Radio Communication

Volume 66 No 6

June 1990

The Journal of the Radio Society of Great Britain

RSGB National Convention and Exhibition NEC 1990

NOVICE LICENCE ANNOUNCED — Full text inside

KENWOOD

Is this the best HF transceiver in the world?

We believe that it probably is, and as you read the review in this magazine, you will begin to understand why.
When a reviewer of the stature of Peter Hart uses phrases such as: "The quality reports received on transmit with the DSP were superb." Or "The PA intermodulation performance was much better than the average rig." "The reciprocal mixing or oscillator sideband noise performance was also excellent, one of the best radios I have measured, and substantially better than the TS-930S or TS-940S even with the Lowe modification," you can begin to understand why we really do belive that Kenwood have set new standards for others to attempt to emulate.
Does the digital signal processing (DSP) really justify itself, or is it just a "gimmick." Peter Hart says: "The DSP performance was amazing In the widest setting, the -6dB audio bandwidth was 180Hz to 3.0kHz and yet the unwanted sideband and carrier rejection was in excess of 70dB!" The exclamation mark is fully justified.

See the TS-950SD at our Matlock head office if you can. We can't at the moment put one in every branch simply because of the demand for this definitive new transceiver, but a fully descriptive brochure is available on request.
If you happen to come across a TS-950SD being used on the air, just take a listen and you will soon answer the question...

"Is this the best transceiver in the world?"

LOWE ELECTRONICS LTD.

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COVER STORY

The President of the RSGB and HQ staff attending the NEC Convention.

Editor of PW rejoins the RSGB: (left to right) Basil O'Brien G2AMV, Hon. Vice-President; Frank Hall GM6 BZX, President; Rob Mannion, Editor - PW; Dave Simmonds G3JKB, RSGB HQ General Manager.

On the Scout stand at the NEC: Richard Crofts, left, and Stephen Deakin from the Stourport & DAR Group.

Full story next month.

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
Tel (GB2RS late changes): 0707 59260
E-mail (Telecom Gold): 76:MSX020
Prestel Page 8107

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Norman Fitch, G3FPK, 40 Eskdale Gardens, Purley, Surrey CR8 1EZ (Telecom Gold 76:MSX022)
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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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General Manager: David Simmonds, G3JKB

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Trophies manager: Mrs M H Claytonsmith, G4JKS
VHF manager: D Butler, G4ASR
Society historian: G R Jessop, G6JP
Intruder Watch (IARUMS): Stan Cook, G5XB

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

EMC Co-ordinator's Scheme expands

We are pleased to announce another eleven members of this scheme who are willing to help with telephone advice. For more details, and additional names, see December 1989 *RadCom*, p7.

New Co-Ordinators
ZONE A
G4UJS, R.P.Harrison, Nantwich, 0270 627620
G3SVW, R.P.Smith, Sale, 061 969 3999
G0FBW, A.Armstrong, Peterlee, 091 586 4500
G0MXI, D.A.Hopkins, Hull, 0482 210763

ZONE B
G1YFT, R.M.Allsopp, Leicester, 0533 833714

ZONE C
G3GRV, G.Halse, Hemel Hempstead, 0442 214972
G4ADM, A.D.Maish, Worcester Park, 081 3372123
G0GTE, P.Daly, Stevenage, 0438 724991

ZONE D
G8AMK, L.J.Parry, Bracknell, 0344 423704
G3DPR, L.K.Ayre, New Milton, 0425 615676

ZONE E
GW3BUT, C.G.Barry, Cardiff, 0222 628430

Please check the December 1989 *RadCom* for information on how and when to use the scheme.

New EMC Committee Chairman

Bob Peace, G8SOZ, has taken over as Chairman of the EMC Committee replacing Alan Dearlove who retired for health reasons. Bob's address is on p59 of May *RadCom*.

EMC Help Line

The Society operates a 24 hour EMC Helpline for those needing help curing interference between amateur radio and domestic equipment. The number is **0537 59 3449**. Please read the EMC section of the 1989 or 1990 *RSGB Call Book* before calling.

New AROS Co-ordinator

The Amateur Radio Observation Service (see Dec 88 *RadCom* and the *RSGB Call Book*) has a new co-ordinator, Geoff Griffiths, G3STG. Geoff is well known for his past Raynet work. He is QTHR.

Headquarters vacancy

Assistant to the Secretary/ Chief Executive at RSGB HQ.

Write to: The Secretary, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts, EN6 3JE, for details.

Fly the flag

Have you ever wanted to design or use an RSGB flag? If so, read on.

The RSGB is holding a competition to find a good design for a Society flag and a prize will awarded to the winner. If the winning design is put into production, the designer will be rewarded with a flag based on his or her work.

Radio amateurs have long been keen on identifying themselves to other amateurs and non-amateurs alike - witness the proliferation of metal and cloth badges, shoulder patches, vehicle number plates in the USA, individual belt buckles, cap badges etc.

A flag can be used to identify yourself or your group at public events, rallies, field days, expeditions to rare counties or squares - wherever you want to show you are proud to be an RSGB member. Miniature flags can be produced as metal badges or cloth shoulder patches. Double-sided paper can be used as signposts to RSGB events.

What sort of designs? This is where you come in. The RSGB diamond emblem on a suitable background is an obvious possibility. The choice of colours for the emblem, background and frame for the design would require careful consideration. More upmarket versions could be colour related to the letters 'RSGB'; Red, Silver, Green and Blue for example. The catch is that silver is tricky to reproduce inexpensively on a flag. Aim for something simple which will remain in fashion. Bear in mind that durable flags are usually made from nylon and inexpensive ones from printed cotton.

Rules: All entries must be received at RSGB Headquarters before 1 August, clearly marked 'Flag design competition'. The designs will be judged by the RSGB Council, the decision of which will be final - no correspondence will be entered into. Unsuccessful designs will be returned if SAEs are provided. Do not forget to include your name, address and callsign/RS number with your entry.

The RSGB Council looks forward to seeing your designs for flags. Think how good the winning design will look flying from your mast!

Amateur radio — back to the future

Many members have expressed concern at the current tendency to knock amateur radio as a hobby and other members must be somewhat bewildered by this phenomenon. To know just how to counter the gloomy predictions of the prophets of doom at the local club, or on nets, is a difficult task and, all too often, it may seem prudent to avoid becoming involved by simply nodding in agreement.

As the years go by there are those who look back to their first flush of enthusiasm and the practical activity experienced in those years. It is all too easy to say that "it's not like it was in my day." Such an opinion is, of course, both true and false. True because it was in those heady days that the person was able to participate wholly and, in all probability, at the leading edge of the art at that time. False, if only because things move on and other people take up the challenge, leaving the more experienced amateur to enjoy himself or herself in their now well-established, but sometimes dated, specialisation. It is not true in all cases, though.

Surely amateur radio is typical of all hobbies and sports in this respect? Whilst the new people are out there pioneering the latest in microwave technology or packet radio or whatever, there are those who prefer to continue to pursue their life-long interest in, say, communicating on the DX bands or building QRP stations from a handful of junkbox components. A 59 signal is the same whether it comes from a solid state final or a much-loved thermionic device!

Any leisure pursuit is what you make of it; benefits largely relate to the amount of input and no amount of "whinging" will help in shaping the future.

Clearly, the Society is doing all it can to encourage the amateur to pursue the hobby positively and pleasurably. For a largely voluntary organisation - literally a radio club with 36,000 members - it is no mean undertaking to publish an authoritative monthly journal, produce a stream of advanced technical and informative books and be associated with a host of exhibitions and rallies, whilst totally engaged in providing a multitude of services including the essential representation of the interests of members to government and international bodies.

It was therefore particularly pleasurable to read the editorials published in the January and February 1990 editions of *Practical Wireless* in which the recently appointed Editor, Rob Mannion, G3XFD, sounded a clarion 'call to arms'. In these two excellent pieces the *PW* Team presented an overview of our hobby that will surely have stirred the imagination of all of the thinking readers of our ever-popular contemporary. The challenge of the forthcoming Novice Licence, simple home construction and personal participation in communicating the pleasures of amateur radio were all there.

In recent years, there is no doubt that the rapid advancement of solid state and computer technology has created something of a vacuum for those amateurs who are not in a position to work at an advanced level or lay out vast sums on equipment.

As we enter the new decade, this important issue is receiving priority at Potters Bar and the *Radio Communication* team both welcomes and endorses the forward-looking policy of our colleagues at *PW*. Together with our readers, we too look forward to a new era of 'back to the future' in amateur radio in which the KISS approach to radio communication may, once more, flourish in total harmony with the pioneering concepts and exciting developments emanating from our many brilliant engineers.

Novice Licence progress

In this month's *RadCom* we publish the final draft of the UK Novice Licence, which it is hoped will come on-line as soon as further administrative work has been completed.

The UK Novice Licence will be quite special; as far as we are aware it is unique in the world of Novice Licences. It has been conceived to enable more beginners of all ages, but especially the young, to try out amateur radio. However, it will be the positive policy of the Society to encourage all Novices to obtain a full licence.

Low-power operation - Novices will be permitted 5W input or 3W output - is both challenging and fun. The limited frequency range and modes will provide an initial incentive to get on the air, but with far greater horizons to aim at when the full licence is obtained.

Unlike the full A or B UK licence, the Novice will have to attend an agreed course of instruction before he or she can take the Novice examination. This training course will provide a thorough grounding in the basic principles and concepts of amateur radio and will teach good operating skills and disciplines right from the word go. Further, the Novice training course will provide wide-ranging opportunities for full licensees to pass on their skills to the new generation of amateurs. Surely, in the future, helping others must be considered as an essential role for any successful radio amateur.

For those holding a full Class B licence, who wish to try out the Novice HF bands, an additional facility has been agreed. Anyone who has held a full B licence for at least a year need only take a 5 wpm morse test in order to use those HF allocations available to the Novice (A).

Watch the pages of *RadCom* for further details on the training scheme, books, videos, and the examination itself.

David A Evans, G3OUF

Young Amateur Of The Year

There is still time to nominate someone for this prestigious DTI sponsored award. See May *RadCom* for details (p7) and an application form. **Closing date is 31 July.**

Scottish Trophies

Two trophies are awarded annually in Scotland. The first is the Jack Wylie Trophy for the Scottish club, society or RSGB member thought to have done most for amateur radio in Scotland, in general terms, in the past year. The second is the Jock Kyle Trophy to the Scottish club, society, or RSGB member thought to have done most in Scotland in the field of VHF in the past year. In the case of an award being made to an individual, that person must have been resident in Scotland during the period the award refers to.

In 1989, the Jock Kyle Trophy was awarded to Iain McHardy, GM3JFG, for his continuing perseverance on difficult bands from his northerly location. The Jack Wylie Trophy was not awarded.

Nominations and citations for each of the trophies for 1990 are invited from at least 5 RSGB members resident in Scotland. They should send them to Zonal Council Member, Ian Suart, GM4AUP, QTHR, by 14 August. In the event of more than one nomination being received for either trophy, the final decision will be placed in the hands of the Scottish RLOs.

G5RP Trophy

This trophy is awarded annually to the RSGB member who, in the opinion of the RSGB HF Committee and the Vale of the White Horse ARS, has made the greatest progress in the field of HF DX in a 12 month period between July and the following June.

The trophy is intended to encourage keen newcomers to HF DX, and emphasis will be placed on progress rather than absolute level of achievement. Particular attention will be paid to progress in DXCC, WAZ, and in the RSGB's Commonwealth, IOTA and ITU Zones programmes.

Nominations should include the name and callsign of the nominated operator, together with a summary of all relevant DX achievements between 1 July 1989 and 30 June 1990. Before completing the proposal, a leaflet *Guidance for proposers* should be obtained from the address below. Two nominators are required, both of whom should be RSGB members and Class A licensees. Send nominations, by 31 July, to HF Committee Chairman, 41 Enniskillen Road, Cambridge, CB4 1SQ.

RSGB Liaison Officers (RLO) Elections for 1991-1993

1) GENERAL

The prime objective of the RSGB Liaison Scheme is to provide the best link between the members and the Society in order to improve the service to members. RLO posts are on a nominal 'per county' basis; however, some counties are 'split' or combined to ensure more equitable and manageable work loads. The RLO Scheme is administered on behalf of Council by the Membership Liaison Committee (MLC) which consists, inter-alia, of all 7 elected Zonal Council Members; each RLO reports to his/her Zonal Council Member.

As all RLO posts are to be filled by election, existing RLOs stand down, but are eligible (subject to being qualified, see 2 below) to stand for re-election. Successful candidates will serve for a 3-year term commencing 1st January 1991.

All paid-up Corporate members of the Society will be eligible to vote in the election for the RLO post for the area in which they reside; this is regarded as more democratic than the previous arrangement whereby (to save election administration costs) only affiliated clubs and registered groups of 10 members were able to nominate and vote.

2) CANDIDATES QUALIFICATIONS

a) The candidate must have been a member for at least 3 consecutive years at the time of nomination.

b) The candidate must submit the following:-

i) Written, signed consent to accept office, if elected.

ii) A statement declaring any commercial interest in the field of amateur radio (note: such interests do not bar any candidate from the election).

iii) A declaration that he/she is normally resident in the RLO area for which election is sought.

iv) That he/she agrees to his/her address, and home telephone number being published if he/she is elected.

These declarations, together with nominations, may conveniently be made using the "Candidate's Form for the Election of RSGB Liaison Officers" (Form MLC/E/RLO) available on request from the Candidate's Zonal Council Member or:-

The Secretary
RSGB Headquarters
Lambda House
Cranborne Road
Potters Bar
Herts EN6 3JE

3) NOMINATION PROCEDURE

a) The nominations for each candidate, at least 5 in number, must be fully paid-up Corporate members at the time of nomination, resident in the RLO area concerned and have been members of the Society for at least 2 consecutive years at the time of nominating the candidate.

b) Nominators may only nominate one candidate.

c) Candidates may not nominate themselves.

d) The nominations may be made on the "Candidate's Form" referred to above, or on any sheet of paper. Each nomination must be signed by the nominator, who should also include the name of his town or village, etc.

e) Council Members may not nominate or vote in these elections.

f) Nominators must submit a recent *Radio Communication* address label or photocopy of their current membership card.

The candidates declaration, together with the completed nominations, should be sent in a single, sealed envelope to the Zonal Council Member responsible for the area concerned, to arrive no later than 5.15pm, Tuesday 31 July 1990.

Please mark the envelope "1990 RLO Nominations".

Nominations for all candidates will be acknowledged by return of post by the Zonal Council Member.

4) JOB DESCRIPTION OF THE RSGB LIAISON OFFICER (RLO)

a) Clubs Activity:-

i) To maintain contact with each club, and to visit each club several times each year where possible and as appropriate.

ii) To encourage, and be cognisant of, activities in clubs which foster and promote amateur radio in their area, in particular:-

Activities of interest to newcomers, RAE, Morse and Novice Licence classes. Provide advice, information and assistance to amateurs in their area

b) Reporting activity:-

i) To provide summaries of club activities and the effectiveness of the Society's activities at local level, via the Zonal Council Member, on a regular basis.

ii) To feed views from members and clubs back to the MLC via the Zonal Council Member, together with any of their views and recommendations.

iii) To encourage clubs and individuals to input news to HQ or local co-ordinator as appropriate.

iv) To become familiar with the operation of the Society and its arrangements at local level, so as to be able to either answer members' queries or properly direct them to the correct person(s) or other officers of the Society.

c) Public Relations:-

i) To encourage public relations activities generally; by explaining how the RSGB and clubs can promote amateur radio, and by encouraging specialists to give talks.

ii) To co-ordinate dealings with the local media.

iii) To ensure that clubs have up-to-date copies of relevant RSGB literature.

iv) To represent RSGB at external events.

d) Expenses:-

RSGB Liaison Officers may claim reasonable out-of-pocket expenses. However, before committing themselves to any significant expenditure, they should seek agreement through their Zonal Council Member (claims to be submitted for approval via Zonal Council Member).

5) RLO AREAS FOR WHICH ELECTIONS WILL TAKE PLACE

There are many discrepancies between counties quoted in addresses, and those used by local authorities. RLO areas are based on local authority counties. So for, example, members living in a London borough, albeit outside a London postal district, are regarded as being in Greater London for all RLO purposes. Members wishing to confirm their county should consult any current Ordnance Survey map or suitable gazetteer eg Bartholomew's.

Zone A

(nominations to: Geoff Smith, G4AJJ, "Greenacres", Sawdon, Scarborough, North Yorks, YO13 9DY)

Cheshire
Cleveland/Co Durham
Cumbria
Greater Manchester
Isle of Man
Lancs
Merseyside
North Humberside
North Yorkshire (E of Rivers Ouse and Swale)
North Yorkshire (W of Rivers Ouse and Swale)
Northumberland
South Yorkshire
Tyne & Wear
West Yorkshire

Zone B

(nominations to: John Allen, G3DOT, 4 Philip Ave, Waltham, South Humberside, DN37 0QD)

Derbyshire
Hereford & Worcs
Leicestershire
Northants/Warwickshire
Nottinghamsire
Shropshire/Staffs
South Humberside/Lincolnshire
West Midlands

Zone C

(nominations to: John Greenwell, G3AEZ, Eastfield, Beare Green, Dorking, Surrey, RH4 5RW)

Bedfordshire/Cambridgeshire
East Sussex
Essex
Greater London (North)
Greater London (South)/Surrey
Herts
Kent
Norfolk/Suffolk
West Sussex

Zone D

(nominations to: Peter Chadwick, G3RZP, "Three Oaks", Braydon, Swindon, Wilts, SN5 0AD)

Avon
Berkshire
Buckinghamshire
Cornwall & Isles of Scilly
Devon (excluding SE)
Gloucestershire
Dorset (S) + Devon (SE)
Guernsey & Dependencies
Hants
Isle of Wight
Jersey
Oxfordshire
Somerset (N)
Somerset (S), Dorset (N)
Wilts

Zone E

(nominations to: John Case, GW4HWR, 2 Abbey Close, Tyrhiw, Taffs Well, Mid Glam, CF4 7RS)

Clwyd
Dyfed/West Glamorgan
Gwent
Gwynedd
Mid Glamorgan/South Glamorgan
Powys

Zone F

(nominations to: Terry Barnes, GI3USS, "White Gables", 95 Crawfordsburn Road, Bangor, Co Down, BT19 1BJ)

Belfast
N Ireland (North) - includes counties of Antrim, Tyrone, Londonderry
N Ireland (South) - includes counties of Down, Armagh, Fermanagh

Zone G

(nominations to: Ian Suart, GM4AUP, 37 Meldrum Mains, Glenmavis, Airdrie, Strathclyde, ML6 0QG)

Borders
Central
Dumfries & Galloway
Fife/Tayside
Grampian
Highland/Western Isles
Lothians
Orkney
Shetland
Strathclyde

6) DATE OF ELECTIONS

A list of candidates for each RLO area will be published in the October 1990 edition of *Radio Communication*. The closing date for votes to be cast and received at the Zonal Council Members' address will be by 5.15pm, Wednesday 31 October 1990. The results will be announced at the Society's AGM in December.

NEWS & REPORTS

The Novice Licence is here!

Industry Minister, Eric Forth, announced on 19 April that, following discussions with the RSGB, the Radiocommunications Agency had published a final draft of the Novice Licence. Work was also in hand on setting up arrangements for the training and examination of potential licensees.

Those arrangements would necessarily take some time to put in hand but the first Novice Licence could be issued early in 1991. See page 10 of last month's *RadCom* for a summary of the Novice Licence conditions.

Turn to page 12 for the complete licence text.

Siobhan Rydings, of Oban, who at the age of 9 passed the RSGB 12 wpm morse test. She is certainly the youngest girl to have taken the test, and is probably the youngest person ever to pass it. Siobhan's brother, Stephen, passed the test last year at the advanced age of 14.

FCC cracks down

The Federal Communications Commission, the US equivalent of our Radiocommunications Agency, has increased from $750 to $1000 the fine for the unauthorized operation of a radio station. This is in addition to the seizure of equipment. Unauthorized operation in emergency bands will now lead to a $1250 fine.

These increases were prompted by numerous complaints of interference resulting from piracy. FCC licensees, broadcast associations and radio listeners have reported increased illegal operations and a proliferation of abusive activities. In the first 3 months of 1990, 12 people were fined, mostly $1000 each. Only one involved the use of an amateur band.

North Pole 90

The following was received from Norman Fitch too late to go in his Spectrum Analysis column ...

As readers will know, the North Pole 90 expedition team returned prematurely to the UK at the beginning of May. Sir Ranulph Fiennes and Dr Mike Stroud completed 801km of their walk to the North Pole, a record distance for an completely unsupported attempt. Just imagine walking through ice fields with 10m hills and areas of open, icy water, pulling heavy sleds with all your needs, for a distance equivalent to London to the far north of Scotland!

I spoke to Laurence Howell, GM4DMA, shortly afterwards. He confirmed what he told me during one of our 14MHz QSOs: Morag, GM0MUV, was unable to operate from the Ice Station after all. The ice had started to break up making it impossible to put an aircraft down on the landing strip. So they remained at the base camp on Sredniy Island (NQ59OM) with Sergei Malachev, EK0AAA, and itinerant polar bears. (Sredniy means 'middle island', by the way.)

They had some success on 50MHz. On 11 April, UA0/GB4MSS worked OH9NLO (KP26UM) at 1632 exchanging RST559 reports, and on the 15th, OH3MF/9 (KP36UN) at 1648. These QSOs were via Arctic-E mode over distances of 2373km and 2328km respectively. Subsequently they contacted OH2TI and SM3JGG at greater distances. TV from the Varanger TX in the far north of Norway (48.25MHz vision) was received consistently around the 1600-1800 period.

The full story will be published in *RadCom* as soon as possible.

Cultural capital

Glasgow amateurs continue to celebrate the city's designation as 1990's Cultural Capital of Europe. Special Event stations operational during June include ...

June 9/10; GB2RBC; a return visit to the Royal Balmoral Castle by royal permission.

June 16; GB2STB; Final Day of the Beith Civic Week in Ayrshire.

Clarification from SMC

In the New Products section of the NEC Programme, a supplement to the April 90 *RadCom*, a price was given for a FT747GX from A.R.E. Communications Ltd, and a saving from the list price quoted. All of this information was supplied by A.R.E. and was published in good faith. South Midlands Communications Ltd have asked us to point out that the model on offer was not the same as that manufactured for the UK, which they sell, and does not have CW and AM filters. They feel that the comparison with the list price was unfair. SMC have also asked us to mention that their branches will be closed for stocktaking on 29 June.

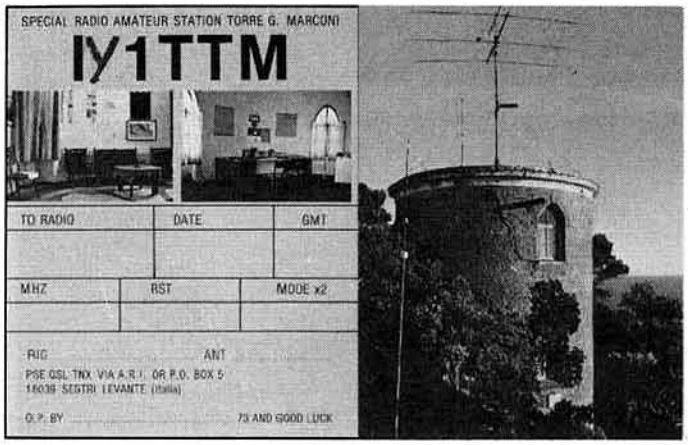
In brief

- The annual amateur radio exhibition takes place at **Friedrichshafen**, Lake Constance, 29 June to 1 July.
- The European CW Association's **Straight Key Day** is on 23 June. This is not a contest but a chance to enjoy cw contacts using a straight morse key. More info from G4FAI.
- On 17 May, the **International Telecommunications Union** (ITU) was 125 years old.
- Dragon Amateur Radio Club have an **exhibition of old radio equipment** at Penrhyn Castle 20-24 June.
- Veteran of the Russian WW2 convoys, Ian Fraser, G3BWN, visited Moscow on 6 May to assist with special-event station **EK45WV**. He is believed to be the first UK amateur permitted to operate from Moscow.
- Congratulations to ***Practical Wireless*** which is about to publish its 1000th edition.
- **WAB** mislaid their bookholders list at the NEC and this is causing them some problems. Anyone who bought a book and may have accidentally picked up the list is asked to call 0709 543747.

RadCom Xmas quiz

We haven't forgotten to publish the quiz answers/results. They just keep being squeezed out. This month, the publication of the Novice Licence has resulted in a number of items being held over.

Alan Birch G4NXG (left) receiving an award from the Wigan and District Amateur Radio Club for working 260 countries whilst mobile. Is this a record? We have a sneaking feeling that the number plate isn't genuine.



Marconi celebrated

International Marconi Day
The Cornish Radio Club designated 21 April International Marconi Day in memory of the great Guglielmo Marconi who was born on 25 April 1874. Fourteen special amateur stations in eight countries were operational on the day, including K1VV/IMD, VE1IMD, IY0TCI, I2IMD, GB0IMD, GB2IMD, ZS6RSA, DA2IMD, GB2MDI, and GB4MDI. Each station represented a location of historical importance in the life of the first radio amateur - Marconi. The Cornish Club's own GM4IMD, was operated from the original test site at Poldhu.

Marconi Tower
Another station, IY1TTM, operated from the Marconi Tower in Sestri Levante, near Genoa. From this town, in the early 30s, Marconi conducted the first important experiments on VHF and UHF, studying propagation and direction-finding systems. One of his most famous experiments involved him entering the very small harbour in his floating laboratory "Electtra" with the front windows obscured. His only "eyes" being his own design of radio navigation system which relied on a narrow VHF beam on top of a 12th century Genoese lookout tower.

The tower was later restored and is now the home of the local radio club. The club has an HF and VHF station. They also keep historic documents and pictures showing Marconi's activities at the tower. The call IY1TTM is used on very special occasions such as IMD.

Anyone interested in operating from this picturesque and awe-inspiring site should contact Roberto Craighero, I1ARZ, Via Bovio 13-11, 16146, Genova, Italy.

Marconi Museum
Last July, a Marconi Museum was opened in Glace bay, Nova Scotia. Operated by Parks Canada, the museum is on the site where the first West to East transatlantic message was passed. The museum's amateur station signs VE1VAS.

Canadian National Exhibition

Described as "the world's largest annual show" the Canadian National Exhibition will be held from 15 August to 3 September in Toronto. VE3CNE will operate from the show and there will be a display of amateur radio photographs. Amateurs are invited to send in photos, "not less than 4x6" (presumably inches) to VE3CNE HAMFOTOS, Box 307, Stn.H, Toronto, Ontario. M4C 5J2. Prizes will be awarded for the most interesting pictures but entrants should note that VE3CNE accepts no responsibility for lost photos. Prints will only be returned if accompanied by an SASE, and the right to publish any entry is assumed. VE3CNE will be on the air daily from 1000 - 2200 local time (EDST).

New BARTG Secretary

The British Amateur Radio Teledata Group has a change of Membership Secretary. For details of joining contact Pat and John Beedie, GW6MOJ and GW6MOK, "Ffynnonlas" Salem, Llandeilo, Dyfed, SA19 7NP.

9M8STA Sarawak

At the invitation of the Sarawak Tourist Association, a group of thirteen 9M2s from the Malaysian national society MARTS, including the President and Secretary, went to Kuching on 4 August 1989 to put Sarawak on the amateur world map. For 3 days, MARTS ran the first ever Sarawak Special Event Station, 9M8STA, which included operation on HF Amtor and packet, and satellites. At the same time arrangements were made for JA1UT to carry out 50MHz propagation tests from Kuching.

The station was declared open on 5 August by the Minister of Tourism the Hon. YB Datuk Amar James Wong Kim Min. The Malaysia Director General of Telecommunications flew in from Kuala Lumpur specially to attend the ceremony and stayed on throughout the operation of 9M8STA. Local senior officers of his department in Kuching were also present for the opening and showed keen interest in the station. 9M2DD attended the event at the invitation of the Sarawak Tourist Association representing IARU Region III.

The event was an unqualified success. Operating throughout the day and night in shifts, 3000 contacts were made with 80 countries.

JA1UT's 50MHz propagation tests were very successful. Over 300 contacts had been made by the morning of 7 August and the tests continued for a further week.

The Special Event Station provided the Minister of Tourism and Environment and other Sarawak officials with their first experience of amateur radio which they had previously thought of as a clandestine affair, or had associated it with disc jockeys. They were enlightened as to the potential of amateur radio, not only for tourism but also in developing the sort of technical knowledge which is in demand in a developing country like Sarawak. Very favourable reports of the event were carried in the local newspapers.

At a dinner hosted by the Sarawak Tourist Association, 9M2DD was able to explain the work of the IARU in coordinating amateur radio worldwide.

Oldham RAE

The Oldham Radio Club has received permission from the City and Guilds to hold the Radio Amateurs Exam in the comfort of their own club premises. The Club has run a very successful RAE course for the past 3 years with an amazing 99% pass rate. Anyone interested in joining the course or taking the examination at the club should contact Kathy, G4ZEP, on 061 652 8617.

New VE licences

Canadian amateur licences are to be re-structured from 1 September. There will be four levels of qualification:-

Basic - all modes; 250W all band above 30MHz, commercial gear only;

Add 5wpm - as above but with 1.8, and 3.5MHz;

Add 12 wpm - as above but with all other HF bands;

Advanced level will allow homebrew transmitting equipment, maximum legal power, and the right to own and operate a remote base or repeater station.

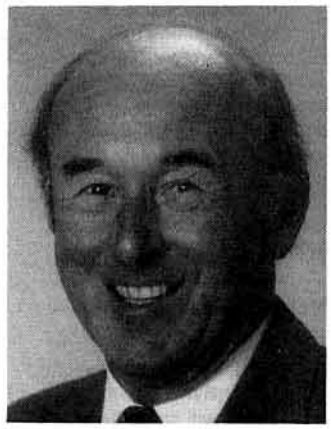
All Canadian amateurs who have the present Amateur Certificate by 1 September will have full Advanced Amateur privileges.

ARRL open day

If you are in the USA this summer, why not go along to the ARRL Headquarters open day between 10 am and 4 pm on 3 June. There will be a tour of the HQ and the newly renovated W1AW station.

The RSGB held its own very successful HQ open week during the 75th Anniversary celebrations, and a repeat event is under consideration.

C & G Bronze for Frank



Congratulations to Frank Jacobs of Cowes, Isle of Wight, who has been awarded the City and Guilds Bronze Medal for his fine performance in the May 1989 RAE.

Inheriting a love of radio from his father, he built his first receiver when he was eleven. He spent the first 20 years of adult life in the RAF, primarily as a pilot but also as a Specialist Signals Officer. On leaving the service he became a teacher and is currently headmaster of Solent Middle School.

Over the years he has built many receivers and ancillary devices including DF sets for yachts. He took the RAE to be able to reawaken his interest in radio after retirement. He aims to specialise in HF CW, using homebrew gear.

UK licence amendments - effective 1 June

The major revision of the licence, 18 months ago, brought most aspects up to date. Discussions with the DTI have continued, and further changes and improvements identified. The following changes will be published in a Gazette notice effective from 1 June 1990. These were the changes originally planned for earlier this year (see *From the Secretary* Oct 89).

The main points are:-

- Amateurs from any country can operate the station under supervision.
- Club stations can send greetings messages when using a special callsign prefix.
- New allocations in 70MHz, 432MHz and 1296MHz for unattended operation. Old 432MHz digital comms allocation in satellite band goes.
- Allocations in 1.8MHz and 3.5MHz for unattended DF operation.
- Speed limit of 20wpm introduced for morse idents in unattended digital operation.
- No written permission needed to operate on 24150-24250MHz.
- Incorporation of other recent changes, ie, removal of restrictions on 18MHz and 24MHz.
- Clarification of the wording of some clauses.

Probably, the major highlight is permitting club stations to send greetings messages under the same conditions as under a Special Event Callsign, and to use a special prefix. The ability to take part in a club's transmitting activities will give visitors and SWLs a chance to play a greater part and help encourage newcomers into the hobby. This is a particularly welcome change and should also reduce the need for special-event station permits, as clubs will be able to provide these facilities themselves. Clubs may continue to use their existing callsigns, but if the station is being used for greetings messages, they will have to use an alternative second letter for the regional prefix; G becomes GX, GM - GS, GW - GC, GI - GN, GD - GT, GJ - GH, and GU - GP.

The licence will now allow the holder of an amateur licence from any country to operate the station under supervision without any formality. This will prove very useful, and we hope other countries will adopt the practice.

There are several changes to unattended operation:-

For clarity, frequencies for unattended operation are now specified by what you can do, rather than what you cannot do.

Unattended beacons are now allowed in 1298MHz-1299MHz, but the allocation at 436.6MHz-436.8MHz has been withdrawn.

Unattended TXs for direction finding are now allowed in a 12.5kHz bandwidth centred on 1.96MHz. It is also allowed, at weekends only, on 3.5MHz-3.8MHz.

Unattended operation for low power control has lost the allocation at 436.6MHz-436.8MHz, and gained allocations at 432.5MHz-432.6MHz and 1298MHz-1299MHz.

Unattended operation for digital modes has lost the allocation at 436.6MHz-436.8MHz, and gained ones at 70.325MHz and 70.4875MHz.

The DTI have introduced a limit of 20wpm on the morse ident for unattended digital operation. We realise this will prove unpopular on the packet network, but the ident is only required every 30 minutes, so we hope it should not prove too much of a problem.

Logging has been changed to include any electronic storage media, and not just magnetic tape or disc.

It was previously unclear how often location details had to be given when not at the Main Address. This is now clarified as every 30 minutes.

More information is included in note "aa" on illegal CB equipment.

The restrictions on the 18 and 24MHz bands were lifted last year. This is now in the schedule.

The requirement for prior written permission to operate on 24150MHz-24250MHz has been removed. However, it still remains for 24050MHz-24150MHz. This should help encourage activity on this band.

The new clauses are:-

Additional sub-clause under clause 1:

"If this Licence is held on behalf of a club and having regard to sub-clauses 2(10) and 3(3), greetings messages may be sent by non-licensed persons provided that:

(a) it is under the direct supervision of the licensee or other Authorised Club Member (who must operate the transmitter and identify the station); and

(b) each greetings message does not exceed two minutes; and

(c) each person may send only one such message to each station with which the station is in contact; and

(d) greetings messages may be sent and received only within the United Kingdom or to and from stations in the United States of America, Canada, Falkland Islands and Pitcairn Island."

Replacement for old sub-clause 2(8)(iii):

"by any licensed radio amateur from any other country, or"

Replacement for old sub-clause 2(4)(a), (b) and (c)

"2(4) Subject to sub-clause 2(5), the Licensee may conduct the Unattended Operations ('Unattended Operation' means the operation of the Station when unattended by the Licensee) only:

(a) of a beacon:

(i) in the frequency bands or sub-bands:

70MHz to 70.5MHz
1298MHz to 1299MHz (not in Northern Ireland)
2310MHz to 2450MHz
3400MHz to 3475MHz
5650MHz to 5680MHz
5755MHz to 5765MHz
5820MHz to 5850MHz
10000MHz to 10250MHz
10270MHz to 10300MHz
10400MHz to 10500MHz
24000MHz to 24050MHz

and all bands including and above 47000MHz, with a maximum power level of 14 dBW erp carrier or pep, or

(ii) for the purpose of direction finding competitions, on 1.96 MHz with a bandwidth not exceeding 12.5 kHz and in the frequency bands: 3.5MHz to 3.8MHz (only between 00.00 hrs Saturday to 00.00 hrs Monday) 28.0MHz to 29.7MHz; or 144MHz to 146MHz,

with a maximum power level of 14dBW erp carrier or pep

which is capable of transmitting the callsign of the Licensee periodically (in accordance with Clause 7) and capable of being switched off within two hours of a demand to close down given by a person authorised by the Secretary of State;

(b) of a low power device to control apparatus at the Main Station Address or a Temporary Location by remote control, in the frequency bands or sub-bands:

70MHz to 70.5MHz
432.5MHz to 432.6MHz
1298MHz to 1299MHz (not in Northern Ireland)
2310MHz to 2450MHz
3400MHz to 3475MHz
5650MHz to 5680MHz
5755MHz to 5765MHz
5820MHz to 5850MHz
10000MHz to 10250MHz
10270MHz to 10300MHz
10400MHz to 10500MHz
24000MHz to 24050MHz

and all bands including and above 47000MHz, specified in the first column of the Schedule,

with a maximum power level of -20 dBW erp carrier or pep, under all reasonably foreseeable operational conditions, in such a way that no electromagnetic energy capable of reception by any station or apparatus outside the boundary of the premises in which the Station is situated is emitted from the Station; or

(c) by digital communications at the Main Station Address or at a Temporary Location notified in accordance with sub-clause 7(3)(b):

(i) in the frequency band:

50MHz to 51MHz

with a maximum power level of 10 dBW erp carrier or pep, or

(ii) on the spot frequencies

70.3250MHz
70.4875MHz

with a bandwidth not exceeding 25kHz; or

(iii) in the frequency bands or sub-bands:

144MHz to 146MHz
1299MHz to 1300MHz (not in Northern Ireland)
2310MHz to 2450MHz
3400MHz to 3475MHz
5650MHz to 5680MHz
5755MHz to 5765MHz
5820MHz to 5850MHz
10000MHz to 10250MHz
10270MHz to 10300MHz
10400MHz to 10500MHz
24000MHz to 24050MHz

and all bands including and above 47000MHz, specified in the first column of the Schedule with a maximum power level of 14 dBW erp carrier or pep."

Replacement for old sub-clause 7(1)(f):

"by morse telegraphy or telephony, at the end of each 30 minute period during which transmissions are sent from the Station (unless already transmitting in morse telegraphy or telephony). If the Licensee is conducting automatic operations involving digital communications then he shall transmit the callsign under this sub-clause at a maximum speed of 20 words per minute."

Replacement for old sub-clause 6(2):

"The Log shall be written in a book or maintained on a magnetic tape, disc or other electronic storage media capable of meeting the requirements of sub-clause 6(4) below."

Replacement for old sub-clause 6(3)(b):

"on a magnetic tape, disc or other electronic storage medium, the magnetic tape, disc or electronic storage medium shall be used only to keep the Log."

Replacement for old sub-clause 7(3)(a):

"use the suffix '/P' with his call sign and give the location of the Station every 30 minutes to an accuracy of at least 5 km by a generally used identifier, or"

Replacement for the old Note (aa):

"The Wireless Telegraphy (Citizens' Band and Amateur Apparatus) (Various Provisions) Order 1988 (SI 1988 No 125) restricts the manufacture and import of amateur apparatus operating only in the frequency band 28.0MHz to 29.7MHz. Section 7 of the Wireless Telegraphy Act 1967 defines manufacture as construction by any method and the assembly of component parts. However, home construction for non-commercial purposes and conversion of 27MHz FM CB apparatus meeting DTI specifications MPT 1320 or MPT 1333, into single band amateur apparatus, is allowed under a General Authority published in the London, Edinburgh and Belfast Gazettes on 17 February 1989. Requests for an authority to manufacture and import single band 28.0MHz to 29.7MHz apparatus outside these specific categories should be addressed to the Department of Trade and Industry, Radio Investigation Service, Room 102, Waterloo Bridge House, Waterloo Road, London SE1 8UA."

IARU Region I Conference Torremolinos - April 1990

Part one 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

"The International Telecommunication Union has more than an official relationship with the International Amateur Radio Union. Amateur radio and radio amateurs are important genes of telecommunications, shaping much of its development and character the world over". These were the opening sentences at the official opening of the Conference, by Dr Pekka Tarjanne, Secretary General of the ITU. He went on to say *"The role of the International Amateur Radio Union, begun in 1925, is widely recognised as a binding force worldwide in amateur radio . . . that your Region structure follows that of ITU Regions set up for radio regulations and frequency allocations is but one signal of our close ties. Your President, Dick Baldwin, and Region I Secretary, John Allaway, are familiar figures on the Geneva scene at ITU conferences and CCIR meetings".*

Dr Tarjanne referred to the forthcoming WARC 1992, where possible extension of the HF frequency spectrum allocated to broadcasting, and reallocation in the frequency range 1 - 3GHz, will be considered. These WARCs, especially WARC 1992, once more challenge amateur radio on the international conference front. Although, by definition, radio amateurs do not have large financial or political resources at their disposal, the activity has survived - and even prospered thanks to the resourcefulness of its participants.

At the opening plenary, the President of IARU Worldwide, Mr R L Baldwin, W1RU, referred to the foundation of IARU in 1925 and the formation of Region I in 1950. Its activities in the past thirty years have increased and diversified, attending more ITU meetings, frequency management seminars and Technical Symposiums. This culminated in strong representation at the 1979 WARC and is now evidenced in its preparation for the forthcoming 1992 WARC.

A greetings message was received from U6MIR and U7MIR on board the Soviet Space station MIR.

This was the largest Region I Conference ever held, with some 180 delegates from 42 countries, together with W1RU, VK3KI, 9V1RH, JA1KAB, YV5BPG, HK3DEU from the Administrative Council, VE3CDM, WARH and K1ZZ from Region II, and JA1AN and JM1UXU from Region III. It was particularly good to see Noel Eaton, VE3CJ, Emeritus President IARU.

Also present in an IARU Region 1 capacity was Ron Broadbent, G3AAJ (who was appointed Region I Satellite Coordinator) and Alan Taylor, G3DME (International Beacon Project Coordinator).

The RSGB delegation comprised Tim Hughes, G3GVV; Charles Suckling, G3WDG; Ron Glaisher, G6LX; John Bazley, G3HCT; Martin Atherton, G3ZAY; Malcolm Appleby, G3ZNU; David Butler, G4ASR.

Observers who attended at no cost to RSGB were Terry Jeacock, from the DTI, and Graham Shirville, G3VZV, representing BATC.

HF MATTERS

The prohibition on 10MHz phone was discussed in detail and re-affirmed by an overwhelming majority of societies present. It is most regrettable that a small number of UK operators have chosen to ignore this decision in the past, as it casts doubt on the self-regulatory ability of the Amateur Service and weakens the credibility of our negotiators for WARC 1992. It is worth repeating that the Amateur Service has secondary status in the 10MHz band (which means that interference must not be caused to primary users) and that the band was gained at the last WARC by a margin of just one vote. It could be lost just as easily at the next WARC.

The Region I **packet allocations** were left unchanged for the time being and it was re-affirmed that there should be no packet operation between 14099 and 14150kHz to safeguard the NCDXF beacon chain and ensure the retention of a 50kHz phone slot free from US-sourced congestion. This policy is consistent with the Region II band-plan and it is expected that Region III will fall into line. Conference recognised the need for a global packet allocation on 14MHz and referred the issue back to the Administrative Council for further consideration. A number of societies commented on the amount of "junk packet" clogging up the HF bands (including Snoopy pictures) and the inefficiency of current modulation techniques. It was suggested that Societies should remind members that the HF spectrum is a scarce resource to be used economically. There was concern about the proliferation of unattended mailboxes and forwarding systems; the general philosophy being that HF packet should be limited to international forwarding with a very restricted number of nodes per country.

The future of morse testing was discussed in the light of the mode's increasing obsolescence at sea and the significant entry barrier it poses to new amateurs, but some 75% of societies voted against a proposal to drop the mandatory morse test and replace it with one on datacomms and keyboard skills.

QSL card handling was discussed and it seems likely that IARU policy will soon be more sympathetic to the need for societies to make additional charges to cover the cost of handling cards en route to/from QSL Managers.

RSGB introduced, and was congratulated for, a number of papers covering **benchmarks for equipment reviewers, a QSL Manager's Code of Practice, and the Values of Amateur Radio.** (The last two will be published shortly in RadCom and the former is available from its author, G3RZP).

It was agreed that a small fund would be established to assist with the **re-introduction of amateur radio to a number of countries in Southern Africa.** This should not only help the DXCC chasers but also ensures the administrations in the region have a clear understanding of the Amateur Service in the run-up to WARC 1992.

WARC Preparations were the subject of a separate sub-committee which met on a number of evenings to review the administrative and lobbying procedures to be followed by each society and examine possible band expansions.

HF beacon work continues with plans moving along to establish a global chain of time-sharing beacons covering 14, 21 and 28MHz. Members are asked to take care not to cause interference to the existing 14.100MHz system and to avoid the 28.190-28.300MHz allocation.

VHF/UHF

Committee 5 dealt with matters concerning bands above 30MHz, including recommending band plans and coordinating technical standards so that international working is possible.

50MHz Band Plan: The 50 to 52MHz plan proposed by RSGB (see Feb 90 RadCom and 1990 Call Book) was adopted by the Conference. In broad outline it has not changed, but some additional frequencies have been noted to reflect the way the band is actually used. For FM operation, a 20kHz channel spacing has been adopted but with a 10kHz offset; that is the first channel is at 51.410MHz, the next at 51.430MHz and so on. The channels have not been given any names such as "S20". Common practice in other parts of the world is to name the channels according to the first two digits of the kHz so that 51.450MHz is just called "channel 45". No decision was made about repeater standards for 50MHz.

