	G4PTE	285	
49	G4ECI	295	
51	GM4WLN	200	
52	G4ZME	190	

Checklog - G3MCX

\+ Trophy Winner * Certificate Winners

1989 10GHZ CUMULATIVE CONTEST RESULTS

The 1989 cumulatives were met with reasonable conditions as reflected by the distances worked. Standards of Log keeping were very good.

Only four stations made comments in their logs, with only three mentioning the contest format. Two requested combining the two modes in a single section with one asking for a multiplier for wideband QSOs, as narrowband was becoming too popular. A closer definition of what defines narrowband was also requested. Only one comment was made about the 24-hour cumulative and that was to combine it with a 432MHz to 24GHz contest.

This year's cumulative saw the re-emergence of a former winner of the Alpha Trophy, at the same time showing that RSGB Presidents do not have to go QRT for their year of office. In the NB section, the winner, G(W)3YGF/P, operating from sites in Berkshire, Gwent and the Isle of Wight, used a G3JVL transverter with a 10W TWT and a 3dB GaAsFET preamp feeding a 1.2m dish. In winning the WB section, the same amplifier, dish and preamp were used but fed with a Gunn/cross coupler transmitter and receiver.

Certificates and congratulations go to G(W)3YGF/P (winner wideband and winner narrowband), G0KZP/P (runner-up narrowband), G3ZME/P (runner-up wideband) and F6DPH/P (leading foreign narrowband station).

G4FRE

WIDEBAND SECTION

Pos	Callsign	Points	QSOs	Locs	Periods	Best DX	Km
1	G(W)3YGF/P	2794	31	81,90,91	2,3,5	G3PYB/P	181
2	G3ZME/P	2595	35	82	3,4,5	G3NKL/P	161
3	G4EFT/P	2075	33	90,91	1,4,5	G4ELM/P	81
4	G2DSP/P	1674	26	90	2,5,6	F8WN/P	171
5	G8CUX/P	1670	25	00,01	2,3,4	F8WN/P	197
6	G6ZAC/P	1666	33	90	1,4,5	G8CUX/P	53
7	G4EML/P	1627	39	81,90,91	2,3,4	GW3ATM/P	78
8	GW3ATM/P	1490	13	81,82	4,5,6	GW3PHO/P	134
9	G6NLC/P	1436	23	81,90	2,4,5	G8CUX/P	106
10	G4ELM/P	1173	14	80,90	2,5,6	G2DSP/P	97
11	G8LSD/P	1134	26	90	2,3,4	F8WN/P	172
12	G3JMB/P	1130	28	90	2,3,4	F8WN/P	172
13	G8AYY/P	579	9	82,92,93	3,4,5	GW3PHO/P	143
14	G3LYP/P	304	8	91	3,4	G6ZAC/P	51

NARROWBAND SECTION

Pos	Callsign	Points	QSOs	Locs	Periods	Best Dx	Km
1	G(W)3YGF/P	3000	27	81,90	2,3,5	F6DPH/P	320
2	G0KZP/P	2843	35	91	4,5,6	F6DPH/P	220
3	F6DPH/P(/EA3)	2404	18	09,12,88	3,5,6	GW8KQW/P	370
4	G8LSD/P	1970	29	90	2,4,5	GW3KEU/P	205
5	G3JMB/P	1792	30	90	3,4,5	GW3FYX/P	205
6	G4ELM/P	1660	23	80,90	2,5,6	F8WN/P	182
7	G(W)8IFT/P	1555	20	82,93	1,4,5	G8BJG/P	257
8	G4EML/P	1355	27	81,90	1,2,4	GW4LXO/P	200
9	G8CUX/P	1310	22	90	3,4,5	GW4LXO/P	230

LOW POWER FIXED CONTEST RESULTS

According to most entrants, conditions on both bands were poor, with 7MHz opening up late to Gs. Some had difficulties winkling out QRP stations against the competition from the DIG Contest. This did not, however, stop people enjoying the Contest as usual.

Congratulations to Peter, G3PDL, on winning the 1930 Committee Cup, and also to Glyn, G4CFS, for achieving third place with 1 watt. Peter made 40 contacts on 3.5MHz and 45 on 7MHz. G3JKS made 38 contacts on 3.5MHz and 45 also on 7MHz.

G3PDL's station was completely home-brew, including his key paddle. His antennas for 7MHz were an inverted dipole at 75' and inverted full-wave dipole at right angles at 55'. The antenna for 3.5MHz was an inverted dipole at 75'.

G4JKS

	CALL	POINTS	PWR/W
1.	G3PDL	1075	3 * +
2.	G3JKS	1020	3 *
3.	G4CFS	850	1 *
4.	G3VYI	845	3
5.	G4ARI	805	3
6.	G4KLQ	650	2
7.	G4OGB	645	3
8.	G4SXE	625	3
9.	G3AWR	545	3
10.	G3NEO	510	1
11.	G3BPM	475	1
12.	G3CQR/P	455	3
13.	G3LRS	450	3
14.	G2HLU	440	3
15.	G4ECI	375	2
16.	G3KZR(	350	1
	G0IDE(	350	3
18.	G3DUX	220	2
19.	GW3SB	175	2
20.	G3ZPN	170	3
21.	G0LCQ	120	1

Check logs received with thanks from: G3MY, GW3GWX, G3JSR, G3VIP and G4ZME.

* Certificate + 1930 Committee Cup

The G3VER/P support team, soaked after breaking down the station (see page 66).

NEWS FROM THE HF CONTESTS COMMITTEE

April committee meeting

G3FKM and G6LX reported on the IARU Region 1 conference and outlined the various recommendations approved by the conference in relation to HF contest matters. It was noted that these would be reported separately in *Radio Communication*.

One proposal discussed by the Contest Working Group at the Conference was to hold a Region 1 Top Band CW contest, which could be organized by member societies in turn. The suggestion had some support, and the Austrian Society OVSV and RSGB were asked whether they would give up their November 1.8MHz events to obtain the wider participation from a Region 1 contest. The HFCC decided that the membership should be consulted before making any decision. It is expected that each society would run its own event under a common date and time scale (similar to the arrangements for NFD). There would have to a common exchange, but this could be an extention of the present county code, or something similar. The HFCC would welcome comments from members, in particular those who regularly participate in RSGB Top Band contests. Please address comments to the Chairman HFCC, Box 73, Lichfield, Staffs.

Another Conference item discussed by the HFCC was a suggestion from IARU Region 3 (Oceania and eastern Asia), that there should be contests on 18 and 24MHz. It was noted that the member societies of Region 1 kept these bands contest free as a haven for those who do not wish to participate in contests. The HFCC fully support Region 1 in their opposition to this proposal.

The committee noted that G6LX had been re-elected by Conference for a further three-year term as Chairman of the Region 1 HF Contest Working Group.

The HFCC exhibit at the recent NEC exhibition was reviewed and it was noted that there had been great interest in the tabulations of contest results and other display material. The worldwide contest calendar giveaway had proved very popular and emergency arrangements had to be made for two extra print runs during the exhibition. Copies are still available from G6LX (Box 73 Lichfield or QTHR) on receipt of a large SAE.

Other matters dealt with included the arrangements for RSGB participation in the IARU HF Championship event, complaints from entrants to the 1990 Commonwealth contest about the clash with a contest organised by a Japanese magazine, the position relative to SWL contests and a number of other policy matters. There were reports from the adjudicators of various RSGB HF events and a review of rules for forthcoming contests. The arrangements for the distribution of stationery for NFD were agreed, as were the details for station inspections and other related items.

HFCC CHAIRMAN

Ron Glaisher, G6LX, has retired as Chairman of the HF Contests Committee. He has served on the Committee since 1947 and has been its Chairman for 5 years. The new Chairman is Dave Lawley, G4BUO.

CONTESTS CALENDAR

RSGB HF CONTESTS

7, 8 Jul	SWL (May 90)
15 Jul	Low Power Field Day (May 90)
15 Jul	Ripon DF (Jul 90)
29 Jul	Chelmsford DF (Jul 90)
19 Aug	Coventry DF
26 Aug	ROPOCO 2 (Jun 90)
1, 2 Sept	SSB Field Day (Jul 90)
9 Sept	Torbay DF
10 Sept	2nd 28MHz Cumulative
18 Sept	2nd 28MHz Cumulative
26 Sept	2nd 28MHz Cumulative
30 Sept	DF National Final
4 Oct	2nd 28MHz Cumulative
7 Oct	21/28MHz Phone Contest (May 90)
12 Oct	2nd 28MHz Cumulative
21 Oct	21MHz CW Contest (May 90)

RSGB VHF CONTESTS

7,8 Jul	VHF Field Day (Apr 90)
22 Jul	10GHz Cumulatives (Jul 90)
28 Jul	144MHz Low Power/SWL (May 90)
29 Jul	432MHz Low Power/SWL (May 90)
All Aug	432MHz Activity (Jun 90)
12 Aug	1·3 & 2·3GHz Trophies (Jun 90)
19 Aug	10GHz Cumulatives (Jul 90)
All Sep	1296MHz Activity (Jun 90)
1,2 Sep	144MHz Trophy/SWL (Jun 90)
9 Sept	10GHz Cumulatives (Jul 90)
16 Sep	70MHz Trophy/SWL (Jun 90)
30 Sep	50MHz CW (Jun 90)
6,7 Oct	432MHz - 24GHz SWL & IARU
7 Oct	10GHz Cumulatives
9 Oct	1·3 & 2·3GHz Cumulatives
17 Oct	432MHz Cumulatives
21 Oct	70MHz CW
25 Oct	1·3 & 2·3GHz Cumulatives
2 Nov	432MHz Cumulatives
3,4 Nov	144MHz CW 8-hr Marconi/RSGB
10 Nov	1·3 & 2·3GHz Cumulatives
2 Dec	144MHz AFS/Fixed/SWL
4 Dec	432MHz Cumulatives

There will be an SWL section in every VHF contest even if not mentioned in rules

OTHER CONTESTS

First Tuesday each month
144MHz Scandinavian VHF/UHF/SHF Activity Contest (Jan89 VHF/UHF)

First Thursday each month
432MHz Scandinavian VHF/UHF/SHF Activity Contest (Jan89 VHF/UHF)

First Monday each month
Microwave Scandinavian VHF/UHF/SHF Activity Contest (Jan89 VHF/UHF)

Dates of publication of rules in *RadCom* are shown in parentheses

DIRECTION FINDING

RESULTS OF NORTHAMPTON D/F QUALIFYING EVENT

Once again the struggle to qualify for the RSGB national direction finding final has started. This year the first qualifying event was organised by the Northampton Club.

The weather at the start (near Castle Ashby, NGR 865600) was quite pleasant and remained so throughout the afternoon.

Nineteen teams took part in the Contest and all but one elected to search for the distant station (TX B) first.

Transmitter 'A', G4JYP, was hidden within two miles of the start, in an old quarry, with plenty of rough ground for competitors to search.

Transmitter 'B', G4ZMX (Eric), was hidden in Maidford Wood, over fifteen miles from the start. Lack of undergrowth created a problem in hiding the transmitter. However, the TX crew made themselves an excellent hide which, with the aid of 500 metres of aerial, gave competitors an interesting time.

After the Contest, tea was served in Yardley Gobion Village Hall, where the Northampton Cup and prizes were presented, and the successful contestants related how this has been achieved. Thanks are due to Mrs Sue Lineham and her willing band of helpers in providing an excellent tea.

RESULTS

Name	Club	Time at TX 'A'	Time at TX 'B'
C Plummer	S Manchester	15.22	14.34
G Whenham	Coventry	15.23	14.36
G Foster	Stratford	15.24	14.36
P Lisle	Mid Thames	15.24.30	14.34
A Simmonds	Mid Thames	15.25	14.33
D Newman	Northampton	15.26	14.33.30
A Collett	Chelmsford	15.28	14.35
M Hawkins	Chelmsford	15.32	14.39
D Holland	S Manchester	15.46	14.36
D Lisle	Mid Thames	15.47	14.38
R Brocks	Chelmsford	16.00	15.06
J Hall	Ripon	15.23	16.10
C Wells	S Manchester	16.22	15.33
B Bristow	Mid Thames	16.22.30	15.38
T Gage	Mid Thames	16.23	15.39
M Standen	Mid Thames	16.25	15.24
C Metcalfe	Mid Thames	16.29	15.38
G Nicholls	Banbury	—	15.30
A Williams	Braintree	—	15.39

C Plummer and G Whenham qualify for the National Final to be organised by the South Manchester Radio Club on 30 September.

RIPON AND DISTRICT QUALIFYING EVENT

Date: 15 July

Map: 99 (Northallerton and Ripon)

Assembly: 1300 for start at 1320BST

Location: Ripon Racecourse car park, NGR 332701

Competitors requiring tea should notify J Hall, 30 Chatsworth Road, Harrogate; telephone 0423 567390, not later than 8 July.

CHELMSFORD AND COLCHESTER QUALIFYING EVENT

Date: 29 July

Map: 169 (Ipswich and the Naze)

Assembly: 1300 for start at 1320BST

Location: Great Bentley, off A133, NGR 112217. Competitors are advised to avoid the A12 at Capel St Mary, NGR 100382, where road works are in progress.

Competitors requiring tea should notify D Brocks, 12 Blacksmith Lane, Wickham Bishop, Witham, Essex, (telephone 0621 891868), not later than 22 July.

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9 element portable	£35.19(a)	23 element	£32.29(b)	4 way 1250MHz	£43.36(c)
9 element crossed	£62.10(a)	4x23 ele – stacking frame – power splitter	£175.00(a)	2 way 1296MHz	£38.35(c)
13 element	£49.06(a)	55 element	£49.27(a)	4 way 1296MHz	£43.36(c)
17 element	£66.24(a)	4x55 ele – stacking frame – power splitter	£250.00(a)	2 way 2300MHz	£38.35(c)
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● AMERICAN spy set RS6. Complete, working with h/book. Collectors item: £75. Lionel J36 bug key. VGC: £30. Swedish hand key. VGC: £30. G3ZWH QTHR. (Snodland) 0634 240520.

● AMT3 AMTOR/RTTY TU. New cond with h/book and IBM s/ware: £145 plus post. G3KZU QTHR. (Oxford) 0865 63000.

● APRICOT portable computer incl manuals and mic for voice command operation. In carrycase, RS232 + terminal program: £250ono. Amstrad 8512 incl serial/parallel interface, Locoscript 2, Locomail/Spell and spare disks: £425ono. Amstrad 8512 incl Locoscript 2, Locomail/Spell plus many programs such as Supercalc 2, Delta, Sage, Tommahawk etc: £485ono. Mark G0MLJ. (Locks Heath, Southampton) 0489 577495.

● AVO 8 Mk5 with leather case. Little used. Current list £276. A bargain: £80. Advance DMM2 bench digital multimeter, mains or nicads. Quality instrument: £30. Air Publications (w/shop manuals) for R1132, R1481, R1155, T1154. Copies of historic docs: £5ea. Pye Lynx TV camera. Believed working: £10. (Codsall) 09074 3134.

● AVO-8 Mk4, case, all leads, immac: £65. Spare lead set: £10. Avo-8 movement: £12.50. 5.25in DS DD disks 3M, used once. Format 80T for BBC-B. 10 disks in plastic box: £12.50. Post extra. TS820S exc: £495. Paul. 0843 61448.

● BBC-B issue 7 DFS+8271 Wordwise plus hi-res monitor. Lots s/ware mags: £300. Trio R1000 rcvr, FM board fitted, boxed: £220. Yaesu FRT7700: £30. Barco hi-res monitor RGB: £75. Barco 20in TV/monitor UHF/VHF/RGB: £125. RX3 TIFI for BBC: £30. Pye MX294 25W 2m FM mobile TX/RX, RO-R7, S16-S23, bracket, mic, spkr, m/mount: £125. Pye M296 15W UHF (70cm) FM TX/RX: £80. Pye M296 6W UHF (70cm) FM TX/RX: £70. Pye T4012/R4012 6W UHF (70cm) FM basestation: £80. Pye PF8 x4: £25ea. ITT Starfones: £5ea. 12V/1A PSUs: £5ea. Pye PFX85 5W 2m FM h/held RO-S23 repeater reverse toneburst, chrgr, car mtg bkt, spare batt: £125. G7DNU QTHR. (Southend) 0702 205058 eve.

● BEARCAT 580XL scanner 29-550MHz, some gaps: £95. SEM absorption wavemeter HF: £20. TBI to TB2 conversion kit: £85. (Cheshire) 0565 873194 after 6.30pm.

● BUTTERNUT HF5B compact beam for 20-15-12-10. Brand new. Never assembled. Boxed: £200. G4PZY QTHR. (Derby) 0332 767994.

● CDR model Ham-M heavy duty ant rotator for fitting in tower or tube. Good order: £120. G3BXI QTHR. (Trowbridge, Wilts) 0373 830804.

● CENTURY 21 CW only xcvr 115VAC wkg. Buyer to inspect and collect: £100. Autoxfrmr can be supplied extra: £10. G3DYY. (nr. Huntingdon) 0487 841558.

● CIRKIT 2m pwr amp kit with preamp 22W. Cost £56. Sell. £20. Datong cvtr UC/1. 2m to 90kHz-30MHz: £20. (Amersham) 0494 725677.

● COLLINS KWM2A with spkr PSU. Collins ATU speech processor desk mic all round emblem: £400. Will haggle if pushed. G4ZJO. (Morecambe) 0524 413259.

● COMMODORE 64, 1541 disk drive, C2N data recorder, joysticks, plus Easyscript WP, Easyfile and other s/ware: £150. MPS 802/3/1526 printer service manual: £7.50. Welz CT150 dummy load, DC 250MHz, 150W average, 400 peak: £20. Various wide spaced caps for linear or ATU construction. Tony, G4KDZ QTHR. (Grays, Essex) 0375 378783.

● COMPLETE beginners HF station TS440S tcvr with AT440 auto ant tuner and YK88SN filter. Butternut HF6V multi-band vert ant. LF30A low-pass filter, MC60 deluxe desk mic, BNOS 12/20E PSU, Hi-Mound morse key. All boxed and as new. Cost over £1800 new. Will sell to 1st caller for: £1200. Tristan G0LOC. (Horsham) 0403 731358.

● CTE 2m h/held chrgr: £130. Matching linear: £40. Ants Jaybeam 1/2wave 2m: £24. D707 active: £75. SWR50B: £25. G4YDM. 091-416 2606.

● CUSHCRAFT AP8 8-band trap vert 25ft new: £100. Trio TR2300 2m FM tcvr with mic, chrgr, MML144/25 PA, MM202S mobile mic, KG209 7/8 mobile whip, gutter mount complete: £150. G3OVT QTHR. (Stevenage) 0438 350136.

● CUSHCRAFT R5 vert ant roof mounting, no radials needed: £200. G0JCM. 0474 823797.

● DATONG FL3 filter: £65. Samson ETM S2 paddle: £35. Never used. G4OEC QTHR. (nr. Bridgwater) 0278 74369.

● DATONG morse tutor: £40. Heathkit IO-102 scope with manual: £50. Bound vols, complete yrs, RSGB Bulletin/RadCom, 1953-1983: £150. Short Wave Magazine 1955-70: £75. All above VGC. Carr paid and open to sensible offers. GM3LGU QTHR. (Dunoon, Argyll) 036987 341.

● DRAKE rcvr model 2B with Q balance 10-80m. Set of new spare valves: £150. Lucas CB converted to 10m channel 1-40 display: £40. G1ABW. (Berkhamsted) 0442 864711 after 6pm.

● EDDYSTONE 740 RX with copies of test report PW 1951 and inst manual. Can be seen working. At least: £70. (Northwood) 09274 25378 eve.

● EDDYSTONE 958 s/state gen.cov rcvr: £300. 990R VHF s/state rcvr: £150. EP17R panadaptor requires attn: £30. Manuals. G6SGW QTHR. (Portsmouth) 0705 691413.

● FOR sale prof freq counter 300MHz Racal 9905 as new. Worth £300: £120ono c/w manual. G4TLY QTHR. 0666 822935.

● FRG7 in GWO. Analogue model: £100. (Ashford, Middx) 0784 247115.

● FORTOP TVT435 ATV transmitter fitted with both 435MHz and 437MHz xtals: £120. MM ATV RX cvtr: £20. 432MHz RX cvtr: £25. Jim Blackburn, G4ACI QTHR. (Upholland, Wigan) 0695 622754.

● ELECTRONIC Circuit Manual by John Markus, published in NY 1971. Over 3100 circuits, 90 chapters, size approx 11.5x9x3in. Valve and transistor circuits. A heavyweight bible: £25. Marris, 35 Kingswood Hse, Farnham Rd, Slough, SL2 1DA.

● FT101 Mk1 10-80m, mint cond. No mods: £200ono. Deecom 10m HB9CV, new and unpacked: £30ono. (Sheffield) 0742 309145.

● FT101E CW filter, mic, spkr, h/book: £300. Homebrew ant match 4-259 socket outlets fitted with Eddystone split stator cap roller coaster output meter: £40. Straight key HK70h: £14. Hsahi twin meter swr: £12. Datong Clipper with pip tones and cir.diag: £15. Heavy duty resistor 80ohms suitable for dummy load: £2. 2m vert whip: £3. 2x boxes useful spares, free for cost of post only. All other items carr at cost. GM3DVX not QTHR. (Edinburgh) 031-556 3281.

● FT101E, fitted FM board. Also FM discriminator. GWO with desk mic YD844A: £325. GW4UYY QTHR. (Prestatyn) 07456 86413.

● FT101ZD fan, mic, SP901, new tubes and driver fitted recently, manual: £425. Adonis mic AM303: £30. Yaesu mic YM38: £20. C64, C2N data recorder, TIF-1 interface with s/ware, Joystick: £150. PSU 20A: £40. All items in VGC. GW4WJO QTHR. (Holyhead) 0407 762330.

● FT101ZD with fan 300Hz CW filter and spare set of valves: £400. G0IUD not QTHR. (Bristol area) 0454 318539.

● FT102 FM/AM immac, boxed: £495. TS700 2m base: £225. PK232 Pakrat modem: £195. ICR70 Icom rcvr: £375. Realistic PRO2004 scanner: £195. Alinco ARL206 2m mobile: £185. Diamond SX200 swr/pwr meter: £39. G0AWY. (Harlow) 0279 445718.

● FT102 HF rcvr AM/FM narrow filters, manuals: £450. FT290R, Mutek, nicads etc: £250. G6NNL/KB6PDZ. (Locks Heath, Southampton) 0489 581027.

● FT290 Sommerkamp 2 sets nicads, carrying case, strap. Slightly scratched, mobile ant: £220. G0JAU QTHR. BT listed. (Banbury) 0295 250169 during day.

● FT290R, Mutek, accs: £250. Bruce, GW4XXF QTHR. (Tywyn) 0654 710741.

● FT707 100W, fitted top-band. FP707 PSU, FC700 ATU. All mint, never mobilised: £620. (Dover) 0304 821790.

● FT727R dual-band h/held. Extension mic, chrgr, nicads etc. Exc. working order: £350ono. GI4MXV not QTHR. 08494 60409.

● FT747 with all filters, FM mic and Raycom F/E: £500. PSU and ATU extra. G4WXF QTHR. Prefer buyer collects. (Hereford) 056884 580.

● FT980 all filters, Curtiss keyer, SP980. 757 ATU cable. Fist mic. New yacht forces sale. Exc. cond: £1000. GM0ECU QTHR. (Crosshouse) 0563 35738.

● FWB 300S target air rifle .177: £235ovno. or swap for FT2/790. 48k Spectrum, D.Ktronics keyboard, Rotronics waffa drive, morse RAE maths programs, data recorder: £80 or swap for Tandy disk drive for 64k colour computer, pt no. 26-3129, plus OS9 operating disk. Trio T17205 h/h: £170ono or swap for scanner of same value either h/h or base/mobile. All items are in A1 cond and have all orig.packing etc. May swap any or all of above for a good 144MHz or 430MHz multimode tcvr, ie TR9130, TR751E or similar spec. Please ask for Dave. (Kings Lynn) 0553 761943.

● G4MH minibeam assembled but unused: £45. Spectrum RP10S switched 10m RX preamp. Factory built: £15. Both as new. G4AFA QTHR. (Winchester) 0962 55160.

● G-WHIP mobiles, tribander with 160m, 80m, 40m coils, single band aerials on 80m, 20m, 10m. G4UDU. (Steyning) 0903 814516.

● HALLICRAFTERS SX24 gen.cov RX ?kHz-44MHz bandspread-hambands s.meter. Restored GWO: Offers invited. 4A RF meter. Collins, 60 Alexandra Rd, Skegness, Lincs.

● HAMMARLUND amateur bands HQ170: £50. Hickok valve tester: £30. Both with manuals. Canadian R103 rcvr 6V with vibrator spare valves: £25. Bulletins 1951-1978, complete: £30. 2x Commodore +4 computers with progs, reference manual, games, books: £100. Buyers must collect. (Watford) 0923 220977.

● HAMMARLUND RX HQ One Eighty for sale with new spare valves and manual: £175. GW3YTL. (Ruthin, Clwyd) 08242 2611 eve.

● HF tcvr Sommerkamp FT277ZD Mk3 with FM + CW filter, DC cvtr, Shure 444D, mic: £500. Kenwood TR751E 2m, 25W all-mode mobile: £495. All items immac cond. G6ZBI QTHR. (Tunbridge Wells) 0892 32095.

● HOKUSHIN HS-HF-5 5-band trap vert ant plus Hokushin HF-5R 5-band radial kit: £35. Keith, G0JLM QTHR. (Swindon) 0793 533783.

● HQ1 minibeam with insts and spares list: £45. Prefer buyer collects. G4UPJ QTHR. (Whitstable) 0227 274947.

● HYGAIN 204BAS 4ele 20m beam. Brand new in orig.box, never erected: £260. Gough, G4DDJ QTHR. (Billingshurst) 0403 782415.

● IBM AT clone 640k 1.2Mb floppy 40Mb hard drive, serial parallel ports mono graphics: £675. Julian G6LOH. (Towcester, Northants) 0327 857766.

● ICOM IC2E with extra batt pack. V.little used: £135. G4CBE QTHR. (St. Albans) 0727 55542.

● ICOM 260E 2m/FM/SSB 2 VFOs 3mems data socket 13.8V 1 or 10W, h/book, up/down scanning mic. All new cond and boxed c/w m/bracket: £230 plus carr at cost. G3PVT QTHR. (Birmingham) 021-747 2329.

● ICOM 271 base tcvr, multimode: £450. Yaesu FT212 45W mobile, 6mths old, mint cond: £225. Yaesu FRC8800 rcvr with tuner and active ant: £490. Icom Micro 2E 2m h/held, with case, chrgr: £220. MM2 morse talker: £60. SMC 8A PSU 2 off: £20ea. Yaesu SP35, swr bridges. Various ants, open to offers. All the above items in exc.cond and open to reasonable offers. Silent key sale for G7DHR. Allen, G7ELS QTHR. (Leeds) 0532 646464.

● ICOM 275E multimode base rig, superb cond, as new c/w SM8 desk mic: £775. G0AHB QTHR. ((Hertfordshire) 0992 589481.

● ICOM 490E 70megs. All-mode tcvr. Good cond. Little used: £275. G3VDN QTHR. (Mansfield) 0623 795915.

● ICOM 735, AT150, PS55, all boxed. As new: £950. Sony IFC2001D, AN1 ant, boxed. 2hrs use: £240. Jim, G4ERU QTHR. (Bournemouth) 0202 510400.

● ICOM 735, FL63A CW filter fitted: £700ovno. FT290 nicads, chrgr and Alinco EL230D linear 30W: £250ovno. G3JXR. 0908 642398.

● ICOM 745 HF tcvr with inbuilt PSU. AT500 ATU. 5-band vert aerial. Mint cond: £875. No split. (Bury St.Edmonds) 0284 704002.

● ICOM IC02E 2m h/held in leatherette case with nicad and chrgr, plus DC/DC cvtr: £175. Butternut HF2V 80/40m vert, complete in good cond: £75. Martin G0HRZ. 081-590 5490.

● ICOM IC240 2m 10W FM synthesised mobile. VGC. Easy to use with accs: £125. G3KLF QTHR. (Fareham) 0329 236906.

● ICOM IC260E 2m multimode tcvr: £210ono. Star LC10 printer. Little used and complete. VGC: £110ono. Shimizu SS105S HF tcvr. 80-10m, CW filter, N/B, FM, boxed: £245ono. GI4SJQ. (Portadown) 0762 334648 after 6pm.

● ICOM IC271E 2m m/mode, fitted PS25 PSU, EX310 voice synth interface for EX309. Immac cond: £395. No offers, buyer collects. Boxed with inst books. GM2BLC QTHR. (Kippford) 055662 614.

● ICOM IC451E: £400. IC251E with Mutek F/E: £425. Both VGC. G6DBX QTHR. (Burgess Hill) 0444 248767.

● ICOM IC740 HF tcvr with PS15 PSU. VGC: £450. Trio R2000 HF rcvr with VC10 VHF cvtr 118-174MHz. VGC: £400. G4TBR QTHR. (Amersham) 0494 786510.

● ICR7000 rcvr: £600. TR751A 2m multimode tcvr: £300. PK232: £200. HK710 key: £25. Standard C500 2m/70cm h/held with desktop chrgr: £300. Mail offers to E.Hyden, c/o Wolfson College, Cambridge, CB3 9BB.

● JAYBEAM Minimax tribander, brand new, never erected: £275. G4NVY QTHR. (Gloucester) 0452 864727 eve.

● JVC compact colour video camera zoom lens 6:1 8-48mm macro electronic viewfinder built-in mic auto manual 12VDC cable linked to Sharp basic recorder player VHS. 12VDC only. All incl: £145. No offers. G0EZW QTHR. (Selston, Notts) 0773 810010.

● JVC GR60 latest camcorder, new, complete. Guarantee, bargain: £595. Cost £799. RF speech processor: £50. MM2/70 70cm tvtr: £105. KLM 70cm 40W linear amp: £65. Sharp camera PSU: £12. Realistic DX440 SW radio: £75. Datacorder: £12. Philips video 2000. (Oxford) 0865 863333.

● KANTRONICS KPC2 packet comms II with h/books. CCTV camera with lens Ikegami type TK204 VD4. Pair 817 valves with ceramic bases. Pair 813 valves. New Brain computer model AD with manual. Phone 6-9pm stating offers. TNX. G4GIM. (Worcester) 0905 354727.

● KENWOOD 5-band tcvr TS520SE, new output valves: £250. Buyer collect. MFJ949C ant tuner: £75. G4GHG QTHR. (Torquay) 0803 327050.

● KENWOOD KW4100E 2m/70cm + ant: £350. Yaesu FT23R 2m h/held + batt/chrgr: £145. G7GFF. 0923 247099.

● KENWOOD SP520 spkr: £25. HF5V trapped vert: £35. Tect dynamic desk mic: £15. Exch either for TR2500 stand unit. G0IXE QTHR. (Aycliffe) 0325 313118.