Germany reported that they could now obtain permits for operation between 50.080 and 50.400MHz (25W erp, horizontal polarisation, fixed station only), and Italy had also obtained a small allocation (50.1575MHz +/- 6.25kHz). Of course, some countries in the Region, such as South Africa, have been lucky enough to have had the full 4MHz allocation for many years. In these countries the Region II band plan has always been used and will continue to be used.

144MHz Band Plan: There was only one change, and that was that any repeaters left on the old R8 channel should be moved. R8 and R9 were removed from the band plan some years ago as they clashed with the satellite allocation. Practically all R9 repeaters have now moved but there are still a few on R8. This does not affect the UK as we do not have any repeaters on R8 or R9.

The idea of changing to **12.5kHz FM channel spacing**

has been around for some time and recent articles in RadCom have described the implications. At the Conference the feeling generally was that the band was not yet so crowded as to make this necessary, so 25kHz spacing was retained. RSGB supported this decision. A note for anyone looking at a new rig: a decision as fundamental as changing channel spacing would not be implemented immediately. There would have to be a timetable, leading up to a switch-over some years after the Conference. Since a change cannot now be made until the next Conference, three years away, this means that IARU Region I will almost certainly be sticking to 25kHz spacing for at least the next five years.

There was a long discussion about the **beacon sub-band**, currently 144.845 to 144.990MHz. Some societies wanted to reduce it to about 100kHz by raising the lower limit to 144.900MHz. Others wanted to reduce the band and also to move the whole thing down to 144.5 - 144.6MHz. In the end, both proposals were rejected, so there is no change this time.

If you wish to experiment with FAI (**Field Aligned Irregularities**) propagation, the recommended frequencies are now 144.140 to 144.150MHz for CW and 144.150 to 144.160MHz for SSB.

432MHz Band Plan: There have been some adjustments to the 430-440MHz band plan, but most do not directly affect UK amateurs. The 7.6MHz split repeater system used in Germany and Switzerland has been extended to make room for digital repeaters. The allocation for linear transponder outputs has been extended to be 432.6 to 432.8MHz, but the use of 432.6MHz for RTTY and 432.7MHz for FAX is to continue. The frequencies 430.400 to 430.575 and 439.800 to 439.975MHz may be used for digital communication links. *[Note that neither of these IARU allocations is currently recommended for digital use in the UK - Ed]*

Contests: Three times a year there are truly international contests for the VHF/UHF/ Microwave amateur. The IARU Region I September Contest is for 144MHz, with UHF/Microwaves having a separate event in October. An ATV contest is in September. Anyone entering any of these, should ensure they check logs carefully, because from 1991, for a duplicate QSO TEN TIMES the claimed score for that contact will be deducted from the total points. The idea of this is to encourage entrants to do proper duplicate checking. The rules and scoring for the ATV Contest have been re-vamped following proposals from BATC, who will be publishing the details in their magazine, CQ TV.

Oscar 13 Mode J: When Oscar 13 was launched, the Mode J uplink was put at 144.425 to 144.475MHz, out of the satellite part of the band. It is generally agreed, even by the satellite makers, that this was a bad decision, but it would be tricky to change the crystal now. Unfortunately, when stations access the satellite on these frequencies, they are operating out of the band plan and can cause interference to other amateurs. It would seem a pity to switch off the transponder, since one of the reasons for including a 144MHz uplink was to allow access from those parts of the world where equipment for higher bands is not readily available. The wording of the Conference decision is as follows:-

> As the IARU Region I 144-146MHz band plan contains no provision for satellite communication in the lower part of the 144-146MHz band, it is recommended that the Mode J transponder in Oscar 13 not be used by amateurs in Region I. If member societies report serious interference to terrestrial communications from the non-recommended use of the satellite transponder, IARU recommends that the Mode J transponder in Oscar 13 be permanently switched to 'off'.

In other words, please don't use the 144.425 to 144.475MHz uplink; go to 1,296MHz instead. If you do use the 144MHz uplink and cause interference to other legitimate users of the band, you could be contributing to a movement to switch off the transponder altogether, thus depriving others of its use. Remember, the first principle of all good operating: Listen before you transmit! If you are sending on one frequency and listening on another, check the transmit frequency too.

The UK delegation: (left to right) John Bazley, G3HCT, Martin Atherton, G3ZAY, Tim Hughes, G3GVV, Dave Butler, G4ASR, Malcolm Appleby, G3ZNU and Charlie Suckling, G3WDG.

Preparations for WARC have been going on for some time, and they are now moving into high gear. For the bands above 30MHz, the first aim is to retain all existing bands, with secondary or shared allocations being made primary or exclusive wherever possible. In addition, IARU will be working for an increase in allocations worldwide.

Even before the WARC, efforts are being made to persuade individual administrations that amateurs need **common frequency allocations** in different countries. This is a particular problem on the microwave bands, where some authorities do not yet realise that amateurs can and do work beyond the horizon. For example, on the 2.3GHz band, amateurs in Italy may not work below 2.440GHz, a frequency which is too close to microwave ovens to be useful.

Meteor Scatter: The requirements for a complete meteor scatter QSO have been clarified. It is now official that a QSO is complete when both stations have copied both callsigns, a report, and a confirmation that the other station has done the same. The confirmation can either be an 'R' preceding the report, or a string of Rs.

50MHz Beacons: 50MHz can provide worldwide communication, but the propagation comes and goes. Beacons are always useful indicators of the propagation, but to work well they must be coordinated worldwide. Committee 5 endorsed a recommendation that the Administrative Council of IARU should look at how this can be done.

S Meter Standards: S9 is now defined for 144MHz and up! The official S9 reference level is –93 dBm available signal power at the receiver input.

CONCLUSION

Several representatives of National Administrations and Licensing Authorities attended the Conference, including UK (DTI), Belgium, Federal Republic of Germany, Israel, Liberia, Netherlands and USSR.

Although the Spanish Society, URE, had arranged the venue to be Torremolinos, this was no holiday! The committee meetings were from 0830 to 1730, followed by working groups which met until midnight.

Of the many important outcomes of the Conference was, firstly, unanimity on preparations for WARC 1992; secondly, agreement on HAREC - the Harmonised Amateur Radio Examination Certificate; and thirdly, the provision to set up sub-regional working groups to deal with problems peculiar to certain parts of Region I, eg, European Community, West Africa, Middle East.

The work of the Conference was only made possible because of the efficient administrative organisation of G3FKM and his hard-working group of volunteer assistants from RSGB. David Evans, G3OUF and Rosemary Evans, G0NDB, gave up a week's leave to be present; John Morris and Phyllis, Heather Evans and Audrey Jefcoate were all there at no cost to the Society.

Next month: HF Contests, Microwaves, ATV and the work of the Common Licence Group

The Novice Licence is here!

On 19 April the DTI announced that there will be two new UK licence classes - Amateur Radio (Novice) Licences (A) and (B). Each will allow limitted access to some amateur bands on passing a Novice Licence examination. HF operation (the Class A) will require the passing of a 5wpm morse test. It was also announced that those who have held an Amateur Radio Licence (B) for at least a year will be able to use the Novice A hf bands simply by passing the 5 wpm morse test. For more details see page 10 of May *RadCom*.

The new licences are intended primarily to encourage young people to take up radio as a hobby and, perhaps, later as a career. In making their announcement, the RA stated that the value of Amateur radio as a training ground for careers in electronics and radio engineering has long been recognized by both government and the radio industry. The licence is expected to be available early in 1991. The training and examination procedures are now being set up so watch *RadCom* for further announcements and calls for volunteers.

By kind permission of the Radiocommunications Agency, we have reproduced below the complete final draft text of the Novice licence.

Amateur Radio (Novice) Licence (A) or (B) Terms and Limitations Booklet.These terms and limitations shall be read as an integral part of the Amateur Radio (Novice) Licence (A) or (B).

Conditions of Use

Purpose

1. (1) The Licensee shall use the Station for the purpose of self-training in communication by wireless telegraphy, which use (without limiting the generality of the foregoing) includes technical investigations.

Messages

1. (2) The Licensee shall address Messages only to other licensed amateurs or the stations of licensed amateurs and shall send only:
   (a) Messages relating to technical investigations or remarks of a personal character; or
   (b) Signals (not encyphered) which form part of, or relate to, the transmission of Messages.
1. (3) 'Messages' and 'Signals' include communication by:
   (a) telephony;
   (b) morse telegraphy;
   (c) visual communications (which include slow scan television (SSTV), fast scan television (FSTV) and facsimile); and
   (d) digital communications (which include data, radio teletype (RTTY) and amateur teleprinting over radio (AMTOR)).
1. (4) The Licensee may use codes and abbreviations for communications as long as they do not obscure the meaning of, but only facilitate, the communications.
1. (5) The Licensee shall not send Messages (other than initial calls) for general reception by licensed amateurs, but shall send Messages only to:
   (a) individual licensed amateurs; or
   (b) groups of licensed amateurs as long as communication is first established separately with at least one licensed amateur in any such group.
1. (6) The Licensee shall not transmit such material as music, public broadcasts or speeches.

Location

1. (7) The Licensee shall operate the Station only:
   (a) at the Main Station Address ('Main Station Address' means the main station address of the Licensee set forth in paragraph (d) of the Validation Document);
   (b) at a Temporary Location ('Temporary Location' means a location, other than the Main Station Address, in the United Kingdom, and in a fixed position);
   (c) while Mobile ('Mobile' means located in the United Kingdom in any vehicle, as a pedestrian or on any Vessel in Inland Waters).
1. (8) "Station" means the station of the Licensee at the Main Station Address, a Temporary Location or while Mobile, as the case may be.
1. (9) The Licensee shall give prior written notice to the Secretary of State at the address specified in note (a) to this Booklet of any change in the Main Station Address (or mailing address, if different).

Standard Frequency Service

1. (10) The Licensee may use the Station for the reception of transmissions in the Standard Frequency Service (a radio-communication service for scientific, technical and other purposes, providing the transmission of specific frequencies of stated high precision, intended for general reception).

Limitations on Use

2. (1) Subject to other, more specific, terms in this Licence, the Licensee shall only use:
   (a) the frequency bands specified in the first column of the Schedule to this Licence subject to the limitations set out in the second column of the Schedule;
   (b) a power relating to such frequency bands not exceeding the maximum specified in the third or fourth column of the Schedule; and
   (c) the types of transmission specified in the fifth column of the Schedule.
2. (2) If the Licence is an Amateur Radio (Novice) Licence (B), then the Licensee shall transmit only in the frequency bands or sub-bands above 30 MHz specified in the first column of the Schedule;
2. (3) The Licensee may receive Messages from another amateur on a frequency band not specified in the first column of the Schedule as long as the Licensee transmits only in a band specified in the first column of the Schedule which is authorised under sub-clause 2(1) or (2).

Unattended Operation

2 (4) Subject to sub-clause 2(5), the Licensee may conduct the Unattended Operations ('Unattended Operation' means the operation of the Station when unattended by the Licensee) only:
   (a) of a beacon:
      (i) in the frequency bands or sub-bands:

      1298 MHz to 1299 MHz (Not in N.Ireland)
      10000 MHz to 10250 MHz
      10270 MHz to 10300 MHz
      10400 MHz to 10500 MHz

      or

      (ii) for the purpose of direction finding competitions, at 1.96 MHz with a bandwidth not exceeding 12 1/2 kHz, in the frequency bands:

      3.5 MHz to 3.8 MHz (only between 00.00 hrs Saturday to 00.00 hrs Monday); and

      28.100 MHz to 28.190 MHz
      28.225 MHz to 28.300 MHz
      28.300 MHz to 28.500 MHz

      with a maximum power not exceeding that specified in the third or fourth columns of the Schedule

   which is capable of transmitting the call sign of the Licensee periodically (in accordance with clause 7) and capable of being switched off within two hours of a demand to close down given by a person authorised by the Secretary of State:

   (b) of a low power device to control apparatus at the Main Station Address or a Temporary Location by remote control, in the frequency bands or sub-bands:

      1298 MHz to 1299 MHz (Not in N.Ireland)
      10000 MHz to 10250 MHz
      10270 MHz to 10300 MHz
      10400 MHz to 10500 MHz

   with a maximum power of 100mW pip or 10mW pep under all reasonably foreseeable operational conditions in such a way that no electromagnetic energy capable of reception by any station or apparatus outside the boundary of the premises in which the Station is situated is emitted from the Station; or

   (c) by digital communications at the Main Station Address or at a Temporary Location notified in accordance with sub-clause 7(3)(b):
      (i) in the frequency sub-band:

      50.620 MHz to 50.760 MHz

      or

      (ii) in the frequency bands or sub-bands:

      1299 MHz to 1300 MHz (Not in N.Ireland)
      10000 MHz to 10250 MHz
      10270 MHz to 10300 MHz
      10400 MHz to 10500 MHz

   with a maximum power not exceeding that specified in the third or fourth columns of the Schedule.
2. (5) The Licensee shall not conduct the Unattended Operation of a beacon unless he had given at least 7 days' written notice of the location (within 5 km), period of operation, frequency, power (Watts), identity of other users of wireless telegraphy who share the site and shut down procedures of the beacon to the Manager of the Radio Investigation Service office in whose district the operation is to take place. The Manager may, before the commencement of operation of the beacon, prohibit the Unattended Operation of the beacon or allow the operation on compliance with the conditions which he may specify.
2. (6) The Licensee is not required to log the operation of a low power device under sub-clause 2(4)(b), although he shall log the operation of the Station in accordance with clause 6.

Pulse Emissions

2. (7) The Licensee shall not use pulse emissions.

Operators

2. (8) The Station shall be operated only by the Licensee personally (except in the case of Unattended Operations under sub-clause 2(4)).
2. (9) The Licensee may permit any person to type the Message of the Licensee for transmission by the Licensee from the Station.

Aircraft and Vessels

2. (10) The Licensee shall not establish or use the Station on any vessel, other than in Inland Waters, or in any aircraft or other airborne vehicle.

Other Requirements

3. (1) The Licensee shall hold:
   (a) an Amateur Radio (Novice) Examination Certificate or be a Class (B) licensee of at least one year's standing; and
   (b) in the case of an Amateur Radio (Novice) Licence (A), an Amateur (Novice) Morse Test Pass Slip issued on behalf of the Secretary of State.
3. (2) The Licensee shall comply with:
   (a) the relevant provisions of the Telecommunication Convention and Radio Regulations unless such compliance would result in a breach of the Licence; and
   (b) all relevant statutory enactments including (without limiting the generality of the

foregoing) the Act, the Wireless Telegraphy Act 1967 and the Telecommunications Act 1984.

3. (3) The Licensee shall:

(a) have no pecuniary interest (direct or indirect) in any operations conducted under this Licence; and

(b) except in the case of activities on behalf ofa non-profit organisation established for the furtherance of amateur radio, not use the Station for business, advertisement or propaganda purposes including (without limiting the generality of the foregoing) the sending of news or messages of, or on behalf of, or for the benefit or information of, any social, political, religious or commercial organisation.

Apparatus

4. (1) The Licensee shall ensure that:

(a) the emitted frequency of the apparatus comprised in the Station is as stable and as free from Unwanted Emissions as the state of technical development for amateur radio apparatus reasonably permits; and

(b) whatever class of emission is in use, the bandwidth occupied by the emission is such that not more than 1% of the mean power of the transmission (not including the power contained in spurious emissions) falls outside the frequency band.

4. (2) Notwithstanding any other term of this Licence, the Licensee shall ensure that the apparatus comprised in the Station is designed and constructed, and maintained and used, so that its use does not cause any undue interference to any wireless telegraphy.

4. (3) If any undue interference to wireless telegraphy is caused by the radiation of Unwanted Emissions or the field strength of electromagnetic energy radiated from the Station, then the Licensee shall suppress the Unwanted Emissions or reduce the level of the field strength to the degree satisfactory to the Secretary of State.

4. (4) The Licensee shall conduct tests from time to time to ensure that the requirements of this clause 4 are met.

4. (5) The Station shall be capable of receiving Messages on the same frequencies and with the same classes of emission in use for the transmission of Messages by the Station.

Recorded or Retransmitted Messages

5. (1) The Licensee may record and retransmit Messages addressed to the Licensee from other licensed amateurs:

(a) with whom the Licensee is in direct communication; or

(b) which are intended for retransmission to a specified licensed amateur.

5. (2) The Licensee may send Messages by (or as part of) the intermediate relaying of the Messages to or from other licensed amateurs.

5. (3) When recording and retransmitting the Message of another licensed amateur, if the Licensee also records and retransmits the call sign of the licensed amateur, then the Licensee shall transmit the call sign in such a way that the origin of the Message and the origin of the retransmission are clear.

5. (4) When operating under sub-clauses 5(1)(b) and (2),the Licensee is not responsible for the content of Messages sent by digital communications which did not originate at the Station when he could not reasonably be expected to review their content (and did not review their content) before relaying them.

5. (5) Notwithstanding sub-clauses 5(1) and (2), the Licensee shall not operate

(a) a mailbox or bulletin board (each being a facility which receives and stores Messages for or on behalf of other licensed amateurs for retransmission at a later time on the request of (and to) the intended recipient of the Message); or

(b) a telephony repeater (a facility which receives and simultaneously retransmits Messages by telephony for or on behalf of other licensed amateurs).

Log

6. (1) Subject to sub-clause 2(6), the Licensee shall keep a permanent record (the 'Log') of all wireless telegraphy transmissions at the Main Station Address and all Temporary Locations showing:

(a) dates of transmission;

(b) the times (in Coordinated Universal Time (UTC)) during each day of:

(i) the first and last transmissions from the Station (except when using automatic operations involving digital communications), or

(ii) switching the Station on and off for the purpose of enabling transmissions (when using automatic operations involving digital communications), and

changing the frequency band, class of emission or power;

(c) frequency band of transmission or, in an Unattended Operation, the specific frequency employed;

(d) class of emission;

(e) power;

(f) initial calls ('CQ' calls) (whether or not they are answered);

(g) except during automatic operations involving digital communications, the call sign of licensed amateurs or licensed amateur stations with which communications have been established (not including those amateurs or stations which form part of the intermediate relay of Messages);

(h) details of tests carried out in accordance with sub-clause 4(4); and

(i) location when the station is operated at a Temporary Location.

6. (2) The Log shall be written in a book or maintained on a magnetic tape, disc or other electronic storage media capable of meeting the requirements of sub-clause 6(4) below.

6. (3) Where the Log is maintained:

(a) in a book, the book shall not be loose-leaf and no gaps shall be left between the entries;

(b) on a magnetic tape, disc or other electronic storage medium, the magnetic tape, disk or electronic storage medium shall be used only to keep the Log.

6. (4) The Licensee shall keep the Log for inspection by a person authorised by the Secretary of State for at least six months from the date of the last entry whether or not this Licence has expired or been revoked.

6. (5) When a person authorised by the Secretary of State requires additional matters to be recorded, the Licensee shall record those additional matters in the log for the period specified by that person.

Identification

7. (1) During transmissions, the Licensee shall transmit the call sign specified in paragraph (b) of the Validation Document:

(a) during initial calls ('CQ' calls);

(b) at the beginning and at the end of each period of communication with a licensed amateur and, when the period of communication is longer than 15 minutes, at the end of each interval of 15 minutes;

(c) at the beginning of transmission on a new frequency (whenever the frequency of transmission is changed);

(d) by the same type of transmission that is being used for the communication;

(e) on the same carrier frequency that is being used for the communication; and

(f) by morse telegraphy or telephony, at the end of each 30 minute period during which transmissions are sent from the Station (unless already transmitting in morse telegraphy or telephony). If the Licensee is conducting automatic operations involving digital communications then he shall transmit the call sign under this sub-clause at a maximum speed of 20 words per minute.

7. (2) At a Temporary Location, the Licensee shall:

(a) use the suffix '/P' with his call sign and give the location of the Station every 30 minutes to an accuracy of at least 5 km by a generally used identifier [for guidance see note (v) to this Booklet], or

(b) give prior written notice of the location to the Manager of the Radio Investigation Service office in whose district the operation is to take place.

7. (3) When Mobile, the Licensee shall use the suffix '/M'.

7. (4) When away from the Main Station Address, the Licensee shall use the appropriate Regional Secondary Locator specified in note (w) to this Booklet.

7. (5) When operating a low power device under sub-clause 2(4)(b), this clause 7 shall not apply to the operation of the low power device (although this clause 7 shall continue to apply to the operation of the Station).

Inspection and Close Down

8. (1) The Licensee shall permit a person authorised by the Secretary of State:

(a) to have access to the Station, and

(b) to inspect the Licence and Log and to inspect the apparatus of the Station

at any and all reasonable times (or when, in the opinion of the Secretary of State, an urgent situation exists, at any time) for the purpose of verifying compliance with the terms of the Licence.

8. (2) When, in the opinion of the Secretary of State:

(a) the Licensee is in breach of the Licence; and

(b) the breach justifies immediate restriction or close down,

the Licensee shall restrict the operation of, or close down and cease to operate, the Station (or any apparatus comprised in the Station) forthwith in accordance with the demand of a person authorised by the Secretary of State for the temporary period specified in the demand.

8. (3) For the purposes of sub-section 1(4) of the Act, this Licence may be revoked, or its terms, provisions or limitations varied, by a notice in writing of the Secretary of State served on the Licensee, or by a general notice addressed to all holders of an Amateur Radio Licence (A) or Amateur Radio Licence (B) published in the London, Edinburgh and Belfast Gazettes or broadcast nationally by the British Broadcasting Corporation.

Period of Licence and Fees Due

9. (1) Subject to the payment, if appropriate, of the fee in the manner indicated in sub-clause 9(2), this Licence shall continue in force from year to year unless revoked by the Secretary of State.

9. (2) Unless he is under 21 years of age, the Licensee shall pay to the Secretary of State before the anniversary date of the Date of Issue in each year, the fee on renewal prescribed by the Regulations for the time being in force under sub-section 2(1) of the Act, and on the payment of the fee the Secretary of State will issue to the Licensee a document in the form of the title page of this Licence (the "Validation Document") which will indicate the next date for renewal.

9. (3) If the Licensee does not pay any fee due and in the manner described in sub-clause 9(2), then the Licence shall expire at the end of the day before the relevant anniversary date of the Date of Issue.

9. (4) The Licensee shall surrender the Validation Document to the Secretary of State forthwith upon the revocation of the Licence.

9. (5) Any licence, however described, which the Secretary of State has previously granted to the Licensee under the Act in respect of the Station is revoked.

9. (6) Sub-clauses 9(2) and (3) do not apply to a person under the age of 21 years.

Interpretation

10 (1) In this Licence, unless the context otherwise requires:

(a) The Interpretation Act 1978 shall apply to this Licence as it applies to an Act of Parliament;

(b) the expression 'Coordinated Universal Time' has the same meaning as it has in the Radio Regulations [for guidance see note(s) to this Booklet];

(c) 'Act' means the Wireless Telegraphy Act 1949;

(d) Inland Waters' means any canal, river, lake, loch or navigation which is not Tidal Water;

(e) 'Inspect' means examine and test

(f) 'Licensee' means the licensee named in paragraph (a) of the Validation Document;

(g) 'Secretary of State' means the Secretary of State for Trade and Industry;

(h) 'Telecommunication Convention' and 'Radio Regulations' mean the International Telecommunication Convention and the Radio Regulations thereunder and include any Convention or Regulation which may from time to time be enacted or brought into force in substitution for, in amendment of, or in addition to, the Telecommunication Convention or Radio Regulations;

(i) 'United Kingdom' means the United Kingdom of Great Britain and Northern Ireland, the Channel Islands and the Isle of Man;

(j) 'Unwanted Emissions' means spurious emissions and out-of-band emissions as defined in the Radio Regulations;

(k) 'Vessel' includes a hovercraft and any other floating structure which is capable of being manned.

10. (2) The Licence consists of the Validation Document, Terms and Limitations Booklet BR, the Schedule to the Booklet and the Notes to the Schedule, as any of them may be varied from time to time.

10. (3) References to a certificate issued by the Secretary of State include references to a certificate issued or granted by the Secretary of State for the Home Department, the Postmaster General or the Minister of Posts and Telecommunications.

10. (4) The headings in this Licence are for ease of reference only and shall not affect the interpretation of the Licence.

The Schedule to Terms and Limitations Booklet

(Amateur Radio (Novice) Licence (A) and (B))

Those licensed under an Amateur Radio (Novice) Licence (B) may not transmit on those bands between 1.950 and 28.500MHz.

1	2	3	4	5
Frequency Bands in MHz	Status of Allocations in the United Kingdom to the Amateur Service	Maximum Power DC Input (Watts)	Maximum Power RF Output (Watts)	Permitted Types ofTransmission
1.950 - 2.00	Available on the basis of non-interference to other services (inside or outside the United Kingdom).			Morse Telephony RTTY Data
3.565 - 3.585	Primary. Shared with other services.			Morse
10.13 - 10.14	Secondary.			Morse
21.100 - 21.149	Primary.			Morse
28.100 - 28.190				Morse RTTY Data
28.225 - 28.300				Morse RTTY Data
28.300 - 28.500				Morse Telephony
50.620 - 50.760	Primary. Available on the basis of non-interference to other services outside the United Kingdom. Antennas limited to 20 metres above ground level, with horizontal polarisation only. No mobile operation.	5	3	Data
51.250 - 51.750	Secondary. Available on the basis of non-interference to other services outside the United Kingdom Antennas limited to 20 metres above ground level, with horizontal polarisation only. No mobile operation.			Morse Telephony Data
433.00 - 435.00	Secondary.			Morse Telephony Data
1240 - 1325				Morse Telephony RTTY Data Facsimile SSTV FSTV
10000 - 10500				Morse Telephony RTTY Data Facsimile SSTV FSTV

Notes to the Schedule

(a) The maximum power specified in the third column of the Schedule refers to the peak input power (pip) and the maximum power specified in the fourth column of the Schedule refers to the peak envelope power (pep). The Licensee may use either measurement method, provided that the maximum power specified in the fourth column of the Schedule is not exceeded.

(b) In the case of frequency bands above 1000 MHz, since high intensities of rf radiation may be harmful, the following safety precaution must be taken. In locations to which people have access, the power flux density on transmit must not exceed the limits recommended by the competent authorities (currently, this limit is 10 mW per square centimetre).

(c) **Primary, permitted and secondary services**

For the purpose of this Licence, frequency bands allocated to the Amateur Service on a primary basis cannot claim protection from undue interference from any other authorised services, such protection being afforded only to users whose frequencies have been registered nationally or internationally. In the United Kingdom, individual frequency assignments are not registered in the Amateur Service, except for beacons and repeaters. This applies equally to all bands allocated on a secondary basis where stations of the Amateur Service are also required not to cause undue interference to stations of a primary or permitted service to which frequencies are already assigned or to which frequencies may be assigned at a later date.

(d) Any modulation technique (except for pulse emissions below 1000 MHz) may be used for the types of transmission specified in the fifth column of the Schedule which are defined as follows:

Morse:	hand or automatically-sent international morse code
Telephony:	speech, including selective calling signals
RTTY:	radio teletype and AMTOR
Data:	digital codes representing numbers, text, speech, images, measurements, computer programs or other information authorised by the Licence
Facsimile:	transmission of fixed or graphic images
SSTV:	slow scan (ie reduced bandwidth) television
FSTV:	fast scan television

(e) **Interpretation**

(i) Peak Input Power (pip): The average DC power supplied to the final stage (power amplifier) of the transmitter during one radio frequency cycle at the crest of the modulation envelope taken under normal operating conditions (except amplitude modulated emissions - see note below).

(ii) Peak Envelope Power (pep): The average power supplied to the antenna by a transmitter during one radio frequency cycle at the crest of the modulation envelope taken under normal operating conditions (except amplitude modulated emissions - see note below).

Note: If the Licensee does not have an rf power meter, the pep should be calculated from the pip, assuming an efficiency of 60% for the power amplifier. For simplicity, the pep or pip may be measured using a single modulating tone for suppressed carrier emissions and an unmodulated carrier for all other emissions. For amplitude modulated emissions, it is permitted to use a pep or pip not exceeding four times the unmodulated carrier pep or pip respectively.

Notes To Terms and Limitations Booklet

(a) Remittances and correspondence should be sent to the Radio Amateur Licensing Unit, Post Office Counters Ltd, Chetwynd House, Chesterfield, Derbyshire S49 1PF, Tel: 0246 217555/ 217699. Do not send the Licence when making remittances.

(b) A list of Radio Investigation Service district offices (see sub-clauses 2(5) and 7(2)) may be obtained from the address given in note (a).

(c) If any message, the receipt of which is not authorised by this Licence, is received by means of the Station, neither the Licensee nor any person using the Station should make known the contents of any such message, its origin or destination, its existence or the fact of its receipt to any person except an authorised officer of Her Majesty's Government or a competent legal tribunal, or retain any copy or make any use of such message, or allow it to be reproduced, copied or made use of. It is an offence under section 5 of the Act deliberately to receive messages the receipt of which is unauthorised or (except in the special circumstances mentioned in that section of the Act) to disclose any information as to the contents, sender or addressee of any such message.

(d) It is an offence to send certain misleading messages, viz:

'Any person who

(a) by means of wireless telegraphy, sends or attempts to send, any message which, to his knowledge, is false or misleading and is, to his knowledge, likely to prejudice the efficiency of any safety of life service or endanger the safety of any person or of any vessel, aircraft or vehicle, and, in particular, any message which, to his knowledge, falsely suggests that a vessel or aircraft is in distress or in need of assistance or is not in distress or not in need of assistance; ..... shall be guilty of an offence under this Act.'

(Underlining added) (Section 5, WT Act 1949).

(e) This Licence does not authorise the doing of any act which is an infringement of any copyright which may exist in the communication sent or received.

(f) Notwithstanding sub-clause 2(2)(a), if the Licensee holds an Amateur Radio (Novice) (A) or (B), then he may transmit on frequency bands below 30 MHz if he is operating under the licence of, in the presence of, and under the direct supervision of a person who holds an Amateur Radio Licence (A). If the Licensee is operating under the licence of, in the presence of, and under the direct supervision of a person who holds an Amateur Radio Licence (B) then he may utilise the extra frequencies available to Class (B) licensees.

(g) References to the operation of the Station include references to the speaking into the microphone comprised in the Station.

(h) Any operation under this Licence must also comply with the 'General Licence for Wireless Telegraphy Systems' issued under the Post Office Act 1969 and continued in force under the Telecommunications Act 1984. Copies of the General Licence are available from the Office of Telecommunications, Atlantic House, Holborn Viaduct, London EC1N 2HQ.

(i) It is an offence under the Wireless Telegraphy (Content of Transmission) Regulations 1988 to send a message, communication or other matter in whatever form that is grossly offensive or of an indecent, obscene or menacing character.

(j) If the Station is situated within 1 km of the boundary of an aerodrome, then the height of the antenna or any mast or structure supporting it must not exceed 15 m above ground level. An antenna which crosses above, or is liable to fall or to be blown on to, any overhead power wire (including electric lighting) or power apparatus must be guarded to the reasonable satisfaction of the owner of the power wire or power apparatus.

(k) This Licence does not absolve the Licensee from obtaining any necessary consent before entering on private or public property (including a public transport vehicle) with any apparatus.

(l) Sub-clause 4(2) of the Licence requires that the apparatus in the Station be so designed, constructed, maintained and used that the use of the Station does not cause any undue interference with any wireless telegraphy. In order to prevent interference due to close coupling of antennas, the antenna used for the Station should be sited as far as possible from any existing television or other receiving antennas. This is particularly important in the case of the installation of an indoor transmitting antenna, eg, in a loft, where transmissions may be conducted through the electricity supply wiring. In some circumstances it might not be possible to use an indoor antenna. In densely populated areas sufficient separation of the amateur equipment from surrounding transmitters, receivers and electronic equipment may not be possible to permit the amateur to operate with full power without the high probability of causing interference. Adjacent transmitters may produce intermodulation products on other frequen-

cies and excessive field strengths may cause breakthrough even in receivers which display an adequate level of immunity to unwanted transmissions. While owners of receivers should take steps to ensure that their apparatus has a reasonable standard of immunity, in some circumstances the amateur may need to modify his transmission practice to minimise a problem to neighbours.

(m) In the event of a demand by an authorised officer to close down or restrict the operation of the Station under sub-clause 8(2), the Licensee must act in accordance with the demand immediately. He will at that time be given oral reasons for the demand and will have an opportunity to provide reasons why the demand should not be met. If the demand is affirmed, then it will be confirmed in writing to the Licensee as soon as practicable. Written reasons will be given by a Manager of the Radio Investigation Service and the Licensee will again be invited to comment. The temporary period referred to in sub-clause 8(2) will usually be 28 days, but may be a greater or lesser period as the circumstances warrant. Where appropriate and where circumstances allow the Radio Investigation Service will be available to discuss with the Licensee how a breach of Licence might be corrected, however, if the Licensee does not comply with the demand or if the breach resulting in the demand is not rectified within a reasonable period of time to the satisfaction of the Secretary of State, then revocation or variation of Licence procedures may be commenced under sub-section 1(4) of the Act or a prosecution may be initiated (depending on the circumstances of each case).

(n) Sub-section 19(5) of the Act applies for the purposes of this Licence as it applies for the purposes of the Act:

'In considering for any of the purposes of this Act, whether, in any particular case, any interference with any wireless telegraphy caused or likely to be caused by the use of any apparatus, is or is not undue interference, regard shall be had to all the known circumstances of the case and the interference shall not be regarded as undue interference if so to regard it would unreasonably cause hardship to the person using or desiring to use the apparatus.'

(o) The bandwidths of emissions should be such as to ensure the most efficient utilisation of the spectrum; in general this requires that bandwidths be kept at the lowest values which technology and the nature of the service permit. Where bandwidth-expansion techniques are used, the minimum spectral power density consistent with efficient spectrum utilisation should be employed.

(p) Under section 1 of the Act, it is an offence to use any station or apparatus otherwise than under and in accordance with a licence granted by the Secretary of State. The Licensee is responsible for ensuring that at all times persons operating under this Licence observe its terms and limitations. Breach of this provision may result in prosecution of the Licensee or operator and the revocation of this Licence.

(q) The Licence is not transferable.

(r) No Log need be kept in respect of Mobile operations.

(s) For the purposes of the Licence, 'Coordinated Universal Time' may be regarded as equivalent to Greenwich Mean Time (GMT).

(t) Codes for classes of emission

Under the Telecommunication Convention, classes of emission are designated by groups of a minimum of three characters. The symbols used to designate classes of emission are listed in the Radio Regulations of which the following is a full list.

First Symbol - Type of modulation of the main carrier

N Emission of unmodulated carrier

Emission in which the main carrier is amplitude modulated (including cases where sub-carriers are angle modulated):

A Double sideband
H Single sideband, full carrier
R Single sideband, reduced or variable level carrier
J Single sideband, suppressed carrier
B Independent sidebands
C Vestigial sideband

Emission in which the main carrier is angle modulated:

F Frequency modulation
G Phase modulation

D Emission in which the main carrier is amplitude and angle modulated either simultaneously or in a pre-established sequence

Emission of pulses:

P Sequence of unmodulated pulses

A sequence of pulses:

K Modulated in amplitude
L Modulated in width/duration
M Modulated in position/phase
Q In which the carrier is angle modulated during the period of the pulse
V Which is a combination of the foregoing or is produced by other means

NB: Emissions where the main carrier is directly modulated by a signal which has been coded into quantised form (eg, pulse code modulation) should be designated by A, H, R, J, B, C, F or G as appropriate.

W Cases not covered above, in which an emission consists of the main carrier modulated, either simultaneously or in a pre-established sequence, in a combination of two or more of the following modes: amplitude, angle, pulse

X Cases not otherwise covered

NB: For the purpose of this Licence, modulation used only for short periods and for incidental purposes, such as identification or calling, may be ignored when calculating the emission designator. Double sideband emissions with reduced or suppressed carrier are included in the first character A.

Second Symbol - Nature of signal(s) modulating the main carrier

0 No modulating signal

1 A single channel containing quantised or digital information without the use of a modulating subcarrier (excluding time-division multiplex)

2 A single channel containing quantised or digital information with the use of a modulating subcarrier (excluding time-division multiplex)

3 A single channel containing analogue information

7 Two or more channels containing quantised or digital information

8 Two or more channels containing analogue information

9 Composite system with one or more channels containing quantised or digital information, together with one or more channels containing analogue information

X Cases not otherwise covered

Third Symbol - Type of information to be transmitted

(in this context, the word 'information' does not include information of a constant, unvarying nature such as that provided by standard frequency emissions or continuous wave or pulse radars).

N No information transmitted

A Telegraphy - for aural reception

B Telegraphy - for automatic reception

C Facsimile

D Data transmission, telemetry, telecommand

E Telephony

F Television (video)

W Combination of the above

X Cases not otherwise covered

The following examples of classes of emission and their symbols are given for the purpose of guidance only:

Telephony (speech):

Single side band, suppressed carrier (SSB) J3E
Frequency modulation (FM) F3E
Phase modulation (PM) G3E
Amplitude modulation (AM) A3E

Morse:

Hand sent, on/off keying of the carrier A1A
Hand sent, on/off keying of the audio tone (FM transmitter) F2A
Automatic reception, on/off keying of the carrier A1B

RTTY:AMTOR:

Direct frequency shift keying of the carrier F1B
Frequency shift keyed audio tone (FM transmitter) F2B
Frequency shift keyed audio tone (SSB transmitter) J2B

Packet/Data:

Direct frequency shift keying of the carrier F1D
Frequency shift keyed audio tone (FM transmitter) F2D
Frequency shift keyed audio tone (SSB transmitter) J2D

Television:

Vestigial sideband (AM transmitter) C3F
Slow scan television (SSB transmitter) J2F

Facsimile:

Frequency shift keyed audio tone (SSB transmitter) J2C

(u) When telephony is used, the letters of the call sign may be confirmed by the pronouncement of well-known words of which the initial letters are the same as those in the call sign. The phonetic alphabet contained in Appendix 24 of the Radio Regulations, reproduced below, should be used:

A	Alfa	J	Juliett	S	Sierra
B	Bravo	K	Kilo	T	Tango
C	Charlie	L	Lima	U	Uniform
D	Delta	M	Mike	V	Victor
E	Echo	N	November	W	Whiskey
F	Foxtrot	O	Oscar	X	X-ray
G	Golf	P	Papa	Y	Yankee
H	Hotel	Q	Quebec	Z	Zulu
I	India	R	Romeo		

(v) When the Station must be identified in accordance with sub-clause 7(3)(a), it is recommended that one of the following location identifiers be used:

(i) the full postcode,

(ii) latitude and longitude in degrees and minutes,

(iii) National Grid Reference correct to six figures,

(iv) International Amateur Radio Union (IARU) locator,

or

(v) the address or other geographical description correct to 1 km.

(w) When identifying the Station, in accordance with sub-clause 7(4) of this Booklet, the following Regional Secondary Locators should be used immediately after the United Kingdom prefix '2' and the letter signifying the licence class (A-Z):

2 England
3 Scotland
4 Wales
5 Northern Ireland
6 Isle of Man
7 Jersey
8 Guernsey

(x) When identifying in accordance with clause 7, please observe the following extract from Article 25 of the Radio Regulations (Regulations 2071 to 2075):

'Identification signals shall wherever practicable be in one of the following forms:

(a) speech, using simple amplitude or frequency modulation;

(b) international morse code transmitted at manual speed;

(c) a telegraph code compatible with conventional printing equipment;

(d) any other form recommended by the CCIR (International Radio Consultative Committee)'.

(y) The Wireless Telegraphy (Citizens' Band and Amateur Apparatus) (Various Provisions) Order 1988 (SI 1988 No 125) restricts the manufacture and import of amateur apparatus operating only in the frequency band 28.0 MHz to 29.7 MHz. Section 7 of the Wireless Telegraphy Act 1967 defines manufacture as construction by any method and the assembly of component parts. However, home construction for non-commercial purposes and conversion of 27 MHz FM CB apparatus meeting DTI specifications MPT 1320 or MPT 1333, into single band amateur apparatus, is allowed under a General Authority published in the London, Edinburgh and Belfast Gazettes on 17 February 1989. Requests for authority to manufacture and import single band 28.0 MHz to 29.7 MHz apparatus outside these specific categories should be addressed to the Department of Trade and Industry, Radio Investigation Service, Room 102, Waterloo Bridge House, Waterloo Road, London SE1 8UA.

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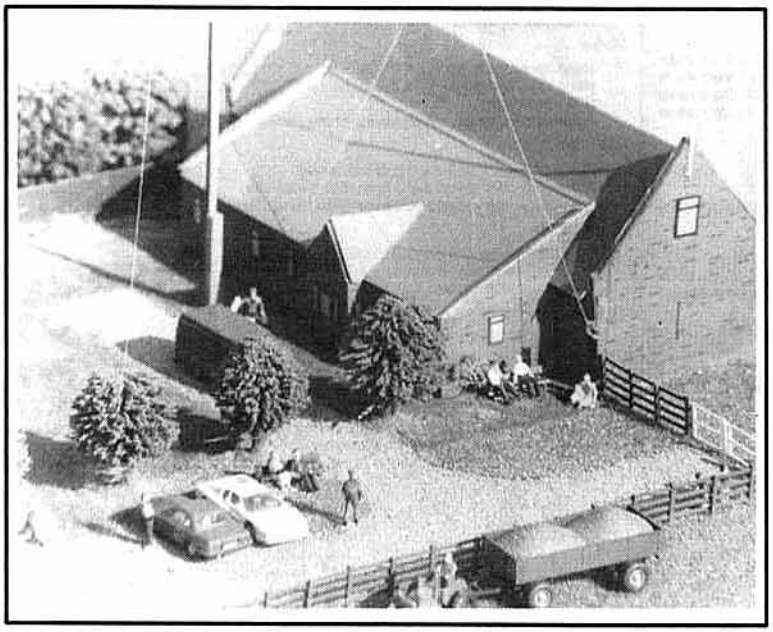

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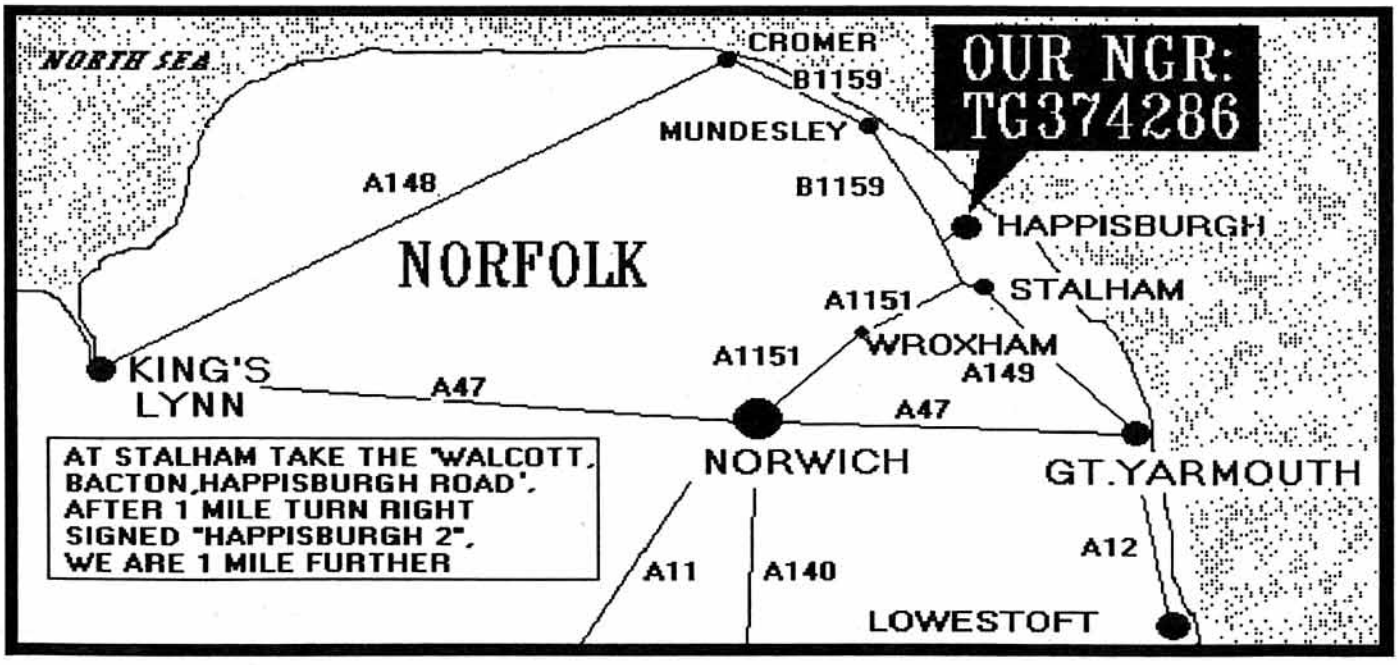

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SPECTRUM ANALYSIS

HF

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham
B17 8QB

The IARU Region 1 Conference which took place during the first week of April became a forum for the discussion of plans and prospects concerning WARC 1992. Member Societies are already being asked to begin work on this most important event, the outcome of which is vital to all of us, and for which each and every one of us is able to help. Between now and the Conference it is *absolutely vital* that we all behave on the air in a responsible manner so that outsiders taking a listen will not hear some of the deplorable things such as those said during some of the recent dxpeditions. These usually come from apparently mentally disturbed people who get pleasure from destroying other peoples' pleasure - but now they could in fact at the same time be destroying amateur radio.