● KENWOOD TM231E 2m FM mobile. 50/10/5W out, with optional Q/R m/bracket. Exc.cond, still under warranty, box, manual. Cost £300. First offer region: £220 will secure. Mobile ext/spkr. As new, boxed: £8. G0EOL QTHR. (Cheshire) 0606 554857.

● KENWOOD TR751A 2m multimode, mint cond: £450. G4YSN QTHR. 0257 793872.

● KENWOOD TR9130 2m multimode tcvr. 25W O/P. Good cond. Please ask for John when ringing. G4IRM not QTHR. (Surbiton) 081-398 0678.

● KENWOOD TS430, narrow SSB filter, wide AM filter. Good cond. Try before you buy: £625. G0CRP QTHR. (Crawley) 0293 782910.

● KENWOOD TS440S with narrow CW filter YK88CN: £850. SMC 12V PSU 35A max: £125. Star Masterkey, CMOS mem keyer: £65. All mint, little used. G3RCE QTHR. 0705 752618.

● KENWOOD TS530S HF tcvr, immac cond with spare unused matched pair of 6146B PA valves: £575ono. G4JTR. (Reading) 0734 476873.

● KENWOOD TS680S tcvr 160-10m + WARC and 6m c/w mic, h/book, orig.packing: £750. G3JFC QTHR. 0474 872743.

● KENWOOD TS830S, CW filter. VGC: £675. Yaesu 747GX, 6mths old. No FM: £425. JVC amp 35+35 JASII: £25. Chris. (Potters Bar) 01-440 1112 or 0707 43879.

● KENWOOD TS950SD, full spec plus voice synth. As new, box, manuals. Superb rig, reluctant sale. Consider mint TS940S plus cash or best offer over: £2650. Kenwood MC60A desk mic, as new, boxed: £65. G0EOL QTHR. (Cheshire) 0606 554857.

● KENWOOD/Trio 830S tcvr. Late GI3CVH. Offers to XYL at QTHR. This rig in VGC. Has worked the world. (Newtown Hamilton) 0693 878895.

● KW77 RX. Fair cond: £65. Europa-B tvtr 144/28MHz: £25. MM144/28 RX cvtr: £15. G8HLJ. (Merseyside) 051-334 8733.

● LASER printer, new, boxed, multi emulations, twin paper trays, c/w parallel or serial i/face, drum, toner, manual, p/lead. Cost new £3000. Now surplus to requirements, so sensible offers please. (Enfield, Middx) 081-804 4565 before 10pm.

● LDF4-50 coax length approx 80m terminated with Andrews N-connectors (male): £110. Purchaser collects. G2HS QTHR. (Ashford, Middx) 0784 258992.

● MAST Hills 42ft teletower triangular lattice type tiltover with winch: £180ono. G4FUN. (Portsmouth) 0705 385589.

● MICROWAVE enthusiasts! Small quantity new miniature coaxial relays, DC-18GHz, VSWR 1.5:1

max, SMA female, 28V coil. Circuit for simple DC cvtr to allow 12V operation incl. (25MA standby, 180MA transmit): £35ea. G6CMS QTHR. No traders. (Chelmsford) 0245 76801 after 6pm.

● MFJ Versatower 300W model 941D MkII. Cost £150 new. VGC: £75. G4FMO QTHR. (Staffs) 0283 840667.

● MICRO Modules tvtr MMT432, 2m-70cm. Mint cond: £175 incl post, but prefer buyer to test. G1VAH QTHR. (Rye) 07978 285.

● MM4001 RTTY tcvr with keyboard. Instant access for satellite/terrestrial/press. All shifts and speeds to 1200ASCII: £130. WP consisting Spectrum with Citizen printer and many practical tapes/carts: £175. Down loading of equip essential. Haggle with G6TPQ QTHR. (Oldham) 061-633 3895.

● MULTIMODE 2m mobile rig. Standard C5800. FM/SSB/CW 25W. Many useful facilities. Scanning mic, m/mount, h/book: £250. Signal R535 VHF/UHF airband scanner. Absolutely mint. Boxed with m/mount etc: £195. David, G4JLU QTHR. (Harrow) 081-954 9180.

● PACKET system. PK88 with televideo dumb terminal 7x51/2in screen. Compact unit. Manuals, exc.cond: £150. Advise collect. G4HZF QTHR. (Grimsby) 71215.

● PAIR 144MHz 12ele ZL specials: £10ea. VME bus 68000 processor board, Forth and Basic languages, list price >£800. Accept: £75ono. Pair 5-500Zs with bases and heater transformer: £20. Also various other components. Ring for details. G0CAD not QTHR. (Oxford) 0865 890066.

● PHILIPS 2521 auto-ranging multimeter with manual: £100. SEM ATU with Easy Tune: £50. GD4EIP QTHR. (Isle of Man) 0624 801353.

● PLESSEY PR155 HF RX 0-30.1MHz plus cvtrs to 70cm: £300. G4ADK QTHR. (West Ham) 081-471 9860.

● PYE UHF basestation. Modern type 1.5in high, mains powered. As new. Separate TX/RX: £75. Pye 70MHz FM RX, same as above: £35. Uher 4000L tape recorder. VGC: £40. Bencher iambic keyer: £25. Marconi RF mV meter. VGC: £40. G0BSX Mk1 packet TNC with full h/book, not cased: £25. Roband 12V 5A PSU: £20. Marconi TF801 sig.gen. VGC: £30. (Northampton) 0604 862803.

● PWR supply variable 0-10A, 0-15V, fully metered: £40. BNOS linear amp, 144MHz 3 in, 100W out. Exc.cond: £100. Daiwa LA2035R, 35W linear amp: £30. Realistic DX200 rcvr 0-30MHz: £45. Drae wavemeter: £5. Pwr/swr meter: £10. 2m Oscar mobile ant 7/8wave: £10. Sandpiper triband quad (no wires): £60. Yaesu FT101ZD FM, fan, spare valves: £475ono. Sommerkamp 277B HF tcvr, spare valves, exc.cond: £350ono. Yaesu FT290R, nicads, chrgr, Mutek F/E, exc.cond: £250. Adonis compressor mic AM503, exc.cond: £30. Dummy load, 600W: £30. KR400 rotator, new: £75. PSU 13.8V/40A, fully protected, exc.cond: £100. (Enfield, N.London) 0992 701150 after 5.30pm.

● PYE Westminster UHF suitable 70cm 10ch: £25. Advance audio generator: £20. PF70 batt tester: £5. Pye AC10 PSU 12/24V output: £20. Noise cancelling mic: £10. Marconi RF wattmeter: £25. Marconi freq.meter, needs attn: £10. Avo transistor tester: £25. Marconi TX tester 1065: £25. VHF RF sig.gen: £25. Many more bits, manuals, meters, cable, plugs, components etc. G4YUJ QTHR. (S.Somercotes, Lincs) 050785 203.

● QRT sale. Yaesu FT757GX, unused, boxed: £625. BNOS PSU 25A, 30A peak: £100. SEM Transmatch ATU 160-10m: £70. Telereader CW/AMTOR/RTTY etc data terminal: £95. Trio TR2300 2m mobile/port with int nicads, chrgr, case and m/mount: £125. Icom IC2E 2m handie with case, nicads and chrgr: £105. Paul, G4XTA QTHR. 09313 359.

● RACAL RA17L above average: £200. RA117E and spare valves: £250. RA218 sideband cvtr: £100. MA197C preselector: £100. All with manuals and leads. Printers Okidata 82A 80col: £40. Okidata 182 132col: £60. Geoff, G7FRU QTHR. (Birmingham) 021-327 2880 after 7pm.

● RANGER 3500 10m mobile 120W digital tcvr, m/bracket, h/book, mic, orig.box. Little used. Proper set, not CB conversion: £225. 0686 630255.

● RATHER special FT980 and FL7000 knowledgeably and individually cared for, each with special mods, work superbly and reliably. FT980 factory modified PLL giving low noise, high stability. Special FSK option. Yaesu factory made CPV chip to receive FSK on European standard USB and FSK board for transmit likewise. Orig. LSB chip and board incl. With MD1B8 desk mic and SP980 spkr and FAS1R ant switch. FL7000 modified to give v.sensitive measure of low swr. Perfectly aligned c/w all leads with ferrite rings, h/books and service manuals. Boxed. Prefer joint sale: £2400. G3NHB QTHR. (Cambridge) 0223 841304 eve.

● REALISTIC PRO2009 base scanner, VGC, 68-512MHz &ch: £75. Bob G7AIH. After 6pm anyday except Tues, Fri, Sat. (Hornchurch, Essex) 04024 46070.

● RN Electronics 2-6m. Cvtr 25W output, boxed. Mint: £140ono. MM2m to 4m cvtr 10W out. Mint: £70ono. Nascom 3 computer with dual disk drive and monitor. Ideal for packet: £80. HF linear bits incl new QY4-400: £75ono. (Rugby) 0788 815506.

● ROTATOR AR40 with control: £36. Folding bicycle deluxe fully adjustable. 3-speed, unused. Go portable in car boot: £50. G1MVV QTHR. (nr.Southampton) 0703 863709.

● ROTATOR CDE45II unused unmarked, orig.packing c/w control unit. Lower mast support manual. Surplus to requirements: £119. G3MJK QTHR. (Basingstoke) 0256 87439.

● SCOPE Tektronix 422 15MHz: £50. Avo-8: £25. Pace solder/desolder station: £60. 1/2% voltmeter: £15. Sony C5 Betamax video + 30 tapes: £40. ZX81 + 16k RAM: £15. Eddystone 740 RX 1-30MHz: £30. Rigonda 5in B/W TV 12/240V: £25. Also much junk. G1BAK QTHR. (Leeds) 0532 559939.

● SHACK clearance, too much petticoat QRM. AT47 Altron tower: £400. HF TB3 £100. 2m co.lin: £20. 8ele 2m: £15. KR400 rotator: £100. MBM 70cm: £30. 8XY 2m: £30. 12XY 70cm: £30. LW16 2m: £30. SkyKing rotator: £25. Electronic AMT switch. High quality 4-way: £15. 20A Coutomt PSU: £15. Daiwa 4A PSU: £15. 5in portable TV: £35. VTVM nice cond: £20. MD1 base mic: £45. Scope Telequip S5IT: £30. Telereader CWR685E: £170. FT101ZD Mk3. Fan, FM, extra xtals: £450. Matching phone patch spkr: £35. Matching ATU: £100. FT726R HF/70/2m sat board: £750. Tape deck and graphic equaliser: £20. FT290R Mk1: £230. Super Star 360 converted to 10m: £120. Datong FL3: £70. Mutek 2m preamp: £20. Mast head preamp Mutek made: £40. G0JAU QTHR. (Banbury) 0295 250169 11am-3pm anyday.

● SHACK clearance. Yaesu FT290 Mk2 multimode, nicads, chrgr: £325. IC3200E dualband mobile: £300. MML144 100LS 100W linear amp with preamp: £100. Kenpro 400 rotator and controller: £100. Yaesu YS500 swr/pwr meter: £55. Revex W520 swr/pwr meter: £45. All exc.cond. (Newcastle) 091-268 8466.

● SHURE 444 desk mic wired for Yaesu: £20. 70cm co-linear GP7V, good cond: £15. Brand new MP dipole of delight 3.5/7MHz: £20 never used. Ron GM4VBE. 041-638 4814.

● HURE mic model 526T series II desk mic: £40. (Bridgwater) 0278 426991.

● SRX30 RX: Offers. G4RGA QTHR. (Taunton) 0823 664911.

● STANDARD C58 2m allmode portable tcvr, s/case, chrgr: £180. May exch 2m h/h or FL2025 linear plus cash. (Somerset) 0458 250124.

● STANDARD C58 2m portable multimode. USB/LSB FM 5mem, scanning, exc prime mover. Nicads, chrgr, case etc. Perfect cond: £185. Yaesu FT727 dual-band 2m/70cm h/held high pwr pack, case: £250. G3TCO QTHR. (Bristol) 0272 681068.

● SUPERB VHF/UHF QTH 600ft A yet only 15m central London. Flint and brick semi-det period cottage in completely rural location at Downe, Kent. 6m Bromley. 3 beds, dining room, sitting room, fitted kitchen, bathroom, det garage, full CH etc. 60ft HD tower, 447 squares and 66 countries worked 144MHz. Offers around: £124,950. Clive Penna, G3POI QTHR. 0959 75992.

● TAIT lowband T199 mobile, CTSS cradle, spkr: £175. Tait T286 pwr unit 240VAC to 12V DC: £55. Pye F494 lowband base: £295. Storno 614 highband base: £125. Schlumberger sync oscillator type 0-1500 poor cond: £10. Schlumberger sig.gen SSB 30 for spares: £10. G4AJE. (Cambs) 0354 741168.

● TBI rotary dipole 10-15-20: £60. HF5B Butterfly minibeam: £70. Altron minibeam: £60. All as new. RN Electronics 6m tvtr from 28MHz with 3ele ant new model AR88D rcvr. VGC with spare valves, coils etc: £60. G0GBK QTHR. (Camberwell, SE London) 071-703 2335.

● TELEX, Transtel ComWriter III, solid state modern telex, 3yrs old, c/w dot matrix printer: £400. Don Ward G0MDO. (Bradford) 0274 567570.

● TEN-TEC Argonaut 515 tcvr, fine cond, mic, leads, filter, manual, one owner, orig.packing. Buyer inspects: £240. G3UYV QTHR. (Hull) 0482 48435.

● TEN-TEC Corsair II model 561 under guarantee: £975. RadCom 1975-89: Offers. KWM2A and Admiralty h/book. Prefer collection. G3ACB. (Seaford) 0323 897145.

● TOKYO Hy-Power HX-240 tvtr. 144MHz input, 80-10m output 40W. Never used. Save £30 on new price: £220. G3TXQ QTHR. (Northampton) 0604 858090.

● TR9000 2m multimode: £275. C7800 70cm mobile FM rig: £140. AR800E h/held scanner to 950MHz, mint: £140ono c/w orig.boxes, accs. Will pt/exch, buy 70cm h/held or mobile 2m/70cm dualband rig. Garry G4IZL. (Tamworth) 0827 282607 6-9pm or w/e.

● TR9130 m/brkt, SP40 m/spkr, 2m multimode: £300. H/voltage components, transformers, Visconol caps, heater transformers: Offers please. G3INU QTHR. (Stevenage) 0438 369128.

● TRIO TS530SP: £650. Kenwood AT230 ATU: £145. Field strength meter: £5. H/B xtal calibrator: £5. Silent key sale. Mrs. Hughes (Winchester) 0962 64370.

● TRIO 830S, CW filter fitted, aux DFC230 VFO with mems, MC50 desk mic, spare unused 6146Bs. All boxed in exc.cond: £725. Trio 7730 25W 2m FM, Q/R mount, mobile mic: £100. Inspect and collect or carr.extra. Andy G4TFE. (Hastings) 0424 428457.

● TRIO TS711E 2m multimode basestation. Boxed, exc.cond: £660. 14ele 2m beam: £30. VHF/UHF pwr/swr meter, remote heads: £45. G4SBK QTHR. (Norwich) 050841 8231.

● TRIO 9000 with PS20 BOA9 basestation plinth: £320. Kingshill PSU 20A/13.8V: £45. Icom SM6 mic, as new: £20. SEM linear 2m preamp: £60. Europa xtalled packet, complete: £45. 2m PFX extra batt, chrgr, case. G0HZE QTHR. (Peterborough) 0733 42439.

● TRIO 9500 70cm multimode. VGC, boxed, all accs, never used mobile: £325. Would exch for small quiet running generator Honda EX650 or similar or would buy same. G3OPW QTHR. (Derby) 0773 603280.

● TRIO 9R59D rcvr in exc.cond. Set of spare valves, inst book: Offers. (West Bromwich) 021-553 2654.