Few changes to the HF bands came out of the Conference (you will find more information elsewhere in this month's *RadCom*.) However, the following were defined as band segments to be shared between SSTV and FAX transmissions: 3.730-3.740MHz, 7.035-7.045MHz (also to include RTTY), 14.225-14.235MHz, 21.335-21.345MHz, and 28.675-28.685MHz. Once again the importance of **not interfering with the 14.1MHz beacon network** was emphasised.

Having just complained about bad behaviour - a word of praise particularly for the operators of the recent AH3C/KH5J expedition. This was one of the best - the operators appeared on the pre-announced frequencies and, unlike many Pacific stations, took very great pains to work us here in Europe. Thank you to the whole gang !

G4ZVL would like to know who is the real QSL manager for ZD8VJ? He has now received several cards and would like to forward them but cannot do so.

Finally - a reminder from G0LRI that there is an International WAB Net which meets on 14.257, 21.318, and 28.655MHz.

QTH CORNER

A43KM/0	via Royal Omani ARS, PO Box 981, Muscat, Sultanate of Oman.
A15AA	DJ6SI, Zedernweg 6, D-5010 Bergheim, FR Germany.
A16AC	DJ6JC, zur Beerbeeke 10, D-3013 Barsinghausen, FR Germany.
A15AW	DK2WV, Max Loewstr 15, D-8014 Neubiberg, FRG.
EH9IC	EA9KQ, Juan T Palma, Box 21, 29880 Melilla.
AH3C/KH5J	Jarmo Jaakola, OH2BN, Kiilletie 5-C-30, 00710 Helsinki, Finland.
S01EA	EA2JG, Las Vegas 69, 01479 Luyando, Alava, Spain.
PA3CXC/ST0	John Fung-Loy, Strausslaan 4, 2551 NM Den Haag, Netherlands.
T5GM	Mr G Morgan, CTA Project URT/88/014, ILO Area Office, PO Box 9212, Dar es Salaam, Tanganyika.
UA0/G0KPH	via G4PKT, 14a Warwick New Rd, Leamington Spa, Warks, CV32 5JG.
US1A	W1AF, Harvard Wireless Club, P. Horowitz, 19 Fair Oaks Dr Lexington. MA 02173, USA.
VP8BXK	via W9ARV, Box 730, Roscoe, Ill, 61073. USA.

DX NEWS

Gwyn Morgan, T5GM, left Somalia on 28 March, and is now going to be in Tanzania for a two-year tour of duty. I do not know his new callsign yet but his new address appears in "QTH Corner" under T5GM.

Jim Smith finally appeared from **Bhutan** as A51JS and although his signal was usually not too strong he did make some 15,000 QSOs. I received a postcard from him in which he said "it is truly a wonderful spot". Jim left behind a complete station and hopefully there will now be more A5 activity.It is believed that Pradhan, A51PN, may be on the air again very soon. (The Society has received a letter from the Deputy Chief Engineer of the PTT of Bhutan thanking it for the selection of RSGB books about amateur radio which had been safely received).

Activity from **Thailand** seems to be on the increase and HSOM and HS0KC have been active. HS0SM is located in the Bangkok Science Museum and has high power and a beam at 110 ft. HS0E has also been on worked on 14MHz ssb. V63CQ in **Micronesia** is on Ponape Is and is to be found most days on 14.195MHz at 1200.

I have received a letter from JA1UT in which he tells me that S21U is the national amateur radio station which was newly established in the office of the National Broadcasting Authority in Dhaka, Bangladesh, on 15 March this year. It has been officially granted a licence by the government for the purpose of preliminary research into amateur radio activity, and it was installed by JA3UB and JA1UT. The first operation netted over 1,000 QSOs and I feel sure that the second (in late April) produced many more.

VP8BXK is located on the **S. Orkney Is** and has been on 21.285MHz at 1900 most days. HF0POL is on King George Is in the **S.Shetland Is** and according to *The Long Island DX Bulletin* is active in the 14.200 - 14.225MHz area most nights between 0000 and 0200.

At present **Equatorial Guinea** is being represented by 3C1EA, who appears regularly near 14.015MHz at about 2230. FT5XA, on **Kerguelen Is** has been found near 28.470MHz in the early afternoon and FT4WB is likly to be on **Crozet Is** for another two years. He may be found on 14.222MHz around 0530. ZD9BV on **Tristan da Cunha** often appears on 28.470MHz around 1600. LU6ELF/D2 closed down on 27 March leaving **Angola** unrepresented on the amateur bands for the time being. The Lynx DX Group is planning a visit to the Chafarinas Is - located near the N.African coast west of Melilla. They will be there from 14 to 17 June and have asked for the callsign EH9IC.

TY1DX is a missionary and in **Benin** for at least a year. He keeps a schedule with QSL manager IK6FHG every Sunday on 28.350MHz at about 0900. *DXpress* notes that there is a French DX Net which meets every Sunday at 0900 on 28.470MHz. This is controlled by F2CW, F8RU, and F6HUJ and attracts most of the stations in the French speaking part of Africa.

Probably too late but of interest anyway - members of the Harvard University Wireless Club were expected to be on the air using the callsign US1A from the Leningrad Institute of Aircraft Instrumentation's club station UZ1AWT. This should have been happening between 24 May and 2 June. In October a group of students from Leningrad will visit Harvard. Another joint US/USSR project takes place next month. This will be the activation of UF7V from Oblast 013 between 1 and 15 July. The team will include six American and twelve Russian operators.

INTERNATIONAL HAMVENTION LENINGRAD-90

An international amateur radio event called "International Hamvention Leningrad 90" will take place in Leningrad between 3 and 6 August. The programme includes presentations by some of the world's top DX and contest operators, talks on YHF and packet, a Russian-style social evening, sightseeing tours, and a visit to a summer palace near Leningrad. Family members will be welcome and sightseeing tours will be arranged for them.

The event is being organised by SRAL (the Finnish Society), and it is suggested that those attending plan to arrive in Helsinki on 1 August and stay there for various events which are being arranged, leaving for Leningrad at lunch-time on Friday, 3 August. The group will return to Helsinki on Monday and after a party on Tuesday the event ends on 8 August. Extensions of the visit to the USSR can be arranged. If interested contact Tarja Vaakanainen or Helena Johansson at Friendship Tours, Kaivokatu 10 D, SF-00100 Helsinki, Finland (tel:+358 0 175 522). The trip (ex-Helsinki) costs FIM 1660 (about 255 pounds), but I understand that this might not include the Finnish part of the trip. For further details contact SRAL, PO Box 44, SF-00441 Helsinki (tel:+358 0 562 5973, or fax 562 3987). It seems to be quite an interesting project !

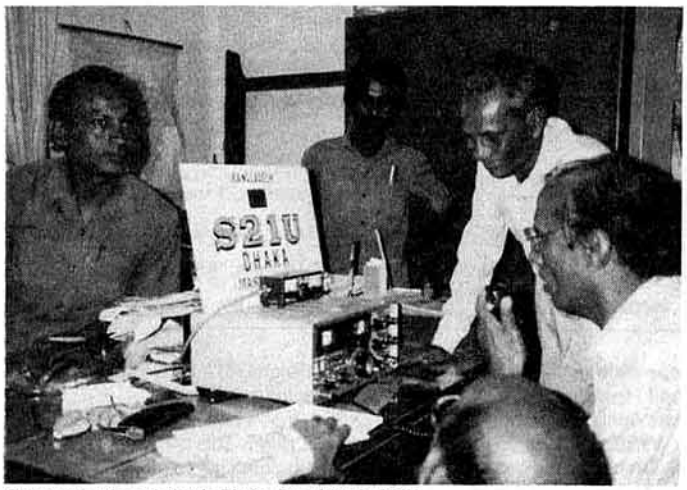
CONTESTS

Apologies to those who were hoping to take part in the ***Yuri Gagarin Cup competition***. The rules quite clearly state that this takes place every third year on the second Sunday in April (in this case, 8 April). The last took place in

EIGHT BAND TABLE NO. 2

Callsign	1.8	3.5	7	14	18	21	24	28	Total
G3KMA	135	248	310	324	120	323	80	311	1851
G3XTT	162	215	265	306	84	297	62	272	1663
G3GIQ	71	211	268	322	70	321	72	305	1640
GW3AHN	16	105	115	324	190	324	233	306	1613
G4LJF	42	215	258	304	27	286	5	255	1392
GM3PPE	69	165	176	234	113	228	106	204	1295
G4OBK	124	156	203	279	10	252	3	227	1254
A92BE	55	145	190	302	25	280	3	251	1251
G3TXF	65	164	204	282	4	264	1	238	1222
G3JGG	51	101	182	227	114	252	91	198	1216cw
G3YMC	81	114	191	250	63	268	50	209	1216
G0AEQ	2	88	118	243	55	196	6	182	890
G3JXN	30	60	115	182	18	177	7	223	812
G3NXG/M	1	33	60	203	37	214	51	204	803
G0HSD	19	103	114	169	0	200	0	188	793
GM4OBK	40	81	115	134	49	122	52	167	760
Average	60	138	180	255	61	250	51	234	1229

Prepared by G3GIQ. Next deadline — scores to reach him by 8 July



The new amateur station in Dhaka, Bangladesh, S21U.

1987 - but what happened this year?

1990 Portugal Day Contest
0700 - 2400 10 June

3.5 to 28MHz - ssb, confined to IARU contest preferred segments where these apply (i.e.on 3.5 and 14MHz). Single-operator multi-band only. Give RS plus serial number from 001. CT1 and CT4 stations will give RS plus two letters indicating their county. QSOs with CT1, CT4, EA1-EA5 and EA7 count two points, with other countries one point and with own no points - only as multiplier. Same station may be worked on each band. The multipliers are the counties (18) DXCC countries and continents - counted once only and not per band. I can supply a copy of the rules (sase please).

SEANET WW Contest
I gave details of this last month but a new set of rules has been sent to me showing minor changes - please note that (1) contest numbers should begin from 001 *on each band*, and (2) The summary sheet *must be signed* and include a declaration that the station has been operated within the spirit of the contest and terms of the station licence.

The results of the ***1989 CQ WW WPX SSB Contest*** have now appeared in *CQ Magazine*. Congratulations to **GB8FX** who came world fourth (and top European) in the single-operator all-band class with 7,049.694 points. GW4BLE was 11th in the same listing with 5,997,406. Other scores were (All-band) GM3BCL (249,030),GW0AJI (179,673), GM3CFS (79,050), and G4NXG/M (21,945), On 28MHz GW0ARK scored 1,848,406 points, GB5OU 1,122,583, and G4XKR 24,564. In the QRP Section GM4ELV came 9th on 28MHz.

In the ***RNARS CW Activity Contest, 1989*** top scorers were GM4SID (582,120), G3LIK (574,280), and OY3QN (519,480). In the ssb section the top three were G3LIK (199,500), G0KNA (154,090), and GD4MNS (127,650). This year the competition will be on 17 and 18 November.

1990 28MHz COUNTRIES TABLE

G4VVP	165 (ssb)
G4MUW	161 (ssb)
G4DXW	126
GM4OBK	117
G0CKP	100 (cw)
G4ZYQ	85
GM4ZIL	79
G4NXG/M	64
G0MXU	56
G2AKK	55 (cw)
G0JSM	18

BAND REPORTS

The G8KG report this month goes as follows :" There is little change to report on the solar front. The monthly average solar flux for March ended up at 188 sfu (provisional monthly sunspot number up to 140.8) and at the end of the third week in April it was looking as if the figures for that month would be much the same, perhaps a little higher. In fact the cycle seems to be "marking time" with the profiles of flux variation for the past three rotations being almost identical and very one-sided, with a very slight upward trend.

In this situation it was to be expected that HF band conditions would be down as compared with March if only because of the seasonal effect but matters were considerably worsened by a number of major geo-magnetic disturbances in the period from 9 to 23 April. Summarising the state of the cycle, as reported earlier it passed through a peak in June/July of last year and has been rather lower but level in recent months."

HF F-LAYER PROPAGATION PREDICTIONS FOR JUNE 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	886321112367	+53.....35
ICELAND	.....	.....	.....1.	131	411233223566	766544334567	665321112235	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	211122224674	41..11113787	5.....1588	3.....257	35	2
NEW DELHI	...111..121.	..1221112431	211112224674	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	422213224775	641..1114788	83.....1589	61.....267	4.....35	2
BAHRAIN	..1222212331	2133333334654	5453223355887	8651..113799	973.....1589	85.....267	62.....35	3.....2
CYPRUS	..1222212331	212443334653	535655557887	8676555678899	9874222235789	8741...12478	752.....146	42.....3
ADEN	1.1222334443	323433445765	756422335888	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	423433445665	756323335888	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	533434556766	866522345889	9884.1113799	9971....1589	884.....268	651.....36	32.....3
HARARE	3..322556644	611533556877	844732335899	976611113799	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	532443457876	865642235898	98773...3799	9985.....589	8862.....268	663.....36	33.....3
ASCENSION Is	11..21344552	33..43446775	773153225898	995341..3799	99751....489	8862.....158	663.....35	33.....2
DAKAR	311121244542	542343345765	875653223788	998741..1699	99851....379	8862.....57	663.....25	33.....2
LAS PALMAS	1...11121321	31.232243553	643565565786	876776566898	998764344689	987431111378	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	875113223687	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	7523322222246	875541111127	99752.....6	7862.....3	563.....	23.....
BOGOTA	1.....111	31..11111123	6412321211136	87443211..27	89751.....5	7862.....2	463.....	.3.....
** N. AMERICA								
BARBADOS	1.....1.121	31.112121233	752332211156	8755421...47	99751.....16	8862.....4	663.....1	33.....
JAMAICA	1.....11	2....1...122	5311221111125	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	5754.....	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 April 1990 issued by the Sunspot Index Data Centre, Brussels, was 139.8. The maximum daily sunspot number was 214 on 22 April, and the minimum was 77 on the 10 and 12 April. The predicted smoothed sunspot numbers for June, July and August were respectively (classical method) 141, 139 and 137; (SIDC adjusted values) 135, 132 and 130.

Information this month came from: G2HKU, G3's GVV, KSH, RIR, YRM, G4's DXW, EHQ, GM4ELV, GW4KGR, G4's MUW, NXG/M, GM4OBK, G4's VVP, ZYQ, and G0's AEG. CKP, and LRI - to whom, many thanks. Stations using CW are in italics.

3.5MHz
2200 S01EA.

14MHz
0000 HF0POL.
0600 *AH3C/KH5J, ZK2KK*
0700 AH3C/KH5J, UA0/GB4MSS, VK9TR.
0800 *FO5BI/P,* T32VP.
0900 A35KB, FO0IGS, *KH8/VK2KKY,* T32's AW, CI.
1000 T32PG.
1500 *9M2ZA.*
1800 A15AW, A61AC, *G4WYG/ST2,* T50DX, VK9LE, XW8KPL, ZS9A, *7Q7LA.*
1900 BZ4CH, *FK8AH,* JA, YJ8AB, ZL.
2000 A47RS, *BV2A, FK0BO, ZD7KM,* 1S0XV, *4K2OT.*
2100 XU8DX, 3X1SG.
2200 *C56/G3XWK, FS/DL8UZ,* JT1BY, NL7HH, *V2/G6QQ, 1S0XV,* 9M8PV.

21MHz
0700 A51JS, BY4RSA, *ZK2RW.*
0900 *BY5QA, 3D2QB.*
1000 AH3C/KH5, FW/YJ8M, JG2CLS/JD1, PA3CXC/STO.
1300 *BV2NB,* R3MIR/7, ZK2KK, 5H0T.
1400 KH8/VK2EKY.
1500 *BV2TA,* VS6GX, XV0SU, ZS9A.
1600 *XU8CW,* XU8DX.
1700 A22MH, KS9F/HZ.
1800 FG5R, *FK8KAB,* ZD9BV, 1S0XV.
1900 S79D, VP8BXK (S. Orkney), XV0SU.
2000 A15AW, KH6JEB/KH7, V51GB.

24MHz
0900 JAs. ZLs.
1000 D44BC, ZL2ANT.
1500 HZ1AB, *TA1AC, YB0USJ.*
1600 FH8CB, *FY5FA,* VU2ZAP, YB2DAB, 5T5FA.
1900 HH2Z, ZS1ACY.
2000 KH6B, NP2DM, *PJ2AM,* PJ6/KV4AD.

28MHz
0700 S21U, XW8DX.
0800 BZ4ROM, G0IXC/3D6.
0900 *A51JS,* SM7PKK/KH8, PA3CXC/ST0, TJ1BJ, ZZ0TA.
1000 A51AW, FT5s XA, XH, *P29PL.*
1100 A71AL, JG2CLS/JD1, WA6MMX/KH2, S01EA, 1S0XV, 3B9FR, 5H0T.
1200 EL2WK, H44MB, P29VMS.
1300 FS5UG.
1400 TR8CJ, VS6WA, G0JFX/5V7.
1500 V85GA, *ZZ0TA.*
1600 FH4EH, S01EA, WZ6C/ST4, TZ6VV, V51NAM, VP5P, YI1BGD, ZD9BV, ZS9A.
1700 TR8CA, VP8CDR.

Many thanks once again to the *Ex-G Radio Club Bulletin* (WA8GTA), *DX Report* (VK9NS), the *Lynx DX Group Bulletin* (EA2JGO), *DX'press* (PA3CXC), *DXNL* (DL3RK), the *Long Island DX Bulletin* (W21YX), and *DX News Sheet* (G4DYO).

Closing date for August issue is 25 June.

UHF/VHF

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

While there have not been any significant tropospheric openings on the VHFs this past month, there have been a few auroras, the one on 10 April being extremely rewarding. The first 'summer' E-layer QSOs on 50MHz have been reported but F-layer and transequatorial propagation on the band have not really come up to expectations.

DXPEDITIONS

Keith Tatnall, G4ODA (LCN), has forwarded preliminary details of the Five Bells Group's 1990 DXpedition. They propose to go to Iceland and to be active from QX square (IP03) for the Perseids, 4-14 August. Most operation will be on 144MHz meteor scatter, with some EME. They will also try MS and EME on 432MHz "... for the better equipped stations". Some portable operation from other squares is possible. Full details later.

The Ted Collins, G4UPS (DVN), *6m Information Pages* for April, states that four US amateurs plan to operate from the Bahamas in June, between the 6th and 12th. They propose to run a beacon on 50.085MHz. It is hoped that a special C6 callsign will be obtained but, failing that, the call will be WA4VCC/C6. Team members are WA4VCC, K4MQG, WA4UNZ and AA4SC. They will have HF equipment, so will monitor 28.885MHz.

BEACON NEWS

A Danish beacon should have appeared on 50MHz in April, according to information from OZ1IPU. The call is OZ4VM on 50.012MHz in locator square JO46 and it runs 10W to crossed dipoles.

Dave Austen, G1EHF (BRK), is proposing to run an unattended beacon in the 70MHz band, subject to there being no objections or restrictions imposed by the local RIS manager of the Radiocommunications Agency. The frequency will be 70.070 +/-5kHz, power 10W, dipole antenna with main lobes NW/SE and FSK modulation with callsign and locator sent every ten seconds. Operation throughout June is proposed; "... to coincide with the start of the Es season."

REPEATER NOTES

Ed Harland, G3VPF (DOR), sent an undated sheet about the *South Dorset Repeater Group* of which he is the treasurer. It runs GB3SD, the UHF voice repeater on RB14, and GB3DP, the VHF packet radio relay on 144.650MHz. A licence for the 1.3GHz link unit, GB7SD, was issued some time ago, but no equipment was installed when the newsletter was edited. All are sited at Weymouth (IO80SQ).

In common with many other groups, the repeater site was badly affected by last winter's gales. A 110mph gust was recorded on 25 January and debris from a flying barn roof damaged the antennas. Ed would welcome hearing from anyone who "... would like to get involved with maintaining the repeaters and help in producing new equipment." He is QTHR.

MOONBOUNCE

This topic was triggered off by a club newsletter forwarded by Chief Executive, David Evans, G3OUF. He visited the *Mount Airy VHF Radio Club* in Philadelphia some years ago, since when he has been on the mailing list of its newsletter, "The Pack Rats' Cheese Bits" now in its 32nd year.

The April issue features an introductory piece, the 'Pack Rat EME Primer' which reminds us it was the United States Navy that first used the moon as a passive reflector. (The ARRL Handbook mentions 400 megawatts ERP to carry four multiplexed RTTY channels between Washington, DC and Hawaii, but doesn't state the frequency or date.) The first amateur EME QSO was on 1.3GHz in July 1960 between the *Eimac Radio Club,* W6HB, and the *Rhododendron Swamp VHF Society,* W1BU.

The primer continues, "EME operations and station requirements have become easier and more achievable over the past ten years due to advances in receiver and antenna technology, and the activation of several super stations around the globe.... There are at least a dozen stations around the world on 432 and 144MHz who are workable by stations with moderate TX/RX systems and single Yagis."

Mention was made of W5UN in Mainville, Texas as one of the super stations. However, Dave recently lost his huge 144MHz array in a freak tornado, so it will be some considerable time before he can rebuild his antennas. He has worked single Yagi stations running as little as 80W.

The main article is by Mark Adams, WB2JHG, entitled *Two metre EME on a Shoestring Budget.* It outlines his first attempts using 800W and a single 18-element Yagi. He then considered the usual starter array of four long Yagis but found; "... this type of array was too expensive to construct and difficult for me to erect, alone."

He finally opted for eight 7-element Yagis on 3m wooden booms, which he claims have a gain of 11.5dBd each and weigh about 1kg including feedline. They are grouped two high and four wide and: "Elevation is accomplished by a TVRO 'jackscrew' positioner with a homebrew control box."

The cross boom of the H-frame is a 50mm aluminium tube which he tilts by rotating it within four U-bolts tensioned by self-locking nuts to eliminate binding. The array can be tipped 180° to permit servicing the upper row of Yagis from the ground, since the cross boom is only 3.4m AGL.

As to cost, Mark says: "With the help of a well-stocked junk box and careful shopping, the entire antenna system including Yagis, feedlines, azimuth rotor, elevation motor, power dividers and the tower, was constructed for approximately $250." - about 150 pounds. Running 1kW output, he has had over 40 EME QSOs with this modest array, including with one and two Yagi stations.

His final advice: "Anyone with a single long Yagi, or even two short boom yagis, and roughly 500W should try 144 or 432MHz EME. It is a great way to check station performance and sharpen weak signal operating skills." He offers to help anyone who is interested with system planning and sked arranging.

EME addicts congregate on 14.345MHz every Saturday and Sunday, 1600-1800UTC, and you will probably find Mark thereon. There are informal activity weekends every fortnight. The weekend of 23/24 June could be good as the moon is only a couple of days past perigree. However, new moon is on the 22nd so at moonrise on the 23rd, about 0410, your antenna will be looking at the sun as well; could be quite noisy!

Most of the day it will be the European window, so stations like G8MBI/G4PCS with their 224-element array and SM5FRH with his 24 home made long Yagis should be workable. The North American window opens around 1830, and from 2100 the moon will be below 10° elevation at 300° azimuth. Moonset is around 2115.

Moonrise on Sunday is around 0530 at 54° providing an Asian window till 0645, thereafter favouring Europe till around 1915 when the North Americans will see the moon. From about 2045 the moon's elevation will be below 10° at about 295° bearing till moonset at 2145. If you cannot elevate your antenna, listen around moonrise and moonset.

Anyone who will be in eastern USA this summer may like to know there is an EME Conference in Abguse at the Trenton State College. I don't have any more

ANNUAL VHF/UHF TABLE
JANUARY TO DECEMBER 1990

Callsign	50MHz Cty	50MHz Ctr	70MHz Cty	70MHz Ctr	144MHz Cty	144MHz Ctr	430MHz Cty	430MHz Ctr	1.3GHz Cty	1.3GHz Ctr	Total Points
G1SWH	34	15	24	4	48	9	17	5	-	-	156
G6HKM	46	14	-	-	47	12	8	3	-	-	130
G4XEN	-	-	-	-	54	19	32	3	1	2	111
G1WYC	12	5	-	-	32	12	16	6	-	-	83
G0CUZ	-	-	-	-	53	8	14	1	-	-	76
G3FPK	-	-	-	-	57	16	-	-	-	-	73
GW6VZW	51	18	-	-	-	-	-	-	-	-	69
G8ESB	3	1	12	1	13	3	17	3	2	2	57
G8PYP	4	4	1	1	25	7	9	2	-	-	53
GM0JOL	-	-	-	-	33	13	-	-	-	-	46
G7CLY	-	-	-	-	41	4	-	-	-	-	45
G4OUT	-	-	7	1	28	5	-	-	-	-	41
GM0GEI	18	15	-	-	-	-	-	-	-	-	33
G6ODT	-	-	-	-	15	4	9	1	-	-	29

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.

details at the moment, though, but expect someone on the net will have all the information.

SOFTWARE

An essential requirement for successful EME operation is to know where the moon is. There are several adequate moon position computer programs around, such as the one in John Morris's, GM4ANB, 1985 book *Amateur Radio Software*. For Amstrad PCW8000-series owners, I have adapted the much longer WA1JXN program, streamlining it somewhat as it was rather wasteful of memory. The above data were obtained from this program.

Neither of these programs allows for the 5.15° inclination to the ecliptic of the moon's orbit. Since Earth's equatorial plane is inclined at 23.44° to the ecliptic, the moon's apparent inclination varies between 18.29° and 28.59°, roughly following a cosine law. One complete cycle of this variation takes about 18.6 years, or 6798 days to be more precise.

In practice, this means that the position of the moon given by these simple programs could be up to ten degrees out. Bearing in mind the polar diagrams of most small VHF/UHF EME antenna arrays, such errors are probably unimportant. However, they could be more significant when using narrow beamwidth dishes on microwave bands.

For the record, on 1 June the apparent inclination will be 26.83° and by the end of May 1992 it will be back to 23.44°, thereafter decreasing to its minimum value of 18.29° by mid-March 1997. If you want to calculate the value in degrees on any date use the formula: 23.44 + 5.15 cos((d/6798)x360), where d is the number of days since 21/11/1987.

For MS addicts I have extended the MSD programs so that you can make printed copies of the reflection efficiencies for all the streams for your own, or any other, QTH. These programs are based on DL5MCG's listing in DUBUS Magazine, issue 1/1986 and Wilhelm's original is in the Public Domain in various guises.

Another popular program is YAGIS which churns out details of doubly optimized Yagi antennas of proven performance. It is based on DL6WU's work and I have added a printout option to this, too. DUBUS issue 1/1990 includes a comprehensive article by DJ9BV who has used the NEC-II software to 'fine tune' Gunter's designs.

I can find only very marginal variations in element lengths and spacings. The main difference is the adoption of twin reflectors, spaced approximately 0.3 wavelength, for some boom lengths and a 0.175 wavelength director/driven element spacing. The article includes sketches for a folded dipole driven element with balanced feed, and a neat idea for insulated parasitic element mounting through the boom, using nylon rivets.

My library of CP/M software runs to many megabytes and includes diskfuls of amateur radio programs. A small selection of these is listed in the PROGLIST and if you would like a current copy, send an SASE to the Purley address. Most of the programs have been refined since originally compiled and the satellite ones are frequently upgraded with the latest Keplerian elements.

If any reader who already has any of my PCW programs wants up to date copies, just return the disk(s) in a Jiffy Bag, with sufficient return postage and a self addressed label, and I will copy the latest versions.

Finally, are you there Al Harvey, GU7DHI? I still have your disk and await a reply to my letter of 1 February. If you tell me exactly what programs you want, give me your correct QTH information and include return postage, such as IRCs, I will return your disk.

NORTH POLE 90

When conditions permitted, Laurence and Morag Howell have called into our daily breakfast net on 14MHz. Morag did not get to the Ice Station because the ice began to break up making it dangerous for aircraft to land. So they have both remained at Base Camp on Sredniy Island (NQ59OM) - Sredniy means middle, by the way - with Sergei, EK0AAA, and itinerant polar bears. Since mid-April the sun hasn't set, so they have been experiencing uninterrupted daylight.

They have had some success on 50MHz. On 11 April, UA0/GB4MSS worked OH9NLO (KP26UM) at 1632, exchanging RST559 reports, and on the 15th, OH3MF/9 (KP36UN) at 1648. These QSOs were via Arctic-E mode over distances of 2373 and 2328km respectively. TV from the Varanger transmitter (Ch. E2, 48.25MHz vision) in the far north of Norway has been received consistently around the 1600-1800 period.

METEOR SCATTER

June is a good month for MS enthusiasts as there are several useful showers. The *Arietids* stream has a highly eccentric orbit, inclined 25° to the ecliptic plane, and a 1.61 years period. At maximum, the Right Ascension of the radiant is 39° and the Declination +24°, and the radiant is above the mid-UK horizon between 0100 and 1730UTC. The best times for the usual four directions are; NE/SW 0700 with a lesser peak at 1430, E/W 0930, NW/SE 1200 with a lesser peak at 0430, N/S 0600 and 1300. The ZHR is around 60 and the peak day should be the 11th.

Next the *Zeta Perseids*, incl. 6.5°, period 1.82 years, RA/DEC 63/+27° and 'available' 0200-1930. Best times; NE/SW 0830 and a lesser peak at 1600, E/W 1100, NW/SE 1330 with a lesser peak at 0600, N/S 0700 and 1500. ZHR around 40 and peak day the 13th.

Now the *June Lyrids*, incl. 45.3°, period 2.94 years, RA/DEC 282/+44° and available all day. Best times; NE/SW 0600 with lesser peak at 2200, E/W 0800 and 1800, NW/SE 2000 with a lesser peak at 0400, N/S 0500 and 2100. ZHR around 8 and peak day the 17th.

Lastly the *Beta Taurids*, incl. 0.3°, period 2.13 years, RA/DEC 84/+24°, 0300-2000. Best times; NE/SW 0900 with a lesser peak at 1630, E/W 1130, NW/SE 1400 with a lesser peak at 0630, N/S 0800 and 1500. ZHR around 24 and peak day the 26th.

As always, a few hours around these peak times should produce useful reflections. There are several more minor streams in June and towards the end of the month their sum total effect usually gives good results with random reflections.

There are quite a few operators regularly using MS mode, so some reports would be welcome. 50MHz MS has been described as a 'doddle' so has anyone exploited the mode on 70MHz where much higher ERPs are legal? Don't be shy, let us know what you are doing!

50MHz

Ray Cracknell's, G2AHU (HWR), March report states that from Britain: "Apart from openings to VK6 on the 2nd and 4th and to JA on the 3rd to the Channel Islands and the extreme south of England, propagation was confined to Africa for F-layer and to Europe via aurora with no obvious Es. There was a GJ/CE QSO on the 2nd and one very weak reception of the FY7THF beacon on the 5th."

Auroras were recorded on March 2, 6, 12, 13, 18, 20, 21, 25, 26, 27 and 29. Between 1930 and 2117 on the 27th, Ken Osborne, G4IGO (SOM), was listening to the V51E keyer and to auroral TV and noted that when one faded up, the other faded out and vice versa. Coincidence or is there a connection? Any ideas?

March 11 was an interesting day as ZS1 and ZS2 stations on the southern extremities of Africa were worked from Britain. That was the first time this has been reported since October 1947, in Cycle 18, although it might have been possible had we had the band during the peaks of intervening cycles.

Costas Fimerellis, SV1DH, heard/worked 23 countries in March. Poor days were the 21st and 28th, while the 15th and particularly the 31st were the best with 13 countries and three continents available on the 31st. A histogram showing the percentage availability of these countries proved ZS3, ZS4 and FR by far the most consistent.

From Zimbabwe Mal Geddes, Z23JO, found it: "Altogether a pretty good month." As in February, the Mediterranean beacons 5B4CY and SV1SIX were the most reliable; 9H1SIX was copied on twelve days. He heard/worked 21 countries in Africa, Asia and Europe, but there were no PAs in his list.

In the March *VHF/UHF* I referred to Bill Stirling's, GM4DGT (LTH), diagrams of the auroral curtain as plotted from his QTH during an event on 29 December 1989. G2AHU's report includes two further plots for 13 and 27 March which are worth further, detailed study. Incidentally, the VLF frequency of MSF, to which beacon GB3BUX on 50.000MHz is locked, is 60kHz and not 16kHz.

Now to G4UPS's *6m Information Pages*. Derrick Milligan, V51DM, says that the special anniversary call, V51NAM, can be used by all ex-ZS3 stations. QSLs should go via PO Box 1100, Windhoek 9000, Republic of Namibia.

The first 50MHz DXCC

certificates have been issued by the ARRL. The first went to Lee, K5FF, the wife of Fred, W5FF, who received the second. No. 3 was awarded to Bob, VE1YX. Cards from YV0, DL and EA8 stations were rejected by the ARRL. The SMIRK organization is awarding plaques to the first ten recipients of 50MHz DXCC certificates.

Andre Sampaio, PY0FF, is a resident of Fernando do Noronha Island and has equipment left by W9VA, who recently visited the place. QSLs can be either sent direct to Box 1, 53990 Fernando do Noronha Island, Brazil, or via W9VA at 1345 Linden Avenue, Deerfield, IL 60015, USA.

Now that Swiss stations have restricted use of the band, so has the 4U1ITU station in Geneva. On 20 April, Dave Court, G3SDL, who operated from Turkey last year *(We are still trying to find the space to run Dave's fascinating account of this expedition - Ed)*, received permission to operate 4U1ITU after TV hours. He was expecting to be QRV sometime in May but no dates were confirmed at press time.

Darrell Moody, G0HVQ (GLR), reports virtually no F-layer propagation. Local Gs were heard working into South Africa around 1100 on 1 April, but he heard nothing. The V51E keyer made a brief appearance at 1310. In a weak aurora on 21 March he worked GM0GEI at 1855 but heard nobody else.

Arriving home at 1530 on 10 April, he found the big aurora in progress and worked many stations till 1820, including G, GD, GJ, GM, ON, OZ and PA. LX1SI (JN39) and SM7FJE (JO65) were got-aways. He switched on again at 2035 but the event had almost finished; OH9NLO was audible weakly via auroral-E.

Neil Carr, G0JHC (LNH), confirms the lack of F-layer signals apart from the V51E keyer on 26 March. EI8EF (IO54) and SM7FJE were new squares worked in an aurora on 25 March. The 10 April aurora lasted from 1200 to 2200. DX stations worked included an F, six ONs, seven OZs plus LX1SI, and from 2030, Ar-E propagation brought LA6HL (JO28), LA9BM (JP40), SM3LBN (JP80), SM3EQY (JP81), SM3JGG (JP71), SM7CMV (JO75), OH3AWW (KP21), OH5NQ (KP30) and OH2TI (KP20). OE6AHD was heard in heavy QRM. There were Scottish-type auroras on 11-14 April. The first Es of the season on 18 April resulted in a QSO with IKJUG (JN45); the opening lasted five minutes.

Neil notes that in recent months, 50.110MHz seems to have become a local calling frequency with newcomers to the band. Any suggestion to move elsewhere, "... is often met with abuse." In some areas, local nets are held on this *internationally agreed, inter-continental calling frequency.* Please respect the band plan for there may be DX stations calling that others could hear, even if you cannot.

LOCATOR SQUARES TABLE
STARTING DATE: 1-1-1979

Callsign	50MHz	144MHz	430MHz	1.3GHz	Total
G3IMV	228	428	125	51	832
G4KUX	-	384	120	-	504
G4SWX	-	347	-	-	347
GM4YXI	-	340	-	-	340
G4IJE	307	338	5	2	642
G0CUZ	-	330	73	-	403
G4DHF	-	325	-	-	325
G0DAZ	137	316	122	39	614
G4RGK	69	302	140	52	563
G4XEN	66	295	114	5	480
G4RRA	-	280	80	-	360
GJ4ICD	360	263	119	59	801
G4PIQ	-	261	87	-	348
G4SSO	-	256	98	-	354
G4YTL	-	249	-	-	249
G3FPK	-	241	-	-	241
G6HCV	243	231	-	-	474
GW4FRX	-	228	-	-	228
G6HKM	202	218	109	46	575
G4DOL	-	216	-	-	216
G0EVT	88	209	57	-	354
G4TIF	172	204	111	-	487
GM4CXP	-	198	31	-	229
G0GMB	-	187	99	-	286
G8LHT	113	185	93	14	405
G6DER	43	183	114	82	422
G1KDF	139	180	102	37	458
G1LSB	44	172	143	-	359
G4XBF	-	171	-	-	171
G1GEY	-	170	92	22	284
G4VXE	147	162	42	4	355
G4MUT	98	153	94	34	379
G1SWH	154	153	58	-	365
G0LFF	83	153	-	-	236
G6STI	-	152	69	24	245
GJ6TMM	109	151	52	-	312
G8ATK	-	143	94	52	289
G4TGK	-	137	-	-	137
GW6VZW	147	125	6	-	278
G8XTJ	44	120	-	-	164
GW4VVX	-	115	-	-	115
G8PYP	119	106	31	-	256
G1SMD	115	106	-	-	221
G1WPF	-	101	-	-	101
G7CLY	-	100	2	-	102
GM0GDL	-	83	22	-	105
G1CEI	11	77	18	-	106
G1DOX	54	73	16	8	151
G0HVQ	89	71	-	-	160
G0HDZ	-	64	-	-	64
G6MEN	67	54	27	3	151
G0JHC	246	48	-	-	294
GM1ZVJ	6	48	-	-	54
G6UWO	-	41	44	18	103
G6ODT	-	25	47	-	72
GM1BVT	41	21	-	-	62
GM0GEI	177	-	-	-	177

No satellite, repeater or packet radio QSOs. "Band of the month" 144MHz

In the contest on 8 April Gerry Schoof, G1SWH (MCH), worked 50 stations up to QRT time at 1142. He operated in the 10 April aurora and contacted some ONs for a new country. In a brief Es opening on 23 April, he worked I0DLP (JN61) for a new square and country.

John Colebrook, G3BJD (CBA), enjoyed the 10 April aurora and divided his operating between 50 and 144MHz. His first QSO was with SM7FJE at 1234, followed by G, GM, GW, LA, ON, OZ, PA and more SM stations till about 1900 when it faded out. Beam headings didn't seem to matter and anything between 20° and 70° brought good reflections. He came on again at 2029 to work OH3MF, LA9BM, OH2TI and LA1MFA (JP99BI) via Ar-E. At 0614 on the 12th he contacted LA3UU in an aurora but it faded within three minutes.

John Hunter, G3IMV (BKS), spent some time on the band in the 10 April aurora and took advantage of the Ar-E propagation in the evening. He made QSOs with SM3JGG, OH3AWW, OH2TI and LA1K (JP53). On MS mode he worked I2FHW (JN44) and OZ1GEK (JO65).

In late March, G4UPS heard auroral GMs on 21, 25, 26 and 30. Ted heard V51E and ZS9H from 1520 on the 22nd; on the 26th the 9L1US beacon at 1024-1038, then ZS6s and V51E keyer around noon. ZS6WB and ZS4S were copied around 1000 on the 27th and the V51E keyer later, up to S9 at 1235. ZS6WB was heard working LXs at 1255 on the 30th.

In April, there was high solar activity on the 1st and ZS6s were heard from 1059 to 1750 with the V51E keyer in and out all afternoon. On the 5th Ted heard 9H1SIX at 0750. Of course the main event of the month was the aurora on the 10th. At 1115, V51E was RST559, then at 1123 there was "... enormous solar noise lasting a few minutes followed one hour later by the big aurora."

The event lasted from 1254 to 1824 and he contacted EI, G, GD, GI, GM, LX, ON, OZ, PA and SM stations. Beacons GB3SIX, GB3NGI and GB3NHQ were strong and very auroral throughout. At 2135 he worked LA9BM and OH5NQ via Ar-E and several LA, OH and SM stations were heard till fade out at 2200.

On the 11th, three 9Hs were heard weakly at 1014 and Z23JO was worked on CW at 1105. GM3WYL (IO75) and GM4DGT (IO86) were auroral QSOs at 1800 on the 12th. On the 13th, the ZS2SIX beacon in KF25 was heard between 1255 and 1300 at up to S9. GM4DGT was contacted at 1611 on the 14th but the band was normal from 1645. On the 17th, LX1SI was S9+ for over an hour from 0807; Ted added: "MS in/out."

On 27 March Ela Martyr, G6HKM (ESX), worked Kosie, V51E, using his new call. There was a ZS contest on 1 April when she contacted ZS6BMS (KG44); a few other weak ZSs were heard. In the contest on the 8th, she collected 28 counties for the annual table and worked three ONs for a new country. The aurora on the 10th produced seven new squares including SM3LBN and SM3JGG in the evening Ar-E session. She worked G, GM, GW, OH, ON, OZ and PA as well, but still no GD.

As usual, results from Jersey Island seem much better than those from the mainland. Geoff Brown, GJ4ICD, reports weak JAs from 0940 on 20 March as the solar flux continued to increase. From the 25th to 31st, weak ZSs were heard daily in the afternoons. From 1330 on 1 April there was a strong opening to ZS6. At 1500, I0KDP and GJ4ICD heard each other but did not make a QSO.

Geoff appears to have missed the big aurora on the 10th, but on the 11th, a CQ call on 50.120MHz at 0920 brought MS QSOs with OZ1BVW (JO45) and SM7FJE. From 0945 there was Es propagation towards Italy up to 65MHz and he made the first GJ/I contact at 0953 with IK0JLO (JN61). Beacon FR5SIX was audible but no FR5 stations were heard and he heard ZS2SIX for the first time. Very strong 9Hs were heard till 1227 and ZS signals appeared to be Es assisted TEP mode.

Friday the 13th was lucky for Geoff. Things were quiet at 1000 but a long CQ call resulted in an MS contact with OZ1BTE (JO65), completed in six minutes. By 1100, several ZS6s were audible and an SSB QSO with Z23JO was made at 1129. The ZS2SIX beacon was S8, ZR1L (JF96) was S9+ and ZS1EK (JF95) was his 360th square. There was no TEP flutter on these very strong signals and there didn't seem to be any assistance from Es in our hemisphere.

Geoff suggests that, even if the band appears quiet, there is always somebody monitoring, somewhere. The moral is to put out CQ calls to create some activity.

Paul Baker's, GW6VZW (GWT), only current activity is on 50MHz. He worked V51E on 27 March for a new square and heard ZS6 and

ZS9. On 1 April ZS6BMS (KG44) was contacted at 1105 and V51KC was S9+40dB for long periods. From 1315 in the 10 April aurora he worked EI, F, GD, GI, GJ, GM, ON (a new country) and PA. Later on he made Ar-E QSOs with SM3JGG, LA9BM, OH2TI and SM0SBI (JO99), another new square.

He has had to deal with numerous cases of TVI, most caused by very poor antennas and/or feeders. He has used AKD notch filters to good effect, and in many cases has improved the complainant's picture quality by remaking leads and resiting antennas. All his power leads incorporate ferrite toroids and he uses a LPF in the antenna feeder.

70MHz

The topic of band planning continues to generate lively correspondence. In his letter of 12 April David Reynolds, G3ZPF (WMD), complains: "70.325MHz is/was for 'informal packet.' RSGB News now tell us that the HFDX Packet Cluster network is about to be licensed on that channel. Hardly 'informal' is it? Just how do you/RSGB expect the rest of us to stick to gentlemen's agreements when RSGB indulges in such blatant duplicity?"

The informal packet idea arose well before I joined the VHF Committee, but I imagine the then members felt they ought to make some proposal for the mode. Since it has been generally adopted by PR operators, it seemed logical to formalize it in the revised band plan. The DX Packet Cluster operators will have to share .325 with everyone else; isn't that what PR is all about?

This seems a more sensible way of band planning than writing in specific frequencies for many different modes, such as RTTY, FAX, AMTOR, PR, SSTV, ATV talkback, etc. at a too early stage, only to find later some are seldom used.

Ian Gilpin, G1SMD (DOR), has gone into the matter very thoroughly, producing six full A5 sheets of well reasoned argument leading to his definitive '70MHz band plan for the 90s.' In essence, he opts for a 20kHz channel spacing for the upper half of the band. He has copied this to several others, including the Chairman of the VHF Committee, so it should get wide publicity and detailed consideration.

144MHz

Andy Adams, GW0KZG/MM, was quite active from the RRS 'Challenger' in March and April and gave several readers new 'wet' squares. G1SWH worked him in IO56 on 15 March, IO96 on 4 April and JO06 the next day. Gerry also worked his friend Bob Nixon in IN78 when he was signing F/G1KDF.

Steve Smith, G1WYC (LCN), worked squares JN48, JN49 and JO30, 31, 43, 46 and 51-53 in the 10 April aurora, best DX being DL8SCO (JN48), all with just 10W to a 12-element Yagi at 12m AGL. G3BJ spent some time on the band on 10 April and John's QSOs included FB1NZQ (JN18), OZ2KZR/P (JN89), SP6GZZ (JO81), DJ6LV (JO31), OK1DFC (JO60), PA3BZO (JO21) and the best DX of the day, SP5AAS (KO02). The event faded in Cumbria at 1900.

John Palfrey's, G4XEN (NHM), first auroral QSO of 1990 was with GM0CLN (DGL) on 25 March, but the 10 April event was "... something special." Using CW, between 1525 and 1759 he worked 43 stations in ten countries and 25 squares. Best DX were HG1YA (JN87), RB5PA (KO21), HG5PT and HG7AJ (JN97), YU2SB (JN95), YU1s EXY, AFS, EV and IO (KN04), HG8CE (KN06), HG0HO (KN07) and I1KTC (JN45). On the 12th, F/DJ4UF (JN33) was John's first new square since last October.

On 1 April, G6HKM worked LX/ON1KPW/P (JN29) and on the 5th, GW0KZG/MM (JO06) was a new square. In the 10 April aurora, Ela worked 20 squares in IN, IO, JN and JO fields. GU3EJL called her on the 13th and said he had lost all his antennas in the storms on 25 January; to this day, Stan has not found his 430MHz antenna!

Darrell Mawhinney, GI4KSO (DWN), reports auroras on 12, 18, 20, 21, 25, 26, 29 and 30 March, the last starting at 0830. The 10 April event brought QSOs with DL, PA, Y, YU, SP, OE, OZ, ON, LA and HB9 as well as 'locals.' Best DX were OE3JPC (JN88), YU3ZV (JN76), SP9HWY (JO90) and OK2KZT/P (JN99). In the 10 April event John Lincoln, GM0JOL (HLD) worked 35 stations, 22 of them new, including ON4AFU (JO10), Y23QD (JO62) and DL6NAA (JO50). He heard OK2TU (JN79) but couldn't make a QSO.

GM4DJS enclosed magnetograms from his two home made magnetometers covering the 10 April aurora. The unsettled conditions started on the 9th and the radio event was first heard at 1150 on the 10th. The traces illustrate the violent oscillations in the ensuing 15 hours. He wonders if there was a visual event as well? His log shows 42 QSOs with eleven countries, best DX being SP6GZZ.

430MHz

Not a great deal of UHF news this time. G1SWH worked F/G1KDF but didn't mention the date. G6HKM's best DX was Paul Pasquet, G4RRA (SRY), on SSB and FM on 6 April! G8ESB monitors 432.200MHz weekday evenings, 1800-2100, from North Yorkshire, so perhaps a call in his direction might be profitable. He also monitors 1296.200MHz at the same time.

GI4KSO says that readers may like to know that GI4EIZ in Belfast, has a sked with EI6AS in Dublin on 432.210MHz on Monday evenings from 2000 local time. They would welcome calls from other stations. The only trouble is that their beams would be aiming north/south so there wouldn't be much chance of mainland stations hearing them unless they turned their antennas round.

DEADLINES

The deadline for August is 23 June and for September, 21 July. With so many new countries available on 50MHz, there should be some interesting Es to report very soon. Let's hope that 1990 will be a good year for Es on 144MHz, too.

SWL

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SPOILT FOR CHOICE!

April was most certainly a month that DXers will remember for some time, with so many DXpeditions available for everyone to log, and work. I do, of course, refer to the KH5J, S2, ST0 and 1S0 expeditions which many listeners seem to have noted in their logs. 3W3RR certainly did a fine job from Spratly Is, and was probably the one which was the most audible. The team which activated Jarvis Is were reported on 21 and 14MHz, while the S2 trip by a group of JAs always seemed rather weak, and there were actually very few reports of the ST0.

Established listeners will remember for all the wrong reasons the last trip to Spratly when several German operators lost their lives. This latest one seems to have passed without such incident, and the operator, Romeo, did many a big favour by putting a good signal around the bands. The Jarvis trip was popular, and was an especially good signal on 14MHz when heard by yours truly, because the operators were filled with hope that the DX Advisory Committee would recommend the addition of the island to the DXCC countries list. This is because the Jarvis and Palmyra Islands are separated by another DXCC country, Kiribati [*I wonder why it has taken so long to recognise this fact?...*]. Several well-known operators, including OH2BH, were in the team, so they must feel it's got a good chance of success. If not, credit will be for Palmyra — KH5. The QSL route is OH2BN. S21U was the callsign aired by a group of Japanese amateurs who were working in Bangladesh as part of a 'radio technical assistance team'. The ST0 trip was mentioned in this column several months ago, so listeners should not have been surprised when PA3CXC/ST0 appeared. I personally missed this one, but only needed it on 7 and 3 MHz, where the skip to that part of Africa did us no favours.

QSL INFORMATION:
A61AD via WB2DND
C39OF via C31OF
CI7U via VE7UBC
CQ7M via G3PFS
CZ7Z via VE7ZZZ
EL2CX via N2AU
EX8M via UM8MO
HD1T via HC1OT
HI5OOUD via HI3UD
HU1A via YS1MAE
J8OA via JL3UIX
LS1H via LU1HM
LT4F via LU5FCI
OB4ZV via OA4ZV
P35S via 5B4ES
PJ4A via K2SB
PQ2DX via PY5TT
PS2A via PT2BW
PT5T via PT2BW
RX9J via UC2ABA
TE0UP via KC7YN
XM5FX via VE5FX
YW1A via YV1AVO
ZP0Y via ZP5JCY
ZW5B via PY5EG
ZX5C via PY5CC
ZY0FX via W9VA
ZZ4Y via PY4OY
4T4DX via OA4OS
4X8MR via VE3MR
6I7CQ via XE2TCQ
8Q7ZL via DK3ZL

ELSEWHERE ON HF

With this rare DX around, it was good that band conditions showed something of a peak. At the end of March, for example, 28MHz appeared 'dead' most of the time. There had been further activity from XU, with 8DX and 8CW active. The operators were the Hungarians that gave us all 3W and XV. They had hoped to be operational from Burma, but it appears that they could not swing that one. However, many listeners appear to have heard them, especially as XW8DX on SSB. The QSL information is F2YS/W2, Jacques Pecourt, Box 1384, Millbrook, New York 12545, USA. The other activity from Bangladesh in April was courtesy of K5VT, signing S20VT. Let us all hope that the paperwork was in order. Other goodies mentioned included KH8/VK2EKY from American Samoa, a colossal signal on 21MHz by all accounts, and CY0SAB from Sable Island. A51JS was renowned DXer Jim Smith, whose signals into Europe were quite weak, but several listeners heard him.

That should have dealt with the 'real' DX situation during the latter part of March and most of April, but there were plenty of reports of 'mediocre' DX too. Once again, I shall choose the best of this DX that was mentioned in your letters to frame this particular part of the column. In doing so, let me thank BRSs 1066, 8841, 25209, 25429, 40292, 48462, 62088, 90281, 92255,

1990 HF TABLE

Station	DXCC	28	21	14	7	3.5	1.8	Total
BRS25429	244	165	179	204	170	103	51	872
BRS8841	227	137	154	168	127	95	47	728
BRS25209	—	66	70	71	114	73	43	437
BRS1066	129	67	68	86	84	43	36	384
BRS52543	125	43	37	45	102	70	24	321
BRS32525	113	56	34	64	33	23	—	210
BRS40292	—	29	17	31	33	24	8	142
G1VDW	—	21	17	57	14	11	—	120
BRS92755	59	—	—	59	—	—	—	59

Perhaps some of the listeners who provided so much information this month to this column would like to consider submitting an entry for the table?

92658, 92755, G1EMD and G1VDW for their contributions. Reported on 28MHz were A45ZN/0 (Kuria Muria), BZ4ROM, FR5CN, FT5XH, HS0AIT, G4WYG/ST2 (QSL direct only to G4OHX), S01EA, TL8WD, TU2UI, TZ6VV, V31UK, V51BG, ZS9A (Walvis Bay), ZZ0TA and 4S7WP. Stations picked from 21MHz logs include BV2VA, N6VMW/DU8 (Cagayan Sulu), FR4AE, HS0E, WD6CVB/HZ, J28SI, TU2QQ, VP8BXK (Signy Is), VS6GX, YC9VX/8 (Sula Is), 3X1SG and 9L1US (ex J52US).

On 14MHz, there was, as usual, a great deal of DX to be heard, including A41JR, FO0IGS, HF0POL (Polish base on the South Shetlands), HS1BV, P29VMS (Ninigo Is), PZ1EL, T32BP, TL8WD, UA0/GB4MSS, V29OA, VP2EXX, VP2V/HB9CJD/MM, VP8AOR, XE1OT, XW8KPL, ZD8DB, 3B8FV, 5H0T, 5V7DP, 9K2KD and 9M8FH.

The LF bands had not provided too much in the way of real DX, but A92BE, HH2Z, ZF2OZ, ZL1AXQ, and 3C1EA were noted on 7MHz, while FP8DX, ZL4AP and 7X2BK were recorded on 3.5MHz.

DX NEWS

Listeners might be interested to know that Y21RO is a member of the third GDR Antarctic Expedition which is now signing Y90ANT until next March. The station is located on Georg Forster Research Station, which is located near the Soviet Novolasarevskaya Base at 70° 46' South and 11° 51' East. Likely frequencies are 3503, 3790, 7003, 7045, 14010, 14190/290, 21010, 21190/290, 28010 and 28490kHz. QSL's are via Y21RO or via the Y2 bureau.

Listeners will be aware that from 1 January the Soviet Arctic Islands were allocated 4K prefixes. It might be of interest to provide more information. Any 4K0 callsigns will be floating ice islands, 4K1 is allocated to Antarctica, Franz Josef Land is 4K2 (4K2OT), other European Arctic Islands will use 4K3 (eg 4K3MI to be active from Morzhovets Island from 4-20 June), while Asian Arctic Islands have been assigned the 4K4 prefix (eg 4K4BAN).

Inside DX notes that there has been a change in the QSL route for N4NW's African operations. Cards should now be sent to KC4NC. Those already sent to AL7EL or N4NW have been forwarded to KC4NC. It seems that from 31 December this year any QSL request for any of N4NW's 1982-89 African DX operations will be returned to you. Best check now that you are not waiting for cards from any of these operations, otherwise you had better try again before it is too late — TN4NW, 9Q5NW, TL8TG, ZS6USA, 7P8DE, TU73, 5V7NW and 6W8/N4NW. It is best to enclose an SASE when requesting cards from KC4NC.

G4IRG wrote to inform readers that he is the QSL Manager for S79EHT and S79MST. There had been a delay in replying to QSLs because the cards were not up to scratch. However, to avoid further delay he was proposing to send them out during April.

WEIRD PREFIXES

Argentina — LO5E, LP3F, LQ8DX, LQ18DX, LQ21DX, LS1H, LS6E, LV1D and L5Y.
Paraguay — ZP0Y, ZP7Y.
Dominican Republic — HI500UD.
El Salvador — HU1A.
Ecuador — HD1T.
Costa Rica — TE0UP.
Peru — 4T4DX, OB4ZV.
Brazil — PQ2DX, PQ4OD, PS2A, PT5T, ZY0FX, ZZ1NEZ, ZZ5JR, ZZ4Y.
Venezuela — YY3A, 4M1G, 4M3B, 4M5Y.
Italy — IE8A, IG1A, IL3A, IQ9W, IZ2W, IZ4C.
France — FV1O, TM2T, TM5a.
USSR — EX1A, EX3A, EX8M, EX9B, R6L, RX9J, UM0MO.
Cyprus — P35S.

WPX CONTEST QSL ROUTES AND WEIRD CALLSIGNS

Every year the WPX weekend provides some wonderful prefixes. With thanks to G1EMD and DXNS, I hope that readers will find the table above useful.

FINALE

There you have another SWL Spectrum Analysis. A reminder that the next two deadlines are earlier because of holidays. Please note the dates, they are Monday 18 June and Monday 9 July.

ICOM

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

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

IC-4SE 70cm. version available

Actual Size

Slim and unbelievably compact.

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

Simple design for operating convenience.

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

Other advanced features:

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

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

Options

- **BA-11, Bottom Cap.** Protective cap for terminals on the base of the IC-2SE.
- **Battery packs and case.**

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

- **BC-72E, AC Battery Charger.** Desk top charger for the BP-81 - BP-85.
- **CP-12, Cigarette lighter cable with noise filter.** Allows you to use the IC-2SE through a 12V cigarette lighter socket. Also charges the BP-81 - BP-85.
- **FA-140BB, 144MHz flexible antenna.** Flexible antenna for 144MHz band operation. Same type supplied with the IC-2SE.
- **HM-46, Speaker/Microphone.** Combination speaker and microphone equipped with an earphone jack. Clips to your shirt or lapel.
- **HS-51, Headset.** Headset with VOX function that allows you hands-free operation.
- **Carrying Cases.**

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

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

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THE COMPACT HANDHELD WITH A SPLIT PERSONALITY

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

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

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

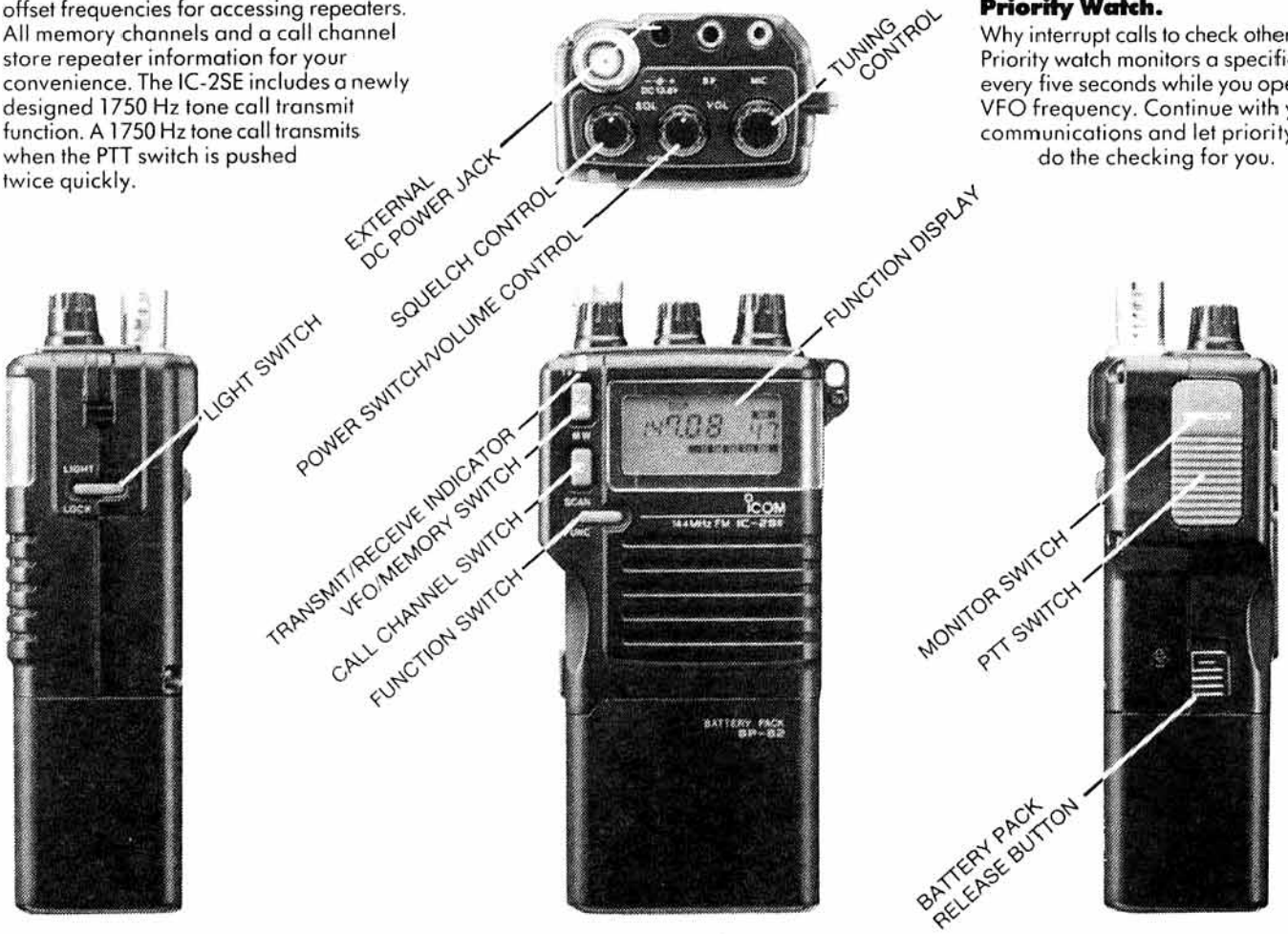
Power Saver for longer operating time.
The power saver ensures lower current flow during standby conditions. Operating times are much longer than with older, more conventional transceivers.

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

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

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

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



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TECHNICAL TOPICS

PAT HAWKER G3VA

FLEXIBLE CW AUDIO FILTER

Albert Roehm, W2OBJ in '75Hz-wide audio filter' (*Ham Radio*, January 1990) presents a simply-constructed CW filter with several novel features: **Fig 1.** In brief, the 741 is wired as a dual feedback bandpass amplifier with a Q of 10 and a gain of 4. With this Q only one rather than the several stages of most op-amp active filters is used but with an arrangement to counter 'ringing'. The result is a sharper and improved shape factor, according to W2OBJ. R1 adjusts the centre frequency to match the receiver offset (typically 700-800Hz) and can be pre-set unless your rig has BFO adjustment. The second stage is a comparator (one section of an LM339) whose output is low if the signal applied to pin 5 is lower than the bias on pin 4. The flat top of the passband guards against ringing because pin 2 remains at a constant high level. R2 varies the bias (threshold) level of the comparator, determining the bandwidth. A second section of the LM339 is used to adjust the comparator's bias. Its input is connected to the first op-amp to sense the same audio signal and threshold setting (points X and Y). The output switches an LED to indicate threshold setting; the LED follows the incoming code signals which may, or may not, help you read the code. R3 provides a volume control, with R4 providing any required blend of unfiltered to fully-filtered audio.

IMPLEMENTING VEROBOARD LAYOUTS

Chris Budd, G0LOJ has found the following procedure a useful way of designing Veroboard layouts from circuit diagrams. He writes: The system consists of producing a grid of black lines on a large sheet of white paper (preferably A3-size paper) to mimic the pattern of tracks and holes on the Veroboard in such a way that each hole corresponds to the centre of a square cell of the pattern, and then following this procedure:

(1) Place the sheet 'pattern side down' on top of a sheet of white paper of the same size. Unless the paper chosen is unusually thick, it will be possible to see the pattern through the paper.

(2) Mark the component positions, the necessary track breaks and the necessary wire links in pencil on the **blank** side of the sheet using a mixture of conventional circuit-diagram symbols and outlines of the shapes of components. I have found it useful to:

(a) Mark track breaks faintly (in case they have to be erased later) in pencil.

(b) 'Temporarily-isolate' each device as it is added to the drawing with a set of track breaks which can be erased later if necessary. This trick makes it much easier to keep track of what is supposed to be connected to what.

(c) Number the pins of each IC as it is added to the drawing.

(3) When all the devices, track breaks and link wires have been marked, place the sheet on a wooden surface and use a sharp instrument to pierce the paper at the centre of each track break.

(4) Turn the sheet over and mark each track break (now identified by a small hole in the paper) in pencil on the pattern.

(5) Cut the Veroboard to size, and make the necessary track breaks on the Veroboard on the basis of the markings on the patterned side of the drawing.

(6) Now turn the drawing over (ie patterned side down) and place it against a light surface so that the pattern of tracks, the positions of the devices and the positions of the wire links can all be seen at once. Assembly is then straightforward.

The necessary patterned sheets of A3 paper may easily be produced with a ruler, an ink pen and a photocopier. Though the idea is very simple, I have found it extremely effective and a great saver of both Veroboard and temper!'

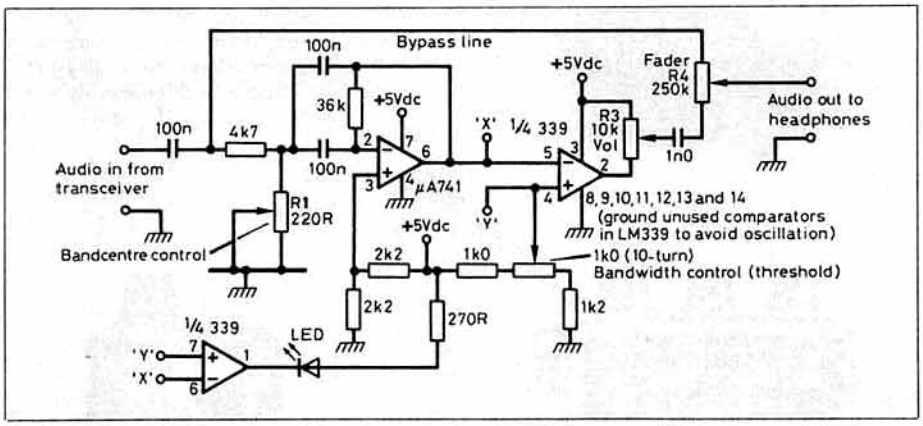


Fig 1. Circuit diagram of W2OBJ's narrow-band audio filter (*Ham Radio*)

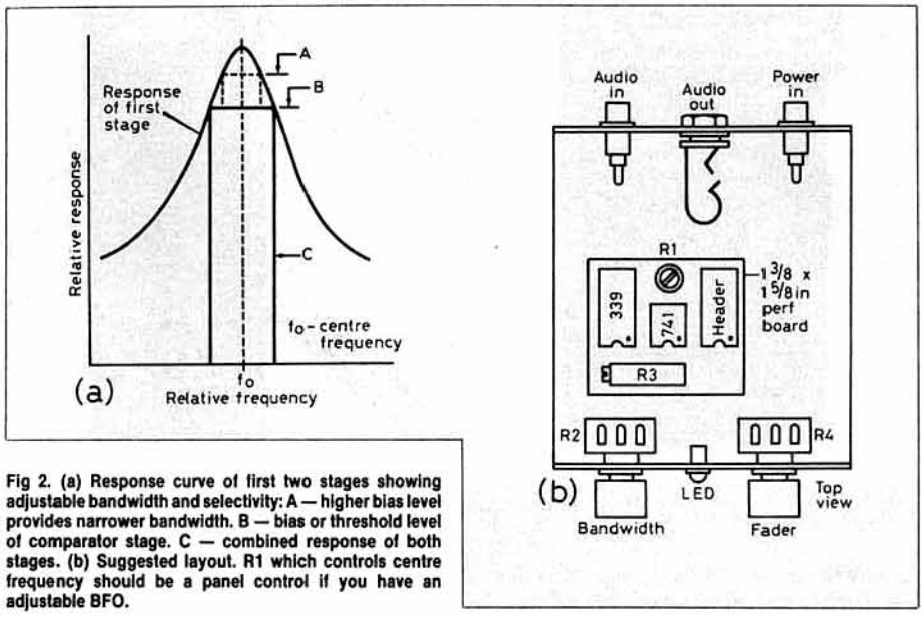


Fig 2. (a) Response curve of first two stages showing adjustable bandwidth and selectivity: A — higher bias level provides narrower bandwidth. B — bias or threshold level of comparator stage. C — combined response of both stages. (b) Suggested layout. R1 which controls centre frequency should be a panel control if you have an adjustable BFO.

THE MECHANICS OF STABLE OSCILLATORS

S M Dyke, G3ROZ comments on the continued difficulty of implementing a KISS approach when it usually ends up with having to make a band-switched VFO stable enough above 20MHz to permit satisfactory SSB operation: 'Anybody who thinks *that* is simple either hasn't tried or has a guardian angel smiling down on him. With the temperature variations found in a garden-shed shack it is very difficult; for mobile operation near-impossible. I have tried often with varying degrees of non-success!

As *TT* has noted before, a major problem with any LC oscillator, no matter how loosely the resonant circuit is coupled to the amplifying device(s), be it valve or solidstate, is the temperature-coefficient of the tank circuit components, particularly the coil. 'Pol' Parrott, G3HAL noting the February *TT* comments on the original Franklin master oscillator (as used for many years in the Marconi range of 'SWAB' high-power HF transmitters) points out that their high stability depended as much on the mechanics as on the electrics. As described and illustrated in the classic '*Short Wave Wireless Communication*' book by Ladner and Stoner, the Franklin master oscillator was built around an elaborate arrangement designed to provide self-compensation of the resonant circuit against temperature variations. Few people would attempt to implement such an arrangement today (with the ready availability of ceramic capacitors having a variety of temperature coefficients both positive and negative). Briefly it depended on the selection of materials used in the coil former/mounting so that as the coil warmed up (increasing its inductance) an end plate moved away from a second plate reducing the capacitance. In the late 1920s and 1930s a number of temperature-compensated inductors were developed; see, for example, chapter 9 of '*Theory and design of valve oscillators*' by Dr H A Thomas (Chapman & Hall, 1939), a book which also gave detailed information on the mechanical properties of dielectric materials used as coil formers etc. The Marconi Franklin oscillators were used in transmitters that had to meet an overall stability of better than ±1 in 25,000 from which, as G3HAL points out, we may infer that the stability of the Franklin oscillator with its mechanical tuned circuit was better than this.

G3ROZ decided to investigate how Rowley Shears, G8KW and his firm KW Electronics succeeded in making reasonably stable VFOs in the valve era — despite being a firm that eschewed high-cost 'one-off' components and systems. He looked inside his KW Atlanta VFO and found that the formers appeared to be cut-down electric fire elements! He writes: 'You have to hand it to KW Electronics. What a perfect off-the-shelf former for a high-stability VFO. Oh, they had been cut down to nearer 'coil former' lengths and were likely to have been made specially as coil formers for KW but, none the less, they looked as though they had come straight from the Belling Lee

factory! Mind you, the firm had still worked hard to achieve good stability. One trimmer had five different temperature compensation capacitors across it! But the 'Belling Fire' former is a tip worth noting. Try the car boot sales!'

24MHz DUAL-LOOP HALF-SIZE CHIREIX-MESNY

In view of recent items on the classic Chireix-Mesny antenna (*TT*, February and April) with its arrays of half-wave dipoles arranged in squares (each square 2-λ perimeter), I was interested to note in 'Ham Radio Techniques' by Bill Orr, W6SAI (*Ham Radio*, January 1990) a 24MHz antenna described as a 'dual quad-loop antenna' but which could equally well be considered as a half-size Chireix-Mesny array using ¼-λ rather than ½-λ sides: **Fig 3.** Such a design would be effective also on even harmonic bands, eg a 24.9MHz double-loop would probably work well on 50MHz.

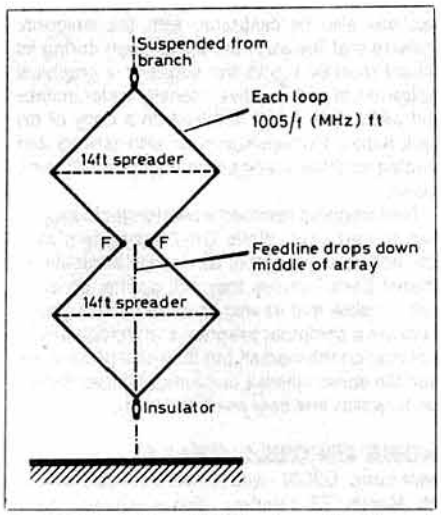


Fig 3. K4BLT's dual-loop 24.9MHz antenna. This is in effect a half-size Chireix-Mesny array on 24.9MHz and should work as a full-size array on 50MHz.

W6SAI writes: 'A single vertical quad-loop makes an effective antenna. It has the radiation pattern of a dipole and provides an additional gain of approximately 1.2dB. The quad loop has a very broadband response and a feedpoint impedance of about 120 ohms. Place two of these loops in phase and feed them at the common point, and you have Jeff O'Connell's K4BLT dual-quad loop antenna. Jeff's antenna is cut for the 12-metre (24.9MHz) band. It's suspended from a branch of a pine tree. Two oak spreaders, 1¼-in square and 14ft long form the diamonds. The pattern is bidirectional and the gain is estimated to be about 3.5dBd. Polarisation is horizontal.

'The antenna is fed at the centre with a coaxial line. The feedpoint impedance is very close to 50 ohms. The line is wound into an RF choke at the feedpoint. The choke consists of four turns of coaxial 5-in in diameter. This helps keep RF off the outer shield. Bring the line down the middle of the array, as shown.'

MORE FET AMPLIFIER HINTS

Roberto Craighero, I1ARZ was interested to see in *TT* (February 1990, p30) the IRF511 8-watt and IRF530 50-watt FET power amplifiers stemming from Wes Hayward, W7ZOI and Jeff Damm, WA7MLH as originally published in the 'Technical Correspondence' column of *QST*, November 1989. Additionally W7ZOI also used the IRF511 in the 10-watt add-on booster for his 1 watt SSB/CW transceiver, as noted in the April *TT*. I1ARZ wrote to Wes Hayward seeking some constructional information on the IRF511 amplifiers. In reply,

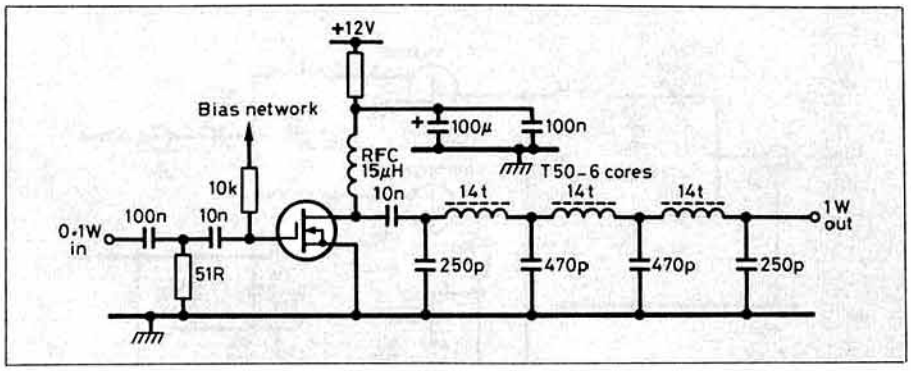


Fig 4. The 1-watt output stage of W7ZOI's compact 14MHz transceiver using IRF511 FET. Corrected by W7ZOI from a diagram in November 1989 *QST*.

W7ZOI provided some helpful ideas which I1ARZ feels may be of interests to others now keen on exploiting these relatively low-cost devices. W7ZOI wrote:

'The FET amplifiers are very simple and not especially critical. Jeff and I always use PCB material for our circuits. However, the boards are rarely etched. Instead, the board is used merely as a low inductance ground. An IRF511 is mounted on a small heat sink which is then fastened to the board with insulated hardware. The source lead is soldered directly to the board, maintaining a short lead length. Lead lengths are kept short elsewhere, but are not as critical as the source lead. We usually build using "ugly" methods, as described in an article that my son and I wrote and published in *QST* in August, 1981.'

WTZOI's 1981 'ugly' concept, as noted in *TT* May 1982, is based on the use of 'old-fashioned' point-to-point wiring rather than the use of etched PCBs. He confessed that 'The one place where I find etched boards to be worthwhile is for circuits containing many digital integrated circuits which are terribly boring to build without a PCB. Even there I have used "ugly" methods for many digital projects. The DIP IC devices are placed on a ground plane, like a dead beetle with legs pointing upward. Some pins are bent to hit the ground foil and soldered. Others are soldered to bypass capacitors. The combination then fixes the "pills" in place, providing support for the rest of the circuitry. About half of the frequency synthesiser I use in my present (1982) receiver is built this way.' For many 'one-off' and prototype experimental projects etched PCBs are an unnecessary complication and make it more difficult to introduce changes and modifications. This, of course, is not to deny the usefulness of PCBs to constructors wishing to duplicate exactly published designs rather than to evolve their own.

But to continue with W7ZOI's reply to I1ARZ: 'While the "ugly" methods work well, perforated board should **never** be used in RF applications unless it is the only thing available. Scrap circuit board material is preferred. The ferrite core is not too critical in the amplifiers that Jeff and I have built, for we are not operating at high power. The transformers are easy to build if you are only transforming down to 12 ohms from a nominal 50 ohms. We usually use the Amidon FT-37-43 core, or something similar.

'Note that there was a mistake in the November 1989, *QST* article. The correct transformer winding is shown in Fig 1, *TT* February 1990 for the 8 watt amplifier. The December 1989/January 1990 *QST* articles on the SSB transceiver had the basic box running 1 watt output with an IRF511 with an external amplifier delivering about 10 watts. There was a missing resistor in the 1 watt RF power amplifier in that rig. The correct circuit is shown in **Fig 4**. It should be possible to get 1.5 watts (as desired by I1ARZ) from this amplifier if you increase the standing current from the 25mA I used to perhaps 35 or 40mA, and if you use a slightly modified output network. The output filter I used presents 50 ohms to the drain. Design a double pi network that, instead, presents about 30 or 40 ohms to the drain. No output transformer is needed in such a low power amplifier. My amplifier peaks at about 250 to 300mA, although the average current is lower. The IRF511 is really very easy to use and I'm sure you will have no trouble.'

20W PUSH-PULL FET LINEAR FOR 50MHz

In *TT* (May 1990) it was noted that the Siliconix VN88AF and VN88AFD power FETS are capable of giving useful output above 30MHz despite the high input capacitance of such devices. With a push-pull pair of VN88AF devices, V P Hill, GW4HDF obtains a useful 20 watts output from a 30V supply line when driven by a 500mW output transverter. He writes:

'After completing the transverter, it was necessary to build an amplifier to boost the linear RF output. The prime requirement was to achieve lowest possible cost without excessively compromising performance. Consideration was given to the popular combination of 2N6080 driver and 2N6082 power amplifier, as used in a number of well-known 50MHz designs. However the combined cost of these two bipolar devices would have been over £30. My choice fell on the VN88AF VMOS FET which is capable of switching 2A in five nanoseconds with a maximum dissipation of 15 watts, readily available at around £2 per device. As noted in the May *TT*, for a maximum power output and efficiency, a supply line of 30V is required,

SWITCH-TRICK

There are quite a few applications where it is essential to switch one circuit 'on' before another. **Fig 5** shows one way of doing this: whichever double-pole switch is closed first, circuit A-A will be completed before circuit B-B since B-B requires both switches to be closed. Similarly, whichever switch is turned 'off' first, circuit B-B will be broken first. The idea comes from an item in the Russian magazine *Radio* (2/90) although, with a Russian text in the Cyrillic alphabet, I have no idea what application the writer had in mind for this switching arrangement.

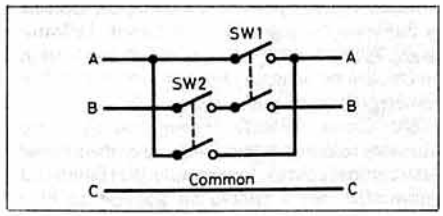


Fig 5. A switching arrangement that ensures A-A is always "on" before B-B and "off" after B-B.

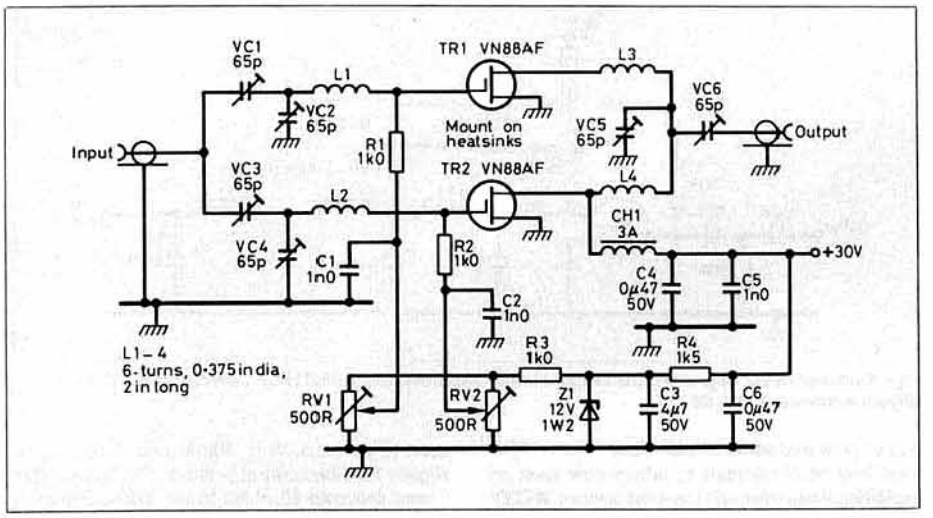


Fig 6. GW4HDF's 20-watt push-pull VN88AF FET linear for 50MHz

although the devices will work at 12V with substantially reduced output. The circuit I used was evolved from information supplied by Siliconix: **Fig 6**.

'The amplifier was built on a piece of double-sided copper-clad board measuring 5in by 3.5in. Both sides are used as a groundplane and must be shorted together in as many places as possible. Insulated posts were used as component lead supports. Layout is left to the individual constructor, but as in any VHF project lead lengths should be kept as short as possible.

'For alignment, a dummy load is connected via a power meter to the output socket and a 30V supply connected. VR1 and VR2 are adjusted for 100mA quiescent current per FET. Drive is applied to the input socket and VC1 to VC6 adjusted for maximum output. Drive is then increased until the power meter measures 15 watts, VC1 to VC6 are again adjusted for maximum output, with the current now of the order of 1A. If a spectrum analyser is available, VC1 to VC6 should be adjusted for lowest intermodulation distortion (IMD) at maximum output.

'This amplifier design has been in service at GW4HDF for about a year without any problems being experienced. Reports over the air have been good, and no adverse comments received. But, as with any amplifier, the output signal can only be as good as the signal put in. Care must be taken to avoid overdriving the amplifier; this is easily done since only about 500mW of drive is required for full output. A 144MHz version has been designed and constructed using similar VN88AF devices. In this case, neither efficiency nor gain is as high as for the 50MHz amplifier; however 10 watts output has been obtained with an input of 2 watts.'

D-I-Y GRAY-LINE GLOBES

In *TT* (August 1989, p36), Colin Horrabin, G3SBI drew attention to the value of Columbus Verlag 'planet earth' globes in enabling an amateur to determine the times and dates during which "gray-line" (dawn-dusk, dawn-dawn and dusk-dusk) propagation paths are likely to open between the UK and specific parts of the world — paths of particular importance to those seeking DX contacts on the lower-frequency MF/HF bands. Unfortunately, 'Planet Earth' globes, although available in the UK, are not exactly cheap — with the 13.5-in diameter model priced at some £130.

John Cronk, G3MEO, finding that there are some very reasonably priced internally-illuminated plastic globes sold by, for example, W H Smith and Woolworths, felt it should be possible to fit a shield in such a way as to cast the correct night-time shadow and so form the basis of a d-i-y gray-line globe.

He writes: 'Initially, I hoped to fit the shield inside the globe. In practice I was not able to install a suitable mechanism through the lamp hole. But having started this train of thought, I realised a very simple alternative by which the gray-line throughout the year can be visualised, as well as some other useful amateur-radio data. It is simply a suitably marked-out cardboard disc on which the base of the globe is positioned. The principle can be used with any globe provided it has the tilted (23°) type of mount. 'Construction: A pointer mark is required on the base in line with the support arm, eg the direction to which the North Pole tilts. This is used to set the date. The cardboard disc, which has a second disc glued concentrically as a centring guide, should be marked out in months, weeks and even days (forget leap year!). Start by marking the summer and winter solstice (June 21 and December 22) and the vernal and autumn equinox (March 21 and September 22). These marks will be at right angles to each other. Then fill in the rest of the dates with January to December running anti-clockwise: see **Fig 7**.

'Next, calibrate the globe around the equator in GMT. Start with 1200 on the Greenwich meridian, 1100 to the right (Africa) and 2400 on the International Date Line. These times can be marked with the aid of suitably prepared labels, and it is also useful to mark these labels so that the international time differences can be read off: ie 1300 (-1), 1400 (-2) etc to 2400 (+12) etc. I found some suitable printed labels by cutting up a small map from an old pocket diary. Incidentally, the longitude lines on my globe were 10° apart but the hourly marks must be positioned 15° apart. As a final check on the geometry, when the date pointer is set to June 21, the North Pole should be enjoying 24 hours of daylight.

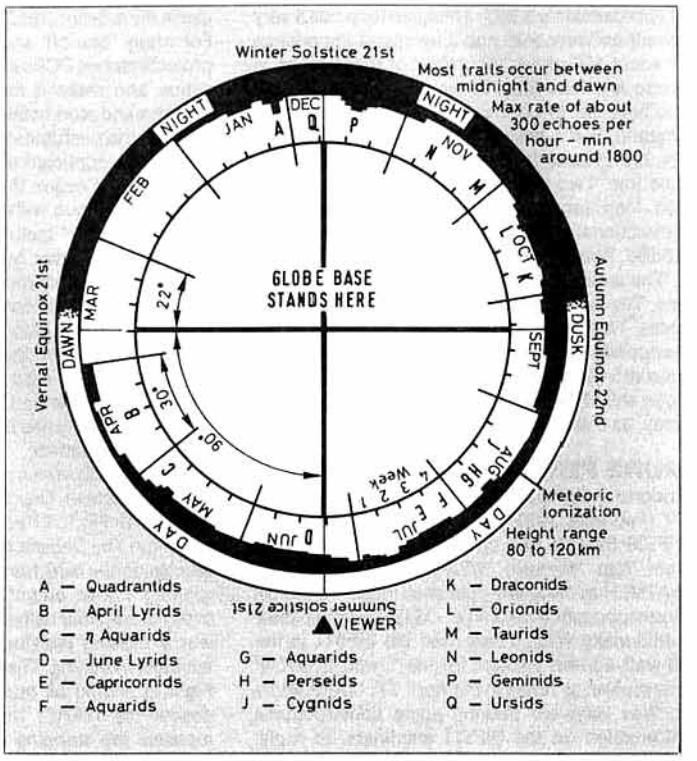
'*Operation:* The disc is placed with the summer solstice line (June 21) facing the viewer whose eye should also be at the centre height of the globe. The base pointer is set to the appropriate date and the time mark (GMT) should face the viewer. Dusk will be in line with their vernal equinox and dawn the autumn equinox. A ruler placed vertically at these points initially may help but it is quite easy to visualise the illuminated area of the earth. The disc can also be calibrated with the meteorite showers that the earth passes through during its annual journey round the sun and a graphical indication of their relative intensity (rate), names and other data. Fig 7 is based on a copy of my Mark II disc. Perhaps someone with artwork and printing facilities could prepare and run off some copies.

'The foregoing comments take longer to explain than to carry out. While D-I-Y gray-line globes may not be as precise or as visually attractive as "Planet Earth" globes they will do the job quite well. I realise that as well as the gray-line globes there are a computer program and a clock-driven wall map on the market, but they cost much more than the above scheme and I doubt if they can be run forwards and backwards as easily.'

MORE ON GELL CELLS

Dave Lunn, G3LSL, with reference to the item in the March *TT* ('Battery power system' p30), supports ZS6UY's advocacy of float-charged car batteries in the shack as a sound approach to powering either HF or VHF equipment, adding: 'One useful tip, which avoids any risk of a leaking battery case causing damage to carpets or floor-boards is to stand the battery in a plastic bucket.

Fig 7. How GW3MEO lays out his rotatable disc for the D-I-Y gray-line globe.



DIRTY DC CHARGING OF DISPOSABLE BATTERIES

M Clift, G3UNV draws attention to a recent write-up on a new battery-charger being marketed by Wellgood Electronics that is claimed 'to put new life into disposable dry zinc-carbon and manganese-alkaline batteries, allowing them to be re-used several times.' Although the magazine suggests this is a 'new invention' with the charger using 'a carefully-controlled DC current, modulated by a special wave to avoid conditions which lead to either evolution of gas or enhanced zinc electrode corrosion' one cannot help feeling, as G3UNV points out, the basic principle may well reflect the 'dirty-DC' type of charging, as advocated for zinc-carbon (Leclanché) dry batteries as long ago as October 1955 (*Wireless World*). This article noted that dirty-DC charging originated in the Netherlands. Joe Cropper, G3BY, brought the idea to the notice of *TT* readers in the 1960s (subsequently included in *ART*) when he reported that he had found the system very effective in reactivating the lantern-type cycle batteries, that he used on the old 'Low power Field Day' contests, up to five times using a very simple mains-charger with no filter capacitors, half-wave rectification and a resistor (200-250-ohms) wired across the diode: **Fig 8.** But, as far as I am aware, the item on the Wellgood charger is the first to point out that this approach also applies to high-energy manganese-alkaline cells.

In *ART*, I coupled the notes on dirty-DC charging with some advice from the US National Bureau of Standards which noted that, even without a dirty-DC waveform it is usually possible to recharge carbon-zinc batteries (this was issued before alkaline batteries had become established) in some circumstances, provided that care was taken to avoid the risk of explosion of sealed cells:

(1) The operating voltage on discharge should not be below 1.0V per cell when the battery is removed from service for charging.

(2) The battery should be placed on charge very soon after removal from service.