● TRIO HF SSB TS120S high pwr model 200W PEP. All solid state. Good order: £350 or offer. G3BXI QTHR. (Trowbridge, Wilts) 0373 830804.

● TRIO TR9000: £280. PK88 packet TNC: £100. Commodore 64, with leads, s/ware, books etc: £80. All goods VGC and GWO. Sorry no offers as I am broke. Paul G0NGA. QTHR as G7DQK. (Romford) 0708 746920.

● TRIO R1000 rcvr HF .1-30MHz AM/SSB: £170ono. 13.8V/20A PSU: £100. G4RFC QTHR. (London) 081-293 4989.

● TRIO TL922 linear amp: £1050ono. As new cond, v.little use, c/w box, leads and manual. G0EFI QTHR. (Leigh-on-Sea) 0702 512186.

● TRIO TS520 mic, manual. GWO: £300. Marconi Elettra Mercury pair rcvrs. TV5 TX/RX 2 Pye Dolphins 160-80m TX/RX AM/CW. Offers for quick sale. FDK700EX FM mobile: £130. Pair 813: £40. G4EUW. (Brightlingsea) 020630 3071.

● TS530S: £550. AT230: £140. FT200 +spkr +VF200: £230. TX3 RTTY/CW TX prog for C64 disk: £15. TIFI interface wired FT290R: £15 or £25 both. Tiny-2 spare Eprom: £10. Also FP12 PSU/spkr, MM preamp MMA144V for reasonable offers. All ono. G4MUY. (Lincoln) 0526 22545.

● TS830S HF bands TX/RX CW/SSB. Exc.cond, boxed c/w inst manual, MC35S mic: £600ono. CWR685E CW/RTTY/BAUDOT CRT TX/RX. Boxed etc: £200ono. (Nottingham) 0602 625047.

● TS900 HF tcvr c/w PSU/spkr. 160W output, the 'Rolls Royce' of Kenwood rigs. Exc.cond with orig.packing. Will part with this rare tcvr for: £550. TS130V c/w m/mount. Exc.cond: £380. Carr extra. Martin G3ZZS. (Plymouth) 0752 707550.

● TS930S HF tcvr narrow filter fitted mic matching SP930 spkr. Mint cond: £1250. FL2100Z linear 9-band, exc.cond: £550. TR7730 2m mobile 25W scanning mic: £95. G4RCG QTHR. 0924 362144 (ansaphone) daytime 0977 519615 ask for John.

● TS940S tcvr: £1400. FT767GX latest model. All modes 70cm/ 2m/6m. Unmarked: £1700. FT980 tcvr: £900. FL7000 linear: £950. MN2000 Drake ATU, 2kW: £250. MM linear 10/100: £100. Oscar swr: £30. Yaesu MD18B desk mic: £50. Kenwood desk mic MC85: £50. Weltz swr SP380: £35. 6m ant 3ele: £25. New 2m 8ele ant: £15. Howard, G0HZH QTHR. 0394 460474.

● TS940S tcvr: £1400. FT980 tcvr: £900. FL7000 linear: £950. MN2000 Drake ATU: £250. MM linear 10/100: £100. Kenwood MC85 desk mic: £50. Oscar swr/pwr : £30. Weltz SP380 swr/pwr: £35. 2 keys: £5ea. 2x Saisho wall phones. Howard G0HZH. (Woodbridge) 0394 460474.

● TS950SD - top of the range with factory fitted digital unit. TCXO, all filters. Voice synth installed. Hand mic plus MC60A desk mic, boxes, manuals. Cond as new. Essential house repairs reason for sale. Cost £3319 March 1990. Best offer circa £2800 will secure this superb rig. G0EOL QTHR. (Cheshire) 0606 554857.

● VHF tcvr Alinco 206E c/w hand mic, Heatherlite mobile mic, Welz SP220 swr/pwr meter. Exc.cond: £195. Casiotone 610 electronic keyboard, many effects and variations, c/w swell pedal and stand: £220ono. G4XHY QTHR. (York) 0759 71022.

● WESTTOWER 4-section heavy duty motorise for raising lowering hand winch operation for tiltover with floor mounted ground post. TH6DXX 6ele Thunderbird beam for 10-15-20m. CBE Ham2 heavy duty rotator c/w control indicator unit. All c/w coax cable, inst manuals. Can be seen working. Buyer dismantles: £975. Will split. Dennis G4ZIR. (Hereford) 0981 540568.

● WW2 airborne 1155/54 equip. Restored and working installation using rotary cvtrs and custom-built 24V PSU. Leads, plugs, accs, duplicates and spare items offered to serious collector for: £500. Cash and carry. Letter with SAE brings full details. G0HTR QTHR. (Tamworth) 0827 898024.

● YAESU FT690R multimode, mint cond, with 10W linear and 3ele beam: £300. G0LVP QTHR. (Northampton) 0604 407993.

● YAESU FT757GXII mint cond. Unused, c/w Yaesu FTV707 tvtr: £900. G4UNM QTHR. (Sandown) 0983 402273.

● YAESU 757GX tcvr. FC757AT aut ant tuner. FC700 PSU. Like new, boxed: £850. G0IOK QTHR. (NW London) 01-904 3282.

● YAESU 757GX tcvr. FC757AT auto ant tuner. FC700 PSU. Like new, boxed: £850. G0IOK QTHR. (NW London) 01-904 3282.

● YAESU 757GX with MH1B8 mic. Both absolutely mint cond and boxed with all orig paperwork: £575. Mic Mod MMS2 advanced morse trainer: £75. Kent solid brass key: £15. Or all for £650. Reason for sale, morse test. Allan G1OTE. (Keighley) 0535 603000.

● YAESU FC902, immac: £125. Yaesu extnl spkr: £25ono. G4PTT QTHR. (Bideford) 0271 860530.

● YAESU FL2100Z WARC linear incl spares: £550. G3POI. 0959 75992.

● YAESU FRG7700 comm.rcvr plus Yaesu 7700 FRT ant tuning unit 0.5-30MHz plus Yaesu FRV7700 cvtr 140-170MHz plus Yaesu FRA7700 active ant: £300 complete setup, clean and GWO. Bill. (Preston) 0772 683098.

● YAESU FRG7700 comm.rcvr. VGC: £225. Prefer buyer collect. G3AWK QTHR. (Lincoln) 753136.

● YAESU FRG7700 with ATU and VHF cvtr: £280. Ten-Tec Century with transformer: £100. Humphries, 3 Abingdon Dr, Caversham Park, Reading, RG4 0RU.

● YAESU FRG8800, mint: £450 incl carr. GM4LBE QTHR. (Lerwick) 0595 4270.

● YAESU FT101B with CW filter. KW103 pwr meter/swr bridge: £280. FRG9600 60-950MHz with video unit. Complete service manuals: £280. 2m h/held FT203R: £90. 2m portable IC21S xtal controlled: £45. MM cvtrs 70/28, 435/ATV: £15ea. Dragon 32 s/ware, books: £35. G4CVC QTHR. (Dartford) 0322 72372.

● YAESU FT101E HF tcvr with FV101B matching ext second VFO: £300. FL2100B linear amp, unused: £500. All in absolute mint cond. As new in orig.packing. G8BJP QTHR. 0843 31069.

● YAESU FT101E, CW filter, mains and 12V pwr leads, spare valves, manual, recently serviced SMC: £300. G3UOP QTHR. (Fordingbridge) 0425 653681.

● YAESU FT102 HF rig. All mods done. Mint cond with iambic keyer. New mic: £550ono. Colin, GW0LBJ QTHR. (Penarth) 0222 530070 eve.

● YAESU FT200 recently overhauled, new PA valves etc, c/w mains PSU and spkr: £250. G3UGL QTHR. 0234 750050.

● YAESU FT200 tcvr 80-10m HF with FP200 PSU: £215. Buyer collects. G0ABF QTHR. (Houghton-le-Spring) 091-584 4673.

● YAESU FT200, FP200, 80-10m tcvr with manual. Front panel protective film still on!: £250. FRG7 gen.cov rcvr 0.5-30MHz in 1MHz bands: £150. Yaesu FT207R h/held synth 2m tcvr 144-148MHz with base chrgr: £110. Buyer collects. G3LTX QTHR. (Derby) 0283 78429.

● YAESU FT201 HF tcvr, built-in PSU, SSB/CW/AM. CW filter 250Hz, elec keyer, mic, manual, exc.cond: £360. Howes 80m boards built and aligned, TX RX VFO sig filter caps with tuned 80/40 trap dipole. Manuals: £50. Global specialities function generator, exc.cond, manual: £40. Carr.extra. G0LED QTHR. (Chester) 051-339 9663.

● YAESU FT209RH 2m h/held, mint, boxed FNB4A: £165. FT703 70cm h/held, boxed: £125. John, G1WSN QTHR. (Lymington) 0590 682092.

● YAESU FT221 allmode tcvr: £250. Icom 24G FM tcvr: £110. Datong morse tutor: £35. FL1 audio filter: £25. Active ant: £15. 2m cvtr, 28MHz IF: £10. Rotel RVC220 rig: £10. Silent key sale. G4JKS QTHR. (St.Albans) 0727 59318.

● YAESU FT227R 10W 2m FM mobile m/bracket: £80. Yaesu FT208R 2.5W h/held 2m FM: £120. Telequipment scope D43 dual trace 15MHz: £60. Hy-gain 18AVT/WB 5-band vert ant: £30. G4CUF QTHR. (Wigan) 0942 728443.

● YAESU FT290II +25W linear. Only used to receive by present owner: £400ono. Era Microreader, new: £100ono. Andy. (Aylesbury) 0296 89780.

● YAESU FT290MkII, nicad pack 2 chrgr, 25W amp, m/mount: £380. 2m 110W amp with preamp: £85. All as new. G2FTY QTHR. (Redditch) 0527 546048.

● YAESU FT290R, nicads, chrgr, s/case, m/mount, rubber duck: £250. Yaesu FT790R mic, nicads, rubber duck, carry strap: £245. G4UZF. (Bury St. Edmunds) 0359 32390.

● YAESU FT470 h/held dualbander 2m/70cm full 5W output c/w belt clip, soft carrying case, FNB11 batt pack, empty batt case, mains chrgr, mobile DC adaptor/chrgr, Yaesu MH12A28 spkr/mic. All in exc.cond. Hardly used. Cost over £555. Bargain at only: £389. G1PRH QTHR. (Canterbury) 0227 738248.

● YAESU FT707 exc.cond: £300. FP707: £120. FC102 ATU: £150. Diamond CP5 ant: £85. G0AHB. (Hertfordshire) 0992 589481.

● YAESU FT707 mint cond: £350. MM144/200LS linear and preamp: £200. Mutek 28-144 tvtr 10W O/P: £300. RN Electronics tvtr 28-50 25W O/P: £150. Converted FMCB: £40. 10m 100W valve linear: £50. G0GTF QTHR. (Hastings) 0424 437513 anytime.

● YAESU FT707 solid state tcvr, manual, genuine reason for sale: £350. Dave GW4VDP. (Holyhead) 0407 762197.

● YAESU FT709 gen.cov tcvr. AM/SSB/CW 10W, carrying case. Brand new: £350. Also Realistic PRO34 portable scanning rcvr. 200ch with extra accs: £150. (Brentwood) 0277 823434.

● YAESU FT709RH 70cm h/held, NC15 desk PSU/chrgr, MH12A2B spkr/mic, as new. 14mths old, boxed: £190. NAD 6220 hi-fi cassette deck, as new. Hardly used, 1/2 price, boxed: £75. Oscar 2m 7/8wave mobile ant, boxed. Little use: £10. GW4WBT. (Llandudno) 0492 78107.

● YAESU FT726R all-modes: £850. Yaesu FT727R quick chrgr, extra pwr pack: £325ono. Trio TR9000: £225. 34ft mast + winch: £130. Extras. (Bedford) 02302 3897.

● YAESU FT726R c/w 6m/2m/70cm modules. Satellite unit, MD1B8 desk mic, YM48A DTMF hand mic, c/w operators and technical manual: £850ono. Part built (needs anode circuit) 4CX250B 2m linear with integral PSU and case, fully metered with 2x spare 4CX250Bs: £80ono. 4ele 6m Jaybeam yagi 1yr old: £15. 6ele 2m quad: £10. 48ele 70cm Jaybeam: £10. Semi-auto rotator with stub mast and support bearing: £15. Part built M.MW 23cm TX +G4DDK osc board and Cirkit 23cm cvtr: £40. New drum of POPE H 100 50m: £27. Almost complete RX80 rcvr with digital readout and 9 cvtrs FM demodulator narrow SSB filter with all relevant RadComs: £50. The lot: £950. G8DZC QTHR. (Camberley) 0252 875436.

● YAESU FT727R 2m/70cm h/held tcvr with chrgr, car adaptor, YH2 headset. V.little used and in good cond: £295. No offers. Rcvr R210 in good cond with h/book and circuit: £45. Chris G6BRH. (Leominster, Herefordshire) 0568 5348.

● YAESU FT757GX complete. Orig.packing, h/book etc. 30A PSU homebrew: £550. Bob G0CLI. (Thetford) 0842 763524.

● YAESU FT767GX with 6m and 2m modules and MD1 mic. Mint cond with latest mods, manuals and boxes: £1200ono. Carr.extra. Going QRP. Dave G0LUA. (Wallingford, Oxon) 0491 36873.

● YAESU FT790 with matching linear FL7010. Both mint: £300. Icom IC04E with wall chrgr plus 3 nicad batt packs used cond: £185. 3-section telescopic mast 25ft. Each section with winch: £150. G6ZSI QTHR. (Oxford) 0865 711167/770959.

● YAESU FT7B HF tcvr 160-10m with built-in tvtr 50W SSB: £340. G3NMZ QTHR. (Luton) 0582 591749.

● YAESU FT980, FC102, SP980, Shure mic: £1200ono. Yaesu FL2100Z: £500ono. G0ESA. (Keighley) 0535 46015.