(3) The ampere-hours of recharge should be 120-180 per cent of discharge.

(4) Charging rate should be low enough to distribute recharge.

(5) Cells must be used soon after charging as the recharged cells have poor shelf life.

NBS added: 'In general, recharging of dry cells may be economically feasible only when quantities of dry cells are used under controlled conditions with a system of exchange of used cells for new ones already in practice, and with equipment available to provide DC for charging. Recharging of cells which are not specifically designed for charging can be dangerous since excessive amounts of gassing from too high current may cause a tightly sealed cell to explode.'

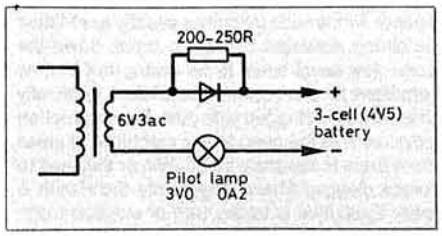


Fig 8. Simple "dirty-DC" charger for reactivating Leclanche-type dry batteries. Values shown for 4.5V three-cell lantern-type battery.

While in the long-term, rechargeable nicad or lead-acid cells are the most economical way of powering hand-held transceivers and similar equipments, the high cost of nicad battery packs mean that dry cells are often used; where this is the case the possibility of getting perhaps five or more charge cycles must make dirty-DC charging very attractive: similarly for many of the portable HF 'short-wave broadcast' portable receivers and 'scanners' which can sink a lot of current. Running costs of over 20p/hr are common for such receivers. The sales departments of battery makers tend to dismiss as 'impossible' the idea that you can recharge dry batteries — but they would wouldn't they?

The Wellgood recharging unit is designed so that popular sizes of cylindrical dry cells can be inserted between spring clips. It is stated that 'the technique will apparently not work with poorly-made batteries, or with those that have been fully discharged over a long period. Voltage characteristics of recharged dry batteries differ from those of the original cells, and internal resistance can actually be reduced after about five cycles.'

Most of the standard-sized car batteries of around 50Ah capacity will fit snugly inside the rectangular plastic buckets on sale in any hardware shop.

The March *TT* also discussed briefly the cylindrical 'Cyclon' rechargeable Gel-type sealed lead-acid cells with thin pure lead grids coated with lead-oxides and separated by an absorbent, fibreglass mat: **Fig 9.** This type of cell/battery, made by Gates Energy Products Inc in the USA, is marketed in the UK under various brand names including Chloride, RS etc. Such cells form the basis of a six page article by W Max Adams, W5PFG 'Briefly Speaking: Gel Cell Batteries' (*CQ*, February 1990) based in part on information from Gates. This form of sealed lead-oxide cell provides a nominal 2V (disconnect load when this drops to 1.6V) and are available in the UK with capacities (based on ten hour discharge rate) of 2.5Ah (dimensions 61mm high by 35.5mm diameter) 5Ah (46mm by 72.5mm dia) and 25Ah (158mm by 67.4mm dia). Typical discharge curve shown in **Fig 10**.

W5PFG provides information on typical constant-voltage chargers, including fast chargers for returning a discharged cell to full capacity in less than four hours. He makes the point that lead acid batteries can enable a station to remain on the air, at least for a short time, during a power cut or in an emergency, enabling an operator to report into a regular net or keep a scheduled contact. He writes: 'A $5.00 fleamarket Gell Cell bargain battery is only a trivial investment to keep several thousand dollars of whistles and bells tooting and ringing in case of emergency! Six D-size 5Ah Gell Cells provide over one hour of intermittent transmit/receive power for both my Kenwood 7950 (7Ah load) and 144MHz repeater (6.5Ah load).'

It should always be remembered that Gell Cells, like other high-energy cells, are capable of delivering dangerous short duration currents and care must be taken to prevent direct short circuits which can result in excessive cell heat, burns, fire or explosions. Although 'sealed', Gell Cell batteries should be operated in a well-ventilated environment. Do not wear metal rings or metal watch straps etc when working on powered equipment (short circuits can result in serious burns to the wearer).

As with nicad batteries, there can be problems with Gell Cell batteries brought about by relatively small differences in the capacity of the individual series connected cells: discharging a cell completely, to zero volts, can cause polarity reversal; this can usually be overcome by making several complete, normal charge/discharge cycles.

When more than four cells or batteries are operated in parallel, steering diodes and individual fuse protection should be provided. The arrangement shown in **Fig 11** is advocated by W5PFG who writes: 'The charge diode and fuse prevents shorted cells from shunting and accepting all the charge current; the discharge diode prevents shorted cells from discharging other parallel-connected cells. The fuse rating is selected by I(F) = 2I(C)max/X(B) where I(F) is the individual fuse current rating in amperes; I(C) is maximum charge current in amperes; and X(B) is the number of parallel-connected batteries.

'When a number of cells are charged in series, use a C/500 maximum trickle rate where C is the capacity of the cell (battery) in ampere-hours. Since the same current flows in all the series-connected cells, trickle charging tends to balance the charge of each cell. For standby power applications, Gell Cells should be maintained at 2.35V (±0.05V) with float (trickle) charge. Rates

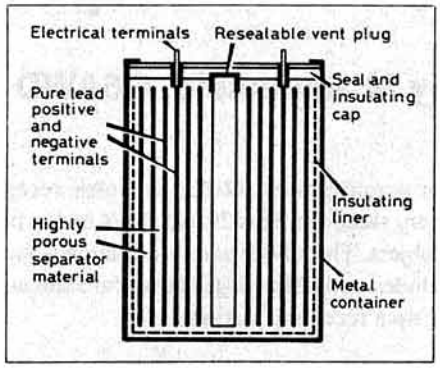
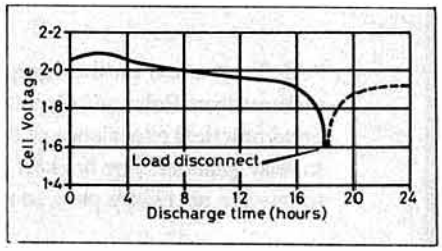


Fig 9. Typical construction of a Gel Cell.

Fig 10. Typical discharge curve of a Gel Cell.



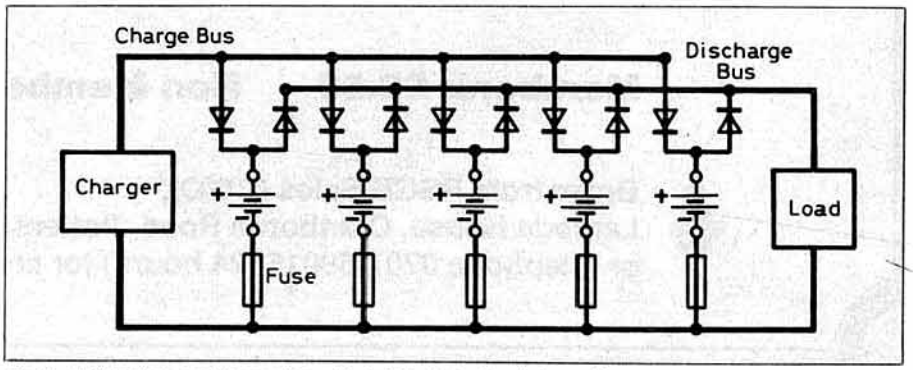


Fig 11. Multi-battery parallel operation with individual steering diodes and fuses.

above 2.4V per cell should be avoided in order to prevent excessive plate corrosion. An overcharge rate of 0.001C is sufficient to maintain a 2.35V charge, after a high charge rate is complete.'

OZONE NO-GO-ZONE

Not so many years ago one could still find among the electronic devices on the consumer market a number of 'ozone generators', reflecting the idea that ozone was associated with the bracing atmosphere of the seaside where a similar odour to ozone is produced by rotting seaweed: ozone, 0_3, is an unstable form of oxygen in which the molecule contains three rather than two atoms. It is generated during high-voltage electrical discharges, for example during thunderstorms. But, far from being beneficial to health, ozone is now recognised as a toxic gas. Exposure for two hours to concentrations as low as 1.5 parts per million may result in coughs and excess production of sputum; while 30 minutes in 50ppm can even be fatal!

New Scientist (7 April 1990, p26) draws attention to the fact that desktop laser-printers and xerographic copying machines both produce ozone since both rely on high-voltages to make the toner stick temporarily to a print drum before its transfer to paper. While such machines usually have filters containing activated carbon to break down the ozone, few users seem to be aware that in time these filters tend to become less efficient, especially if they become clogged with dust. Few instruction books warn of the need to use machines in areas where there is adequate ventilation or the need to replace clogged filters. Apparently the Health & Safety Executive is taking further steps to make this problem known to office-workers and to encourage makers to give more information on replacing filters.

This matter could be of concern to those radio-amateurs who use a laser-printer in a relatively small and possibly poorly ventilated shack. If you smell that 'seaside' atmosphere watch out!

HERE & THERE

J G Wroe, G4IUJ writes: 'If there is anybody else out there still grinding or etching crystals they may be interested in the method I use to calibrate them. I removed the 4.194304MHz (2^{22} Hz) crystal from a quartz clock and wired the crystal of unknown frequency in its place. This made the clock run at the wrong speed. By allowing the clock to run for about 24 hours and comparing clock-elapsed-time with real-elapsed-time, the frequency of the crystal can be calculated: Crystal frequency (Hz) = elapsed time on clock multiplied by 2^{22} divided by elapsed real time.'

P Harrad, G8UN was not impressed by the reaction of the local BT field engineer to his complaint that after having his old dial-type, carbon-microphone telephone replaced by a push-button 'Tribune' plug-in instrument, he found that every time he transmitted on 3.5MHz the new telephone rang unless he reduced power to under about 10 watts. The BT engineer brought his investigation to a singularly unsatisfactory conclusion by claiming: 'It's your equipment that's at fault — it wants suppressing'. G8UN then solved the problem by simply removing the telephone plug while transmitting. More recently he wired a telephone extension socket in his kitchen (a run of about 14m) and then discovered that, even without the extension phone being plugged in, the original problem vanished. He wonders whether the extra wiring could be acting as some sort of a stub? Nothing else has been changed. My own guess is that the leads may be acting as a bypass capacitor. □

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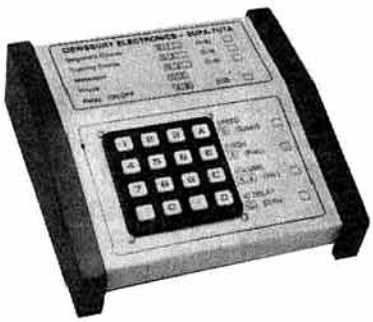

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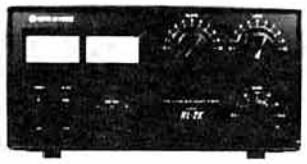

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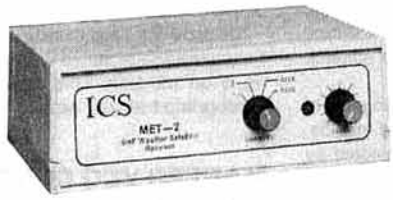

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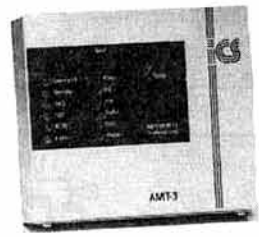

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VISA Access

The G4WIM dual-bander

PART 2

Tim Forrester, G4WIM, continues his description of this sophisticated transceiver

MULTIMODE IF

On receive the signal from IC2 is routed to the first IF amplifier TR15, via D8 which is turned on during reception (see **Fig 4**). The IF signal is amplified and presented to F1.

F1 is an FM filter with a -3dB bandwidth of 15kHz, which also acts as a 'roofing filter' on SSB receive. After the IF signal has passed through F1 it splits two ways. One path is to TR16 for SSB filtering and reception, while the other is to TR21 for further amplification prior to FM demodulation in IC4.

On SSB reception, after the signal has been further amplified in TR16 it is passed onto F2, which is the SSB filter. TR17 and TR18 complete the SSB IF amplification, while TR19 and TR20 form the receive AGC circuitry.

IC3 is a conventional Plessey balanced modulator, used here to demodulate the IF signal. The BFO signal generated by TR23 and TR24 is applied to pin 3, and the audio appears at pin 5.

The required BFO frequency is generated by either XL2 or XL3, depending upon which sideband is selected. However, note that the band in use will determine which crystal generates either LSB or USB. This is because on 50MHz the local oscillator is above the signal frequency, so causing an inversion of the SSB signal. Therefore to generate USB on 50MHz, LSB has to be generated at the IF frequency. The correct selection of BFO frequency is catered for by a relay on the audio circuit board.

The SSB receive signal is amplified and filtered in IC5b. It is selected in preference to FM by D13 being forced to conduct the signal through to TR26.

In the past I had been unhappy with the performance of audio-derived AGC systems and broadband IF amplifier ICs, so therefore in this design I chose to use discrete components in the IF circuits so that I could have total control over the AGC characteristics. As a result the receiver exhibits a very smooth AGC action, with no tendency to momentary overload on strong signals.

On FM receive the IF signal is mixed down to 100kHz in IC4 with crystal XL1. IC4 is a PLL-type FM demodulator and also provides the squelch signal for both FM and SSB reception.

The demodulated FM signal appears on pin 8 of IC4, and is further amplified and filtered in IC5a. Like the received SSB signal, FM is selected by forcing D12 to conduct, so passing the signal onto TR26 which acts as an audio gate, blocking the received audio path when the squelch is not lifted.

On SSB transmit (**Fig 5**) the signal from the microphone is amplified and filtered in IC7 prior to being applied to IC8, which generates a DSB signal at pin 5. This DSB signal is amplified in TR27 before being converted to SSB in F2. The SSB signal emerging from F2 is amplified in TR17, before being routed to the transmit converter via D9. Note that TR17 is used on both transmit and receive, the only difference being that it has AGC applied on receive to gate 2, while on transmit it has ALC applied to gate 2.

On FM transmit the audio signal is further filtered and amplified in IC9a, before it is limited to prevent over-deviation. D18 and D19 form a simple but effective limiter. After the signal has passed through the limiter it is filtered in IC9b before being used to frequency-modulate the oscillator stage formed by TR28. RFC13 (actually a 10.7MHz IF transformer) is a means of adjusting the FM modulator for best linear operation. D21 routes the FM transmit signal to the transmit converter.

IC6 provides a regulated 8V for the IF, while RL4 switches an 8V signal to the mode switch when the rig is on transmit. This signal then powers the appropriate transmit exciter.

MASTER VCO CONTROL CIRCUIT

The circuitry required to control the master VCO on the transmit/receive converter may at first look overwhelming, but when broken down into its separate functions becomes very straightforward (see **Fig 6**).

The basic resolution of the PLL is 100Hz, with 10Hz interpolation being achieved by slightly pulling the PLL reference oscillator. This enables a 'true' VFO feel to be achieved without the usual slight frequency hops which can be heard with

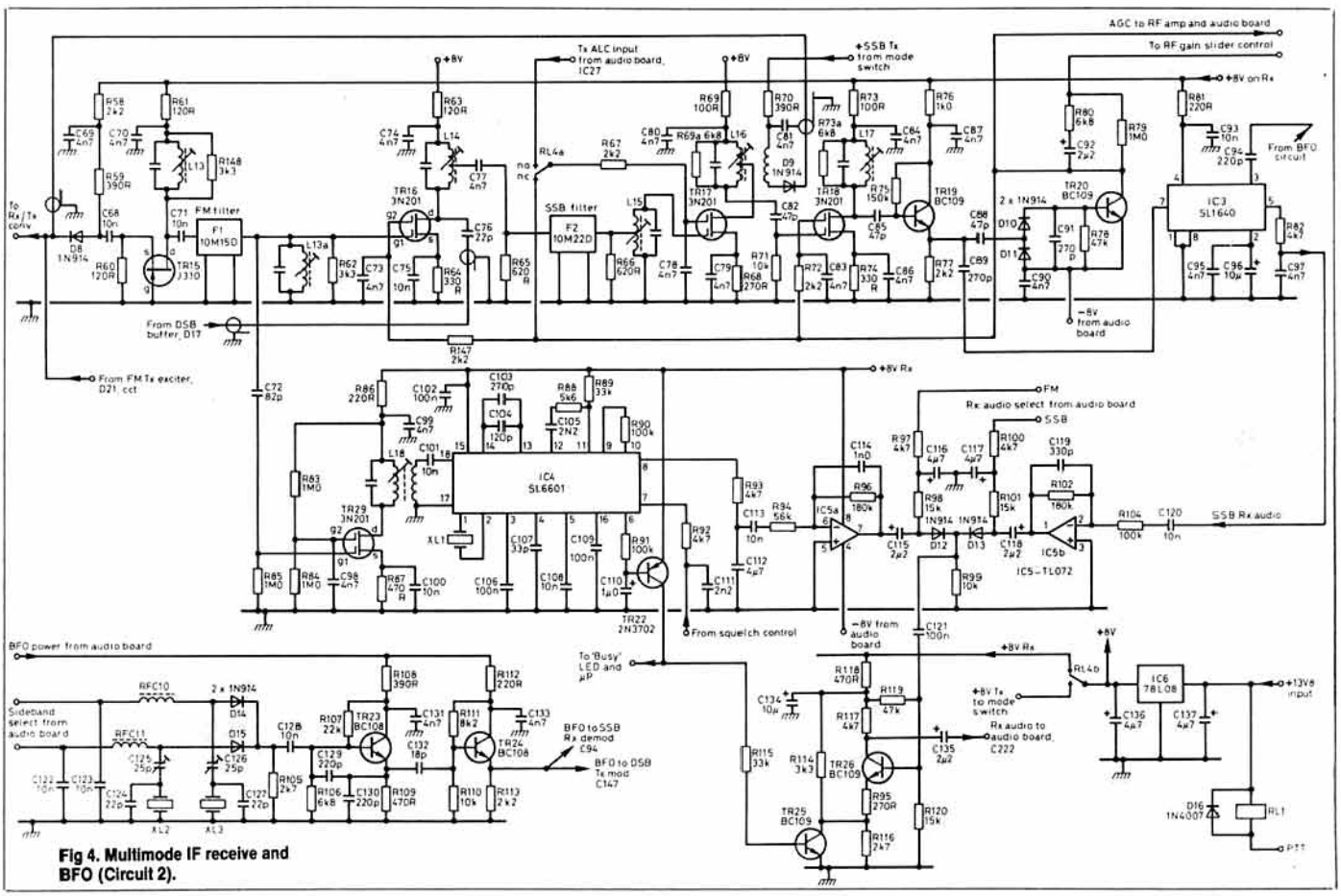

Fig 4. Multimode IF receive and BFO (Circuit 2).

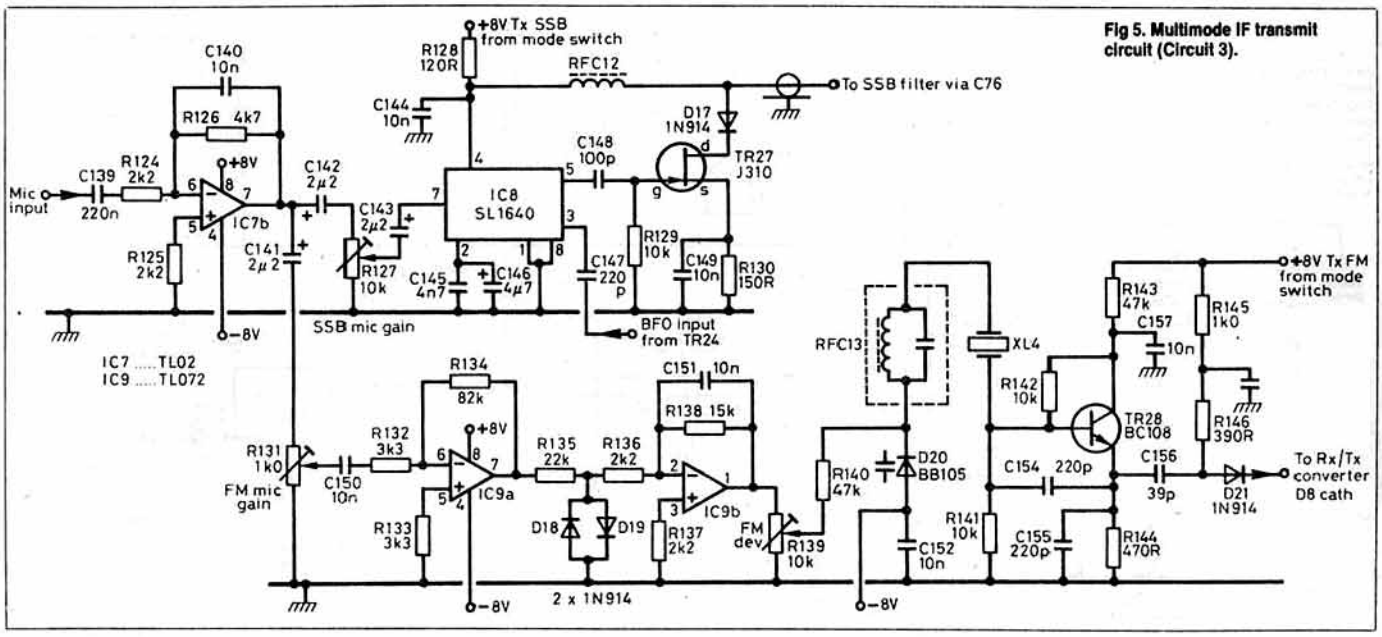

Fig 5. Multimode IF transmit circuit (Circuit 3).

only 100Hz resolution. The technique used to generate this degree of resolution is widely used both in amateur and professional equipments, however during the past two years or so direct digital synthesis of frequencies up to about 70MHz has become possible. This new technique offers very much greater resolution (usually down to 1Hz or less) and has a capacity for very low phase noise indeed, but at the present time very few radios employ this technique, presumably due to the still relatively high price of the digital circuits.

This design uses a total of three phase-locked loops, each serving a particular function, and when operating as a whole provide the required performance with respect to resolution, phase noise and frequency accuracy.

Operation of PLL 1

The first PLL is the circuit associated with VCO 1. This VCO covers 20 to 20.99MHz in 10kHz steps, which is simply achieved by taking a sample of the VCO output from TR30 emitter and mixing it down to within the frequency range of IC20. For example, if VCO 1 is to be phase-locked to 20MHz, then this 20MHz signal is mixed with the reference frequency of 10.24MHz in IC16. The resulting signal of 9.76MHz appears on pin 5 of IC16, and is subsequently filtered and amplified by C212, RFC15, C214, TR37 and TR38.

This signal of 9.76MHz is then divided by 976 (N = 976) in IC20 to produce a 10kHz signal which is phase-compared with an internally generated 10kHz reference. Any phase error between the 10kHz reference and the VCO signal generates a phase error signal at pin 4 of IC20.

This error signal is then filtered and buffered by the components associated with IC21, before being used to correct the frequency of VCO 1 to (N x 10kHz) + 10.24MHz. If, instead of 976, 977 were programmed into IC20, then the resultant frequency would be 20.01MHz, i.e. 10kHz higher.

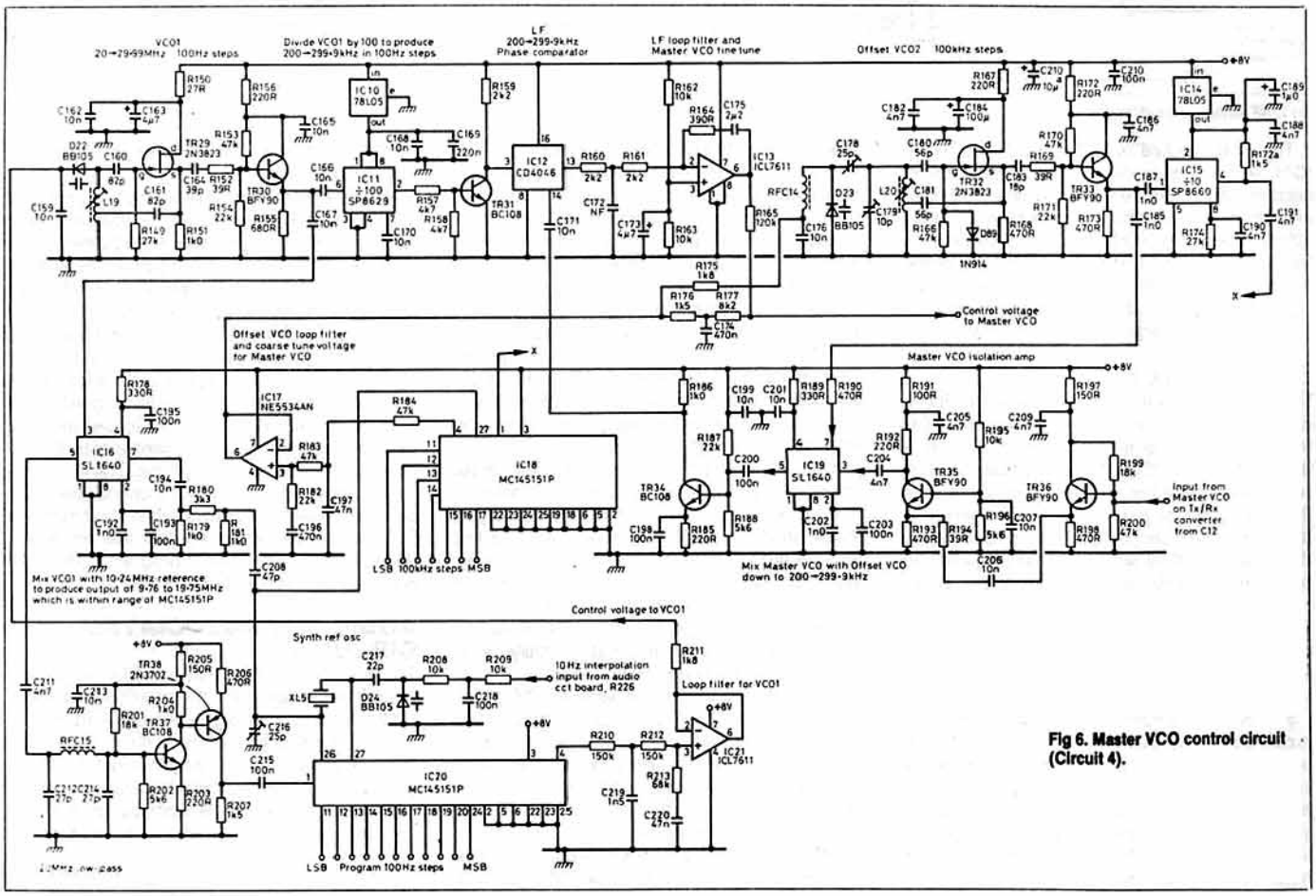

Fig 6. Master VCO control circuit (Circuit 4).

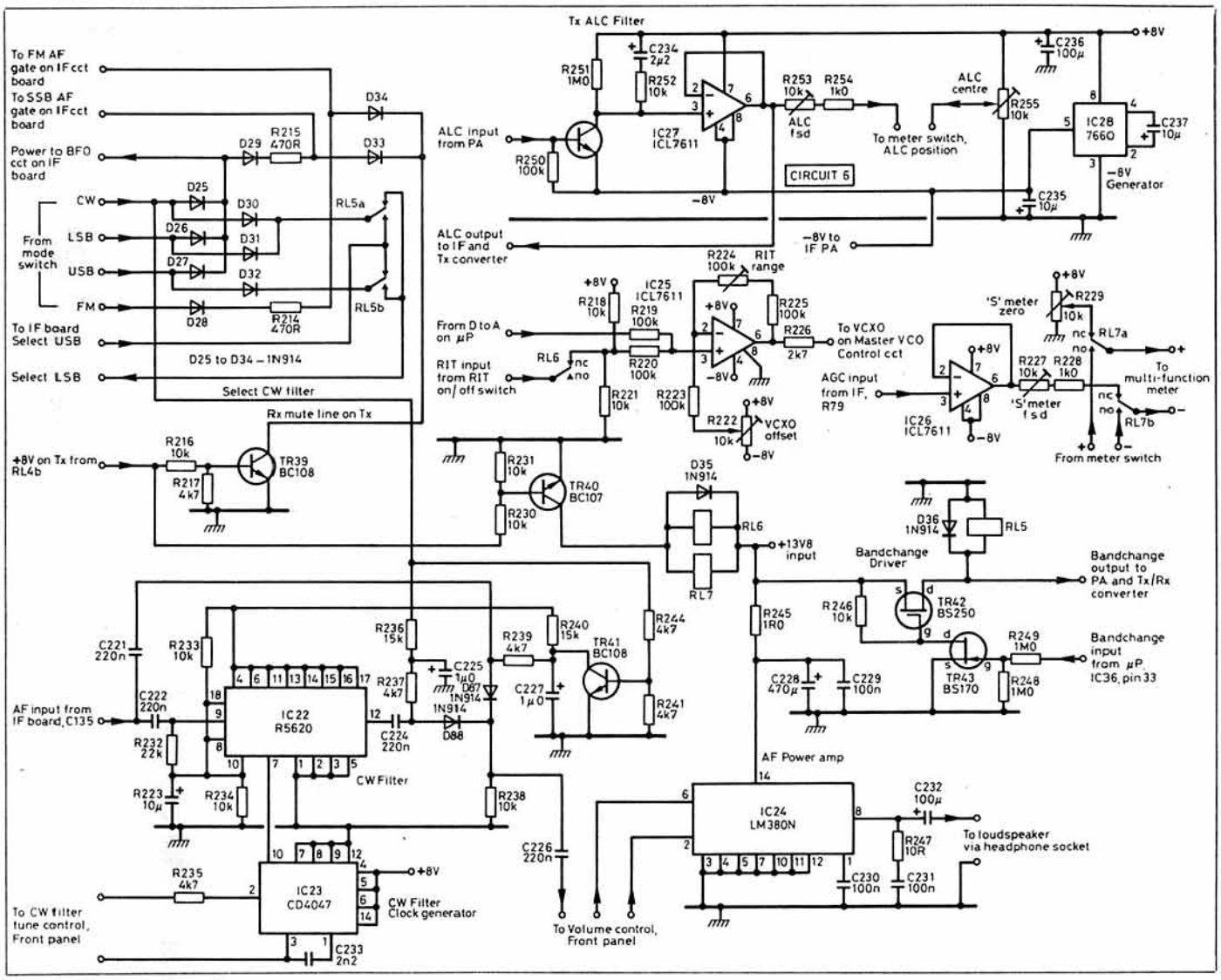

Fig 7. AF circuit board (Circuits 5 and 6).

The phase-locked output of VCO 1 is fed to IC11, where it is divided by 100. Hence 20MHz becomes 200kHz and 29.99MHz becomes 299.9kHz, and instead of the frequency step size being 10kHz, it becomes 100Hz. A bonus of dividing the frequency by 100 is that it also divides any phase noise present by 100. This means that this LF signal is very pure and can be used to provide the 100Hz resolution required.

Operation of PLL 2

VCO 2 PLL works in a similar manner to PLL 1, except this time, instead of mixing the VCO frequency down to within range of IC18, it is divided by 10 in IC15. Assuming that PLL 2 is required to operate on 60.5MHz, then a sample of the VCO 2 signal is taken to IC15, where it is divided by 10, so becoming 6.05MHz. IC15 passes the signal onto IC18, where it is divided by 605, so becoming a 10kHz signal. As before any phase error between the VCO signal and the internal 10KHz reference produces an error signal on pin 4 of IC18. This error signal, after it has been filtered and buffered by IC17, is used to correct the frequency of VCO 2 to exactly 60.5MHz.

However, if the number programmed into IC18 is changed to say, 606, then VCO 2 has to shift up by 100kHz to maintain phase lock with the internal 10kHz reference. The control voltage of VCO 2 is also used as a coarse tune voltage for the master VCO. This is to ensure that the master VCO is initially in the right frequency range to ensure rapid lock-up of the master loop.

Operation of the master VCO PLL

Assuming that we want to operate on exactly 50MHz, then the first local oscillator must be on 60.7MHz. A sample of the master VCO frequency is taken from the transmit/receive converter PCB, and fed to TR36 and TR35 where it is amplified and buffered prior to being fed to IC19.

IC19 is a mixer, and the master VCO is mixed with the signal from PLL 2, which needs to be on 60.5MHz in this case. The difference frequency between PLL 2 and the master VCO appears at pin 5 of C19. This frequency should be 200kHz, and is amplified in TR34, before being phase-compared with the 200kHz signal from PLL 1.

IC12 is a simple PLL IC and only the phase comparator part is used. The 200kHz signal from PLL 1 is fed to pin 3, while the master VCO signal mixed down to 200kHz (by means of PLL 2 and IC19) is fed to pin 14. Any resulting phase error signal appears at pin 13, and is then filtered in IC13. This error voltage is summed with the coarse tuning voltage from the VCO 2 control voltage line, and so ensures that the master VCO is accurately maintained on 60.7MHz.

To tune the receiver up the band in 100Hz steps, the frequency of PLL 1 is gradually increased to a maximum of 29.99MHz (299.9kHz), so forcing the master VCO up in frequency by the exact same amount. When the radio has been tuned to 50.0999MHz, i.e. up by 99.9kHz, PLL 1 has reached its maximum frequency; to tune to 50.1MHz PLL 1 resets to 200kHz, and instead PLL 2 moves up by 100kHz to 60.6MHz. Again this forces the master VCO to move to 60.8MHz to maintain phase lock.

IC20 is the same type of device as IC18, but IC20 is used as the master reference oscillator, with XL5 being the crystal reference of 10.24MHz. This signal of 10.24MHz is divided down by 1024 in both IC20 and IC18 to provide the 10kHz reference signals for PLL 1 and PLL 2 respectively.

The frequency of XL5 can be varied slightly to give an interpolation down to 10Hz, by means of D24. Fortunately the microprocessor takes care of generating the appropriate numbers for IC18 and IC20. All the operator has to do is to tune the radio by means of either the tuning sensor or by the up/down buttons on the microphone. The microprocessor serves several other functions which will be described later. However, when I first built this PLL system, the microprocessor was not operational, and I therefore had to program IC18 and 20 manually to check that all was well.

AUDIO AND ASSOCIATED CIRCUITS

This circuit board (**Fig 7**) ties up all the 'loose ends' which don't happily fall into any other category.

The received audio signal from the IF PCB is fed to IC22, a switched capacitor filter. The centre frequency of this filter is set by the clock generator IC23, whose frequency can be adjusted by the CW filter tune control on the front panel. If CW is selected then D32 is forced into conduction, so

(Continued on p48)

RSGB QSL Bureau

The purpose of the Bureau is to facilitate the exchange of QSL cards between RSGB members and other radio amateurs. Most national radio societies operate such a bureau, some making an extra charge for this service. The RSGB provides it as a free service, though only members may make use of the outgoing service. Use of the bureau is probably the cheapest way of sending cards in these days of high postal charges.

How the QSL Bureau Operates:

Your Outgoing Cards

All cards for distribution should be sent to the RSGB QSL Bureau at Headquarters. There is no limit to the number of cards which may be sent at any one time.

When the cards arrive at the bureau those destined for abroad are sorted into countries and despatched in bulk to the appropriate overseas QSL bureaux, most of which are operated by members societies of the International Amateur Radio Union.

Cards for stations within the UK are sorted into call-sign groups, each of which is in the charge of a sub-manager whose task it is to associate the cards sent to the sub-bureau from the main QSL Bureau, with the envelopes which are on file.

Sending Cards Through the Bureau

Choose QSL cards which do not exceed normal post-card size, viz 5.5" x 3.5". As packets going abroad are sent open-ended at Printed Paper Rate, large cards invariably have to be folded, whilst small ones and those of a thin nature are difficult to handle.

Print the addressee's call-sign on both sides of the cards, together with the call of his QSL manager, if applicable.

Separate cards destined within the UK from foreign-going ones. Sort all cards alphabetically by prefix. Sort USA cards into call areas. When a QSL Manager is involved, sort under *his* callsign. Do not space cards with markers etc. Pack cards adequately, and the same way up. Pack them with the correct postage prepaid.

Collecting Cards from the Bureau:

Your Incoming Cards

Supply your sub-manager with stamped self-addressed envelopes of a suitable size and strong material.

Print your call-sign or RS number in the top left hand corner of each envelope.

Envelopes should be numbered and "Last envelope" marked on one so that it is known when a fresh batch is needed.

Envelopes are not normally returned until full weight has been reached for the postage paid; those wishing to receive cards at more frequent intervals should mark their envelopes "Wait 6" etc.

An up-to-date list of names and addresses of sub-managers is available from HQ on request. Changes to the list are broadcast on GB2RS.

General notes

1) Licensed UK amateurs who are non-members of the RSGB may send stamped addressed envelopes to their sub-manager for collection of their cards, but they may not send cards for distribution.
2) Cards for amateurs who have neglected to send envelopes are retained for three months, after which the cards are destroyed. Amateurs who do not wish to collect cards should notify the QSL Bureau accordingly.
3) Amateurs who operate from a part of the United Kingdom which has a different prefix should deposit envelopes with the appropriate sub-manager for the different prefix. For example a G7 station who operates temporarily from Wales and who wishes to receive cards should leave envelopes with the GW7 submanager.
4) Overseas members of RSGB in countries where there is no QSL service operated by the IARU member society for that country, may send their cards to the RSGB QSL Bureau for distribution.
5) Overseas members who are not members of the RSGB may send cards addressed to UK stations only, direct to the RSGB QSL Bureau.
6) The facilities of the RSGB QSL Bureau are available both to transmitting and receiving members of the Society. Listeners are reminded, however, that their reports should contain sufficient information to be of genuine value to the transmitting amateurs concerned. Reception reports relating to short-wave broadcasting stations cannot be accepted.

All QSL cards and correspondence relating to the RSGB QSL Bureau should be sent to the QSL Bureau Manager at RSGB Headquarters.

Adhesive address labels are available free of charge on receipt of a stamped addressed envelope.

Envelopes for the collection of cards and correspondence concerning incoming cards should be sent to the appropriate sub-manager.

Now that Ted and Aileen Allen have retired, Please remember that *all* QSL cards now go to:

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See the next page for a list of RSGB QSL Bureau Sub-managers.

RSGB QSL Bureau Sub-Managers

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G0BAA-BZZ ..... Mr M J Cuckoo G6ECM, 15 Fair Oaks, HERNE BAY, Kent CT6 6EU

G0CAA-CZZ ..... Mr P Jobson G3HLF, 52 Old Road West, GRAVESEND, Kent DA11 0LN

G0DAA-DZZ ..... Mr J F Purvess G0FWP, 14 Hunger Hills Drive, Horsforth, LEEDS, LS18 5JU

G0EAA-EZZ ..... Mr R Jobson G4ZYW, 37 Rushdene Road, BRENTWOOD, Essex CM15 9ET

G0FAA-FZZ ..... Mrs A Burchmore G0ARQ, 49 School Lane, Horton Kirby, DARTFORD, Kent DA4 9DQ.

G0GAA-GZZ ..... Mr N P Roberts G4KZZ, 79 Mellowdew Road, COVENTRY CV2 5GP

G0HAA-HZZ ..... Mr J T Macrae G4DXI, Park House, 1 Highsted Road, SITTINGBOURNE, Kent ME10 4PS

G0IAA-IZZ ..... Mr C J Webb G4JFF, 68 Higgs Field Crescent, Cradley Heath, WARLEY, West Midlands B64 6RB

G0JAA-JZZ ..... Mr J A Towle G4PJZ, 63 Digby Avenue, Mapperley, NOTTINGHAM NG3 6DS

G0KAA-KZZ ..... Mr K Draycott G3UQT, 28 Ladywood Road, Kirk Hallam, ILKESTON, Derbyshire DE7 4NE

G0LAA-LZZ ..... Mr C Lennox G4LXU, Blazefield House Farm, Blazefield, Pateley Bridge, HARROGATE, North Yorks. HG3 5DR.

G0MAA-MZZ .... Mr R Veale G4LEA, 6 Grantson Close, Brislington, BRISTOL BS4 4NA.

G0NAA-NZZ ..... Mr E G Allen, G3DRN, 30 Bodnant Gardens, WIMBLEDON, London SW20 0UD.

G1 series ..... Mr P Storey G0BDF, 16 Spencer Road, LUTTERWORTH, Leics LE17 4PG

G2 Series ..... Mr C H Adams RS10906, 4 Park Gate Gdns, LONDON SW14 8BQ.

G3AA-ZZ ..... Mr L Adams G4RKV, 2 Reculver Lane, Hillborough, HERNE BAY, Kent CT6 6SP

G3AAA-DZZ ..... Mr C A Bradbury BRS1066, 13 Salisbury Ave, CHELTENHAM, Glos. GL51 5BT

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G3WAA-XZZ ..... Mr F Rylands G2VF, 39 Parkside Ave, Millbrook, SOUTHAMPTON SO1 9AF

G3YAA-ZZZ ..... Mr I Batley G0IID, 3 Folldon Ave, Fulwell, SUNDERLAND, Tyne & Wear SR6 9HP

G4AA-ZZ ..... Mr L Adams G4RKV (address under G3AA)

G4AAA-AZZ ..... Mr D Roebuck G0LJM, 23 Alexandra Road, SHIPLEY, West Yorks BD18 3ER

G4BAA-BZZ ..... Ms L Harper G4FNC, "Three Oaks", Braydon, SWINDON, Wilts SN5 0AD

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G4DAA-DZZ ..... Mr D Buckley G3VLX (address under G3RAA)

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G4JAA-JZZ ..... Mr J A Towle G4PJZ (address under G0JAA)

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G4LAA-LZZ ..... Mr C Lennox G4LXU (address under G0LAA)

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G4NAA-NZZ ..... Mr M Musgrave G4NVT, 49 Vowler Road, Langdon Hills, BASILDON, Essex SS16 6AQ

G4OAA-OZZ ..... Mrs J Rhodes G8LRT, 2 Spring Mount, Spring Bank, New Mills, STOCKPORT SK12 4BQ.

G4PAA-PZZ ..... Mr D Hollingworth G0AMH, 182 Hythe Crescent, SEAFORD, Sussex BN25 3UA

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G4UAA-UZZ ..... Mr P Godfrey G8ULU, 16 Thornden Close, HERNE BAY, Kent CT6 7RT

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G4WAA-WZZ ..... Mr L Gaunt G4MLV, 31 Moat Hill, Birstall, BATLEY, West Yorkshire WF17 0DX

G4XAA-XZZ ..... Mr S R Tyler G4UDZ, 2 John Court, HODDESDON, Herts EN11 9LZ

G4YAA-YZZ ..... Mr D J Newbury G0ENR, 8 Mayfield Road, PERSHORE, Worcs WR10 1NW

G4ZAA-ZZZ ..... Mr J Densem G4KJV, "Cotswold", Startley, CHIPPENHAM, Wilts SN15 5HG

G5 & reciprocals .... Mr L Adams G4RKV, (address under G3AA)

G6AA-ZZ ..... Mr F Harris G4IEY, 4 Merestones Dr, The Park, CHELTENHAM, Glos GL50 2SS.

G6AAA-ZZZ ..... Mr D & J Brooks G4IAQ & G4IAR, 28 Avon Vale Rd, LOUGHBOROUGH, Leics LE11 2AA

G7AAA-ZZZ ..... Mr D J Hudson G6OVO, 62 Derron Avenue, South Yardley, BIRMINGHAM B26 1LA

G8AA-ZZ ..... Mr F Harris G4IEY (address under G6AA)

G8AAA-ZZZ ..... Mr J F Purvess G0FWP, (address under G0DAA)

GBxAAA-MZZ ..... Mr M W Stoneham G4RVV, "Hafnia", 139 Hever Avenue, West Kingsdown, SEVENOAKS, Kent TN15 6DT

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(GM1,6,7 & 8) ..... Miss Karen Hunter GM0JHE, 160 Tresta Road, GLASGOW G23 5DE

(GM2AA-GM2ZZ) .... Mr J T A Johnston GM3LYY, The Dolphins, Montgomerie Drive, FAIRLIE, Ayrshire KA29 0DZ

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The "j" operator and impedance

Clive Smith, G4FZH, explains the uses of this mathematical tool in circuit analysis

INTRODUCTION

Readers may have come across impedance expressed in the form a + jb; this may mean something to some readers whilst it probably means nothing and is somewhat baffling to many others. The purpose of this article is to explain in SIMPLE terms what it is all about. Please do not "get turned off" because it contains some mathematics, it's all very simple — really! This article is *not* meant as a mathematical treatise on the subject and covers, for sake of simplicity, only the series circuit. It will, however, give your brain, calculator and computer some exercise! The computer programs are in BASIC and use standard type structures. They have been checked on a BBC model B and an IBM PC clone using GW-BASIC. The programs contain no error checking on the inputs.

BASIC AC THEORY

During learning for the RAE or other courses the concepts of reactance and resistance have been taught. The following equations will have been given:-

Inductive reactance = $X_L = 2\pi fL$ ohms
Capacity reactance = $X_c = 1/(2\pi fC)$ ohms

It will have been taught that inductance and capacitance introduce a phase shift in the circuit between the applied voltage and the current flowing. Also, a circuit has impedance rather than resistance when inductance and capacitance is involved in a circuit carrying an alternating current.