● 19SET 22set or 62set in GWC to start collection. Also 1155. Will travel to view and collect. Details please to Tim Price G4YBU, 4 Purberry Grove, Ewell, Surrey, KT17 1LU. 081-393 9691 eve-w/e.
● 2M mobile rig or TR2200G wanted. Cond not important, as long as it works. G4DJK QTHR. (Leicester) 0533 891960.
● BC221 absorption wavemeter, calibration charts, manual and PSU. Mint cond essential. G0KWS QTHR. (Tyneside) 091-252 7141.
● BIRD plug-ins for model 43. Type 100H 25D/50D 25E/50E. Especially 5k/10k or any near equiv. John, GW3JGA QTHR. (Prestatyn) 07456 3255.
● BIRD Thruline modules and accs. Cushcraft HF and VHF aerials. Maybe pt/exch some of LP collection? 0467 25365 after 8pm.
● CIRCUIT diag Philco rcvr model 537. Loan, copy or buy. O.Davies, 16 Central Way, Burton-on-Trent, DE13 0UU.
● CIRCUITS (Unilar) scope 032.601. Ferguson video 3V16. Tube LD924E. Telequip 533A scope. Advance DVM DMM2. G0IPT QTHR.
● CODAR T28 top-band RX. Must be clean and in GWO. 071-486 4376.
● DRAKE TR7A S/N 10k+ or TR4310 and PS7. Also any Watkins Johnson RF comms (Harris) or Drake prof HF rcvrs. Marconi, Autokey, Crusader, Oceanspan, Seaspan, Bellini, Tosi loops. Any radio room bits for collector. G3YFK. (Shrewsbury) 0743 884858.
● EARLY wireless sets wanted. Also horn speakers, xtal sets, valves, clandestine radios. Any cond, will collect. Jim G4ERU, 5 Luther Rd, Winton, Bournemouth, Dorset. 0202 510400.
● ELECTRONIQUES IF strip IFA/1.6 SSB MkII. Also details and circuit Electroniques transistor qoil pax. Tony Woodward. (Worcester) 0905 641759.
● FT101B FM mod by G3LLL or similar. 2m base co-lin. G8HLJ. (Merseyside) 051-334 8733.
● GDO wanted for overseas friend. Please write to Ray, G4NJW QTHR or 0507 441424.
● H/HELD portables for 70MHz AM. H/book for Pye T30AM and R6AM. W20 Whitehall control box. Pye SSB125, SSB130 or AEL3030 tcvr or similar, must cover 7MHz. G3VKM QTHR. (Norfolk) 050277 622.
● ICOM IC202, price and cond. Please, also National NC60 or NC77 rcvrs. Price and cond please. GM0KMG QTHR. (Glasgow) 041-649 4345.
● ICOM SM10 desk mic. £70+ offered for same in mint cond with orig. box insts etc. 0762 324855.
● IN good cond Codar AT5 with matching PS. Spare valves welcome. Please phone details. (Glasgow) 041-779 2709 after 6pm.
● INFO leading to source of small single solar cells for purchase within Britain (preferably). GM3HAT QTHR. (Aberdeen) 0224 316004.
● KENWOOD spkr SP520 and digital display DG5, working or faulty. Datong FL3 filter. (Codsall) 09074 3134.
● KENWOOD TS830M with AM. Good price paid for unmodified clean rig. EI5DI QTHR. (Dublin) 0001 953668.
● KW Victor or KW Valiant AM TX. Good price for nice cond. Also goniometer. 0473 311665 after 7pm.
● LABGEAR TX LG300, GEC BRT 400 RX or similar good valve gear. Mark G4HVK. (St. Ives, Cornwall) 0736 795948.
● LEAD with plugs to connect Microline 80 matrix printer to ZX Spectrum +. G4PEZ. (Louth, Lincs) 0507 602379.
● LINEAR, preferably FL2025, and other accs reqd for FT290R. Must be in good cond. WHY. (Wilmslow) 0625 531154 anytime.
● MANUAL for RA17L. G4RGA QTHR. (Taunton) 0823 664911.
● MINIBEAM for 20m. G3CZM not QTHR. Gordon, 11 Cormorant Pl, College Town, Camberley, Surrey, GU14 6XY. (Crowthorne) 0344 777412.
● MM5257N static RAM. G4OGB QTHR. (nr. Doncaster) 0427 752528.
● PRE 1946 domestic radios, some latter sets may be of interest. Valves reqd S4VB, SP4, EBL31, AC/VP2. PX4 etc. G4OOW QTHR. (Hinckley) 0455 612091 after 7.30pm.
● PYE PF8 pocket phone in full working order. Xtal on 70cm if possible. G4XYR QTHR. (Leeds) 0532 501496 after 6.30pm.
● PYE Vanguard spares, control box/lead, mic, spkr, h/book. G2AK absorption wavemeter, meter type preferred. G3JFC QTHR. 0474 872743.
● QST mags 1987 to present. G3UGL QTHR. 0234 750050.
● R210 and R216 service h/books. Buy or hire for photocopying. E.F.C.Owen. (Crawley) 20172 x214 w/days only.
● RACAL linear amp TA940A or similar. Also Racal 1772 RX. Cond immaterial. G6XNC QTHR. 083462 4461.
● RAF air publications relating to H25/ASV radars, navigation equip ie Babs, Oboe, Loran, Gee etc. Also ex-RAF radio stores index publications AP1086 Sec.10. Issue 1, 1938-1948. Exc. prices offered. Would purchase post-war magnetrons, klystrons, T/R cells, TWTs, thyratrons. special types of M-OV/EEV valves and CV types. Many thanks. M.Gee, 17 Foxley Cl, Mountford Est, Ferncliff Rd, Hackney, London, E8 2JN. 01-790 2846 or 01-254 9083 anytime.
● RCVR type BC624 (part of SCR522 TX/RX). Will collect unit if in good cond. State price and cond. GW4KYT QTHR. (Swansea) 0792 846014.
● RECRUITING 24 would-be club members. All British amateurs, to share in the enjoyment as well as the running costs of a radio amateur exotic tropical island beach villa. QTH c/w HF station to be shared at the rate of two weeks per member annually. Hurry, only a few more required. 0908 668169.
● SERVICE manual or diag for Telequipment S32A scope. Borrow to photocopy or buy if reasonable price. Brown, 56 Harding, Cambridge, CB4 3RR. 0223 354440.
● SOMEONE with the skill or computer to produce for me an outline great circle map centred on 33degN 16deg20'W. Fair price paid. GI3IVJ. not QTHR. (Ballynahinch) 0238 561016.
● THANKS all who responded May Helplines for old Marconi marine gear. Still looking! Esp Autokey, A/As, TXs, miscellany, Globespan manual, Crusader sideband generator unit, Westinghouse overload protection unit type Z4/6625-99-949-3777/1965 SVC info. Bruce, GW4XXF QTHR. (Tywyn) 0654 710741.
● TRIBAND HF beam in good order, heavy duty rotator to suit. Chrgr for Pye PF85 and spare batts. Icom IC701 tcvr and PSU. Icom RM3 remote controller, Icom SM2 desk mic. Can collect. G4AJE. (Cambs) 0354 741168.
● VIDEO recorders, old reel-to-reel types, 1/2in or 1in formats, WHY. Require manuals for Sony CV2100ACE, AV362OCE VTRs, and Philips N1500, N1700 VCRs. Also require anything relating to pulse electric clock systems, incl masters, slave clocks and other units. eg Gents, Synchronome etc. Also want pre-1950 radio and TV service sheets, and Newnes 'Radio and TV Servicing' vol 1978-79. Also details of how to make rubber drive belts for tape recorders etc?! G8UDJ QTHR. (Oxford) 0865 735821.
● WWII spy sets, also later models wanted or exch for German WWII equip. Write G.Huetter, Box 2129, D-8990 Lindau, W.Germany. 010 49 4223 2856.
● YAESU FC102 ATU to complete 102 line up. Going price paid. G0JFU. (Gloucester) 0452 862773 anytime.
● YAESU FC107 ATU, or consider FC902 or FC102. Also want FV107 in grey, DMS unit. Cash waiting. G4OLC. (Choppington) 0670 855953.
● YAESU FC902 ATU. Peter, G0LVG QTHR. (Gtr.Manchester) 061-736 0667 anytime after 6pm.
● YAESU FT730R VHF tcvr. Must be in good cond and c/w h/book. Mike Watson, G8CPH QTHR. (Ipswich) 0473 831448.
● YAESU FTDX401 for spares. Needn't be working else IF coils for same will pay to get some wound. (Newport, Shrops) 0952 813361.
● 1ST class Eddystone and Raymart 6-pin coils offered for Eddystone 4-pin equiv. Bernard Litherland, G4IMT QTHR. 0225 891254.
● 65FT 3-section heavy duty tower with spare winch for square section mono tube tower with rotator plus video editing equip or computer etc WHY. G6XMY. (Somercotes) 0773 604965.
● BBC-B modcomputer. DDFS fitted but never used. As new, with: £250 cash. Exch for HF rig under 12yrs old. (Leeds) 0532 665568.
● BUTTERNUT HF6V plus TBR 160S. Good cond. Buyer inspect and collect. Would like FC102 tuner or similar ATU. (Braintree) 0376 49908.
● FORD Anglia 1961, YTP 381, one driver since 1963, Constance G8LY. Passed MOT in April. Taxed to December. 52000 soon be vintage like owner now taken to electric chair! Would exch for FTV707 tvtr and or WHY? Value £550ono. QTHR. (Lee on the Solent) 0705 550547.
● FT790 or FT290 exch for FTV107R with 2m or 70cm module fitted. (Ware) 0920 871639.
● HRO coils 7-14 and 14-30 for other coils. G4RGA QTHR. (Taunton) 0823 664911.
● PK232 new modwith mailbox and Navtex. Unmarked, 2wks old. Need KAM or KPC4. Straight swap! Graham G7EVY. (Preston) 0772 812778.

WANTED

● 19SET 22set or 62set in GWC to start collection. Also 1155. Will travel to view and collect. Details please to Tim Price G4YBU, 4 Purberry Grove, Ewell, Surrey, KT17 1LU. 081-393 9691 eve-w/e.
● 2M mobile rig or TR2200G wanted. Cond not important, as long as it works. G4DJK QTHR. (Leicester) 0533 891960.
● BC221 absorption wavemeter, calibration charts, manual and PSU. Mint cond essential. G0KWS QTHR. (Tyneside) 091-252 7141.
● BIRD plug-ins for model 43. Type 100H 25D/50D 25E/50E. Especially 5k/10k or any near equiv. John, GW3JGA QTHR. (Prestatyn) 07456 3255.
● BIRD Thruline modules and accs. Cushcraft HF and VHF aerials. Maybe pt/exch some of LP collection? 0467 25365 after 8pm.
● CIRCUIT diag Philco rcvr model 537. Loan, copy or buy. O.Davies, 16 Central Way, Burton-on-Trent, DE13 0UU.
● CIRCUITS (Unilar) scope 032.601. Ferguson video 3V16. Tube LD924E. Telequip 533A scope. Advance DVM DMM2. G0IPT QTHR.
● CODAR T28 top-band RX. Must be clean and in GWO. 071-486 4376.
● DRAKE TR7A S/N 10k+ or TR4310 and PS7. Also any Watkins Johnson RF comms (Harris) or Drake prof HF rcvrs. Marconi, Autokey, Crusader, Oceanspan, Seaspan, Bellini, Tosi loops. Any radio room bits for collector. G3YFK. (Shrewsbury) 0743 884858.
● EARLY wireless sets wanted. Also horn speakers, xtal sets, valves, clandestine radios. Any cond, will collect. Jim G4ERU, 5 Luther Rd, Winton, Bournemouth, Dorset. 0202 510400.
● ELECTRONIQUES IF strip IFA/1.6 SSB MkII. Also details and circuit Electroniques transistor qoil pax. Tony Woodward. (Worcester) 0905 641759.
● FT101B FM mod by G3LLL or similar. 2m base co-lin. G8HLJ. (Merseyside) 051-334 8733.
● GDO wanted for overseas friend. Please write to Ray, G4NJW QTHR or 0507 441424.
● H/HELD portables for 70MHz AM. H/book for Pye T30AM and R6AM. W20 Whitehall control box. Pye SSB125, SSB130 or AEL3030 tcvr or similar, must cover 7MHz. G3VKM QTHR. (Norfolk) 050277 622.
● ICOM IC202, price and cond. Please, also National NC60 or NC77 rcvrs. Price and cond please. GM0KMG QTHR. (Glasgow) 041-649 4345.
● ICOM SM10 desk mic. £70+ offered for same in mint cond with orig. box insts etc. 0762 324855.
● IN good cond Codar AT5 with matching PS. Spare valves welcome. Please phone details. (Glasgow) 041-779 2709 after 6pm.
● INFO leading to source of small single solar cells for purchase within Britain (preferably). GM3HAT QTHR. (Aberdeen) 0224 316004.
● KENWOOD spkr SP520 and digital display DG5, working or faulty. Datong FL3 filter. (Codsall) 09074 3134.
● KENWOOD TS830M with AM. Good price paid for unmodified clean rig. EI5DI QTHR. (Dublin) 0001 953668.
● KW Victor or KW Valiant AM TX. Good price for nice cond. Also goniometer. 0473 311665 after 7pm.
● LABGEAR TX LG300, GEC BRT 400 RX or similar good valve gear. Mark G4HVK. (St. Ives, Cornwall) 0736 795948.
● LEAD with plugs to connect Microline 80 matrix printer to ZX Spectrum +. G4PEZ. (Louth, Lincs) 0507 602379.
● LINEAR, preferably FL2025, and other accs reqd for FT290R. Must be in good cond. WHY. (Wilmslow) 0625 531154 anytime.
● MANUAL for RA17L. G4RGA QTHR. (Taunton) 0823 664911.
● MINIBEAM for 20m. G3CZM not QTHR. Gordon, 11 Cormorant Pl, College Town, Camberley, Surrey, GU14 6XY. (Crowthorne) 0344 777412.
● MM5257N static RAM. G4OGB QTHR. (nr. Doncaster) 0427 752528.
● PRE 1946 domestic radios, some latter sets may be of interest. Valves reqd S4VB, SP4, EBL31, AC/VP2. PX4 etc. G4OOW QTHR. (Hinckley) 0455 612091 after 7.30pm.
● PYE PF8 pocket phone in full working order. Xtal on 70cm if possible. G4XYR QTHR. (Leeds) 0532 501496 after 6.30pm.
● PYE Vanguard spares, control box/lead, mic, spkr, h/book. G2AK absorption wavemeter, meter type preferred. G3JFC QTHR. 0474 872743.
● QST mags 1987 to present. G3UGL QTHR. 0234 750050.
● R210 and R216 service h/books. Buy or hire for photocopying. E.F.C.Owen. (Crawley) 20172 x214 w/days only.
● RACAL linear amp TA940A or similar. Also Racal 1772 RX. Cond immaterial. G6XNC QTHR. 083462 4461.
● RAF air publications relating to H25/ASV radars, navigation equip ie Babs, Oboe, Loran, Gee etc. Also ex-RAF radio stores index publications AP1086 Sec.10. Issue 1, 1938-1948. Exc. prices offered. Would purchase post-war magnetrons, klystrons, T/R cells, TWTs, thyratrons. special types of M-OV/EEV valves and CV types. Many thanks. M.Gee, 17 Foxley Cl, Mountford Est, Ferncliff Rd, Hackney, London, E8 2JN. 01-790 2846 or 01-254 9083 anytime.
● RCVR type BC624 (part of SCR522 TX/RX). Will collect unit if in good cond. State price and cond. GW4KYT QTHR. (Swansea) 0792 846014.
● RECRUITING 24 would-be club members. All British amateurs, to share in the enjoyment as well as the running costs of a radio amateur exotic tropical island beach villa. QTH c/w HF station to be shared at the rate of two weeks per member annually. Hurry, only a few more required. 0908 668169.
● SERVICE manual or diag for Telequipment S32A scope. Borrow to photocopy or buy if reasonable price. Brown, 56 Harding, Cambridge, CB4 3RR. 0223 354440.
● SOMEONE with the skill or computer to produce for me an outline great circle map centred on 33degN 16deg20'W. Fair price paid. GI3IVJ. not QTHR. (Ballynahinch) 0238 561016.
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● PK232 new modwith mailbox and Navtex. Unmarked, 2wks old. Need KAM or KPC4. Straight swap! Graham G7EVY. (Preston) 0772 812778.

HELPLINES

2-METRE CAVITY FILTERS

Do you work for an organisation who is scrapping, know where to source or have in the back of your shack some 2 metre cavity filters suitable for a voice repeater. Bedford Repeater Group are looking for the above. Information to Doug Ash, QTHR or tel: 0462 711722 (answerphone).

2" INSIDE DIAMETER METAL TUBING

Ben Follows, G4FJU, is trying to obtain a supplier of 2" INSIDE diameter tubing. He has three 11' x 2" hardwood poles which he wishes to join together to make a 33ft mast. He is looking for 2ft lengths of aluminium or mild steel tubing. If you can help please contact Ben at 1 Avon Road, Rivers Est, Bloxwich, Walsall, WS3 1PA.

TAPE DECK - AKAI 40T

Fred Sammon, GI4PCY, has a faulty IC (LD3141) on his Akai 40T and has been unable to obtain a replacement for this. It is a small voltage amplifier, similar to the ubiquitous 741, but pin 9 supplies a voltage to the preceding voltage amplifier transistor - it could be an ALC control voltage. If you can help, write to Fred at 11 Drumclay Road, Enniskillen, BT74 6NG.

MICRODESK MKII CIRCUIT DESIGN

A circuit design is required for a Microdesk MkII type WI-612 made in 1966 by Microwave Instruments Ltd of Shiremoor, Northumberland. Please contact Mr C James, G3VVB, "Gonfishin", 15 Perhaver Park, Gorran Haven, St Austell, Cornwall, PL26 6NZ.

RACAL MANPACK

Mr JH Davies, G3YJD, is trying to repair a Racal Manpack, believed to be model PRM4301. It is in a green case, frequency cover 1MHz-30MHz with decade tuning, and has apparently developed a fault in the ATU indicator cirtcuit which is on a small pcb. Also two transistors have failed, type E176. Mr Davies would be interested to know where to obtain these parts, or their equivalent, and any reasonable costs would be refunded. Write to him at 24 Burghwood House, Burgh Hill, Hurst Green, E Sussex, TN19 7PE.

CANADIAN 58 SET

A circuit diagram covering the set and psu, plus advice on the microphone used with the Canadian 58 Set would be gratefully received by Ron Grout, G3XPH. Ron can be contacted on Titchfield 0329 43219.

CLUB NEWS

DEADLINE - Items for inclusion in the September 1990 issue must be sent to HQ marked "Club News - DIARY", to be received by 20 July latest. If news is received by the published deadline, it will appear in the listing. It is your responsibility to ensure that items are sent DIRECT to HQ in good time. News items should be sent in writing, preferably typed or written legibly, and be signed by the club secretary or the person responsible for publicity.
NOTE: This is primarily a service for clubs affiliated to the RSGB, to whom priority will be given.

AVON

Bristol RSGB Group - 30, talk by Derek Pearson, G3ZOM of Jandek; Aug 20, video "Aerial Circus" by Dud Charmans, G6CJ. Details 0272 513573.
North Bristol ARC - 7, VHF Field Day. Details 0454 616267.
South Bristol ARC - 4, talk "Pictorial History of WD & HO Wills" by Fred Rice; 7, VHF National Field Day; 11, bring & buy; 18, 2 Metre activity evening; 25, video "The Bristol Lundy Expedition" by Peter. G0DRX; Aug 1, lecture TBA; 8, 2 Metre activity evening; 15, Dx Broadcast TV Activity.
Thornbury & DARC - 4, talk "Message Handling for RAYNET" by Ted, G1ABT; 18, HF activity night; Aug, no formal meetings. Details 0454 411096.

BEDFORDSHIRE

Bedford & DARC - 17, preparations for Special Event Station GB0BBE; 28, Special Event Station - GB0BBE - Bamberg/Bedford Exchange; 31, slide show by Alfred, DL3NAX of Bamberg.
Shefford & DARS - 2, an evening with Biggleswade Archery Club; 5, TBA; 7 & 8, VHF National Field Day - Toplers Hill; 12, Pedestrial DF Hunt; 19, TBA; 26, TBA. Details 0763 71149.

BERKSHIRE

Maidenhead & DARC - 5, talk "10GHz Equipment" by Roger, G3VCT; 17, talk "Amateur Radio in the USA" by Dave, G0MLU; Aug 2, 2 Metre Foxhunt on S14. Details 0628 25952.
Reading DARC - 7, VHF NFD at Watership Down organised by G4THN; 12, talk "Antenna Tuning Units" by G3RZP; 19, boat trip from Burghfield arranged by G6DAG; 22, McMichael Rally at Slough organised by G1MWI; 26, talk "The Improved Coverage of GB3RD by the Berkshire Downs Repeater Group" by G4CCC. Details 0734 744042.

BUCKINGHAMSHIRE

Aylesbury Vale RS - 4, quiz night with TV celebrity Quiz Master; 18, no meeting. For June, July and August there is only one club meeting on the first Wednesday of each month. Details 0908 560026.
Chiltern ARC - 4, planning for the VHF NFD. "Equity & Law" Social Club, Hazlemere, High Wycombe.

CAMBRIDGESHIRE

Cambridge & DARC - 6, VHF NFD Contest briefing; 7 & 8, VHF NFD; 13, evening in the shack and Morse class; 20, club 10GHz microwave beacon project update; 27, evening in the shack and Morse class. Details 0223 880835.

CHESHIRE

Chester & DARS - 3, committee meeting; 10, talk "The ICOM 9000" by Dave, G4JMF; 17, open forum "Amateur Radio - The Future"; 24, annual barbecue; 31, your questions answered.
Macclesfield & DARS - 3, construction; 10, club barbecue; 17, shack night; 24, talk "Homebrew HF Transceiver" by G3OGQ (winner of the NARSA 1990 construction award). Details 02605 2028.
Warrington ARC - 3, beginners night; 10, surplus equipment sale; 17, talk "Morse the Forces Way" by Will, G0GSO; 24, open forum; 31, talk "Commercial Packet Data Networks" by Keith Brown; Aug 7, beginners night; 14, barbecue at GYCC - hosts Mike & Debbie Mansfield. Details 0928 715070.

CLWYD

Delyn RC - 3, visit to Chester Police Station; 17, Bar-B-Que at the QTH of GW7AAV and AAU; 31, talk "The Work of Jodrell Bank" by a well known scientist; Aug 14, open forum and discussion night. Details 0244 819618.
Wrexham ARS - 3, field night and barbecue; 17, demonstrations of members' computers. Details 0978 261482.

CORNWALL

Cornish RAC - 5, CRAC main meeting; 9, CRAC computer club; 10, radio constructors workshop; 14, Cornish Rally, Richard Lander School, Truro; Aug 2, CRAC main meeting; 7, radio constructors workshop; 13, CRAC computer club. Details 0209 212314.

DERBYSHIRE

Derby & DARS - 4, junk sale

DEVON

Exeter ARS - 9, construction contest evening; Aug 13, free and easy evening.

DORSET

Plessey Christchurch ARS - 12, Annual General Meeting. Details Highcliffe 72826.

EAST SUSSEX

Brighton & DARS - meets at 8pm 1st and 3rd Wednesday of the month at the Roast Beef Bar, Brighton Racecourse. Morse Class meets at 7.30 Mondays (excl Bank Holidays) at Bellerby's College, 44 Cromwell Road, Hove. Classes for beginners, intermediate and final. - 4, briefing and preparation for the Sussex Amateur Radio & Computer Fair; 18, de-briefing ditto - lessons learnt. Details 0273 501100.

ESSEX

Loughton & DARS - 13, talk "The Grid Dip Oscillator and its Uses" by Ray Pedley, G0LWF; 27, TBA. Details 081-508 3434 (after 6pm).

GREATER LONDON

Acton, Brentford & Chiswick ARC - 17, talk and demonstration "Home Brew Helical Antenna" by G2FHV.
Coulsdon ATS - 9, talk "German WWII Communications" by George Cripps, G3DWW; Aug 13, inter club quiz v Wimbledon & DRS. Details 081 684 0610.
Edgware & DARS - 7/8, VHF Field Day; 12, informal; 15, Low Power Field Day (see G3SJE); 26, TBA. Details 081 205 1023.
Southgate ARC - *CHANGE OF VENUE* Winchmore Hill Cricket Club, Firs Lane, Winchmore Hill, London N21. 12, talk "Radio Data Service" by Alan Guard, G3LWA; 26, construction evening - Antenna Noise Bridge; Aug 9, talk "Nicam Stereo" by Gerry Meek of Fergusons. Details 081 360 2453.
Sutton & Cheam RS - 7/8, VHF NFD; 19, TBA, 28, 144MHz low power contest; 29, 432MHz low power contest.
Wimbledon & DARS - 13, Op-Amps; 22, DF hunt; 27, Pre-camp meeting; Aug 10, night on the air (at camp); 4/12, WDARS summer camp; 13, CATS v WDARS quiz at CATS. Details 081 330 2703.

GREATER MANCHESTER

Eccles & DARS - 3, talk "My Student Days" by G7CNP; Aug 7, talk "101 Holidays in a Bedford CF4 Van" by G8VF.
Stockport RS - 11, night on the air, Anniversary callsign GB4SWS; 25, talk "Diversity Reception with only One Antenna (and that's invisible)" by Keith Twort, G8CHY. Details 061 439 3831 or 061 439 4285.

HAMPSHIRE

Basingstoke ARC - 2, talk "Radiopaging" by Noel, G8GTZ; 14, demonstration station at LeCourt Cheshire Home Fete.
Fareham & DARC - 4, talk "HF ATU's" by Ron, G3XPH; 18, talk "Vodaphones" by Chris, G8JFJ; Aug 1, test equipment night organised by Mick, G4ITF.
Horndean & DARC - 5, talk "History of Computers" by John Lansdown. Horndean Community School, Barton Cross (off Catherington Lane), Horndean; Aug 2, talk "Chemistry in Electronics". Details from Fred Charrett, G3COO, QTHR, tel: 0705 483676.
Itchen Valley ARC - 13, talk "Radio Controlled Models" by Roger Bedford; 27, open meeting. Details 0703 736784.
Three Counties ARC - 4, talk "10/10 International" by Robert Coombes; 18, talk "In Car Entertainment" by Pioneer HighFi UK; Aug 1, computer night; 15, talk "Electronics in Air Traffic Control" by Duncan Tribute. Details 0428 72315.

HEREFORD & WORCESTER

Bromsgrove ARS - 10, construction project. 80 metre receiver; 24, night on the air. Details 0527 503024.
Bromsgrove & DARC - 1, Droitwich Strawberry Rally; 13, club night, Jandek kits; Aug 10, talk "Modern Short Range Radar and Amateur Applications" by Ray MacMillan, G4JVB.

HERTFORDSHIRE

Cheshunt & DARC - 11, talk "Prison Visiting" by Tony Slater; 25, junk sale; Aug 5, Woburn Rally; 8, portable evening - Bass Hill Common, Broxbourne. Details 0992 464795.
Stevenage & DARS - 3, planning club VHF station; 7/8, VHF NFD; 10, HF night on the air & project evening; 15, Low Power NFD; 17, checking and gear for A10 Rally; 21/22, A10 Rally St Edmund's College Park Puckeridge; 24, repair of club gear; 26, committee meeting 81 Whomerley Road.
Verulam ARC - 24, talk "Electromagnetism - Oliver Heavyside, the Forgotten Genius" by Mr. Ivor Catt.
Welwyn-Hatfield ARC - 2, talk "Cellular Radio"; 16, foxhunt; Aug 6, video night; 20, informal.

HUMBERSIDE

Goole R&ES - 6/7/8, VHF NFD; 13, logfill; 20, demonstration of Packet Radio by G6ZOI; 27, social evening; 29, Scarborough Rally bus trip; Aug 3, contest discussion; 5, treasure hunt.
Hornsea ARC - 4, VHF Field Day preparation; 7/8, VHF Field Day; 11, VHF FD post mortem; 18, committee meeting. Details 0964 533331.

KENT

Bredhurst R&TS - 5, VHF NFD briefing; 7/8, VHF NFD; 12, construction night; 19, talk "Weather and its Effects on Propagation" by Ron Lobeck, TVS Weatherman; 26, construction night. PWCA, Parkwood Green, Gillingham. Details 0634 271548 or 713828.
Gravesend ARS - meets at the "Coach and Horses" Public House, Parrock Street, Gravesend, 8 pm Monday evenings. Attempts are being made to rejuvenate the club and it is hoped to recruit new members, and to re-enlist old members who have dropped out. Those interested please contact Phil Jobson, G3HLF, tel: Gravesend 534571.
Maidstone YMCA RS - 6, Morse Class and RAE (Measurement); 13, construction contest: 20, Morse Class and RAE (Licence Conditions); 27, River Festival preparation meeting; 28, River Festival. Details 0622 676776.
West Kent ARS - 20, talk "SOS" by Phil Sale.

LANCASHIRE

Preston ARS - 7/8, VHF NFD; 12, illustrated talk "Nuclear Fuels"; 26, Preston holidays; Aug 9, talk on Crime Prevention.
Thornton Cleveleys ARS - 2, VHF Field Day preparations; 9, talk by Nick Searle, G3BDT; 16, barbecue; 23, summer sale of surplus equipment; 30, talk "The Coastguard Service"; Aug 13, talk "The Work of the Post Office".

MERSEYSIDE

Wirral & DARC - 4, mobile treasure hunt - starting point TBA; 11, talk "Slow Scan TV" by GW0HWK; 25, annual BBQ at Heswall Shore.

NORFOLK

Fakenham RC - 3, tips and demonstration on Flying Radio Controlled Model Aircraft by Tony, G1XYD; 17, informal; Aug 7, Roy Dickinson from the Muckleburgh Collection, North Norfolk.
Norfolk ARC - *NEW SECRETARY* M.J. Cooke, G4DYC, 4 Geddes Way, Mattishall, Norfolk NR20 3RE, tel: 0362 850591. 4, "CQ Stateside", night on the air; 11, mobile DF hunt; 18, informal and committee meeting; 25, demonstration "Using Satellites" by Pat Gowen, G3IOR; Aug 1, talk "Meteor Scatter" by Paul Turner, G4IJE; 5, club outing to Woburn Rally; 8, HF SSB FD/Town & Country Show briefing; 15, "Real Radio" evening. Details 0508 78258.

SHROPSHIRE

Telford & DARS - 4, club station on UHF bands; 11, aerial mast erection competition; 18, foxhunt, 7.30pm, 144.600MHz; 25, novice licence planning; Aug 1, club antenna repairs night; 8, foxhunt, 7.30pm, 144.600MHz. Details Telford 616166.

SOMERSET

Mid Somerset ARC - 7, auction of goods VHF/UHF from the shack of the late G8KBQ.
West Somerset ARC - 3, WAB evening by Walter, G1FRY.
Yeovil ARC - 12, talk "How jFets Work" by G3MYM; 19, talk "Measuring jFet Characteristics" by G3MYM; Aug 2, talk "Designing jFet Amplifiers" by G3MYM. Details from David Bailey, G1MNM, QTHR.

SOUTH GLAMORGAN

Barry College of FERS - *NEW SECRETARY* Mrs. M. Beynon, GW4GSH, QTHR, tel: 0446 781261.
Cardiff RSGB Group - 9, slide show by Don Green, GW3MRI on recent trip to South Africa.

SUFFOLK

Bury St Edmunds ARS - 17, talk "Satellites and their Working" by Pat Gowan, G3IOR. Details 0359 70527.
Felixstowe DARS - 9, ten-pin bowling evening RAF Bentwaters; 23, visit to BBC Radio Suffolk, Ipswich; Aug 6, talk "The Novice Licence" by speaker from RSGB. Orwell Park School. Details 0473 642595 (daytime).

SURREY

Dorking & DARS - 7/8, VHF NFD; 10, informal - Black Swan, Ockham; 24, portable activity night 6-4-2-70cms. Assemble 7pm. Barbecue BYO. Talk-in S20 - Southdowns venue TBA; Aug 14, informal - Falkland Arms.
Reigate ATS - 17, members' evening; Aug 21, talk "DTI Radio Technology Labs" by John Mellish, G4HUK and Steve Jones, G0FMZ.

TAYSIDE

Dundee ARC - 3, visit to North of Scotland Hydro Electric Board Control Room, Mid Craigie Road, Dundee - 7.30pm; Aug 14, visit to British Telecom Exchange, Willison Street, Dundee - 7pm. Details from George Millar, GM4FSB, QTHR.