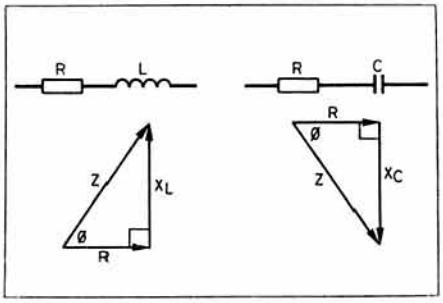


Fig 1. Impedance in a series circuit.

Again, referring to what has been taught, impedance can be represented by a triangle such as shown in **Fig 1** for a series circuit. It is *not correct* to write that $Z = R + X_L$ or $Z = R + X_c$ as this has *not* taken into account the phase shifts (90°) introduced by the reactive element. Rather, one must use:-

$$Z = \sqrt{R^2 + X_L^2} \text{ or } Z = \sqrt{R^2 + X_c^2}$$

and the phase angle is given by

$$\tan \Phi = X_L/R \text{ or } \tan \Phi = X_c/R$$

It would, however, be very convenient if there was a method whereby R and X could be combined in some form without the use of square roots and trigonometric functions. It would also allow a consistent set of units — ohms instead of dealing with pF, μF, μH, mH and so forth. It would also be convenient if reactances could just be added and subtracted. This would be very helpful in, for example, antenna calculations where one needs to find a series reactance that will make an antenna look purely resistive. The next sections explain a method for attaining these ideals.

THE "j" OPERATOR

There is a mathematical tool which uses the "j" operator ("i" is often used in mathematical books) and this allows one to write $Z = R + jX_L$ or $Z = R - jX_c$. NOTE: the minus sign for capacitive reactance. The R and the "j" terms *cannot* be further simplified, i.e. if it is given that Z = 3 + j4 this is its simplest form. The "j" term thus implies a quantity that is at 90° (or quadrature) to the resistive term.

Now for two practical examples — see **Fig 2.** Using the formulae for reactance given earlier and the frequencies quoted in the examples, then the series circuits can be specified as Z = 220 + j628.3 and Z = 100 - j15.9 respectively (note these figures have been rounded off). The computer program in Listing 1 will perform the above calculations.

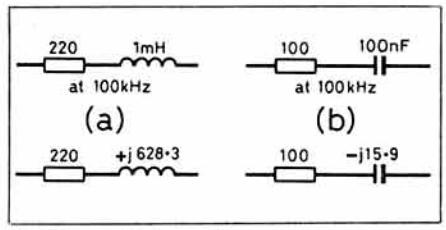


Fig 2. Two practical examples.

Listing 1

```
10 CLS
20 REM Impedance calculation to get A + jB
30 INPUT "Resistance in ohms "; R
40 INPUT "Working frequency in kHz
";F:F=1000*F
50 INPUT "Reactance type.. L or C "; R$
60 IF R$="L" OR R$="1" THEN INPUT
"Inductance in uH "; L:X=2*3.14159*F*L/
1000000! : S$= " + ": GOTO 80
70 IF R$="C" OR R$="c" THEN INPUT
"Capacitance in uF "; C:X=1000000/
(2*3.14159*F*C) : S$=" - "
80 PRINT "Z = ";R;S$;"j";X
90 END
```

The phase angle can be obtained from the formula:-

$$\tan \Phi = \text{"j" term/ resistive term}$$

but take into account the + or - before the "j". Thus:-

$$\tan \Phi = 628.3/220 \text{ and } \tan \Phi = -15.9/100$$

respectively.

This gives phase angles of approximately 72° (lagging) and 9° (leading) respectively. The minus sign indicates the reactance is capacitive and the plus sign denotes inductive.

If the series circuit as shown in **Fig 3** is used the combined impedance is given by:-

$$Z = R_1 + R_2 + jX_L - jX_c$$

The "non j" and the "j" terms can be collected together which gives:-

$$Z = (R_1 + R_2) + j(X_L - X_c)$$

Thus series resistance can be added together (something that should be known) as also can series reactance — but taking into account the sign. The reactances can *only* be added together provided that they are quoted at the same frequency.

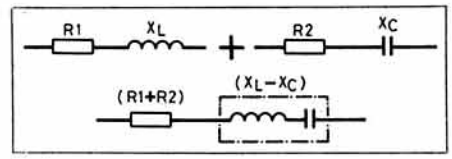


Fig 3.

Taking the examples from **Fig 2** and combining them in series gives:-

$$Z = 220 + 100 + j(628.3 - 15.9)$$

which gives:-

$$Z = 320 + j612.4$$

This denotes that the combined circuit at 100kHz has a resistive part of 320ohms and an inductive reactance of 612.4ohms (because j term is positive). This is equivalent to 0.975mH (or 975μH). The resulting phase angle of 62.4° is obtained from:-

$$\tan \Phi = 612.4/320$$

A well-known condition is achieved when the resultant "j" equals zero, i.e. when $X_L = X_c$. From earlier then:-

$$2\pi fL = 1/(2\pi fC)$$

When rearranging this one obtains:-

$f = 1/(2\pi\sqrt{LC})$ — i.e. the resonant frequency formula.

One is then left with Z = the resistive term only, i.e. a series circuit at resonance is purely resistive — something one learnt for the RAE?

A PRACTICAL USE

One may well ask what is the use of this, is it just a mathematical exercise? No, it is not: a practical use was hinted at earlier. The following example is just one application.

The impedance of an antenna system is measured at 3.7MHz using a noise bridge and it is found that the resistive part is 38ohms and the reactive part is -j100ohms. To get maximum power into the

Listing 2

```
10 CLS
20 REM To obtain physical values from A + jB
form
30 INPUT "Reactance, including sign ";X
40 INPUT "Working frequency in kHz ";
F:F=F*1000
50 IF X<0 THEN LC= 1000000/
(2*3.14159*F*X):U$=" uF"
60 IF X>0 THEN LC=X*1000000/
(2*3.14159*F):U$=" uH"
70 PRINT "Component is "; ABS(LC); U$
80 END
```

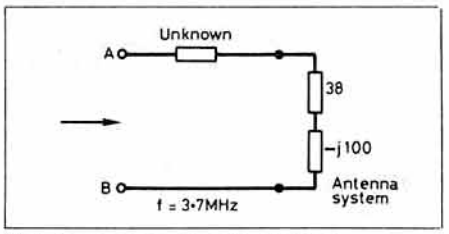


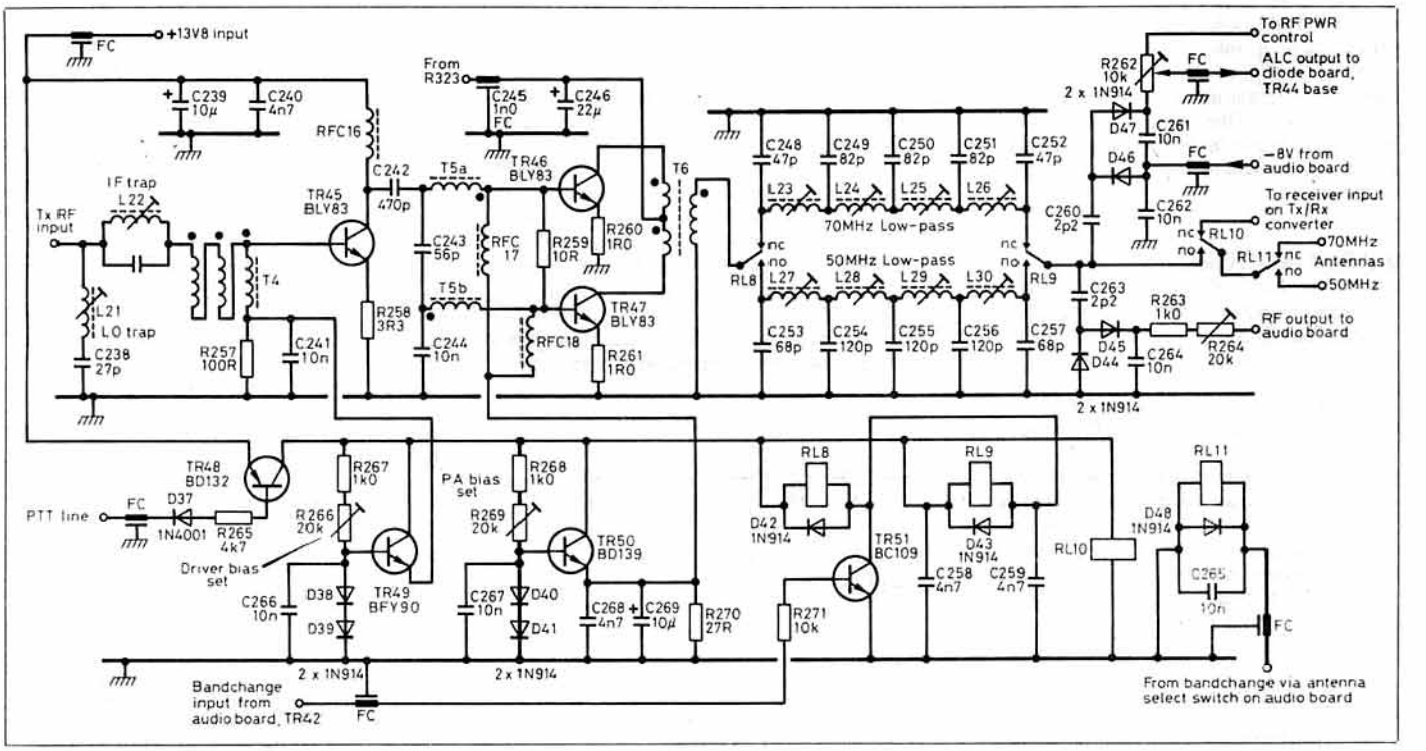
Fig 4. The impedance of an antenna system.

antenna it is desirable to eliminate the reactive part so that from terminals AB the impedance is purely resistive. Assuming the noise bridge gives an equivalent series circuit, then a reactance must be added in series to cancel the -j100 term. This is obviously +j100 and the value of the inductance can now be calculated as 4.3μH at 3.7MHz. The computer program in Listing 2 will perform this calculation.

CONCLUSION

It is hoped that this short article has provided an insight into the use of the operator "j", but the article really only touches the surface regarding the use of this operator.

Sufficient information is given for converting between physical values (i.e. farads and henrys and sub-multiples) and equivalent reactances which are expressed in one single unit — the ohm. The practical example given will hopefully allow one to use the operator for other applications. □



The G4WIM dual-bander
(continued from p42)

passing the received signal from the CW filter to the volume control. If any other mode is selected then D28 conducts, thus bypassing the CW filter. TR41 ensures that only one audio path to the volume control is active at any time. IC24 is a standard 2W audio amplifier and provides plenty of driving power for the internal speaker.

TR43 takes the band change signal from the microprocessor and, in conjunction with TR42, converts the 5V logic signal into a 13.8V signal, which can be used elsewhere in the radio. On this PCB it is used to operate RL5, the purpose of which is to ensure that the correct BFO crystal is selected depending upon which band is in use.

TR39 is turned on during transmit and, by means of D33 and D44, blocks both the FM and SSB receive audio paths. The same signal which drives TR39 also drives TR40. When the radio is on transmit TR40 conducts, causing RL6 and RL7 to pull in. RL6 disables the RIT control while on transmit, and RL7 switches the multi-function meter from being a signal strength meter on receive to whatever function is selected on the front panel while the radio is on transmit.

IC25 sums the RIT voltage and the 10Hz interpolation voltage, to provide the correct level of signal for D24 on the PLL reference.

IC26 buffers the AGC voltage so that it can drive the meter to display received signal strength, while IC27 buffers the transmit ALC voltage from TR44. R251, R252 and C234 set the transmit ALC time constants. IC28 generates the -8V rail for use elsewhere in the radio.

BROADBAND PA AND LOW-PASS FILTERING

This part of the circuit is shown in **Fig 8**. The low-level transmit signal from the transmit/receive converter is fed to TR45, which is a Class A driver stage for the power amplifier. Bias is provided by TR49, while TR48 operates as a power switch, feeding current to the bias transistors and relays RL8, 9 and 10.

To lessen any unwanted relay clicks while the radio is in receive and scanning, both 50 and 70MHz, RL8 and 9 only operate when on transmit.

L21 and C232 help to attenuate any local oscillator signal which may have leaked into the broadband amplifier, while L22 is an IF trap to attenuate any 10.7MHz IF signal which the broadband driver may have amplified. While these traps are not strictly needed, they do help to reduce unwanted spurious emissions to a very low level.

The signal from TR45 is converted into a push-pull signal by T5, for driving TR46 and TR47. These transistors run in Class AB, with a quiescent current of 40mA. The operating point is maintained by the bias supply TR50 and emitter ballast resistors R260 and R261.

A push-pull output stage was chosen as it has an inherently lower second harmonic content than a single-ended design. The output signal from the PA is switched to the appropriate low-pass filter by RL8. A nine-pole low-pass filter was chosen to give a harmonic content which was at least -65dBc (in practice). However, to achieve this figure it is necessary to pay attention to screening around the filter and PA.

RL9 selects the output of the selected filter and passes the signal onto RL10, which is the main transmit/receive aerial changeover relay. RL11 provides a means of switching between 50 and 70MHz aerials as required, but can be disabled by a switch on the rear panel, thereby using the same aerial on both bands. D44 and D45 generate a DC signal to drive the RF output meter on transmit. D46 and D47 generate the ALC voltage, and R262 sets the maximum output power. The front-panel RF power control adjusts the output down to approximately 100mW as required. □

(Part 3 of this article will appear next month)

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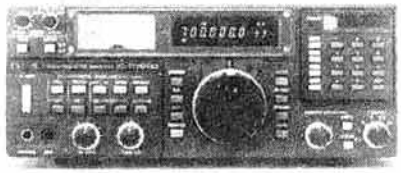

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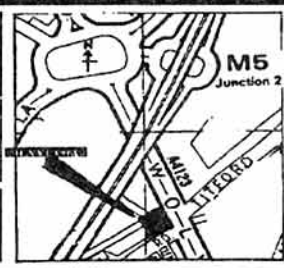

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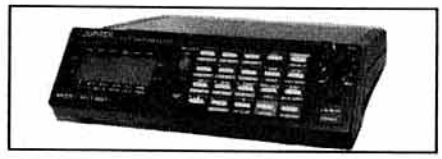

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Suffolk NR32 3PJ.

The last batch of satellites got away safely from their launch, but as so frequently happens on such occasions, their direction into their intended orbits and their mode of operation did not in all cases turn out to be just as was planned. UoSAT E or UoSAT-4 or OSCAR 15 as it is now to be called since its launch, suffered much the same fate as did its predecessor UoSAT-1 way back in 1982. It got lost!

About thirty hours after launch, transmission from OSCAR 15 ceased and attempts to re-establish control have so far been unsuccessful: This episode mirrors what happened to UoSAT-1 which was lost for several weeks following its launch. On that occasion contact was re-established by using the 150 foot diameter dish antenna at the Stanford Research Institute, USA, which had to be refurbished for the operation, and the team who carried out this work deserve much credit for their efforts. With its help powerful signals were directed at the errant satellite, overpowering the onboard transmitter, which was jamming the receiving equipment aboard. Once control was re-established, UoSAT-1 functioned perfectly once again.

UoSAT-2 also ran into problems: shortly after launch a communications problem on the satellite prevented further control operations. It took some ten weeks before a solution was found; even though the failure had produced an absence of telemetry signals, the problem was identified as a component failure and a means of bypassing this component was devised. A redundant UHF uplink circuit was used which did not depend on the failed component and this enabled UoSAT-2 to function fully again. UoSATs 1 and 2 both produced quite unique situations in which apparent failures were corrected by action at the Ground Control Stations.

OSCAR 14 and 15

To prevent something similar happening again, special precautions were taken in the design of the two recently launched UoSATs — OSCARs 14 and 15, which have three receivers aboard, one being the command receiver and the other two being switched frequency receivers. The services of the 150 foot dish at Stanford and its powerful transmitter have been called in again in an attempt to regain control of OSCAR 15, and with the help of the dish, signals from the local oscillator of the command receiver have been detected. Efforts are now being made to monitor one of the switchable frequency receivers and, if one is heard, commands can be sent to change the receiver frequency. Thereby command should be regained. However, this all takes much time and very accurate azimuth and elevation steering of the huge dish antenna and, at the time of writing, contact has not yet been re-established, so one must wait and hope these efforts will prove successful. Fortunately the other UoSAT launched at the time, ie UoSAT-3 (OSCAR14) — is working well. The primary payload carried by this satellite is a digital store-and-forward communication transponder for multiple access. This is intended to provide communications with portable ground stations such as could be used for emergency use or with remotely situated communities. This satellite is also interesting in that it has high efficiency gallium arsenide solar cells and inexpensive nickel-cadmium rechargeable batteries. If attempts to get control of OSCAR 15 fail, its proposed projects may be repeated on the next UoSAT (UoSAT-F), as Arianespace has offered the University of Surrey launch facilities in 1991.

OSCAR 17

As if OSCAR 15's troubles were not enough for one launch, DOVE, OSCAR 17, has also been in trouble. On the evening of Tuesday, 17 March, DOVE began to emit very uncharacteristic signals. It began transmitting a steady carrier, on high power, with no characteristic breaks in the transmission: Its anticipated mode of 2 minutes 30 seconds of transmission and 30 seconds off, had been maintained since its launch until that time. The 'off time' was to allow ground stations to command the spacecraft, the fault was diagnosed as being due to a problem in its computer. Such an event is usually caused by 'single event upsets' (SEU's). Assuming this to be the cause, is thought to be due to a high speed electron from the sun, as part of the solar wind, being caught up by the earth's magnetic field and funnelled down towards the earth's upper atmosphere, impacting the memory of the spacecraft. OSCAR 17 went into a continuous transmission mode, jamming the control receiver, a situation similar to that described above in the case of UoSAT-4. The solution to the problem seemed to be similar to that and for UoSAT-4. In this case, the creator of DOVE's programming, N4HY, arranged for several amateur radio operators with large moon bounce antenna arrays to attempt to break through its continuous transmission with their more powerful signals. Junior de Castro, Brazil's Amateur Satellite Organisation President, PY2BJO, DOVE's owner and sponsor, tried his equipment without success, Junior, PY2BJO, has a 30 foot dish antenna, but it was being installed on a new mountain top location and was unavailable for use. Dave Blashke, W5UN, in Texas, who owns one of the largest two metre antenna systems in the world, was called in to help, but even his efforts were unsuccessful. However, in Italy, Alberto Zagni, I1KBD, noted that the longer DOVE was in eclipse, on the night side of the earth, the weaker its continuous signals became. So why not try sending the 'break-in' signals then? Further more it was realised that during the night, the satellite's batteries would be weakened, thus decreasing the sensitivity of its receivers, so a further test was carried out during the night. A signal of about two million watts erp was transmitted just as DOVE came over the Texas horizon, and it worked! The computer was reset!

The problem with DOVE was that it is a single band system. The other Microsats transmit on 70 cms and receive on 2 metres; this effectively prevents control receiver desensitization. As construction began and the launch time neared, DOVE's designers realised that they just did not have time to construct a special 70 cm receiver for DOVE. They had used the same design as for the other Microsats. Fortunately however, DOVE did have an S band transmitter, which was intended to serve as a back-up to the 2 metre, 145.825 MHz transmitter, and at the time of writing, the 2 metre transmitter has been shut down and the S band is in use on 2401.22 Mhz with a power level of just under one watt.

A sad footnote to this story is that W5UN's massive antenna array was totally destroyed in a tornado during the last weekend in March, but fortunately Dave and his family were not injured in this calamity.

We are indebted to Rich Ensign, N8IWJ, for this account of DOVE's problems. Rich is the AMSAT Science Education Advisor, he also edits "AMSAT Educational News", a very informative production indeed, which, as its title indicates, is meant for use in schools. This already has a very wide distribution with schools in USA, Canada, England, Belgium, the Netherlands, Germany, Australia, New Zealand, Switzerland, Japan, France and Zimbabwe. All ages of students are catered for, from early elementary, through to university level. He hopes to publish this on a monthly basis, but fast-breaking news may sometimes short circuit their intended deadlines. Richard's address is: Richard C. Ensign, AMSAT Science Advisor, 421 N. Military, Dearbourn, Michigan, 48124, USA.

Your help is required for the next Satellite design

AMSAT International is currently giving consideration to the next major satellite project. Input from satellite users is required to establish which frequencies and modes of operation should be included in the satellite.

Please complete the questionnaire below with your own preferences. You should NOT take into account current regulations or restrictions as to frequency bands currently available for the Amateur Satellite Service. Remember that there is a WARC in Geneva in 1992, at which Conference frequencies to the radio amateur may be lost or changed.

Please fill in the form below, or a photocopy thereof, ticking the appropriate answers. Do not add any other remarks, the paper is to be scanned electronically for results. The completed form should be sent to the Hon Sec, AMSAT UK, London, E12 5EQ. Thank you for your time and trouble.

Mode/Frequency	Desirable	Undesirable	No interest
29MHz-Downlink	( )	( )	( )
50MHz-Downlink	( )	( )	( )
145MHz-Downlink ...	( )	( )	( )
145MHz Uplink	( )	( )	( )
435MHz Downlink ...	( )	( )	( )
435MHz Uplink	( )	( )	( )
1.2GHz Uplink	( )	( )	( )
1.2GHz Downlink	( )	( )	( )
2.4GHz Downlink	( )	( )	( )
10GHz Downlink	( )	( )	( )
CW	( )	( )	( )
SSB	( )	( )	( )
RTTY/AMTOR	( )	( )	( )
Packet/Data	( )	( )	( )
Slow Scan	( )	( )	( )
FSTV/ATV	( )	( )	( )
FM/AM	( )	( )	( )
FAX	( )	( )	( )

Your Name .....

Call ..... Date .....

SWL

BOB TREACHER BRS 32525
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Newcomers

A healthy number of newcomers to start the column this month. Edward Pavelin is ARS92627. He is 13 years old and has been interested in amateur radio since early last year. His elder brother is G4WWH. His first receiver was a 14MHz Howes kit, but he soon progressed to a GEC BRT-402E receiver which his father acquired from his place of work. He used it in conjunction with the RX-4 program from Technical Software and a Commodore 64 computer to receive RTTY and SSTV signals. From the large GEC receiver, which has a fault (can anyone provide a service manual?), Edward turned to a portable Matsui MR-4099 receiver. He considers this to be particularly good for monitoring broadcast stations. Edward's address if anyone can provide a manual for the GEC receiver is 60 Elmbridge, Old Harlow, Essex CM17 0JX.

RS92266 belongs to Ryan Price who is 16 and lives in Yeovil. He has been interested in the hobby since his local Club gave the fifth year of his school a talk on amateur radio and a demonstration using the special callsign GB2PCS. He passed a few "Greetings" messages and found himself hooked. He started some construction work and built simple receivers for 3.5, 7 and 14MHz. Now, he too has a Matsui MR-4099, together with a Trio JR-310 which he uses for HF. He also has a Daiwa Search 9 and a 9 element yagi for 144MHz. Ryan has 49 countries heard and a 95% QSL return rate for direct cards.

Ian Baxter is RS92255. He uses a JRC NRD-525 and a 22m long wire. His interest is mainly in monitoring the "Utility Bands", but he sent an interesting list of DX heard since mid March which I have included in my "Spectrum Analysis" column.

Broadstone in Dorset is where you would find ARS92684, Martin Saunders. He has a Lowe HF-225 receiver and a 30 foot wire. He was particularly pleased with the performance of both on 28MHz. Being new to the hobby, Martin had a good many questions. I will cover QSLing later in this piece. He also wanted to know how to find out more about Amateur Radio Awards. The Society has a very fine Awards Handbook which is available from Headquarters. Its cost to members is £7.95. Yes, an SWL will find an ATU of benefit, especially if only using a random length of wire. I will cover ATUs in more details, together with other "add-ons" when I have a little more space available. Martin was somewhat concerned that, even at a local Radio Rally, secondhand HF receivers were being sold for over £200. He was rather concerned that young people interested in the hobby would soon be frightened away because of the sheer cost of the receiving equipment required to get started. Unfortunately, commercial receiving equipment is not cheap, but there are cheaper kits to be had, for example the Howes kits mentioned earlier on. Another good idea is to join a local Club, get friendly with some older G3's who will probably have a shack full of equipment, and might be willing to loan you something to get you started.

Military radio museum

Following mention in the column of BRS88021, Bob Francis' desire to add to his Museum collection, I am pleased to say that he has been inundated with requests, information and offers of gear.

Bob is keen to add even more to his collection of military memorabilia, and has asked me to find space for another mention. With that done, I will simply pass on that he is interested in any type of military equipment, but also boasts a vast library of workshop manuals and technical handbooks and a large store of spares for many items of equipment. He is also willing to provide photocopies of literature from his reference library. For those who can help Bob expand his collection or wish to take advantage of his offer to provide help and assistance, his address is 163 Sherwood Park Avenue, Sidcup, Kent DA15 9JG.

DC-RX users

A growing number of DC receiver users have written to me of late. Stephen Slater, BRS92755, would like me to devote a portion of a future column to DC-RX users' news and experiences. Therefore, if you use a DC-RX and have some interesting news or views, drop me a line.

QSL techniques

For the benefit of newer readers, I will repeat some of the advice I gave a couple of years back about how SWL's should set about QSLing.

First, you will have to approach a printer to provide you with your own QSL cards which bear your RS/ARS/BRS No. This magazine usually carries a reasonable supply of QSL card printers in its "Classified Advertisements" page.

Then, you must be reasonably selective about who you are going to send a card to. QSLing everything you hear when you first get on the bands is a big temptation, but this is NOT the way forward. Try to be selective, and if you want a card from an ON on 14MHz for a new country, tell him so. It might just work, but the message is that Europeans heard on the higher bands do not really want a QSL card from a British listener. Save your reception report for an ON until you hear one on 1.8MHz where the report will be a little more useful. Most listeners want a QSL card from rare DXpeditions — fair enough, but make sure that you provide details of more than one QSO. It is a little idiotic providing a 5x9 report for, say, the AH3C/KH5J expedition covering just one QSO, when the operators were making four QSOs a minute and were only transmitting for about 5 seconds per QSO! Make sure that you quote the time as '3 June, 90' instead of '3.6.90', as in the Americas this could be taken to refer to 6 March 1990 — as they tend to put the month before the date. Another good tip is to try not to report QSO's with G stations in your report. The station you are reporting to will already know that he was 5x9 in Britain. It is best, if possible, to report on a cross-continent QSO (eg 9K2 — KP4, or a similar DX to DX QSO from the same part of the world. If a YB was 5x7 at your QTH while he was working a VK, and he was not working Europeans before or after that QSO, tell him. I will include a few more tips next time.

Propagation — 1: skip zone and skip distance

Following mention in April's column, I shall start a series this month which looks at propagation. When a signal is heard, it will have arrived at the receiver by one of two means — ground wave or sky wave. As a ground wave, the signal travels along the surface of the earth, or close to it. As a sky wave, the signal is radiated upwards from a transmitter out into space. Long-distance radio communication depends on sky wave propagation. Between the area served by the ground wave signal and that served by the sky wave is the area known as the 'skipzone'. Here, the signal cannot be heard at all (like the G — DL situation referred to in the April column).

The distance between a transmitter and the start of the sky wave is the 'skip distance', which depends on the frequency of the transmitted signal, the height of the ionospheric layer responsible for refracting the signal back to earth (the higher the layer, the longer the skip distance), and the angle at which the signal hits the ionospheric layer.

Finale

Once again, I have a large amount of news which I have to hold over to next month. Please keep writing, your letters are most interesting, and it is good that I have at last heard from some of our newer, younger members. Please note that because of holidays, the next two deadlines are slightly earlier than usual — Monday 18 June and Monday 9 July.

EMC MATTERS

HILARY CLAYTONSMITH, G4JKS
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New EMC Committee Chairman

Owing to ill health, Alan Dearlove, G1WZZ, has had to give up the Chairmanship of the EMC Committee. The Deputy Chairman, Bob Peace, G8SOZ, has been appointed by Council to take over the Chair.

EMC Co-Ordinators Scheme - an update

Additional names and telephone numbers of members of the scheme can be found in the News pages at the front of this issue.

A success story

What must have been one of the worst possible cases of interference recently brought to our attention, has just reached a satisfactory conclusion.

The EMC Committee was contacted by Mike Neil of Hugh Steeper Ltd in London, a firm making aids for the disabled. One of their patients was experiencing breakthrough from an amateur into an intercom system which forms a part of an "Environmental Controller" and is a lifeline to the person concerned.

The amateur lives in the upstairs maisonette with his antennas only yards from the cable run of the intercom belonging to the patient in the maisonette below. Every time he transmitted he cut off the person's only form of contact with the outside world.

The services of GM3WIL (the local EMC corresponding member) were sought. Dave visited the amateur and found he had done all that was possible under the circumstances.

Discussions between the manufacturer and the EMC Committee were held and various preventative methods were suggested; however these were not totally effective. The manufacturer made further modifications within the unit, which proved to cure the situation completely.

Mr.Neil contacted the patient who announced she had had no problems for some weeks, and presumed the amateur was away. However, after visiting the amateur, Mr.Neil discovered that he had in fact been operating as usual.

It was pleasing to deal with a designer / manufacturer who first of all accepted that the immunity of the unit in this extreme case was not adequate, and secondly was willing to make the necessary modifications to the intercom system to render it virtually "bomb proof".

April Fool ?

In April *EMC Matters* the equation for the field strength at a given

distance from a transmitting antenna of given power, appeared incorrectly. As printed, it suggested that field strength increases, rather than decreases, with distance from the transmitter. I would like to thank all those who rang and wrote asking whether this was an April Fool. It was, in fact a typesetting error.

To find the E field strength in volts per metre at a distance "d" from a transmitting antenna, (assuming "far field" conditions) multiply the effective radiated power (ERP) in watts by 49.15. Take the square root of the result, then divide by the distance "d" in metres. Some readers asked why the power is multiplied by 49.15 and not 30. This is because the power is ERP which is the power reaching the feedpoint of an antenna, multiplied by the antenna's gain relative to a dipole. If the power fed to the antenna is multiplied by the antenna gain, relative to an isotropic antenna, the result is EIRP (Effective Isotropic Radiated Power) and the factor of 30 would be used when calculating the field strength at the given distance.

EMC - a wider view

During the IARU Region 1 conference in Torremolinos at the beginning of April, the IARU EMC Working Group met to discuss matters of general concern including :-

a). Standards for ISM (Industrial, Scientific and Medical) systems operating between 433.05 MHz and 434.79 MHz

b). Cable TV systems in some countries, which use bands covering 144 MHz and 432 MHz, and the lobbying for prohibition of the use of these frequencies for cable TV.

c). Terms of reference for the IARU Region 1 EMC Working Group. Mr Henryk Cichon, SP9ZD, was proposed Chairman of the group for the period 1990 - 1993.

Test antennas for measuring field strengths

As a result of the article in April *EMC Matters* I have been sent two differing approaches to the construction and calibration of antennas for this purpose. One from Dicky Marshall, G3SBA, referring to the use of two identical units, whilst the other, from Robin Page-Jones, G3JWI, suggests the use of short antennas.

In this column, I will concentrate on Robin's experiments, giving more attention to Dicky's submission in the August issue.

As I mentioned last time, it is difficult to calibrate an antenna; Robin's objective is to find an antenna which is effectively self-calibrating. In the relatively high fields being dealt with, handling the signal after the antenna would be no real trouble. In his experiments Robin has made some assumptions as follows on which he solicits comments :-

"The basic assumption was that the EMF across a dipole that is short compared to a half-wave, is 'half the dipole length, multiplied by the field strength' (e = EL/2) - see 'Capture Area' in the Feb. Column.

The next step was to find a way of measuring the EMF directly - that is some sort of high impedance RF voltmeter. The solution was to use an active dipole antenna with detachable elements. This meant that different length elements could be made so as to check the correlation between element length and signal pickup. The antenna used was a Datong AD370 head unit, which had a very high input resistance and an output capacitance of a few pF - as measured at the frequencies of interest using coils and a GDO. I then worked out the (capacitive) reactance of the elements from a formula I dug up in an old text book, and hence was able to calculate any errors between the measured voltage and the actual EMF. Tests showed a pretty good tie up between elements of different lengths in the same field and also between the EMF obtained when the elements were half a wave long (where the formula e = E λ/π given in the April column applies) and shorter elements where the e = EL/2 formula is appropriate. So far, tests have been confined to the range 25 to 60 MHz, horizontal polarisation."

Robin is interested in finding out if this approach is worth pursuing but he has had difficulty in finding any references, at least in a form that an ordinary mortal can understand. If anyone feels they can help, let me know

N.B. Steven Maskrey, G6FDK wishes to draw our attention to a design for amateur field strength meter in the *ARRL Handbook* and also the *ARRL Antenna* books.

Stand up for your ferrites

It is generally agreed in the EMC world that ferrites are pretty useful devices, though for most of us, understanding the underlying principles is hazy, to say the least. A chat with a friendly physicist showed why this is so - it is a difficult subject to explain in simple terms. However, at the risk of rushing in where angels fear to tread, the following thoughts have been put together.

Many solids consist of crystal structures packed together in various ways, but the special feature of magnetic materials is that the crystals are themselves divided up into "domains" in which the individual atoms are aligned so that their magnetic effects reinforce one another, giving the domain an overall magnetic polarity. Ferrites are manufactured from magnetic materials, chemically combined so that they are non-conductive, but still possessing the required crystal structure for domain formation. When the ferrite is not in a magnetic field, the polarities of the various domains effectively cancel each other out and the overall effect is zero. If a field is applied, the atoms of each domain try to align themselves with the field, mutually interacting so that domains which are more favourably aligned grow at the expense of their neighbours, until a dynamic balance is reached. This interaction takes time and the net result is that ferrite materials are relatively slow to respond to a changing magnetic field. Just how slow depends on the chemistry of the particular ferrite and generally materials with high permeabilities are limited to relatively low frequencies. Ferrites which have permeabilities of a thousand or so, have maximum frequencies in the hundreds of kHz range, while those which operate up to tens of MHz usually have permeabilities of less than 50. The old favourite FX1588 ferrite toroid has a permeability in the region of 250 at frequencies up to about 2 MHz. At higher frequencies where the permeability is beginning to fall, the losses in the ferrite start to increase, due to the energy used trying to set up the mutual interaction in the time available - only to have it reversed on the next half cycle. When ferrite toroids are used as braid-breaking chokes, this apparent disadvantage is really a blessing in disguise, and the effectiveness of the choke in reducing currents on the outside of the braid is due to a combination of inductance and absorption through losses in the material. Which of the two predominates, depends on the frequency of operation, but in practice it is irrelevant. A similar effect takes place with the small ferrite beads which are often threaded onto individual wires inside radio equipment to get rid of unwanted RF currents. Their effectiveness is highlighted by their familiar name of "birdie beads". This dual effect of inductance and loss explains why almost any ferrite toroid will have some effect when used as a braid-breaker, but to get best results, the right sort should be used - typically the FX1588 or equivalent. The effectiveness of a toroid bread-breaker is dependent on the thickness of the ring and the number of turns. Since with coaxial cable the number of turns is limited, it is usual to use two 6mm thick ferrite rings.

Members of the ferrite family should not be confused with their venerable relative, the iron dust core. Dust cores consist of very small particles of iron embedded in some form of insulating medium, so that domain size is limited to the individual particles. This enables iron dust material to operate at relatively high frequencies, but only at the cost of relatively low permeability.

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

Torremolinos, April 1990

The IARU Region 1 triennial conference at Torremolinos has come and gone. A fuller account of what was discussed and what actions were agreed in preparation for the run-up to WARC '92 (and now, it seems WARC '93, convened to discuss world-wide HF broadcasting) appears elsewhere.

Over the past couple of months I've mentioned a number of proposed changes affecting microwave operating frequencies in the 2.3, 5.7, 10 and 24GHz bands and, indeed, reported a few UK operators' reactions to the proposals which were aimed at identifying and nominating common operating frequencies for narrowband DX working. In the event, the proposals for the 2.3 and 10GHz bands have been held in suspension following some technical difficulties in some of the major user-countries in Europe. Agreement was, however, reached on common frequencies for the "6cm" and "12mm" bands.

With effect from 1 January 1991, the narrowband working sub-band on the 5.7GHz band will be changed from 5,760 - 5,762MHz to 5,668 - 5,670MHz. Similarly, on the 24GHz band, narrowband working will change from 24,192 - 24,194MHz down to 24,048 - 24,050MHz in the Primary section of the band, this change being, in effect, immediate in the UK.

10GHz and the Components Service

Last month I mentioned recent work on the development of second generation "hi-tech" designs for 10GHz narrowband equipment being carried out by G3WDG and G4DDK.

I'm pleased to report further rapid progress, the outcome of which is a "suite" of three designs aimed at using readily and inexpensively available components. Work has progressed to the point where *beta-testing* ie. reproducibility testing in the hands of other than the designer, has begun.

The first and simplest design (G3WDG-001) is for a 2.5GHz to 10GHz multiplier/amplifier chain yielding of the order of +20dBm (100mW) output. This unit was designed to be suitable for use as a simple CW/FM/FSK narrowband transmitter, for instance as a beacon or packet TX. It requires a drive level of about +7dBm (5mW) at 2556MHz (for use as an RX IO, with the standard 144-146MHz IF) or 2592MHz (for use as a transmitter at 10368MHz). This is conveniently provided by the G4DDK-004 LO source mentioned last month with a PCB available from the Components Service.

The first stage of the new unit is based around an Avantek MMIC, type MSA0504, giving an adjustable gain to drive a GaAsfet quadrupler. If the G4DDK-004 output is measured at 5mW or greater, this stage can be omitted and the track "patched" with a small piece of copper foil. Some variation in the level of output from the 'DDK-004 board is inevitable because of component tolerance spread and individual variations in accuracy of construction and alignment. The quadrupler is followed by a "pill-box" resonator filter, the form of which will be familiar to those who have followed German amateur developments in recent years. This filter selects the required harmonic output before being presented to a two-stage GaAsfet amplifier, each stage of which yields a gain of about 10dB.

The second design (G3WDG-002) is a receive converter using a similar local oscillator/multiplier chain to give injection into a dual diode mixer which is preceded by a signal frequency image-rejection filter (another pill-box) and a two-stage low-noise preamplifier. The mixer is followed by a low-noise bipolar post-mixer amplifier at the IF of 144 to 146MHz. The overall noise figure of the prototypes has been measured at about 1.9dB, considerably in advance of any other UK equipment so far described.

The final design (G3WDG-003) is a linear transverter which combines the 001 multiplier chain with the 002 receiver and an additional chain consisting of an active transmit mixer and amplifiers, again yielding of the order of 100mW output.

Once the designs have been proved to be easily reproducible - using "average" microwave constructional facilities (and skills) - then we proposed to have PCBs and filter resonators made and have certain other critical (eg. high-Q) chip components available through the RSGB Components Service. The remaining components, including GaAsfets, are quite easily available from other sources which will be indicated. The whole project will be written up in detail just as soon as the beta-testing programme is complete. Indeed, as I write this, I'm looking at the handwritten draft of part of the write up!

Meanwhile other work is going on with the objective of improving the receiver noise figure and increasing power output by means of small, easily constructed "add-on" modules. At these levels of performance, you really can start to exploit troposcatter to work longer and more obstructed paths than those possible with simpler wideband equipment used by so many current operators.

I hope this brief account will whet your appetite and encourage you to think about having a go at self-build "hi-tech" microwaves! The prototype modules were displayed at the RSGB Convention at the NEC where they created a great deal of interest. They will also have been on display on the Microwave Committee's stand at the VHF Convention at Sandown.

If you are interested in the modules, perhaps you would let me (or any other Microwave Committee member) know, so that we may judge the likely level of response before committing too many resources to producing the "difficult" items mentioned above. Meanwhile the G4DDK-004 board is proving very popular and, again, feedback on your experiences would be invaluable to the Committee in planning further microwave PCB projects.

Microwave Newsletter

Since I last reviewed the Newsletter, there have been a couple more issues the first of which, 08/89, was delayed by the postal strike which badly affected HQ's operations. The penultimate issue of the 1989 year, 09/89 followed very shortly after: for this we apologise!

08/89 gave the dates of the 1990 10GHz Cumulatives, two of which were timed to coincide with Region 1 events viz. the RSGB 432MHz to 24GHz Contest over the weekend of 5/6 May and the other with the 6/7 October Region 1 Contest which is usually very well populated by European operators, again all bands 432MHz to 24GHz. Our apologies for the late announcement of the dates, again due to unforeseen circumstances. The results of the 1989 Cumulatives were also announced there for the same reason as the dates of the 1990 events.

The same issue reported on the doings at two Round Tables, the new one in the midlands, organised by Dave G0DJA and attended by some 16 microwavers - a good attendance considering the relatively short notice at which the event was organised. The well-established Leeds event was also reported. It was organised through the good offices of Peter, G3PYB, and the management of YTV, and attracted an attendance of more than 30 amateurs. Thanks to all concerned for their efforts. Other information included details of the latest Mode-S satellite transponders, some other sources of components, an update on the G4DDK-004 board (already mentioned) and an account of Martyns' (G3UKV) experiences in trying to get an 1152 to 10GHz multiplier working - many useful experiences!

09/89 contained four items of 10GHz beacon news, an account of the Winchester Round Table, held in February and attended by over 30 amateurs from all over the country and from France. Various notes on components followed, plus a programmable calculator program for calculating distances and bearings. There was also the first part of a useful article by Toshihiko Takamizwa, JE1AAH, outlining some of the latest Japanese microwave design technology - a dual band (5.7 and 10GHz) transverter using a 1280MHz IF. In Japan, it appears that the MGF1402 GaAsfet sells for less than 4 pounds, with a 1W solid state PA module for 10GHz weighing in at about 188 pounds. The transverter was measured at 1.45W at 5.7GHz and just under 1W at 10GHz. The remaining details will follow in the last issue of the year. There should also be details of G6TIU's 1.3GHz transmitter board, designed to take 10mW input to yield 5W output, with integral PIN-diode TX/RX switching. This uses an NEC thick-film hybrid "gain block" and was developed especially for packet link use in the first place. Further advance details of the board and design are available from G6TIU on 0408 67123, 24hr answering.

Finale

That's it this month. My news deadlines for the next six months can be taken as roughly the middle of the month and any news, technical or operating, will be more than welcome.

DATACOMMS

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Sorry, there is no Datacomms column this month. It will be resumed in the July issue.

GAREX ELECTRONICS

WEATHER SATELLITE EQUIPMENT

ATARI ANIMATED SYSTEM

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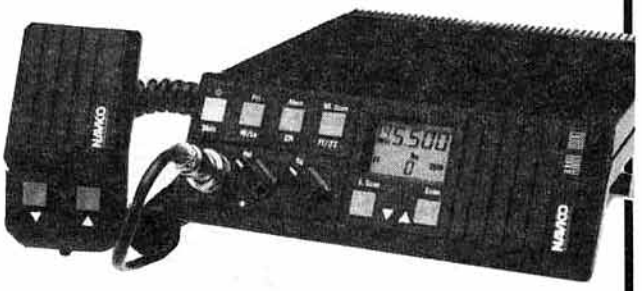

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Technical details were first published in "Maxwell's Equations and the Crossed Field Antenna" by Kabbary, Hately and Stewart in Electronics World and Wireless World Vol 95 No. 1637, pp216-218, March 1989. There were follow up articles by C Bryan Wells G3MND, in the same journal Nov 1989 and March 1990. Our technical director has given lectures on the system to IEE and RSGB audiences in Aberdeen, Edinburgh, Glasgow, Dundee, Paignton, Glenrothes and the recent RSGB National Convention. International Patents are being Applied For, and commercial licences to manufacture have been negotiated for certain sectors of the world wide market. The amateur kit form of the GROUND PLANE version is available for commercial evaluation as well as for amateurs restricted by lack of garden space, or apartment housing who wish to radiate on HF bands from 1.8 through to 29 MHz.

For Technical Details and full Price List of CFA and conventional wire antennas, send 4 first class stamps (or 3 IRC's) to the above address. Prices were given in APRIL edition of RAD COM page 66.

Proprietor: Maurice C Hately, MSc, FIEE, Chartered Electrical Engineer. GM3HAT

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CONTEST NEWS

AFFILIATED SOCIETIES CONTEST 1990 - RESULTS

AFS 1990 was considerably better supported than the 1989 event (undoubtedly due to the better propagation conditions) with seven more groups entering, and a 10% increase in the number of stations participating. The leader board remains almost the same as last year however, the only change in the first four being that Addiscombe, unable to raise a full team, were displaced by the Three A's. Once again the individual award goes to G3OAY by a safe margin. The leading Scottish Society was the RNARS(Glasgow) in 55th place overall, and the leading individual Scottish station was GM4OBK, placed 36th.

The majority of comments accompanying the logs were brickbats concerning the 9-day period allowed for preparing the logs. These complaints were well-founded, and your adjudicator can only apologise. It was in fact an error resulting from unfamiliarity with the new WP program used for submitting material to RadCom, and was noticed only after it was too late to publish an amendment. A number of groups did write requesting an extension, and in fact no entry was disallowed for being late.

Similarly there were problems with the cover-sheets (HFC2 and HFC9) and although several entries were incorrectly documented, all were accepted. New Log and Cover-sheets have been designed and should now be available.

The reversion to the full frequency allocation was universally approved and resulted in a noticeable decrease in QRM and an absence of high-speed interlopers in the QRS Corral.

Standards of log-keeping were in general very good, although one entrant omitted a whole page of reports received, and another failed to put any times beside a page of QSOs. The majority of points were lost as the result of errors in copying callsigns ... G3ZFE-G4ZFE, G3GLL-G4GLL, G4ALE-G4ARI etc.

A number of entrants commented on the growing practice of calling and giving a full report before receiving an acknowledgement and report from the stn calling CQ. This is not good practice and is to be discouraged. Apart from this, comments were in general complimentary and your adjudicator, who was active during the event, is for the most part in agreement except to remark on the poor standards of check-logging in certain quarters, having been called no less than FOUR times by one particular station.

Subject to the ratification of Council, the Edgware Trophy will be awarded to the Leicester Polytechnic Radio Society, and Certificates of Merit will be awarded to the Verulam ARC, Lichfield ARS, RNARS(Glasgow), G3OAY and GM4OBK.

In conclusion, it remains only to thank all those who came on the band, whether to do battle or merely to give points to the combatants, and to say "See you all next year!".

G3UFY

Psn	Club	Stn 1	Stn 2	Stn 3	Stn 4	Stn 5	Score
1	LEICESTER POLY 'A'	G3OAY	G3ORY	G5LP	G4ARI	G3XBY	11785
2	VERULAM ARC 'A'	G3RTE	G4DJX	G2BAP	G4JKS	G3UJV	11280
3	LICHFIELD ARS	G3SJJ	G3KDB	G3NKC	G3LNS	G3HCT	11223
4	THREE "A"S CG 'A'	G3FXB	G4FAM	G4BUO	G3SXW	G4BUE	10857
5	LEICESTER POLY 'B'	G4BCA	G4EOF	G3SDC	G4ZFE	G4CZB	9665
6	GOVMNT. COMMS. 'A'	G3NKS	G3SSO	G4PDQ	G3FXA	G3SNN	9495
7	SOUTHGATE ARC 'A'	G3RWL	G3SFG	G3KTZ	G3ZVW	G0IDA	9136
8	GRIMSBY ARS 'A'	G3TBK	G3RXP	G4EBK	G3RSD	G4HZF	8755
9	ADDISCOMBE ARC	G4ALE	G3UFY	G3SJX	G3VYI		8524
10	RNARS PORTSMOUTH 'A'	G3LET	G3LIK	G3JTG	G3JFF	G3CHN	8348
11	NORFOLK ARC	G4ODC	G3PDH	G3JNB	G4DYC	G3YLA	8319
12	COLCHESTER RA	G3GLL	G3YAJ	G4LZB	G3YEC	G0IBN/P	7021
13	MAIDSTONE YMCA CG 'A'	G3ZYV	G3ZWH	G3OHP	G3ORP	G4AXD/P	6801
14	EDGWARE & DRS 'A'	G4UMS/P	G3ASR	G4IUZ	G4HMD	G3SHY	6790
15	STOCKPORT RS 'A'	G3NOM	G3HQH	G4FAS	G4GRU	G4ECI	6762
16	CROYDON (SRCC)	G3BFP	G6LX	G4GTO	G4DDY	G8TB	6621
17	VERULAM ARC 'B'	G3RFS	G4JBD	G0EHO	G4SUP	G4VER/P	6550
18	SUTTON & CHEAM RS	G4ERW	G3DCZ	G4HSD	G0CPE	G2FHV	5935
19	CRAWLEY ARC	G3GRO	G3JKF	G3KAU	G3YVR		5851
20	MAIDENHEAD & DARC	G3WYK	G3TWG	G3IOF	G3LVW	G4GGV	5661
21	ECHELFORD ARS	G3KKQ	G3XTZ	G3MCK	G4GSC	G3EAO	5614
22	TORBAY ARS 'A'	G0CEL/P	G3MIR	G4ELZ	G3LHJ	G3HFG	5589
23	FARNBOROUGH & DRS 'A'	G3HEJ	G4BJQ	G4JFN	G4IZB	G3OLB	5582
24	RAFARS YORK	G3PSM	G2AFV	G3JGB	G3ISL	G0BOX	5320
25	PLYMOUTH RC 'A'	G4HTD	G3ULN	G3VCN	G3ZYY/P	G0JNZ	5241
26	GUILDFORD & DRS	G5OD	G3YXX	G0EFO	G3EIZ		5072
27	RNARS BIRMINGHAM	G4KNM	G4SFO	G3TZM	G4IP	G4NCY	5004
28	RNARS MIDDLESBROUGH	G4WNA/P	G3AWR	G3HKO	G4FCH	G3MXZ	4857
29	RNARS LIVERPOOL 'A'	G3HZL	G4OKL	G4HWK	G0AHH	G4PTN	4817
30	VALE OF EVESHAM RAC	G2HDU	G4RMV	G3DEF	G2FZO	G3UEY	4652
31	PRESTON ARS	G4KGK	G4OTN	G3DWQ	G4OOT		4584
32	HALIFAX & DARS	G3IGW	G2UG	G4GLL	G4RAW	G4VOB	4576
33	LEICESTER RS 'A'	G4OOS	G3HYH	G3LRS	G0FRV	G3TQF	4561
34	RAFARS SEALAND	G0CGV	G8GG	G5ND	G3LDT	G4MRJ	4444
35	SCUNTHORPE ARC	G3PDL	G4OGB	G4NFX	G4WZV		4344
36	YORK ARC 'A'	G3GC	G4JBH	G3CQR	G3ATK	G0HDJ	4304
37	RNARS LONDON	G4BOU	G4FRN	G4INI	G8IB	G3OZY	4260
38	AYLESBURY VALE RS	G3YLC	G0CUT	G3KLT	G0KMC	G4FXI	3804
39	CLIFTON ARS	G3JJZ	G3BSN	G3GHN	G4TJE	G0HUZ	3777
40	RNARS LOWESTOFT	G3OOK	G8NT	G4KDL	G0DID		3762
41	AXE VALE ARC	G3HAL	G3VW	G3DIC	G3FFH	G0GHH	3714
42	CHESHAM & DARS	G3VRY	G3XZG	G3NCL	G3AYS	G0KZP	3626
43	SOUTHDOWN ARS	G3SJV	G3AGF	G3ZFE	G0DOF		3488
44	RAFARS HALTON	G3XRX	G3GPE	G4SNQ			3478
45	RNARS YEOVILTON	G3SWH	G3LZK	G4ZIY			3327
46	RAFARS LINCOLN	G4KGG	G3FPB	G3LQS	GOLJL	G0MHP	3204
47	SOUTHGATE ARC 'B'	G4KZD	G0FQT	G3YRW	G3GUL	G4IEH	3142
48	LEICESTER POLY 'C'	G5MY	G4KRS	G4GLC	G4XEN		3114
49	STOCKPORT RS 'B'	G3GMM	G4SYC	G0AMY	G0HAL	G0JQI	2815
50	HEREFORD ARS	G4CNY	G4JSN				2787
51	RAFARS HQ	G2FIX	G3FVC	G0HKC	G3GNS		2745
52	S. MANCHESTER RC 'A'	G4HON	G0LZL	G3FNM	G0CBJ	G3VIW	2683
53	SHEFFORD & DARS	G4DRS	G0BVW				2664
54	CHESHUNT & DARC	G3TIK	G4YGH	G4UNL	G3WFM		2654
55	RNARS GLASGOW	GM4CXM	GM4GIF	GM0MDB	GM3LGM		2607
56	RAFARS CLEVELAND	G3MEA	G8QM	G4PUI	G3JNW	G4XJV	2598
57	RNARS SWANSEA	GW4HDB	GW4XQK	GW4SPL			2490
58	THREE "A"S CG 'B'	G4IFB	G3TXF				2468
59	GRIMSBY ARS 'B'	G4PYD	G4CFO	G0IOR	G0CSV	G3DOT	2464
60	RNARS PLYMOUTH	G4KKZ	G3AQM	G0JCY			2270
61	WIGTOWNSHIRE ARC	GM4OBK	GM4ZIL				2248
62	SOUTH BIRMINGHAM RS	G4EYD	G4WYS	G4FCO			2130
63	RNARS ROSYTH	GM3YTS	GM3UM				1987
64	GLOUCESTER ARC	G3MA	G3ZKN				1942
65	TORBAY ARS 'B'	G0CED	G3KZJ	G3SNU			1920
66	LICHFIELD ARS 'B'	G3YIO					1890
67	ABERDEEN ARS	GM4SID	GM3VEY				1820
68	GLENROTHES & DARC	GM4GRC	GM4WLN				1747
69	RNARS LIVERPOOL 'B'	G6SX	GW3IVX	G4RBE			1550
70	THREE COUNTIES ARC	G0BUZ	G0MBQ	G3TBT			1434
71	RNARS MEDWAY	G0BDC	G4PTE				1350
72	RNARS COPENHAGEN	OZ7JR	OZ1FJB/A	OZ3GIL			1200
73	MEIRION ARS	GW3SB	GW4XXF	GW4PHB	GW0MMB	GW3GKZ	1047
74	STEVENAGE & DARS	G4DDX	G0KJN	G0GTE			930
75	PLYMOUTH RC 'B'	G0IVZ					890
76	EXETER ARS	G3YBK	G0FGE				878
77	CENTRAL LANCS ARC	G0IDE					820
"	BROMSGROVE & DARS	G0KIN/P	G4IVJ				820
79	EXMOOR RC	G4PGW					817
80	ARIEL RG	G2FNK	G3GDT				807
81	HORNDEAN & DARS	G4OFG					794
82	RNARS HARROGATE	G4ODS					764
83	GOVMNT. COMMS. ARC 'B'	G0LBS	G4MEM				634
84	RNARS THURSO	GM3CFS					607
85	MAIDSTONE YMCA CG 'B'	G0LNX	G0KCZ	G4ZXI	G0JUS		580
86	EDGWARE & DRS 'B'	G0IGP					485
87	FARNBOROUGH & DRS 'B'	G3AID	G0HNA				470
88	LEICESTER RS 'B'	G0AIZ					467
89	VERULAM ARC 'C'	G0LRD/P	G0IAL	G3PMF			315
90	YORK ARC 'B'	G0JVG	G4EVI				220
91	MAIDENHEAD & DARC 'B'	G3WQG					217
92	S. MANCHESTER RC 'B'	G3HZM					140
93	DOUGLAS VALLEY ARS	G3BPK					130
94	STOCKPORT RS 'C'	G0GDN					44

1	G3OAY	2687	28	G3RWL	2100	55	G4EBK	1791	82	G4JBD	1520	109	G4HSD	1247	136	G4GTO	1100	163	G4DDY	958	"	G4OOT	850
2	G3SJJ	2548	29	G3SJX	2070	56	G4ZFE	1770	"	G3RSD	1520	110	G3ORP	1244	137	G4SFO	1090	164	G3ZYY/P	957	"	G4IP	850
3	G3RTE	2501	"	G4BCA	2070	57	G3JNB	1744	84	G2HDU	1500	"	G4KNM	1244	138	G3VCN	1087	165	G3GPE	954	192	G4NCY	840
4	G3LET	2490	31	G4JKS	2050	58	G3FXA	1740	85	G4OGB	1490	112	G4WNA/P	1240	139	G3YLA	1070	166	G4FCH	950	193	G4INI	824
5	G3NKS	2470	32	G3WYK	2040	59	G3XRX	1737	86	G3YLC	1488	113	GM4CXM	1230	140	G3TWG	1057	167	G0CPE	940	194	G0IDE	820
6	G4DJX	2435	33	G4EOF	2029	60	G3IGW	1711	87	G3ASR	1480	114	G4GLL	1220	"	G2FIX	1057	"	G3FPB	940	195	G4PGW	817
7	G3ORY	2394	34	G3RXP	2020	61	G3LIK	1707	88	G3YEC	1437	115	G3MCK	1184	"	G3MA	1057	"	G4OTN	940	196	G0BDC	810
8	G2BAP	2380	35	G3PDH	2008	62	G5OD	1697	89	G3SJV	1421	116	G3SHY	1180	143	G3BSN	1051	170	G3DEF	937	"	G4VER/P	810
9	G4ALE	2364	36	GM4OBK	2004	63	G4IFB	1691	90	G3DCZ	1410	"	G3HAL	1180	144	GW4HDB	1050	171	G3FVC	930	198	G0AHH	807
10	G4FAM	2357	37	G4DRS	1960	64	G3ZWH	1690	91	G3JFF	1380	118	G3MIR	1170	"	G3AGF	1050	"	G8GG	930	199	G0CED	804
11	G3FXB	2304	38	G3BFP	1959	65	G0IDA	1667	92	G3GC	1377	119	G4BJQ	1167	"	G3HKO	1050	173	G4EYD	924	200	G0CUT	803
12	G4BUO	2281	39	G3HCT	1940	66	G3GLL	1650	93	G4BOU	1374	120	G3VRY	1157	147	G4JFN	1047	174	G0JNZ	917	201	G0FQT	800
"	G3TBK	2281	40	G3KKQ	1930	67	G4ERW	1631	94	G3LZK	1367	121	G0CEL/P	1154	148	G4FRN	1037	175	G4IZB	914	202	G3MEA	797
14	G3KDB	2278	41	G4KGK	1920	68	G3YAJ	1620	95	G3JJZ	1361	122	G3CHN	1151	149	G4OKL	1030	176	G4JBH	910	203	G4OFG	794
15	G3PSM	2272	42	G3UJV	1914	"	G3JTG	1620	96	G3HQH	1357	123	G5MY	1150	150	GM3YTS	1010	177	G4HON	908	204	G3EIZ	790
16	G5LP	2245	43	G3VYI	1906	70	G3SWH	1610	97	G3KAU	1354	"	G4HTD	1150	151	G3HFG	1008	178	G0IVZ	890	"	G4HWK	790
17	G4CNY	2240	44	G3YIQ	1890	71	G4CZB	1598	98	G4FAS	1337	125	G4HZF	1143	152	G4PYD	1000	"	G3HYH	890	"	G3ATK	790
18	G3LNS	2238	45	G6LX	1874	72	G3ZYV	1590	99	GM4GRC	1317	126	G4ELZ	1140	153	G3TIK	997	180	G3LDT	887	207	G4SNQ	787
19	G3XBY	2234	46	G3SSO	1870	73	G3OOK	1587	"	G4HMD	1317	127	G3ULN	1130	154	G3VW	990	"	G5ND	887	208	G4GLC	777
20	G4ARI	2225	47	G3HEJ	1864	74	G3ZWH	1580	101	G4KZD	1314	"	G3IOF	1130	155	G4KRS	987	182	G3ZKN	885	"	G3TXF	777
21	G3NKC	2219	48	G3SFG	1861	75	G3SNN	1558	102	G3YXX	1308	"	G4GRU	1130	156	G4KKZ	980	183	G3CQR	880	210	G8NT	774
22	G4ODC	2210	49	G4PDQ	1857	76	G4LZB	1547	103	G0EHO	1290	"	GM4SID	1130	"	G3TZM	980	184	G3LVW	877	211	G3LRS	767
23	G3SDC	2198	50	G3NOM	1837	77	G3HZL	1540	104	G4DYC	1287	131	G2AFV	1127	"	G0CGV	980	185	G3DWQ	874	"	G0IBN/P	767
24	G3UFY	2184	51	G3RFS	1820	"	G4OOS	1540	105	G2UG	1278	132	G3AWR	1117	"	G3JGB	980	186	G3GMM	870	213	G4ODS	764
25	G3GRO	2157	52	G3KTZ	1818	79	G4UMS/P	1538	106	G0EFO	1277	"	G3LHJ	1117	160	G3XZG	977	187	G3AQM	860	214	G4MRJ	760
26	G3PDL	2150	53	G3JKF	1800	80	G3OHP	1537	107	G4IUZ	1275	134	G4SUP	1110	"	GM3UM	977	188	G3GHN	857	215	G2FZO	754
27	G3SXW	2117	54	G4BUE	1798	81	G4KGG	1530	108	G3XTZ	1250	135	G4ECI	1101	162	G4RMV	971	189	G4AXD/P	850	"	G3NCL	754

217	G4KDL	741	"	GM4WLN	430
218	GW4XQK	730	280	G3SNU	416
"	G8TB	730	281	G3GUL	414
220	G8IB	725	282	G0GHH	407
221	G0BUZ	710	283	G3WFM	377
"	GW4SPL	710	284	G0KIN/P	370
223	G2FHV	707	285	G0FGE	360
"	G3ZFE	707	286	G4ZIY	350
225	G0BVW	704	287	G0JQI	347
226	G3KZJ	700	"	G0HDJ	347
227	GM3VEY	690	289	G4RBE	340
"	G3ISL	690	290	G3AID	330
229	G3KLT	684	"	G3JNW	330
"	G3TQF	684	292	G3DOT	327
231	G6SX	680	293	G4XJV	324
"	G4GSC	680	294	OZ3GIL	320
"	G0FRV	680	"	G0CSV	320
"	G4DDX	680	"	OZ1FJB/A	320
235	G4NFX	674	297	G0DOF	310
236	GM4GIF	670	298	G0LJL	301
237	G0DID	660	299	G3OZY	300
238	G8OM	650	"	G0IOR	300
"	G4PTN	650	301	G4TJE	294
240	G3LQS	647	302	G3GDT	290
241	G4YGH	640	"	G3VIW	290
"	G4UNL	640	304	G0CBJ	287
243	G0KMC	630	305	G0KZP	270
244	G4SYC	620	"	G0KJN	270
245	GM3CFS	607	"	G4RAW	270
246	G4WYS	605	308	G0BOX	251
247	G3FNM	604	309	GM4ZIL	244
"	G0LBS	604	"	G3GNS	244
249	G4FCO	601	311	GW4XXF	220
250	G0LZL	594	312	G3WQG	217
251	G3OLB	590	313	G0HUZ	214
252	G3DIC	580	314	G0LNX	210
253	G3EAO	570	315	G4XEN	200
254	G3YRW	564	316	G4FXI	199
255	OZ7JR	560	317	G4ZXI	190
256	G3FFH	557	318	G3TBT	180
"	G4GGV	557	"	G0KCZ	180
258	GW3SB	550	320	GM3LGM	170
259	G4JSN	547	321	GW4PHB	157
260	G0MBQ	544	322	G0LRD/P	154
261	G4PTE	540	323	G0IAL	147
"	G3YVR	540	324	G3HZM	140
263	GM0MDB	537	"	G0HNA	140
264	GW3IVX	530	"	G0JVG	140
265	G3YBK	518	327	G3BPK	130
266	G4CFO	517	328	GW0MMB	110
"	G2FNK	517	329	G4VOB	97
268	G0HKC	514	330	G0MHP	87
269	G3MXZ	500	331	G4EVI	80
270	G0HAL	497	332	G4IEH	50
"	G4PUI	497	333	G0GDN	44
272	G3UEY	490	334	G4MEM	30
273	G0IGP	485	"	G4WZV	30
274	G0AMY	481	336	G3PMF	14
275	G3AYS	468	337	GW3GKZ	10
276	G0AIZ	467	338	G0JUS	0
277	G4IVJ	450	339	G0GTE	-20
278	G0JCY	430			

Checklogs received with thanks from: G0HYT, G3BPM, G3SXE, G3MCX, G4CVL, G4KTI, G4SLE and GW3JI.

RULES

ROPOCO 2 1990 RULES

1. The general rules for RSGB HF Contests will apply.

2. Date and time: 0800 - 1000 GMT, 26 August 1990.

3. Sections: Single operator entries only. All entrants must be paid-up members of the RSGB, resident in the British Isles and holding a class 'A' licence.

4. Band and mode: CW in the 3.5MHz band only. Entrants are requested to confine their operation to 3.520 - 3.570MHz.

5. Exchange: Send RST, plus for the first contact, your own postal code; for the second and subsequent contacts, the postal code received in the previous contact. Contacts with European stations will not count.

6. Scoring: Ten points per contact.

7. Documentation: Entrants are requested to use RSGB HF Contest log sheets (HFC1) and the cover sheet (HFC2), which must include a signed declaration stating that the rules and spirit of the contest were observed. Column five should be headed 'postcode received' and used for this purpose.

8. Name and address for logs: Logs should be sent to Mrs H Claytonsmith, G4JKS, 115 Marshalswick Lane, St Albans, Herts AL1 4UU.

9. Date for entries: Logs to be postmarked not later than 10 September 1990.

10. Awards: Certificates of merit will be awarded to the first, second and third placed entrants. The G3XTJ Memorial Trophy will be awarded to the entrant with the highest checked score and most accurate log. This trophy will only be awarded once in 10 years to the same station. Previous winners - GW3YDX, G3SXW, G4DJX, G4BUO, G3KHZ.

VHFCC CONTEST RULES JUNE - SEPTEMBER 1990

432 MHZ ACTIVITY CONTEST AUGUST

Three sections: Section F Fixed station single operator; Section O portable and/or multi operator; Section L SWL

Time 1900-2100 GMT any night throughout August

General rules apply.

Scoring radial rings.

Contestants choose the best 5 evenings.

Summary sheet required.

Adjudicator G4DEZ 110 South Avenue Southend Essex SS2 4HU

Entries must be postmarked not later than 16th September 1990.

1296 MHZ ACTIVITY CONTEST SEPTEMBER

Three sections: Section F Fixed station single operator; Section O portable and/or multi operator; Section L SWL

Time 1900-2100 GMT any night throughout September

General rules apply.

Scoring 1pt per kilometre.

Contestants choose the best 5 evenings.

Summary sheet required.

Adjudicator G4DEZ as above.

Entries must be postmarked not later than 16th October 1990.

1.3 GHZ TROPHY

Date 12 August.

Time 0900 - 1700 GMT.

General rules apply.

There will be 3 sections: Section F Single operator fixed; Section O All other stations; Section L SWL.

Radial ring scoring.

The VHF Contest Committee Cup awarded to overall winner.

Adjudicator G4PIQ A. Cook, Fishers Farm, Tendring, Clacton-on-Sea, Essex.

2.3 GHZ TROPHY

Date 12 August.

Time 0900 - 1700 GMT.

General rules apply.

There will be three sections: Section F single operator fixed; Section O all other stations; Section L SWL.

Scoring 1pt per kilometre; crossband contacts count half points.

The G6ZR Trophy to the overall winner.

Adjudicator G4PIQ as above.

144 MHZ TROPHY

Date 1 - 2 September 1990

Time 1400 - 1400 GMT

General rules apply

There will be four sections: Section F Single operator fixed; Section S Single operator portable; Section O Multi operator fixed and multi op portable; Section L SWL

Scoring Radial rings for RSGB and 1pt per kilometre as well if logs to be forwarded to IARU.

Adjudicator G8HHI John Pilags, 43 Bartons Drive, Dungells Lane, Yateley, Camberley GU17 7DW.

70 MHZ TROPHY

Date 16 September 1990

Time 0900 - 1600 GMT

General rules apply

There will be three sections: Section F Single operator fixed; Section O All other stations; Section L SWL

County and Country multipliers as per rule 14

The overall winner will receive the VHF Manager's Trophy.

Adjudicator G3ZXX D Boniface, 59 Gale Way, Wincanton, Somerset, BA9 9BS.

50 MHZ CW

Date 30 September 1990

Time 0900 - 1700 GMT

General rules apply: Three sections; Section F single operator fixed; Section O all others; Section L SWL

Maximum points per QSO 25

Radial ring scoring.

Adjudicator G8XVJ Eric Gedvilas, 518 Manchester Road, Paddington, Warrington, Cheshire, WA1 3TZ.

RESULTS

FIRST 1.8MHZ CW CONTEST 1990 RESULTS

A good response again to this popular contest, although several of the counties usually heard were not active this year. Conditions were very good to EU during the contest, with inter-G propagation not so good. Maybe this was in part due to the very high winds shortly before the contest resulting in all the enormous antenna arrays falling down!

As usual, many points were lost through unmarked duplicates, with even some of those who submitted check sheets still failing to find them. In all, 11 logs contained unmarked duplicates, including one of the four computerised logs! Check your QSO points to see if yours was one, and if so try harder next time! I look forward to receiving more computerised logs (in the correct format) in the future.

Many thanks to Sandra, G4JQL, for her invaluable help with the checking of the logs.

CONTEST SUMMARY

Total counties active: 46

Total countries active: 26

% QSO's cross checked wrong: 10

Highest Perfect Log: G0IDE

Somerset Trophy to GM4OBK.

Certificates to : GM4OBK, G3TBK, G4BUO, BRS1066, OK1OAZ, SP1PEA, OK1KYY.

G4DRS

UK TRANSMITTING

Psn	Call	QSOs	QSO Pts	Counties	Countries	Bonus	Score
1	GM4OBK	179	531	38	23	305	836
2	G3TBK	160	442	40	21	305	748
3	G4BUO	157	437	36	21	285	722
4	G3SYM	146	432	36	16	260	692
5	G3OLB	141	417	37	17	270	687
6	G3LET	136	401	35	16	255	656
7	G3PDL	128	378	36	15	255	633
8	G4HTD	124	370	35	15	250	620
9	G4RFR	107	320	34	12	230	550
10	GM3YEH	111	299	34	16	250	549
11	G0JFX	103	309	34	12	230	539
12	G4OGB	101	297	34	13	235	532
13	G3ZGC/P	105	314	31	12	215	529
14	G3VYI	91	270	32	14	230	500
15	G2MJ	96	286	29	13	210	496
16	G3OXC	102	303	30	8	190	493
17	G3SWC	94	272	31	11	210	482
18	G3YLC	95	272	31	10	205	477
19	G3KKQ	89	264	32	7	195	459
20	G0JNZ	78	234	33	10	215	449
21	G3MCX	87	257	30	8	190	447
22	G4ARI	90	229	30	11	205	434
23	G4ECI	77	215	29	10	195	410
25	G5MY	76	226	28	8	180	406
26	G3BPM	69	198	28	7	175	373
27	GM3UM	78	196	28	7	175	371
28	G0IDE	65	195	30	5	175	370
29	G3AWR	31	199	26	5	155	354
30	GW3JI	30	167	27	3	150	317
31	G3TXF	68	168	22	7	145	313
32	G3JSR	61	165	22	5	135	300
33	G2HLU	54	160	23	4	135	295
34	G3FVW	48	149	25	4	145	294
35	G3GMM	51	144	21	5	130	274
36	G4HUP	46	130	21	6	135	265
37	G4PYD	58	132	20	3	115	247
38	G4EBK	38	109	20	6	130	239
39	G3ZRZ	40	110	19	5	120	230
40	G3GMS	34	100	20	3	115	215
41	G0AIZ	17	47	12	2	70	92

UK RECEIVING

1	BRS1066	66	198	30	6	180	378

OVERSEAS TRANSMITTING

Psn	Call	QSOs	QSO Pts	Counties	Bonus	Score
1	OK1OAZ	61	178	32	160	338
2	SP1PEA	57	170	32	160	330
3	OK1KYY	49	147	30	150	297
4	OL1BVR	50	147	29	145	292
5	OL8CUT	48	140	25	125	265
6	DL4EBN	42	123	27	135	258
7	DK2VA	45	133	24	120	253

(continued overleaf)

(continued from preceding page)

8	OK1DRU	44	102	27	135	237
9	EI4VIJ	35	100	21	105	205
10	OL8CWI	32	92	20	100	192
11	LY2BTA	37	81	19	95	176
12	OK1FRU	46	36	26	130	166
13	OL9CUD	22	65	17	85	150
14	OK2BQU	20	60	16	80	140
15	UC2WJ	25	36	14	70	106
16	DL9DW	12	35	10	50	85

OVERSEAS RECEIVING

1	UB5-075-145	13	39	11	55	94

Check Logs gratefully received from: G2AFV, G2CIL, OK2BXR, OL1BUY, UA1OLL, UA3ICK.

1989 70 MHZ TROPHY RESULTS

Sorry for the delay in providing the results, caused by internal delays and deliberations within VHFCC. Most entrants found conditions average to poor, although those well sited stations added a few dB to their signals which made them stand out over the rest! Congratulations to the winner and the runners-up. Many points lost through logging errors which could easily cause loss of position, please don't guess, if you're not sure, ask for a repeat. *G4DEZ*

OPEN SECTION

Pos	Call	Pts	Ant	Pwr	Loc	Best DX	Km
1	GM4FRE/P	98670	2X5	150	IO85DJ	GJ7AOG/P	689
2	GM1GEY/P	62590	8	70	IO74NV	GJ3TCU/P	650
3	GJ3TCU/P	44226	2X6	150	IN89VG	GM4FRE/P	688
4	G3UAX/P	42515	2X5	100	IO80LW	GM0FRT/P	668
5	GM8XVJ/P	40788	8	100	IO86GH	G4ADV/P	677
6	G4RFR	38250	2X12	100	IO90AS	GM0FRT/P	686
7	GM4CHW/P	26754	5	150	IO74TQ	GJ3TCU/P	620
8	G4ZTR/P	25520	5	75	JO01GU	GM0FRT/P	598
9	G1SAS/P	24795	4	40	JO02BA	GM8XVJ/P	531
10	G0KYW/P	23276	5	12	IO81UC	GM8XVJ/P	584
11	G4ADV/P	22780	2X7	50	IO70JH	GM8XVJ/P	673
12	G4DDN/P	22554	6	100	IO80ST	——	—
13	G3PRC/P	21608	2X4	100	IO80AS	GM4FRE/P	524
14	G7APD/P	14760	2X4	50	IO91RV	GM8XVJ/P	526
15	G4EKT/P	14134	4	50	IO94OA	GJ3TCU/P	537
16	G8EIK/P	13755	8	25	JO02IS	G4ADV/P	492
17	GJ7DGJ/P	7680	3	20	IN89WG	G0GTI/P	418
18	G8DDY/P	5550	2X5	25	IO90IQ	GM4FRE/P	548

SINGLE OPERATOR SECTION (FIXED)

Pos	Call	Pts	Ant	Pwr	Loc	Best DX	Km
1	G4CVI	28200	8	130	IO90FW	GM0FRT/P	673
2	G3XBY	26416	5	150	IO92DG	GM0FRT/P	521
3	G3UKV	25704	5	90	IO82RR	GM0FRT/P	467
4	G4ASR	21516	10	95	IO81MX	GM8XVJ/P	482
5	G3NKS	20640	3	150	IO81XU	GM0FRT/P	566
6	G3EDD	18920	4	60	JO02DE	GI4ONL/P	572
7	G4PMK	17004	3	70	IO93GT	GJ3TCU/P	507
8	G1SWH	15288	5	100	IO83QO	GJ7AHG/P	483
9	G4BVY	13818	D/Po	150	IO82TD	GM8XVJ/P	469
10	G1DOX	10461	4	80	IO81QM	GM8XVJ/P	526
11	G4JNT	7920	4	90	IO90IV	GM4FRE/P	527
12	GW4HBK	7656	6	60	IO81KP	GM4FRE/P	419
13	G1GVA	6608	3	25	IO91PJ	GM8XVJ/P	575
14	G3ZJY	5125	4	10	IO90FR	GM4FRE/P	538
15	G0EHV	4158	3	50	IO94FW	G4RFR	464
16	G6LAU	2242	5	10	IO91RM	G4ADV/P	355
17	G1EHF	2240	HB9CV	10	IO91PJ	G4ADV/P	337
18	G4ARI	1683	XDIP	S3	IO92IO	GJ3TCU/P	386
19	G4SJH	1152	DIP	10	IO91RL	GJ3TCU/P	272

Thanks to GM4ZUK and G4NBS for checklogs.

SWL SECTION

Pos	Call	Pts	Ant	Loc	Best DX	Km
1	52543	11040	HB9CV	IO83LT	GJ3TCU/P	508
2	28198	1995	TA31JR!!	JO00HX	G3PRC/P	315

Adjudicated by G4NBS. Text G4DEZ.

144 MHZ JANUARY 1990

The return of the CW contest was welcomed by many of the participating stations, despite the fact that radio conditions were described as flat and abyssmal. G4PIQ bemoaned the lack of activity from the continent, especially DL (though he still won). Several stations, like GM0FRT, G3KNV, GM4AFF and G4XEN, could only spend an hour or two operating but still sent logs in. Thanks for their dedication. GM4AFF also prepared a large dinner for a party between QSO's. Congratulations and certificates go to the Northern Lights Contest Group, G4KUX for winning the open section. G4PIQ the single operator Fixed station winner an G0CUZ the runner up. *G8HHI*

144 MHZ CW JANUARY 1990 RESULTS.

OPEN SECTION

Pos	Call	Pts	Qso's	QRA	Best DX	Km
1	G4KUX	882	84	IO94BO	FE2IL	695
2	G4RFR	678	71	IO90AS	GM0FRT	699
3	G0CLP/P	621	71	IO84KD	EI5FK	523
4	G4OTV/P	319	53	JO01ED	G3BDJ	454

SINGLE OPERATOR FIXED

1	G4PIQ	862	98	JO01MU	GM0FRT	614
2	G0CUZ	527	73	IO82WM	GM0FRT	505
3	G4VBG	442	40	IO94FW	F6FLB	497
4	G4ZTR	297	39	JO01LV	DJ6LV	408
5	GI4KSO	291	25	IO64XK	G4PIQ	552
6	G4OUT	283	47	IO92AT	GM4AFF	468
7	GM4AFF	278	18	IO87VA	G4RFR	695
8	G3WGV	203	37	IO91NJ	G4VBG	397
9	G3KZR	168	34	IO91SE	G4VBG	423
10	G4ZVS	159	35	IO92BK	F6FLB	305
11	G5UM	137	25	IO92MP	G4VBG	260
12	G4XEN	122	18	IO92PH	DJ6LV	528
13	G4HUP	114	17	JO02PD	G4VBG	362
14	G3JJZ	106	23	JO01AJ	G4KUX	379

Checklogs gratefully acknowledged from :
GM0FRT, IO87WB
G3KNU, IO93QN

MARCH 144/432 MHZ CONTEST RESULTS

The conditions during the contest on both bands were best described as flat; contestants used other words! The high winds during the contest caused some problems to operators, and of course the previous high winds meant that some operators didn't have any antennas at all, hence the lack of activity during the contest. It was noted with interest that G0MTV/P lost his antenna and noticed that his caravan was moving! A real contest operator would not have noticed a little thing like the shack moving! Certificates and congratulations to winners and runners-up in all sections. *G4DEZ*

SINGLE OPERATOR SECTION (OVERALL) BAND POSITION.

Pos	Call	Pts	144	432
1	G4PIQ	4981	1	1
2	G0CLP/P	2720	2	3
3	G8MKD	1044	3	7
4	G0MTV/P	916	4	5
5	G8HHI	867	6	2
6	G1LSB	520	8	4
7	GM4AFF	458	5	9
8	G0HKT	288	7	8
9	G5UM	178	9	6

MULTI OPERATOR SECTION (OVERALL) BAND POSITION

Pos	Group	Pts	144	432
1	Victory Contest Grp.	10913	1	4
2	The Windbreakers C.G.	10052	3	2
3	Warrington Contest G.	9048	2	3
4	Flight Refuelling ARS	8239	4	1
5	Bracknell Amateur R.C.	4803	5	8
6	Watford Contest Grp.	3949	6	5
7	Five Bells	3314	8	7
8	Scunthorpe VHF Grp.	3165	7	9
9	11th Hour Contest Grp.	2756	10	6
10	Southampton Univ. RC	2756	9	10
11	Leicester Radio Club	1102	11	11
12	Oswestry and Dist. ARC	587	12	12

SWL SECTION

Pos	Station	Pts	144	432
1	BRS28198	651	648	3

Checklogs received with thanks from G3ILO, G2FWX, G0GGG/P and G0KYS/P. The question of single band entries will be looked at in committee.

SINGLE OPERATOR PORTABLE 144/432

144MHZ

Pos	Call	Pts	QSO	Loc	Pwr	Ant	Best DX	Km
1	G0CLP/P	2371	263	IO84KD	60	8	ON6HT/P	742
2	G0MTV/P	700	100	IO94MJ	80	18	——	—

432MHZ

Pos	Call	Pts	QSO	Loc	Pwr	Ant	Best DX	Km
1	G0CLP/P	349	52	IO84KD	50	48	G7AZP	384
2	G0MTV/P	191	25	IO94MJ	80	21	G0FRR/P	404

SINGLE OPERATOR FIXED

144MHZ

Pos	Call	Pts	QSO	Loc	Pwr	Ant	Best DX	Kms
1	G4PIQ	4278	412	JO01MU	300	14	HB9CJC/P	787
2	G8MKD	975	147	IO92AL	50	4X9	DL4YBM/P	698
3	GM4AFF	457	25	IO87VA	400	17	F6FLB	805
4	G8HHI	302	44	IO91OH	30	15	DK0MU	569
5	G0HKT	268	37	IO90AR	75	9	PA3FNE	546
6	G1LSB	202	20	JO02CT	75	19	DK3LD/P	494
7	G5UM	90	14	IO92MP	12	10	ON4ASL	308

432MHZ

Pos	Call	Pts	QSO	Loc	Pwr	Ant	Best DX	Kms
1	G4PIQ	703	83	JO01MU	60	21	HB9AMH/P	683
2	G8HHI	565	67	IO91OH	400	21	DL8QS	694
3	G1LSB	318	36	JO02CT	80	21	DK0JK/P	587
4	G5UM	88	16	IO92MP	10	14	G0CLP/P	261
5	G8MKD	69	13	IO92AL	10	19	G4ZTR/P	232
6	G0HKT	20	7	IO90AR	50	19	GW8SJP/P	204
7	GM4AFF	1	1	IO87VA	10	4X19	GM4ZUK/P	5

MULTI OPERATOR OPEN

144MHZ

Pos	Call	Pts	QSO	Loc	Pwr	Ant	Best DX	Kms
1	G8LNC/P	10008	761	IO90JO	400	4X19	OK1KRG/P	1001
2	GW0CDA/P	7722	682	IO82KW	400	60	DF0SX/P	929
3	G4VIX/P	7212	570	JO01PU	400	2X15	DL7AKA	825
4	G4RFR/P	5858	474	IO80UU	400	2X19	Y24BO	1104

5	G4TDL P	4296	375	JO01QX	300	2X17	HB9ACJ	672
6	G0KEG P	3207	427	IO91PS	350	18	FD1JRX	735
7	G4ERG P	2852	328	IO94PH	350	16	DK0PU/P	607
8	G4SIV P	2785	295	IO92UA	400	4X9	DK5OZ	688
9	G3KMI	2526	294	IO90HW	100	2X17	DL3LAL	824
10	G6CTU P	2195	326	IO91XG	400	4X17	DK1UF	658
11	G3LRS	973	187	IO92KP	70	17	ON6HT/P	548
12	G1ORA P	538	86	IO82LT	17	16	—	

432MHZ

Pos	Call	Pts	QSO	Loc	Pwr	Ant	Best Dx	Kms
1	G0FRR P	2381	203	IO80UU	250	2X24	Y2/DK0TU/P	1171
2	G4ZTR P	1840	174	JO01PU	200	2X21	F1DXC	671
3	GW3CKR P	1326	146	IO82KW	400	4X21	DF7VX	820
4	G0LNC P	905	107	IO90JO	150	4X17	DG8YBD	629
5	G0KVA P	662	108	IO91PS	120	2X23	DL0EU	765
6	G8MNY P	561	116	IO91XG	400	27	F6HEO P	479
7	G8ZHP P	529	63	IO92UQ	400	4X18	F6HEO P	627
8	G0GJV P	507	54	JO01QX	20	2X21	DK0JK P	482
9	G8FEK P	313	43	IO94PH	35	21	G0LNC P	413
10	G8KMI	230	40	IO90HW	10	2X21	DK0ATV	615
11	G6XRS	129	35	IO92KP	280	8	G0LNC P	228
12	G1OIB P	49	25	IO82LT	25	21	—	—

432 MHZ FIXED/AFS/SWL CONTEST 1990

Conditions ranged from poor to average, with low activity. Logs were very good, and few points were lost due to transcription errors. Congratulations to winners G0LIP in the multi-operator section, G3NNG in the single operator section, and to Sutton and Cheam for the AFS entry. Congratulations also to the runners-up, SWL, and to the Zonal winners, all of whom will receive a certificate.

G4DEZ

AFS SECTION

Pos	AFS			Ops				Total	Zn
1	Sutton and Cheam RS	G3OLX	494	G4OWM	237	G3WHK	318	1049	C
2	Harwell ARC	G3NNG	572	G8NRP	114	G3NAQ	116	802	D
3	Farnborough Dis 'A'	G8HHI	343	G8PDP	247	G8ATK	162	752	D
4	South Manchester RS	G4JLG	320	G4NTY	231	G3ZDM	140	691	A
5	Reigate ATS	G1WIS	33	G3YSX	122	G8JXV	160	315	C
6	Farnborough Dis 'B'	G0GCI	84	G0HNA	22	G1IPO	61	167	D
7	Stourbridge and D	G6OI	43	G8APB	59	—	—	—	B

SWL SECTION

Pos	BRS No.	QSO	Pts	Loc
1	28198	7	39	JO00HX

MULTI-OPERATOR SECTION

Pos	Call	Qso	Zn	Pts	Ant	Pwr	Loc	Best DX	Km
1	G0LIP	129	B	732	2X21	400	IO92JW	PA3DZZ	442
2	G4RFR	103	B	705	2X24	400	IO90AS	G1GEY	464
3	G6KEZ	81	B	521	4X18	400	IO92UQ	PA0EZ	376
4	G3OLX	103	C	494	21	400	IO91VH	G3FNQ	316
5	G3WHK	76	C	318	24	100	IO91VJ	G1KDF	302
6	G4OWM	65	C	237	88	90	IO91WI	G4NTY	286
7	G8OHM	55		213	24	100	IO92AJ	G0BPU	219
8	G0GGG	24	D	168	19	20	IO81VE	G4ERG	306
9	G8NRP	34	D	114	2X21	50	IO91IQ	ON4KNG	399
10	G6OI	19	B	43	19	18	IO82WK	G4RFR	185

SINGLE-OPERATOR SECTION

Pos	Call	Qso	Zn	Pts	Ant	Pwr	Loc	Best DX	Km
1	G3NNG	104	D	572	21	300	IO91EP	PA0EZ	472
2	G6ZTU	79	A	539	21	200	IO93HN	G1ENJ	314
3	G4ERG	50	A	351	21	200	IO93SR	G4RFR	344
4	G8HHI	77	D	343	2X21	400	IO91OH	G8ESB	331
5	G4JLG	58	A	320	88	120	IO83TM	G4RFR	307
6	G8MNY	70	C	288	19	400	IO91XI	GW8ELR	317
7	G1KDF	45	A	271	21	100	IO83NN	G4RFR	316
8	G8PDP	59	C	247	19	100	IO91PG	G3ESB	336
9	G4XEN	53	B	237	24	50	IO92PH	PA3DZZ	399
10	G4NTY	47	A	231	21	80	IO83TM	G4RFR	307
11	G8DOK	36	A	192	18	50	IO83RK	G4RFR	299
12	G1NWO	51	D	175	2X24	100	IO91QL	G4JLG	256
13	G8ATK	54	C	162	2X18	100	IO91OF	G4ERG	278
14	G8JXV	44	C	160	48	70	IO91VE	G1KDF	320
15	G1NXS	32	A	150	17	25	IO83RK	G4JRFR	299
16	G3ZDM	36	A	140	21	50	IO83UK	G4RFR	297
17	G0MGI	24		130	MB	10	JO02DL	G4RFR	246
18	G3YSX	38	C	122	8 8	10	IO91WF	G4NTY	297
19	G3NAQ	28	D	116	19	40	IO91HL	G4ERG	258
20	G0GCI	34	C	84	19	120	IO91OF	G4BYV	204
21	G8ACR	20		81	18	10	IO92BJ	G4RFR	181
22	G1IPO	19	D	61	5 5	80	IO91OH	G4ERG	269
23	G8APB	17	B	59	21	30	IO83WD	G4RFR	264
24	G5UM	16		48	14	10	IO92MP	GW4HBK	220
25	GW4HBK	6	E	34	19	50	IO81KP	G6KEZ	226
26	G1WIS	12		33	18	10	IO91WG	G6ZTU	268
27	G0HNA	14	D	22	19	1	IO91PS	G4RFR	104

Thanks to G0CLP P for checklog and to G0HNA with just one watt!

VHFCC NEWS

POSITION CERTIFICATES

As from this year's VHF Field Day, all entrants to VHF/UHF contests will be issued with a position certificate free of charge. Please note that you must request a certificate; it will not be automatically sent.

"MOT" CERTIFICATES

An "MOT" certificate will be issued if requested, this will briefly tell entrants where they are going wrong in their entries, so that they can learn from their mistakes.