WARWICKSHIRE

Mid Warwickshire ARS - 10, 2m DF foxhunt. 145.350 horiz FM - 7pm start TX; 24, scanners & open evening led by Roy, G8XDL; Aug 14, families' evening get-together. Details Kenilworth 513073.
Rugby ATS - 17, 144MHz direction finding competition, round 3; 29, 2nd annual car boot sale; Aug 7, talk "St Kilda Island"; 14, 144MHz direction finding competition, round 4.
Stratford upon Avon & DARS - 9, 2m fox hunt; 23, construction and photographic competition. Details 060 882 495.

WEST MIDLANDS

Coventry ARS - 1, treasure hunt; 6, 2m DF contest (outdoors); 13, night on the air and Morse tuition; 20, members' mini lectures; 27, night on the air and Morse tuition.
wMidland ARS - 17, annual rig check; Aug 21, junk sale.
South Birmingham RS - 4, monthly meeting, VHF/NFD planning meet; 7/8, VHF/NFD Waseley Hills Country Park.

WEST YORKSHIRE

Keighley ARS - 17, packet radio on the air; 31, visit YPL Television; Aug 14, night on the air. Details Bradford 496222.
Northern Heights AR&ES - 4, field day preparation; 7/8, VHF Field Day; 18, field day inquest. Details 0274 673116.
Spen Valley ARS - 5, closing night on the air.
Todmorden & DARS - 2, construction for beginners.

WILTSHIRE

Trowbridge & DARC - 4, family picnic - White Horse Hill, Westbury. 6.30pm. Details 0380 830383.

MOBILE RALLIES

This is a list of all rallies, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact callsign and telephone numbers direct to HQ and marked 'Rally News - DIARY'.

1 JULY

Worcester & District Droitwich Strawberry Rally - High School, Droitwich . Opens 11am. Usual trade stands. Bring & Buy. Family entertainment and Strawberry Fields (weather permitting). Free car park and free entrance. Details from Tony, G4OPD, tel: 0905 620507 or Derek, G4RBD, tel: Worcester 641733.
York Radio Rally - Tattersall Building at York Race Course. Ground and First Floors will be used. First floor accessible by wide stairs, lift and escalator. Roller doors will provide loading facilities for traders. Ample parking for traders and visitors. Talk-in on S22 and GB3CY on RB13. Details tel: 0904 625798.

14 JULY

Cornish RAC Rally - Richard Lander School, Truro. Doors open 10am (9.30 for disabled visitors). Usual trade stands. Bring & Buy. Computer display/demo. Weather satellite demo. Refreshments. Free parking. Details from Rolf Little, G7FKR, tel: 0872 72554.

22 JULY

Burnham Beeches and Maidenhead & DARC McMichael Rally. The Haymill Centre, Burnham near Slough. Doors open 10.30am (10.15 for disabled visitors). Admission fee £1. Car boot sale admission £5 for car and driver. Usual traders. Royal Naval ARS. Datacomms Symposium. Packet radio demo. Refreshments. Bar. Details from Bob Hearn, G0BTY, tel: 0494 29868.
Colchester Mobile Rally - Highwoods Sports & Recreation Centre, Gilberd School, Brinkley Lane, Severalls Lane, Colchester. Open 10am - 4pm. Talk-in on S22. Details from G0DZB on 0473 258367 (week days), 0206 42950 (evenings & weekends).

29 JULY

Rugby ATS Amateur Radio Car Boot Sale - Lodge Farm, Walcote, Nr. Lutterworth, Leicestershire. It is less than 2 miles east from junction 20 of the M1. Opens 10am. Entrance fee to non stall holders 50p per car. Pitches £5.00 for whole day. Talk-in GB8CBS on S22. Details from Kevin, G8TWH, tel: 0203 44159 or David, G4DDW, tel: 0455 552599.
Scarborough ARS Rally - The Spa, Scarborough. Doors open 11 am. Many trade stands. Bring & Buy. Morse exam and demo from Morse Examiners. Refreshments and Bar. The Spa is situated on the South Shore Seafront. Details from Ian, G4UQP, tel: 0723 376847.

5 AUGUST

Woburn Rally - Woburn. Details from RSGB HQ.

12 AUGUST

Derby Mobile Rally - Lower Bemrose School, St. Alban's Road,(just off the A5111 Derby Ring Road), Derby. Details from Kevin Jones, G4FPY, 20 Pinecroft Court, Oakwood, Derby DE2 2LL. Tel: 0332 669157.

Flight Refuelling Hamfest - Flight Refuelling Sports Grounds, Wimborne, Dorset. Opens 10 a.m. Free parking and overnight camping on the Saturday night by prior arrangement. Radio and Electronics trade stands. Craft and Gift Fair. Bring & Buy. Vintage Wireless Exhibition and full family entertainment. Talk-in on VHF S22. Details from John, G0API, tel: 0202 691649 or Rob, G6DUN, tel: 0202 479038.

19 AUGUST

Royal Forest of Dean, Glos, Speech House Rally. All the usual Rally stalls plus picnic and parking. Details from Terry, G4HZT QTHR, tel: 0594 33334 (mid evenings).

West Manchester RC Red Rose Summer Rally - Bolton Sports & Exhibition Centre, Silverwell Street, Bolton. Opens 11 a.m., 10.30 for disabled visitors. All usual trade stands. Large bring & buy. Snacks and meals, plus bar extension. Venue is all at pavement level, with toilet facilities for disabled visitors. Admission 50p, children free. Details from Dave, G1IOO, tel: 0204 24104 (evenings only).

26 AUGUST

Galashiels and DARS. Open Day - Focus Centre, Livingstone Place, Galashiels. Trade stands. Bring & Buy. Catering. All the usual activities. Talk-in on S22. Details from John Campbell, GM0AMB, 9 Brunton Park, Bowden, Melrose. Tel: 0835 22686.

Torbay ARS Mobile Rally - STC Social Club, Brixham Road, Paignton, Devon. Details G3HTX QTHR.

27 AUGUST

Huntingdonshire ARS Annual Junk Sale and Rally - Medway Centre, Coneygear Rd, Huntingdon, Cambs. Signed from the A604, close to the A1. Opens 10 am. Admission 50p. Boot sale pitches £6 on the day, £5 in advance. Double the size of last year's event. Trade stands - components, surplus, antennas. Large bring and buy. Hot/cold drinks and light refreshments available throughout the day. Ample free parking. Talk-in on S22 and via GB3OV (RB5). Details tel: Dave, G7DIU, on 0480 431333; Dave, G8LRS on 0480 456772; or Chris, G1YVS, on 0487 830212.

2 SEPTEMBER

Milton Keynes & DARS 4th AR Car Boot Sale - Cranfield Airfield, Cranfield, Bedford MK43 0AL. Opens 10am. Bar & refreshments. Talk-in on S22. Details from Tony, G6WXM, tel: 0908 316435, Mike, G0FMC, tel: 0908 566796, Ray, G1LRU, tel: 0908 660798.

Preston ARS 23rd Annual Rally - University of Lancaster. Details from Godfrey, G3DWQ, tel: 0772 53810.

Telford Radio Rally & Exhibition - Telford Exhibition Centre, Telford, Shropshire. Details from G3UKV, QTHR, tel: 0952 255416.

9 SEPTEMBER

Lincoln Hamfest - Lincolnshire Showground and Exhibition Centre (4 miles north of the City on the A15 Lincoln to Scunthorpe road). Opens 10.30am (10am for disabled visitors). All the usual trade stands. Bring & Buy. Refreshments. Real ale bar. Helicopter rides (provisional), model cars and model aircraft displays. Caravans welcome by prior arrangement. Talk-in on 2M by West Lincs Raynet Group. Further details from Sue Middleton, c/o G8VGF, tel: 0522 531788.

Vange ARS Annual Rally - The Laindon Community Centre, Aston Road, Laindon, Basildon, Essex. Opens 10am. The centre is a short walk from Laindon Station on the London (Fenchurch Street) Shoeburyness line. Approach roads will be signposted. Talk-in on S22. Adequate parking. Usual traders. Bring & Buy. Free raffle.

15 SEPTEMBER

Annual Wight Rally - Arreton Manor, near Newport, Isle of Wight. Details from Douglas Byrne, G3KPO, QTHR, tel: 0983 67665 or 0983 616503.

16 SEPTEMBER

BARTG Rally - Surrey Hall, Sandown Park Race-course. Details from Mr. Peter Nicol, G8VXY, 38 Mitten Ave, Rubery, Rednal, Birmingham B45 0JB. Tel: 021 453 2676.

Bristol Radio Rally - Brunel's Great Train Shed, Temple Meads Station, Bristol. Doors open 10.30am. Usual attractions. Bring & Buy. Refreshments. Good access for disabled visitors. Talk-in on S22. Good parking facilities. Venue is just 5 minutes from the M32. Details from David Farr, G4WUB, tel: 0272 839855.

22 SEPTEMBER

QRP Beside the Seaside - The Garnham Centre, The United Reformed Church, Back Chapel Lane, Gorleston on Sea, Nr. Great Yarmouth. Details from G3OEP.

23 SEPTEMBER

Centre of England Autumn AR Rally 1990 - British Motorcycle Museum, Bickenhill, nr Birmingham, opposite NEC on the M42 Jcn 6. Opens 10.30am. All the usual favourites. Bring & Buy. Raffle. Refreshments. Licensed Bar. 3 large halls with ample parking. Over 60 traders. RAIBC/Club stnads. Admission £1. Concession for RAIBC members and senior citizens. Special rates for those wishing to visit the museum with over 500 cycles on show. Talk-in S22. Details from Frank, G4UMF or Margaret, tel: 0952 598173.

Peterborough 1990 Mobile Rally - Wirrina Sports Stadium, Peterborough. 10am - 5pm. Talk-in S22 and SU22 by G3DQW. All the normal traders. Bring & Buy. Details from Robert Maskill, G4PYR, tel: 0733 230412 or 0836 542630 any evening.

30 SEPTEMBER

Harlow AR & Electronics Mobile Rally - Harlow Sports Centre. Doors open 10.30am. Bar. Hot Snacks. Facilities for disabled visitors. Giant Bring & Buy. Special Interest Groups. Talk-in on 2M & 70cm by G6UT. Free parking. Admission £1. Details from All, G7FNY, tel: 0279 418392 (weekdays) or Mike, G7BNE, tel: 0279 722569 (evenings and weekends).

6th North Wakefield R.C. Rally - Outwood Grange School, Potovens Lane, Outwood, Nr. Wakefield. Doors open 11am (10.30 for disabled visitors). Admission 50p. Fully licenced bar with real ale. Refreshments. Raffle. Bring & Buy. Radio, computer and electronics traders and repeater groups. Talk-in on S22, club callsign G4NOK. Venue is 2 miles from M1 and M62 motorways. Details from Richard, G4GCX on 0532 622139.

7 OCTOBER

Armagh & Dungannon DARC Annual Rally - Drumsill House Hotel, Moy Road, Armagh. Details from T.E. Hall, GI0MSJ, tel: 0861 523454.

Blackwood AR Rally - Oakdale Community College, Blackwood, Gwent, NP2 0DT. Details from B. Matthews, GW0JWF.

Great Lumley Radio Rally - Community Centre, Great Lumley, Nr. Chester-le-Street, Co. Durham. Details from Barry, G1JDP, tel: 091 388 5936.

South Devon RC. Sixth Annual Ham Radio Computer Exhibition and Rally - Hillhead Campsite on the Dartmouth Road in Brixham. Details from 0803 5222116

20/21 OCTOBER

4th North Wales Radio Rally - Aberconway Centre, Llandudno. Details from B. Mee, GW7EXH., Anncott, Hylas Laner, Rhuddlan, Clwyd, LL18 5AG, tel: 0745 591704

11 NOVEMBER

MARS Birmingham Mini Mobile Rally - Stockland Green Leisure Centre, Erdington, Birmingham. Details from Norman, G8BHE, tel: 021 422 9787.

18 NOVEMBER

Bridgend & DARC Annual Rally - Bridgend Recreational Centre. Details from Don, GW3RVG, tel: 0656 860434 after 5pm.

West Manchester RC Winter Rally at Bolton Sports and Exhibition Cenbtre, Bolton. Details from Dave, G1IOO, tel: 0204 24104 (evenings only)

27 JANUARY 1991

University of Lancaster ARS & Central Lancs ARC. The Lancastrian Rally - Lancaster University. Details from Sue Griffin, G1OHH, tel: 0524 64239 or Mike Sherlock, G4ZYN, tel: 0257 452287.

3 MARCH 1991

Welsh Mobile Rally - Barry Leisure Centre, off Holton Road, Barry. Details from Ceri, GW0JCB, tel: 0446 721304.

31 MARCH 1991

Centre of England Easter Amateur Radio Rally - Motorcycle Museum, Bickenhill, nr NEC Birmingham. Details from Frank Martin, G4UMF, tel: 0952 598173.

14 APRIL 1991

Trafford Rally "The Great Northern Rally" - G-Mex, The Greater Manchester Exhibition and Events Centre, City Centre, Manchester. Details from Graham Oldfield, G1IJK, tel: 061 748 9804.

29 SEPTEMBER 1991

Harlow AR&E Mobile Rally - Harlow Sports Centre. Details from - weekdays: All, G7FNY on 0279 418392; evenings & weekends: Mike, G7BNF on 0279 722569.

OTHER EVENTS

1 JULY

Newport ARS 3rd Grand Surplus Equipment and Junk Sale, Brynglas Community Education Centre, Brynglas Road, Newport. Doors open 10.30am - 10am for disabled visitors. Talk-in on S22 from GW1NRS. Details from Kevin, GW7BSC, tel: 0633 262488 or Bob, GW4IED, tel: 0633 280958.

8 JULY

RAIBC Romsey Picnic - the Fairground, Broadlands, Romsey. All usual attractions. Free parking and entry. Mammoth junk sale. Grand Draw. Refreshments. Talk-in on S22. Details from John, G4COM on 0703 693017.

15 JULY

Sussex Amateur Radio and Computer Fair (formerly the Sussex Mobile Rally) - Brighton Racecourse. All usual facilities will be available. Details from Ron Bray, G8VEH (QTHR), tel: 0903 763978 or 0273 415654 (office hours).

21 JULY

West Manchester RC Open Day at Club HQ, Astley & Tyldesley Miners Welfare Club, Meanley Road, Gin Pit Village, Astley. To celebrate the Club's 9th birthday. Opens 11.30 am to 4pm. Visitors welcome. Exhibition of "home built" equipment will be on display. All equipment will be up and running, and working, and a special callsign is being applied for so that any member of the general public can, if they wish, pass messages to other stations. Licensed Bar and Light refreshments. Details from Frank Hilton, G4NRN, tel: 0942 884614.

15 SEPTEMBER

Scottish AR Convention - Cardonald College, Glasgow. Official opening by the RSGB President, Frank Hall, GM8BZX. RSGB stand and bookstall. 11 am start (10.30 for disabled visitors). Trade Stands. Lecture programme. Bring & Buy. RSGB Morse test. Meals and snacks. Licensed bar. Ample free parking. 3 exhibition halls. Talk-in S22 by GM9OCC. Facilities for disabled visitors. Live demo station. Details from Tom P. Hughes, GM3EDZ, QTHR, telephone: 041 427 0122..

29/30 SEPTEMBER

RSGB HF Convention - Coventry. Details from G3ZAY. (See news pages).

26/27 OCTOBER

Leicester AR Show - Granby Halls, Leicester. Same format as last year with the two halls. Details from Frank, G4PDZ, tel: 0533 553293 or 871086.

RAF ARS Annual General Meeting - RAF Cosford. Further information from Warrant Officer M.J. Street; tel: Albrighton 2393, extn 2472.

GB CALLS

The list below shows all special event stations licensed for operation during this month and up to 8 August. It was taken from the HQ computer on 6 June. These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days.

1 JULY

GB0BUS - BRISTOL UNI.SUMMER SCHOOL - G4ZOG
GB0GG - GIRL GUIDES - G4FNC
GB1CDX - COASTAL DEFENCE 'X' - G0JBU
GB2CHG - CUPAR HIGHLAND GAMES - GM3AYR
GB2DTS - DAGENHAM TOWN SHOW - G0IAP
GB2SHS - SHREWSBURY HOUSE SCHOOL - G4GPB
GB2SVL - SPEN VALLEY LIONS - G4PHR
GB2VGG - ORIGINAL CLUB CALLSIGN - G4IVJ
GB2WWS - WROCKWARDINE WOOD SCHOOL - G4EIX
GB4BHP - BRERETON HEATH PARK - G5YKI
GB4JUL - JULY 4TH CELEBRATION - G0KKZ
GB4LOD - LONGANNET OPEN DAY - GM0MMN

2 JULY

GB2CDT - COASTAL DEFENCE - G0DHZ

4 JULY

GB2KBG - KILMARNOCK BOWLING CULB - GM0AAX

5 JULY

GB2LC - LINNET CLOUGH - G3WFW

6 JULY

GB0WVS - WALTON VILLAGE SCHOOL - G3UNS
GB4CRG - COLCHESTER ROYAL GRAMMAR - G0DZB

7 JULY

GB0CHS - CHALFONT HEIGHTS SCOUTS - G0BST
GB2CD - CELEBRATION DEWSBURY - G0FOI
GB2LPS - LEASINGHAM PRIMARY SCHOOL - G3RGO
GB2MJS - MAYHILL JUNIOR SCHOOL - GW0KPD
GB4WF - WATERLOO FESTIVAL - G0KTR

8 JULY

GB0CCE - CULTURAL CAPITAL OF EUROPE - GM4FDM
GB50BOB - BATTLE OF BRITAIN - G0BDG

12 JULY

GB2DPS - DITCHAM PARK SCHOOL - G0BUZ

13 JULY

GB0SKG - SWINTON & KILNHURST GALA - G0KSK
GB4LCF - LE COURT FETE - G40DM

14 JULY

GB0ARR - AMATEUR RADIO ROCHFORD - G0ENN
GB0BBC - BBC - G3KKQ
GB0HS - HOLT SCHOOL - G0GRI
GB0IBM - IBM UK LTD - G0GFD
GB0WRS - WAKEFIELD RADIO SOCIETY - G0MVA
GB2NAB - NABBOTTS SCHOOL - G0AFP
GB4DX - "DX" "SANDHOLM"HEATH FARM RD - G4BWP
GB4FG - FERRIBY GALA - G0EXY
GB4KC - KELVIN CARNIVAL - G0LFU
GB4PCP - PEMBREY COUNTRY PARK - GW4XLK
GB8BBC - BBC CLUB SPORTS GROUND - G2BCI
GB8CA - CULTURAL STATION 'A' - GM0HRT

15 JULY

GB0RSB - ROYAL SIGNALS BRIGHTON - G0EXS

16 JULY

GB0LAP - LICHFIELD ADVENTURE PLAYGROUND - G0DRA
GB4HHS - HOLLINS HIGH SCHOOL - G4VEY

20 JULY

GB4LCS - LAMBETH COUNTRY SHOW - G0LMK
GB75STD - ST. DUNSTAN'S - G3SEJ

21 JULY

GB0RCY - RED CROSS YOUTH - GI0H0W
GB2BCU - BABY CARE UNIT - G4LOI
GB2NSD - NORWAY,SWEDEN,DENMARK - G3OOQ
GB5TI - TIREE ISLAND - GM0EAV

23 JULY

GB2CCE - CULTURAL CAPITAL OF EUROPE - GM0EFH

26 JULY

GB2SAT - SATELLITES - G3AAJ

27 JULY

GB0BBE - BEDFORD BAMBERGE EXCHANGE - G0GBI
GB4GUZ - OLD SIGNAL STATION LETTERS - G3VNG

28 JULY

GB0GCC - GIVE A CHILD A CHANCE - G0LJQ
GB1NSC - NATIONAL SEA SCOUT CAMP - G8ALO
GB5LI - LADY ISLE - GM4SUC
GB8NSC - NATIONAL SEASCOUT CAMP - G8ALO

31 JULY

GB2PC - PROJECT COUNTRYSIDE - G3MRC

1 AUGUST

GB1CDN - COASTAL DEFENCE 'N - G0JBU
GB1MAD - MONTGOMERY ACTIVITY DAY - G1MAB
GB2LBD - LES BACORES DX - G0KJV
GB1CDB - COASTAL DEFENCE 'B' - G6MWY
GB4MAD - MONTGOMMERY ACTIVITY DAY - G4ZAU
GB6CDW - COASTAL DEFENCE "W" - G6MWY
GB6SS - SANDWELL SHOW - G0JAA

2 AUGUST

GB4TCF - TOWN & COUNTRY FESTIVAL - G4VCX

3 AUGUST

GB1KJ - KERNOW JAMBOREE - G6FBK
GB4SGJ - SCOUT GUIDE JAMBOREE - G0FHT
GB50BOB - BATTLE OF BRITAIN - G0JOD

8 AUGUST

GB0CCE - CULTURAL CAPITAL OF EUROPE - GM4FDM
GB2ER - ELIZABETH REGINA - G4TIX

the last...

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.

DISCIPLINE

Way back in 1958, I nearly lost my transmitting licence because in the excitement of chasing my first 'JA' on 21, my VFO wandered 340Hz out of band. Within three days I received a warning letter from the GPO Monitoring Service, and only some persuasive letter writing saved the day.

By comparison, I read in this month's RadCom that four characters, (I hesitate to call them radio amateurs) - have been prohibited the use of the London repeaters for a specified period, due to the fact that they had all been engaged in an airborne version of street corner brawling for a considerable period.

Surely, persons of this ilk, including two of their brethren I witnessed at a recent rally engaged in fisticuffs over a disputed piece of junk, should have no place at all in the world of amateur radio.

Somewhere, somehow, things have gone badly wrong. Whether this is due to the lowered entrance requirements, or a change in the national character, is open to debate. My own feeling is that in the drive for greater numbers, the quality has taken one hell of a nosedive. Things MUST be tightened up - or we shall all lose everything we have achieved during the past seventy-odd years.

H N Kirk, G3JDK

IMPERIAL VINTAGE!

As a volunteer Novice Licence examiner and established radio amateur licence tutor for many years, I was astonished on reading the GW4HWR article to note that it gave details of the Pendulum Frame as a teaching aid for use by instructors, wherein all the dimensions are in old imperial measure and which refers to the use of 0BA nuts and bolts rather than their metric replacements.

Surely, we should aim to start the way we mean to go on, or are we to include 'The use of slide-rules will be allowed in the examination but not electronic calculators'?

E Chicken, G3BIK

THANKS KW

Some months ago I acquired an old but still active KW2000 (serial no: 373), which is nearly 30 years old. It was in reasonable working order but had a problem in the balanced modulator.

Although the circuit is fairly standard, I wrote to the original manufacturers asking for their comments. A prompt reply was received detailing some suggested modifications and also enclosing two diodes free of charge. Although KW Electronics no longer manufacture transceivers, I am sure that the service they offer for their current product range will be just as good.

I am glad to say that the suggested modification worked and that the carrier suppression is now very good considering the age of the equipment and the type of circuit involved.

Once again, many thanks KW Electronics.

J D Harris, G3LWM

SELECTIVE MEMBERSHIP

In these days of high inflation, poll tax, etc, may I suggest that the Council give the following suggestion serious consideration.

The RSGB is the national society which has the voice internationally on behalf of the British radio amateur and should therefore be supported by all or even the majority of those who enjoy the liberties afforded to us on the use of the many frequency bands.

Surely, to encourage such support, there has to be "give and take" from both sides so why is there not another grade of membership? One that would allow amateurs to financially support the Society, but would have no voting rights, and would not receive a copy of the magazine but be allowed the use of the QSL Bureau. With a, say, £12 or £15 fee pa for this level of membership, would this not prove a very valuable addition to RSGB funds?

Thanking you in anticipation.

Gerry Maxwell, GM4BAE

SHAMBOLIC SHACK WINNER "FIGHTS BACK"!

As the winner of the first prize in the most Shambolic Shack Competition I would like to thank the organisers for the lovely gift of a certificate and decorated yard brush.

I must apologise for being a "brooming" nuisance in keeping writing about my missing prize but I was "bristling" with indignation as the prize was so long coming.

Let us hope I can now "brush up" my operating technique and do away with all the "sweeping" statements about the tardiness of the RSGB.

The "Victory" broom will only be used to remove electrocuted SW listeners from the shack premises and the accompanying certificate will take pride of place on the shack wall (if I can find the wall!)

Yours, as always, covered in dust

John Eley, G3LMR

PS I may hire out the broom to the local Witches Coven if they promise to use it for flying purposes!

PPS The Witches declined the offer as the broom does not have a "current" MOT! and they found some "resistance" when they tried to "volt" over the broomstick!

RETURN OF THE SES

May I endorse the comment of Mr FC Webb, G2HBC regarding the publication of Special Event call signs in *RadCom* each month. I enjoy working or listening for these stations and have found the list most useful as it gives some indication as to when and where these stations may be on the air.

I notice from a *RadCom* of 1982 that several lines were devoted to each SES describing the exact location, the reason for the event, bands and modes of operation and details of the organiser. I accept that with the increased number of special event stations now being held there is insufficient space to give such detailed lists but I would like to see the return of the basic details which we had until the end of last year.

In closing may I thank you for sending me a list of special event stations operating during the recent Girls Guide 'Thinking day on the air', as an operator I found it most useful in identifying and locating other stations participating in the event.

Stephen M Ellison, G7APS

With reference to the letter from Mr F D Webb (*RadCom*, May), I agree wholeheartedly with all his points.

In particular, I consider that the publication of special event stations, with full details of location, etc, should be given absolute priority.

These events, which create much interest in amateur radio, entail a great deal of work by many caring amateurs and to fail to give them the full publicity they deserve, can mean disappointment on the day.

Many congratulations on a first-class publication - keep it up!

J P Gaunt, G1TAG

Where have all the special event callsigns gone? Apart from some special DX callsigns mentioned in HF Spectrum Analysis, I have missed out on the GB calls for some months. I am sure a lot of other amateurs also found it a useful reference, even if all were not listed.

Come on, let's have that column back as soon as possible.

John B Powell, G4WVV

[Bowing to public opinion we are re-introducing SESs as from this month. Thank you to all those members who sent in their comments - Ed]

PLATES AGAIN

I read G4PAC's letter in the May issue of RadCom with great as interest. If callsign registrations are to be made available at all by the DoT, they should be issued only on the production of the amateur licence or its photostat, and not be available to the general public. Otherwise, as G4PAC suggests, you could see your own callsign on someone else's vehicle, which is definitely not on!

Another thing, say you change after a while from "B" to "A" licence and find your new callsign issued to a non-amateur.

What then? Action by the RIS against callsign piracy? Perhaps it would be better if the whole idea be dropped.

Alan B Pidgeon, G6CBP

Readers of "Viz" comic will already be aware of this ploy as an alternative to buying expensive "cherished" car registrations, but may I suggest that those fellow amateurs who are so troubled by vanity that they seek to personalise their callsigns can save themselves a great deal of time and trouble by simply changing their names by deed poll to suit the callsign they already have!

Mr Geezero Deekayjay

ECONOMIC CHALLENGE - ANOTHER WORD

G3CCL makes an economic challenge in June RadCom, and makes an interesting historic statement accepted readily "Just after the war, ex WD gear could be obtained . . . . without thinking too much about the cost".

Let us have a look at that!

1946 adverts: Q Max Q5/10 RX a mere £52.10.0 brand new. The matching TX 4OW and 4 bands at £75. A whole station for £127.10.0! But let us not forget inflation. That price has to be multiplied by about 16.6 which comes to £2,116.10.0! The poor amateur of today could only buy an HF rig, linear tower and beam for that and even then would have to find the costs of 13A plugs and pay to have them fitted!

But Gov't surplus was cheaper? R1155 at £15.15.0 less psu. £261.45 at today's values. The psu for it was £10 or £160 or £420 the lot. But at least you had 3 HF bands!

Components were cheap? Quartz crystals to frequency a mere £30; IF transformers only £7 each, so cheap that I insisted on the Eddystone ones at just twice that price!

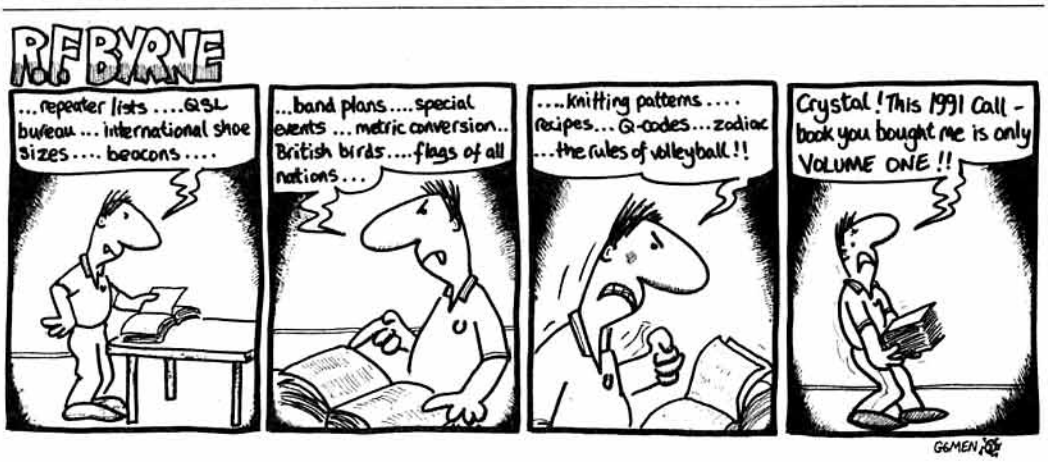
It is true that many of the odd units could be bought and bits salvaged to MAKE simpler receivers, etc. It was only in 1949 that I managed to BUY a receiver, a WS 52 which then cost me five weeks money!

What is different? In those days it was economic to make even a MW radio - for otherwise you wouldn't have one! That could be nudged onto top band and amateurs heard on AM. Get better skilled and the bands could be added going HF. VHF being left until you got really smart with the making of things.

The problem seems to lie more with expectations than the realities of cost. It seems to be *de rigeur* to have not just all bands at 100W but to go for linear, tower and beam (to whinge about the cost to a wider audience?)

I am not claiming that modern gear is cheap or even good value for money, what I do claim is that when I were a lad my ambitions were money limited and if it was a 'Golden Age' for amateur radio, and it might have been, it was despite cost!

D.L.Lisney G3MNO



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November 1989

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Febuary/March 1989

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October/November 1988

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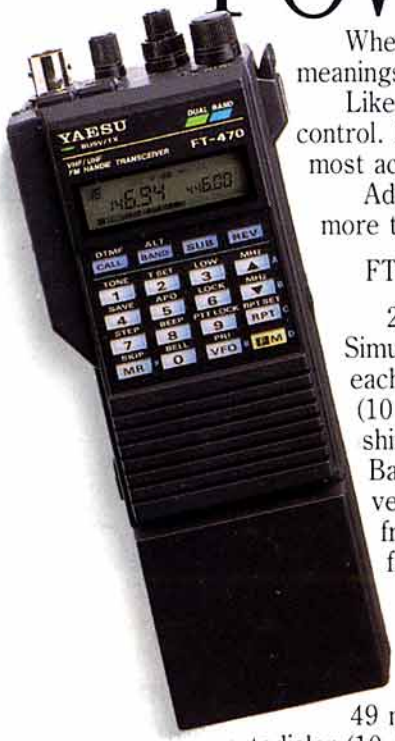

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