To obtain either or both of the above certificates please enclose an A5 stamped addressed envelope with your entry; no SAE, no certificate. Mark the envelope MOT or PLACE or MOT/PLACE. The same envelope will be used to send extra forms and log sheets if requested.

FOREIGN ENTRIES

In the rules for foreign entries please note that United Kingdom should be changed to British Isles, this will allow contestants from Eire to participate.

The reason for not allowing entries from mainland Europe to be judged along with British Isles entries is that we would then be open to entries where none of the contacts made by a foreign entrant need be into the UK or Eire. For example a station in Transylvania could work no-one but Germans, the entry would therefore be impossible to check. Entrants from mainland Europe will be accepted but will be placed in a separate section, with the usual certificates for winners and runners-up. Some European stations are showing an interest in entering our contests and are always welcome, I would like to see many more.

CERTIFICATES

If you feel that you should have had a certificate for a past contest (since January 1988) and have not received it, please write to Bryn LLewellyn, G4DEZ, QTHR, giving full details of contest, date, section, place, callsigns to be put on certificate, and I will endeavour to make sure you get them.

G4DEZ

CORRECTION

The VHF Contests Committee regrets the following errors in the results of the 144MHz CW RSGB and Marconi Contest published in the March 1990 edition.

G0CLP/P who was placed 4th in the Multi-operator 24 hour section should be 2nd in the 6 hour section. A certificate is on its way!

G0CRW/P who was placed 1st in the Multi-operator 6 hour section should be 3rd in 24 hour multi-operator section. Please can we have our certificate back! Seriously though, thanks for the letter and your honesty.

Apologies to all concerned.

G4DEZ

CONTESTS CALENDAR

RSGB HF CONTESTS

2,3 June	HF National Field Day (Feb90)
10 Jun	Mid-Thames DF (Apr 90)
23, 24 Jun	Summer 1.8MHz (Apr 90)
24 Jun	Banbury DF (Apr 90)
7, 8 Jul	SWL (May 90)
15 Jul	Low Power Field Day (May 90)
15 Jul	Ripon DF
29 Jul	Chelmsford DF
19 Aug	Coventry DF
26 Aug	ROPOCO 2 (Jun 90)
1, 2 Sept	SSB Field Day
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

10 Jun	10GHz Cumulatives (Jan 88)
10 Jun	432MHz CW Single/Multi/SWL (May 90)
10 Jun	432MHz FM Fixed & Open (May 90)
7,8 Jul	VHF Field Day (Apr 90)
22 Jul	10GHz Cumulatives (Jan 88)
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
All Sep	1296MHz Activity (Jun 90)
1,2 Sep	144MHz Trophy/SWL (Jun 90)
9 Sept	10GHz Cumulatives
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

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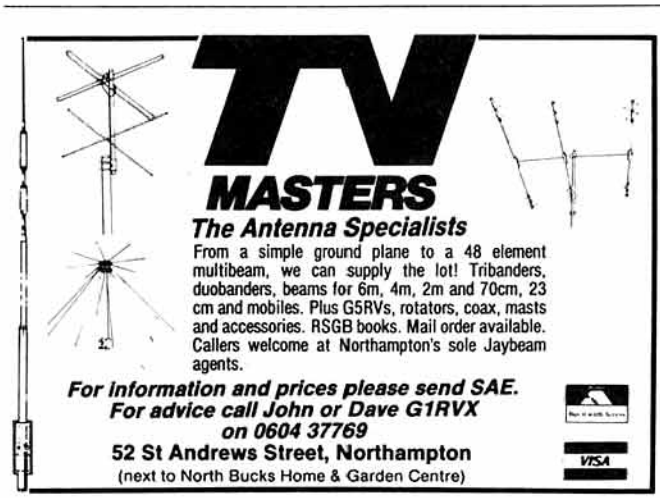

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● ROLLER coaster 2-5kW approx dimensions 260Lx260Hx180W silver plated, twin bearings. Dble sprung carrier: £65. G3SWC. (Horsham) 0403 722444

● MARINE VHF RS7000 12V/25W needs attn: £145. HRO500 synth comms rcvr 0-30MHz, working needs minor attn: £210. Buyer collects. G3SWC. (Horsham) 0403 722444 eve

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● QUME printer in good cond with owners manual, parts manual and tractor unit. Can demo with BBC: £150. (Bunwell) 095389 8376

● PYE Compak HF SSB manpacks, 10W CW/SSB. As new, unused c/w 2 spare batts, chrgrs and full ant systems. Equipped with rucksacks, fist mics, morse keys. Unxtalled: £175 for pair. Will split (reluctantly). Ray, G3SCZ QTHR. 0734 700041 eve

● WIRELESS World 1943-55, bound copies. Admiralty Handbook Vols I and II. Several other old radio books, valves etc. A.Parr, 42 Argyle Rd, Poulton-le-Fylde, Blackpool, FY6 7EW.

● JST 135 tcvr, fitted 1.8kHz and 1.00kHz filters, bandwidth option, mic, used RX only. Cost £1740 mint: £1200. NFG97 ATU: £190. Icom 271E basestation, Mutek F/E: £500ono. SM8 mic: £55. BNOS, LPM amp 144-10-180: £250. Pocom PRM1200 packet decoder: £200. SEM noise bridge: £30. Most items boxed, unused. All items must go. Buying Icom 781. G6SFD QTHR. (Dronfield) 0246 413413

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● FT726 multimode 6m/2m/70cm modules. Exc.cond: £850. Light duty rotator plus bearing: £25. John G0NAJ. (Dukinfield) 061-338 8731

● CUSHCRAFT A3 yagi and 30ft tower: £300. G0JOU. (Stockport) 0625 872138

● FRITZEL FB33 tribander 3ele quality construction with 30/40m add-on kit, New, unused, boxed: £275ovno. Kenwood TS930S/TS940S, TS140S CW filter, YG455C-1: £55. YK88C1. £25. 500Hz pair for both IFs. (Lancs) For filters 0772 432332 weekdays. For ant 0772 622008

● RN Electronics 28/50MHz tvtr Oct. 88: £150. G5DS QTHR. (Surbiton) 01-390 1566

● LOADSA savings. FT726R with sat unit, CW filter, 2m/6m/70cm: £850ono. Matching SP102 spkr: £40, or free with FT726R. FT211RH c/w Heatherlite mobile headset: £200. BNOS linears LPM144-10-100: £140. LPM50-10-100: £160. Both for: £275. BNOS 144MMHz and 50MHz filters at: £15ea. All with boxes, manuals and in good cond. Brian. (Fareham) 0329 234904 eve

● COMPLETE 2m/70cm and sat station, consisting of FT225RD, Mutek F/E. Mint cond. FT780R, good cond. Tokyo HL160V amp. KR500 elevation rotator. 4x 9ele 2m tonnas. 4x 21ele tonnas 70cm. GMFA 144E mast head preamp never used. 4-way pwr splitter 70cm. 4-way pwr splitter 2m. Datong speech processor, Heathkit pwr meter 144-146MHz. Weltz pwr meter 30-500MHz. Complete station: £1500ovno. Gordon G8TPR not QTHR. 01-864 8261 or 081-864 8261 after May 6

● FT480R Yaesu all-mode 2m tcvr. Boxed, as new, used only hours: £260. G4JJC not QTHR. (Bradford, W.Yorks) 0274 670606

● YAESU 290R Mk2, nicads, case, chrgr, 2025 linear, m/bracket, boom mic, PTT switch: £435. Jaybeam 5ele on rotator, pole, with 12m quality cable: £35. 1000W dummy load: £25. Dip meter: £20. Various PSUs. G6LJP QTHR. (Peterborough) 0733 77564

● TS530SP HF tcvr 160-10m WARC bands, nearly 3yrs old. MC35 mic, box, manual. Spare PA valves, exc.cond: £650. G4MWP QTHR. (Coventry) 462035

● COLLINS (Rockwell 1976) KWM-2A, 516F-2 AC PSU/LS, SM3 desk mic, additional band xtals, operating and service manuals, spare valves and relays: £450. G3ONU. (Watford) 676344

● FT101 Mk2, HF tcvr. Modded FM on transmit. Also 10MHz tcve. CW filter, h/book etc. GWO: £250. G3UKV QTHR. (Telford) 0952 255416

● 80FT Strumech Versatower mast. Trangle section, all complete. Exc.cond: £475. Not QTH. Mast located near Slough. Dave 0628 664741

● KENWOOD TS830S mint plus MC50 mic. Tono 5000E TU mint. Swan WM2000 swr/pwr bridge. Ten-Tec 4229 ATU mint. Santec ST144/UP h/held. All unused 4yrs, except checks, due illness/death. Offers. GI8OLV QTHR.

● FT101E: £150. Prefer buyer inspects/collects. G3NSU QTHR. (Leeds) 0532 630661.

● YAESU FT690 Mk2 with 15W linear, boxed: £315. Yaesu MMB31 mount, unused. G1VLD QTHR. (Ely) 0353 740410.

● LARGE 1929 det house in mature tree-lined road by golf club. Exc HF/VHF QTH. 5mins town centre. 17 miles B'ham. 4 beds, 2 bathrooms, large kitchen, lounge, separate dining room, dble garage, w/shop, outbuildings, good gdns. Value 160-190k. Exch for det house in rural locations around Devon, Shropshire, Herefordshire. Minimum 2 acres. G4XWD QTHR. (Kidderminster) 0562 823674.

● YAESU FR101DD, FL101, SP101, h/books, mic. Rcvr has all xtras incl 2m CW filter, digital display: £400ono. G4UQF QTHR. (Peterborough) 0733 79079.

● TWO Ferguson VHS video recorders. Fully serviced, top loader: £95. Front loader: £120 or pt/exch for pre 1939 domestic radios. G4OOW QTHR. (Hinckley) 0455 612091 after 7.30pm.

● CHERISHED TS430S 1.8/30MHz tcvr. Receives 0.2/30MHz. Fitted AM/FM/NSB filters. VGC: £675. IC22A 2m mobile: £85. Standard C146A 2m FM h/held: £35. Tokyo 2m amp 2/30W: £37. Commodore C64: £55. Sony stereo r/r recorder: £50. Drake 1kW filter: £15. G3XJN. (Chichester) 0243 672814.

● JST135 tcvr bandwidth option NBD520 PSU/spkr, new 12/1/90. 6wks use QRP only. Warranty Lowes. Mint cond, cost £1800 sell: £1400. Yaesu FT7B tcvr + FM + 160m. FP12 PSU/spkr, mint cond: £350. Both with mics, manuals, boxes. GW4RLP QTHR. (Caernarfon) 0286 5264 eve.

● COLLINS KWM2A, 312B5, PM2, VGC: £650. 390A, VGC: £500. SSB adaptor: £200. Pan adaptor: £200. Kenwood TS930S, SP930 ATU, extra filters. As new: £1100. Hallicrafters Cyclone SR400A, VGC: £250. G3BB QTHR. 0284 753049 day 037983 657 eve-w/e.

● FL2100Z WARC, one owner, very low mileage, unmarked, mint cond with orig packing: £550. Prefer buyer collects. G3EFR not QTHR. (Hull) 0482 654966.

● ICOM 25E micro handy plus scanner 88-192MHz with BP82 nicad pack, BP86 batt pack. BC73E nicad chrgr, LC55 case. All boxed, 6mths old, incl Welz diamond base co-linear: £235. GM0BVF QTHR. (Lockerbie) 05763 494.

● DATONG VLF rcvr cvtr: £25. G4DPJ QTHR. (Bristol) 0272 590413.

● SEM Transmatch ATU, 0-30MHz, fitted Ezitune, v.little used and in good cond: £80. (Edinburgh) 031-665 7287.

● TRIO 9000 2m multimode: £195. SX200N scanner: £110. Trio MC50 desk mic: £25. FT707: £385. FP707 PSU: £80. M/MT144 tvtr: £50. MM cvtr 432-436 28-30 O/P: £20. Labgear LG50 CW/AM transmitter: £15. G4RXD QTHR. (Sandbach) 0270 761354.

● APPLE 2e, mono screen. RAM card, 2 drives, printer, CPM and super serial cards, mouse, incl manuals and discs. S/ware for packet: £290. (Huddersfield) 0484 510804.

● CONNEXIONS 8520 stereo computerised sat rcvr/positioner, OMT, 1.7dB 10.95-11.7GHz LNB, 1.7dB 12.2-12.7GHz LNB (Telecom), V/H switch. Fully auto remote controlled deluxe system. Cost approx £1800. Sell for: £1100ovno. NEC 8201A batt pwr portable computer, Brother HR5 thermal printer, cassette recorders. all leads and manuals: £200ovno. Mike. (Essex) 081-892 6918 eve.

● TAGRA 3ele yagi for 10m. As new: £50. Small bell rotator free with beam. G0JCM. (Shorne) 0474 823797.

● KENWOOD TS680S, AT230 c/w insts, mic and boxed: £850. G1GSM QTHR. (Stockport) 061-449 9176.

● ICOM 735, AT150, PS55, all boxed. As new: £950. Sony IFC2001D, AN1 ant, boxed. 2hrs use: £240. Jim, G4ERU QTHR. (Bournemouth) 0202 510400.

● IC202E. Icom 2m SSB/CW portable tcvr. 144.0-144.6MHz and 144.8-145MHz. Boxed with manual: £95ono. G4KWT QTHR. (Reading) 0734 698526.

● SUPERB VHF/UHF QTH 600ft ASL 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.

● YAESU FL2100Z WARC linear incl spares: £550. G3POI. 0959 75992.

● KW2000B matching PSU, Shure 201 mic, manual: £220. MMT144/28 tvtr: £80. 2m h/held AOR240 with chrgr 3W output: £95. All above GWO. Buyers inspect and collect. G4XTZ QTHR. (Slough) 0753 74463 after 6.30pm w/days, 1pm w/e.

● YAESU FT101ZD, VGC with manual, Shure desk mic, Yaesu FC707 ATU. Complete. Prefer no split: £500. Brian, G0GRT QTHR. (Nr.Oxford) 0993 882387.

● TH3 3-band 3ele beam, partially dismantled requires new bolts: £100ovno. Sale on behalf blind Amateur, Bernard, G8BFL QTHR. (Lichfield,Staffs) 0543 268569.

● QRT sale. Drake T4XB, R4, MNL, MS4, mint: £500. TR44 rotator: £60. Ten-Tec omni D tcvr PSU/ATU, mint: £600. KW204 160/10 TX: £55. Various electronic keyers, 1 bencher. G3KLX not QTHR. 0909 639782.

● KENWOOD TS830S: £650. DFC230 ext VFO: £55. R2000 rcvr: £365. All boxed and exc.cond. G5BM QTHR. 0531 820960 eve.

● YAESU FT480R: £230. Yaesu matching PSU: £30. Racal RA17 rcvr: £110. All good cond. G5BM QTHR. 0531 820960 eve.

● TRIO TR2400 h/held 2m tcvr with nicads, chrgr: £79. Also Sony ICF7200D PLL synth world band rcvr with AC adaptor: £89. David G0KLQ. (Pinner,Middx) 01-429 0806.

● NAVICO AMR 1000 2m tcvr and spkr 5mths old: £175. SEM QRM eliminator, new: £55. Buyer inspects and collects. (Ferryhill) 0740 651938.

● TRIO TS520 HF tcvr 10-80m, CW filter, SP520: £375. VFO 520: £50. Both immac cond, little used, orig packing. Prefer buyer collects. G3VCR QTHR. (Waterlooville) 0705 254080.

● IC735 fitted FL63 250Hz CW filter. Immac.cond. Buyer collects: £700. Ian. (Benfleet) 0268 794252.

● RADCOM June 1973 to Dec 1988. Accept any modest offer. Buyer to collect/pay carr. GW4CFC QTHR. (Menai Bridge) 0248 712944.

● LAKE Electronics DTR3 80m CW QRP tcvr. In good cond: £50. GW3WSU QTHR. (Barry) 0446 781261.

● RTTY tcvr MM4001. Murray coded 45.5 50-75 100 baud. Amateur standard ASCII 110, 300, 600, 1200 baud. Accepts FSK AFSK signals. TX shift 170, 425, 850, 1200Hz. Message store 4x 325 characters. With compatible RCA ASCII keyboard VP601. All manuals: £75. Lin amp 100W 432MHz MML 432/100 lined up by MM for ATV: £100. G3NXU QTHR. (Bristol) 0272 867107.

● KENWOOD AT230: £120. Remote VFO520S: £50. G4HCQ QTHR. (Alfreton, Derbys) 0773 831601.

● ZX Spectrum +2 computer. Also technical s/ware. TIFI interface for CW/RTTY/ASCII/SSTV plus programs RX4, TX3, logbook, morse tutor and games. Blank tapes, joystick, c/w manuals and green screen monitor, wired for Kenwood and Cobra: £250. Sony ICF2001D synth rcvr, mains and batt operated. FM/AM, air bands, manuals, boxed. As new: £260. PSU 20A, home made: £60. Selena 215 Vega Russian commerical radio 8-band rcvr. As new: £30. All above items buyer collects eve-w/e. G7GGC QTHR. (Calne) 0249 816334.

● MMT50/28, as new: £150. MMT144/28, as new: £150. Tonna 50/5 F9FT, new: £25. Telequipment storage scope double beam D53S: £250. Fluke 8020A DVM: £50. Extra type-G Y-amp: £45. Plywood tripod based mast 27ft: £20. Various home-brew masts. POA. (Milton Keynes) 0908 313379 eve.

● NEW Icom 751A. Factory new Icom 751A, ICSP3 ext spkr and RC10 remote freq controller: £1300 firm. MFJ986 3-KW roller inductor tuner: £180 firm. All for: £1450. N0KRO. (Letchworth) 0462 678708.

● IDEAL HF QTH. Loft room 9x15ft fitted operating position - window. 3 bed det, oak trees in garden, sun room, pristine condition, 110ft aerial possible. Overlooking open land. Have operated for 23yrs, no TVI complaints. Wokingham, Berks: £135,000. G3UAZ QTHR. 0734 782378. Appts only.

● NDI 2m rig 5/25W mobile or base with 800ch 4/8MHz can tranmsit on 1 freq rec on another. 3mem tone burst etc with 12A PSU and ant with 15m coax: £200. GW4UYY QTHR. (Prestatyn) 07456 86413.

● GOING QRT. FT101E RF processor, mic, CW filter, DC PSU, spare valves, service & user manuals. Immac: £350. Yaesu YC355D 0-200MHz freq.counter 240V, manual: £50. HF5 5-band vert aerial: £50. Maplin TU1000 RTTY terminal unit -0-1000Hz RS232 PTT, prof case: £50. Homebrew 10-2m tvtr (QQVO3-10 MOSFET RX): £40. Paul. G3WYW QTHR. 0635 69146.

● ON behalf of silent key. Icom 751A, HM36 mic, fitted voice synth ICEX30 and RC10 freq.controller: £1175. Desk mic ICSM6: £25. 2x 20A PSUs ICPS15: £90ea. Atlas 215X with Shure 444 mic: £210. BNOS 12V 6A PSU: £45. SEM Transmatch with Ezitune: £100. SEM Ezitune: £30. Katsumi electronic keyer EK150: £30. Hi-Mound keys, HK705: £15, BK100: £20. KW LP filter: £5. 2-way ant switch, balun, phones etc. Prefer buyer collects. G4IRP QTHR. (N.Harrow) 01-866 3584.

● DRAE VHF wavemeter, new cond: £15 incl UK p+p. R.Bunney G8ZMM, 33 Cherville St, Romsey, Hants, SO51 8FB.

● QUANTITY Data General Nova equip, cheap to good home. G4LKI. (Frome) 0373 65666.

● COMMAND rcvr BC454 in steel case with built-in PSU and 70MHz cvtr: £30. Another 70MHz cvtr: £10. CW/TX for 70MHz with 300V PSU and spare valves: £15. Ditto for 50MHz incl BF981 cvtr: £25. Small grey-sprayed rack, 3 panels lowest one containing 300V +LTs PSU: £10. Collect Leicester. G5UM QTHR. 0533 416473.

● SILENT key sale. Various Hallicrafter rcvrs, suit collector. Storno CB601, LM601, COL662. COM612 plus misc. G3NFV QTHR. (Leatherhead) 0372 372587.

● ICOM 251E 2m base multimode, Mutek F/E, exc.cond. Recent Icom (UK) service. Boxed c/w all manuals, incl Mutek circuits: £425. Also Multitech MVM12G 12in green screen monitor, high res, swivel/tilt base. Boxed, new, unused: £40. John. (Gr.London) 01-857 8096 after 11am.

● SPHINX 3-band CW/SSB valve TX 1.8, 3.5, 14. Control unit incl. V.heavy. Prefer buyer arranges collection 6146PA: £25. (Durham) 091-388 6057.

● HEATHKIT 32ft freestanding lattice tower, galvanised. Good cond, dismantled: £150. Akai 4000DS reel-to-reel stereo tape deck: £70. G4ERO QTHR. (Ely, Cambs) 0353 665869.

● 6M linear amp, preamp. BNOS 50-10-50. 10W input 50W output. Practically unused. Mint, boxed with insts. Under guarantee: £100. (List £138). No offers please. G2FZU QTHR. (Southwell, Notts) 0636 813847.

● 30A PSU ex equip: £50. Bird 420MHz low-pass filter with 6VAC relay N-type, plugs, ex equip: £60. MZ80K computer: £75. SEM Z Match with Ezitune 160-10: £90. (Manchester) 061-766 7403.

● TS930S narrow CW filter fitted, mic, matching SP930 spkr. Exc.cond: £1495. FL2100Z linear amp, WARC bands, exc.cond: £550. TR7730 2m mobile rig, scanning mic: £95. Trio world clock HC10: £55. Prefer buyer collects or split carr. G4RCG. (Wakefield) 0924 362144 ansaphone leave phone no. QTHR.

● ICOM IC720A HF all-band plus gen.cov with ICPS15 PSU: £500. Brian G1SPW. (Worthing) 0903 65831 after 6pm.

● YAESU FT270RH 45W high pwr FM mobile rig and mic. Good cond: £220. G4UVQ. (Herts) 0462 674437.

● KENWOOD TS940S tcvr, 13mths old. Fitted with 2 CW filters and AM filter. G3UQZ QTHR. (Birmingham) 021-373 8806.

● YAESU FT290R: £225. FT690R: £225. FT790R: £225. Harrier CBX converted 10FM: £30. Trio TR7500 2m/FM: £90. Fairmate VHF/UHF scanner: £90. Pye PF70 h/helds convert 2m: £10ea (No batts). Capco VHF ATU: £40. BBC-B computer: £190. Dble-sided 40tr drive: £45. Philips 12in 80col amber monitor: £65. PK88 TNC: £95. Prefer buyer collect. Graham, G1ULB QTHR. (Manchester) 061-789 1604.

● PHILIPS D2935 RX in GWO: £119. (Elgin Moray) Longmorn 391.

● FT736R 2m/6m/70cm/23cm, base mic: £1250. No offers. (Crewe) 0270 811373.

● 3 section 30ft lattice tower: £65. Drake TV3300LP low-pass filter: £20. Ant switch 2-way: £8. G4DIC QTHR. (Hinckley) 0455 636315.

● HARMSWORTH'S Wireless Encyclopaedia. 3vols dated 1923. In pristine cond. Beautifully illustrated. History and photography. Weight 5kg: £75 incl post. No offers. G4EHZ. (Worthing, BN11 1DA) 0903 39612.

● ICOM 551-50MHz 10W TX/RX with Jaybeam 4ele beam. Fitted FM unit: £450. G6SZG QTHR. (Sittingbourne) 0795 473962.

● AMT-1 AMTOR/RTTY/CW terminal unit. VGC.

Never heavily used. Offers around: £100. Gone packet! G6ANF not QTHR. (Liverpool) 051-228 4299.

● RACAL RA1217 solid state rcvr: £265. TA940A 100W linear amp. £100. Pye VHF tcvrs, caps, transformers, racks, valves. Large collection mint LP records. Ask lists. Exch for Bird Thruline equip, Versatower. VHF/UHF equip/beams WHY? 0467 25365 after 8.00pm

● FLAT roof mount, for HF/VHF dish ants, specially designed and manufactured by Strumech. Heavy duty triangular lattice tripod, 5ft base footprint. H2R rotor head unit. KSO65 thrust bearing, galvanised, free-standing. 12ft height, drawing available. As new: Offers. (Notts) 0602 609345

● PK232 Pakratt terminal unit with PC-Pakratt, PK-Fax s/ware, latest version 10/89, brand new, boxed: £225ono. Revex MS1 station monitor scope, new boxed: £210ono. Jaybeam VR3 triband vert 2kW. 20/15/10: £45. DL1000 1kW dummy load: £45. SSA PC boards part assy: £10. (Notts) 0602 609345

● PYE Cambridge 2m AM/FM with mic. Fully working: £30ono. Also Radcom 1978 to present day: Offers. Nick GW4JWV. (Denbigh) 0745 716164.

● HI-POWER linears. 2m. 3/10W in, 160W out, preamp: £150. 70cm. 1/3W in, 30W out: £90. Welz CT300 goldplated 1kW dummy load: £65. Computer PSU 180W suit PC clone. Brand new: £40. 102 key PC keyboard: £20. Sensible offers considered. Buyer collects or pays post. Charles Crane, G4YFN QTHR. (Reading) 0734 861136.

● APPLE IIE. 2 disk drives, mono monitor. 132col printer: £200. Sony Trinitron Prestel terminal. Alpha keyboard, all manuals, ext modem: £125. Daiwa 2m HHT. Daiwa +20W linear: £200. G1SHV (Twickenham) 081-894 1892.

● YAESU FT727 2m/70cm h/held: £310. Yaesu FT747 HF used RX only. Incls mic and FM board: £415. G6HYD. (Littlehampton) 0903 722724.

● TRIO TR2300 144-146MHz nicads, chrgr, aerials, case, book. PSU lead: £90ono. TS530S MC50 mic. As new, valves: £550. G3ZLN. (Ipswich) 0473 49139.

● YAESU FT480R 2m multimode: £250. Ray G0FCE. (Sutton) 01-661 1620 after 6pm and w/e.

● IC735 tcvr: £750. AT150 auto ATU: £250. Both mint. FT401 tcvr: £150. IC28H 45W 2m FM, boxed, new: £270. Bird 43 wattmeter plus plug-ins: £100. 200W UHF load: £50. KR400RC rotator: £100. Europa 2m SSB tvtr: £30. MM28/432 tvtr: £100. 36ft 3 section lattice tower: £100. (not telescopic). RA17: £95. Needs a little attn but working. FT707 and FP707: £350. Kenwood phones: Offers. Eddystone EC10 rcvr: Offers. G4OKM QTHR. (Wokingham) 0734 789187 eve.

● YAESU FT707 exc.cond: £300. FP707: £120. FC102 ATU: £150. Diamond CP5 ant: £85. G0AHB QTHR. (Herts) 0992 589481.

● AMIGA 1000 computer, 2 disk drives and 1081 colour monitor. 1.5meg RAM expansion and clock card fitted (1meg populated). VGC: £500 or swap for VGC Yaesu FRG8800 rcvr. Can arrange carr. Steve. G6LLD QTHR. (Durham) 091-377 0593.

● MIZUHO SB2X 2m SSB VXO 4 xtals. GC, case, nicads: £95. Fortop TVT435/R TV tcvr 20W+: £110. Yaesu FRDX400/FLDX500 plus spares, VGC: £280. Icom IC255E 2m FM mobile 25W+: £130. MML144/40-40W 2m linear: £40. MML432/50-50W 70cm linear: £90. MMT432/144R 2m/70cm tvtr: £90. SSM Europa on 4m: £75. SSM Europa on 6m: £85. Digitrex 8600 freq counter 600MHz: £60. Welz SP45M swr/pwr meter: £40. Silverstone GaAs 70cm preamp: £30. Mutek 70cm preamp: £10. Mutek SLNA144S: £35. SSM PA3: £3. Codar CR40 HF preamp. £25. Skywood CR203 HF RX: £30. MM 2m RX: £10. HF vert 10/15/20m: £45. Peter, G8EUX QTHR. (Towcester) 0327 53522 eve-w/e

● MUTEK ATCS 144S. Kenpro 400RC rotator, no manuals. 10ele 2m beam. Offers approx 1/3 list price. Buyer collects. G0COE. (Bishops Stortford) 0279 654330

● 30FT mast comprising 3 no 10ft triangular sections: £125ono. Buyer collects. G4OCO. (Banbury) 0295 720062 after 6pm.

● YAESU FRG7 mint: £130. 1938 Peto-Scott Trophy 8 comm RX. 550kHz-43MHz. GWO: £60ono. G3WIF. (Bristol) 0272 293738

● KENWOOD R5000 with 6KO. 2KA and OK5 filters fitted. Offers to LJ.Devaney, 24 Canada Rd, London, W3 0NP

● 10M22D 2.2kHz 10.7MHz SSB 8-pole xtal filter c/w USB/LSB carrier xtals. Brand new: £15. Cirkit 15W HF linear PA, unopened kit: £15. Pair QQV06/40A, one slightly used, one brand new: £10. All post paid. (Taunton) 0823 270822.

● 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.

● TS830S + VFO120 CW filter, boxed: £700. TL922 2kW linear. VGC: £900. Highgain 204BA: £130. (Cheshire) 0565 873205.

● YAESU FT1 exc.cond, sensible offers or exch WHY. 20m mobile whip Jaybeam: £15. G4YRR QTHR. 0782 395017.

● YAESU FT980 tcvr, mint: £1160ono. JST135 tcvr BWC option. NBD520G PSU/spkr, new Jan: £1400. Yaesu FP12 PSU/spkr: £60ono. Hansen FS710H peak/RMS pwr/swr meter 1.8-60MHz 20-200-2kW: £80. Daiwa NS660 pwr/swr meter RMS/PEP 1.8-150MHz cross needles, new: £90. GW4RLP QTHR. (Caernarfon) 0286 5264.

● SCHOOL closure forces sale. 35yrs accumulation of valve equip from 30's onwards. Radios, TVs, test gear, PSUs. Also valves, meters, components (some modern), relays, telephones and exch spares, VTRs, teleprinter RX, etc. SAE with interests please. Mike. G3OTR QTHR. (Bishops Stortford) 0279 74392.

● FT101Z Mk3 HF tcvr (all bands 160-10) FM hand mic, fan: £325. FTV901R tvtr with 2m/boards: £250. Together: £550. TM221A 2m mobile FM rig 45W, mint, never used mobile: £200. TH3JRS 3ele tribander beam 10/15/20m: £175. (Scarborough) 0723 362450.

● TWO 15ele QDs, phasing harness, pwr splitter: £120 or may separate 17ele tonna for 70cm: £20. FM boards for FT7B: £50. G6ZCF QTHR. (Ashford) 0784 259149.

● YAESU FT203R 2m h/held, chrgr: £150. Tono 2m-90G 2m amp, 10W in, 90W out: £85. G3ZJK QTHR. (Rugby) 0788 810535.

● AMT1 AMTOR/RTTY/CW plus Commodore 64 s/ware, and RS232 interface: £90. Eagle C3005 pwr/swr twinmeter: £10. Daiwa RX ant coupler Mod CC22: £8. Toni-Tuna RTTY tuner, see August 1982 Radcom: £40. Collectors! 1944 capacitance test set pattern A189: Offers. Vic 20 RS232 kit by Maplins. Unmade: £8. Old test gear free to any buyers of above items. Les G4HBU. (Bristol) 0272 611093.

● FT290R 2m multimode with m/mount port/case and chrgr. Also incls MML144/100LS amp phasing harnus 10XY beam and 100ft cable all exc.cond: £400. Damien. (Londonderry) 0504 268597 after 7pm.

● TS530S CW filter, VFO120, MC30S, HS5, boxed, VGC: £585. Bencher paddle with keyer: £40. Welz SP15M VSWR-pwr meter: £35. Ten-Tec 300W dummy load: £10. Drake B1000 balun: £10. HF ammeters. ATU caps. Ant components. Bulletin, Radcom from 1965. (Gloucester) 0453 763994.

● TRIO TS130V: £365. PS20 PSU: £40. AT130 ATU: £70. TH41E: £140. All with manuals, boxes. G3VWH QTHR. (Shrewsbury) 0743 65061.

● 2M ex pmr FM TX/RX chassis. GWO with circuit: £12. 160/80m 10ch RX. GWO with circuit: £40. G3YGM QTHR. 0502 731708.

● SHARP laptop computer model 4501 with 2x 720k drives, 640k mem c/w s/case and all manuals: £495ono. Delivered within 50 miles radius. G6JNS QTHR. (Worcester) 0905 620041 after 8.30pm.

● FT980 tcvr, VGC. Unmarked: £900. SM220 monitor: £200. MM 2m 10/100 linear: £100. Oscar swr: £30. Ants 70cm: £20. 2m 8ele: £15. 6m new: £25. Coax: 30p.m. Near offers considered. Howard, G0HZH QTHR. (Ipswich) 0394 460474.

● YAESU FL2100B linear serviced at cost nearly £300. New pair 572B's fitted mains filter c/w all leads, manual and service invoice. 100% working order. View Dewsbury Electronics: £425ono. G3BWN QTHR. (Nottingham) 0602 228789.

● FT290 Mutek F/E, c/case, nicad, chrgr, m/mount, 30W linear, preamp: £300ono. (Liverpool) 051-428 1114.

● FT290R and FT790R: £200ea incl nicads. Realistic PRO2004 scanner, £329 new: £150. G4SIQ QTHR. 0983 296615.

● MOTORISED hydraulic pump-up mast approx 30ft, in working order. Requires a lick of paint etc: £150. 4CX250 linear amp for 2m integral construction. Neat & tidy, surplus to requirements: £240. Ken, G4XQA QTHR. (Warrington) 0925 64166.

● PHILIPS reel-to-reel stereo deck: £35. 2x paper guillotines, Holmes double-cut: £20. Safetrim MR model 29: £30. Brass sheet 48x24x1/16in: £10. Reasonable offers accepted for the following. Wang 5204 printer ribbons. Yaesu FP2 13.8V PSU. Siemens teleprinter (big!). Redifon GK2000 RTTY TU. Ex WD WS31. Weller WTCP2 soldering iron. Tektronix DB scope 545B. OU scope HK/2A. Fuji Beridox V621 prof video tapes. Buyers collect. Peter G3UXH. (Hoo, Rochester) 0634 250562.

▲I YAESU FT200 tcvr and good H/B PSU/spkr. Exc. complete spare valve set incl 4x6JS6C, 7360: £200ono. Will deliver 100 miles London. Rigonda 4in B/W TV. 12V/mains. GWO: £15. Paul G0DQN. 01-789 7788 01-873 2042.

● SHACK clearance. Heathkit SB102 c/w PSU/spkr & all manuals: £200. Alinco ALR22E extended freq, factory mod: £125 + post. Tiny-2 TNC: £95. Dumb terminal: £25. 1meg RAM disk BBC-B: £55. MM430/50 linear/preamp: £110. G0NBK not QTHR. (Newcastle-upon-Tyne) 091-268 8466.

● YAESU h/held 2m FT209R with nicad batt and spkr/mic MH12AZB. No chrgr: £180ono. (Cheltenham) 0242 675632.

● TRIO TS930S ATU spkr, MC60 perfect: £975. Finance possible. G0BXN (Cannock, Staffs) 05438 2289.

● FT290R case, nicads, chrgr with 30W linear: £300. Hancox, G0LBG, 3 Hillfoot Rd, Liverpool. 051-486 2377.

● 30FT galvanised tower 3x10ft triangular sections suit HF beam dismantled: £65. Buyer collects. Located Didcot, Oxon. G4DWC QTHR. (Brackley) 0280 701562.

● ICOM IC740 mint cond, used only to RX c/w mic, DC pwr cord, inst manual. Also PSU IC PS15: £750ovno. Ron Day, G1DER QTHR. (Windsor) 0753 861785 day 0753 866054 eve.

● YAESU FT767GX 2m module fitted. Latest spec. Only 20mths old. Immac cond. Going QRT. Please no time wasters: £1100. G4TMA QTHR. (Poulton-le-Fylde, Lancs) 0253 886389.

● HONEYWELL Microsystem 6/10 640KB mem plus 2x 320KB diskettes, MSDOS 2, CMP86 with DBase 2, Supercalc 2 + manuals, CBasic + manual. Also Honeywell high res monitor and printer 80col 110 key separate keyboard: £175ono. John Chance-Read. 15 Garrard Way, Wheathampstead. 058283 4150.

● FT902DM full WARC bands, FT901R tvtr 2m/6m/70cm recent modules. Recent 6146Bs. VGC. Little used. Manuals. Connectors. Complete HF VHF/UHF station: £550/£350ovno. John G0EVD. (Hatfield, Herts) 0707 269505 after 5.30pm.

● FOR sale by Scarborough and District Search and Rescue team. Pye Westminster low-band AM tcvrs 4 off, 15W TX. 2 off 30W TX. Copies of technical data incl: £30ea. B.D. Barrett, 26 Rosamund Ave, Pickering. 0751 72919.

● KW77 RX. Fair cond with h/book: £65. 051-678 3082.

● COLLECTORS items. MW only wartime "utilities" wireless rcvr. Suitable restoration. Offers around: £50. (Birmingham) 021-472 3688.

● MOTOROLA h/helds HT220 2ch (presently 169MHz) with rapid chrgr, 1 batt only: £100 all. Mark G4RGB. (Medway, Kent) 0634 30822 eve-w/e.

● PARAGON tcvr matching PSU + spkr FM CW filter, mic. Absolutely mint: £1750. Racal 17L rcvr, mint cond LF amp, spare valves: £150. (Manchester) 061-969 2359.

● FT101Z Mk3, WARC bands, CW filter, FM, mic, manuals. As new: £400. G4EJW. (Burnham-on-Sea) 0278 784734.

● YAESU FT690 Mk2, chrgr, nicads, case, boxed: £280. Jaybeam 4Y/6m c/w cable, boxed: £30. G6NGA QTHR. (Bishops Stortford) 0279 658516 7-9pm.

● PYE Westminster converted for 70cm with 5 repeater channels: £60. Also 70cm fibreglass colinear ant. VGC: £30. Paul. 0920 871639.

● SHACK clearance. FDK multi 700EX 25W 2m FM tcvr: £125ono. Belcom AMR217B VHF marine band scanner, 10 popular xtals fitted: £90. Realistic DX400 comm rcvr 150kHz-30MHz very sensitive: £75ono. B/W video camera with 9in monitor: £60ono. G4MVS QTHR. (Sutton) 081-644 8249.

● HAZELTINE 2000 computer terminal: £50. Commodore comm modem for C64/128: £60. Creed 444 teleprinter in GWO: £20ono. Property of the late CE.Sutton G3AQ. KW Vanguard: £50. MM144/100: £90. MM432/50: £80. Azden PCS3000 2m FM tcvr plus ext Azden spkr AS006: £165ono. Nigel, G4KZZ QTHR. (Coventry) 0203 444160.

● YAESU FL2100Z linear 9-bands, unmarked, mint cond: £550. Yaesu FV101Z ext VFO, also mint cond: £100. Colin G0DNQ. (Wallasey, Wirral) 051-678 6052.

● FT101ZD Mk3, FM and CW filter. Very clean, new 6146s: £430ono. Binatone route 66 converted for 10m FM: £20. Jupiter Ace computer, Memotech keyboard, RAM-pack, PSU, books, s/ware etc: £25. Advance DVM type DMM2: £10. Acorn 6502 development system: £10. Joymatch ATU: £5. Homebrew keyer, Bauer paddle: £10. Antique wavemeter R502, case, coils, graphs. VGC: Offers. G3ZTU QTHR. (Horsham) 0403 51544.

● PRO2004/5 owners. Now available int unit which memorises 256 freqs found during scan mode. SAE. G3IES QTHR. (Bristol) 0272 500742.

● YAESU 480R 2m all-mode rcvr: £270. G0JEG. (Merseyside) 051-639 9520.

● HF tcvr FT747GX, new June 1989. N8FM board: £540ono. Hokushin HFS 5-band trap vert with radial kit and assembly inst: £50ono. Yaesu FRG7 rcvr, VGC: £110ono. G0NAP. (Plymouth) 0752 667241 day 0752 892690 eve.

● FT7B mobile HF rig. 80-10m 50W c/w YC7B digital freq.display. Perfect cond with manuals and orig.packing: £375ovno. Buyer pays carr. GW0IQP QTHR. (Newtown) 0686 626551.

● TRIO TH21E chrgr DC/DC cvtr PB21, PB21H nicads, case, rubber duck, 5/8 whip: £195. G4ZMO QTHR. (High Wycombe) 0494 32602.

● CREED 444 (GPO type 15) teleprinter with terminal unit both in GWO. Set at 50 bauds. Silence cover and paper roll holders also incl. No reasonable offer refused. Johnm G4NND QTHR. (Mansfield) 0623 823184.

● PW neon 50MHz/28MHz +4W linear: £60. Pye Europa's UHF: £10ea. Tristar 747 50MHz multimode 5W output: £75. G1JAJ not QTHR. (Reading) 0734 591168.

● YAESU FT290 Mk2, case, batts, chrgr: £300. MM 2m 30W linear: £75. Eddystone 830 rcvr incl 2 spare sets of valves. Exc.cond. Good offers. Realistic PRO2002 scanner: £75. Phil G0JXR. (Hoddesdon) 0992 468522.

● Sony PRO80 h/held scanner. Phil G0JXR. (Hoddesdon) 0992 468522 sl TS130S with narrow CW and SSB filters: £465. VFO120: £45. SP120: £35. Boxes and manuals or: £525 the lot to incl base and hand mics and P+P. Kevin, GI4SNC QTHR. (Limavady) 05047 66151.

● TEMPO 2002 linear 1kW 2m 2x 8874 h/book immac: £800. 60cm satellite dish c/w feedhorn AZ/EL mount: £15. (Yeovil) 0935 28341.wl HF linear. (Yeovil) 0935 28341.

● YAESU FT23R 2m h/held + extras: £150. NEC PC8201A laptop computer, ideal packet: £140. Kam all-mode TNC: £195. All in exc.cond. No offers. GM4UJZ QTHR. (Edinburgh) 031-331 2755.

● SOTA 23cm tvtr 2W output 144MHz IF with ant relay switching, suits FT290R: £130. MM144/28 tvtr (28MHz IF) suits TS430S or almost any 28MHz tcvr: £80. QM70 144MHz transistor amp, 10W in 50W out FM/SSB, suit mobile: £50. Updating station, make me a reasonable offer. G4XEN QTHR. (Wellingborough) 0933 677573.

● HY-GAIN TH3JRS, 2mths use. Perfect cond as new. Make me an offer. Jim, G0BGY QTHR. (New Malden) 01-940 5549 after 6pm.

● EDDYSTONE 730/4 rcvr. Good cond, h/book: £100. Heavy 12V/12A PSU 5V/30A etc, stabilised: £30. Variac 110V/15A new: £15. Heathkit DX4OU transmitters (2) and VFO 50W: £45. Many valves, octal etc. FT203R handie mains car chrgrs, spkr mic: £140. All ono. Buyer collects. G3HSS. (Southampton) 0703 692540.

● YAESU FR50B, FL50B, mic, leads, manuals, etc. Both working: £150ono. G0FXG QTHR. (High Wycombe) 0494 718563.

● AOR2002 AM NFM WFM 25-550MHz 800-1300MHz. As new, c/w box: £350. G1WMV QTHR. (Milton Keynes) 0908 660089.

● QRT sale. TS900 HF rig, IC290D 2m multimode Telrex 5ele tribander MM morse tutor 5/8 over 5/8 co-linear 2m: Offers. 0734 842205.

● HQ1 minibeam: £50. 2 Capco loop aerials 3.5-30MHz: £275 the pair. Buyer to collect. G0ACS (Northampton) 0604 770718.

● 144/433 h/held portables Icom IC2E, case, extra rechargeable batt and 12V adaptor packs, helical and 1/4wave ants plus matching ICM4 10W RF amp. IC4E extra batt packs and 1/4wave ant as above plus 7ele beam. Both: £150ea. Dual-band ant 2m and 70cm ants with mag mount: £15. Cash sales please. Larry, G0HTR QTHR. (Tamworth) 0827 898024.

● FT757GX with MH1B8 scanning mic, as new, used QRP only, orig.packing: £595. FC700 ATU: £70. GW4FMD. 03483 641.

● HF tcvr KW2000B with PSU: £175. AR88 RX: £75. HRO RX. Coil packs and HB PSU: £75. Eddystone EA12 amateur bands RX: £200. Avo bench valve tester with valve data manuals: £50. Cash and carry. Larry, G0HTR QTHR. (Tamworth) 0827 898024.

● FT101ZD HF tcvr WARC fan, exc: £375. FL2100Z HF linear: £475. Datong auto RF speech processor: £45. G4XIY. Matlock 636364.

● TRIO 530S good cond, orig.packing and manuals, Drake SPR4 rcvr, high mound morse key No.8. Ken, G0HJA QTHR. (Horsham) 0403 52023.

● CBM 8096 computer, 8250 drive, MPP1362 printer, Visicalc, good cond, cheap to good home. Buyer collects. G3MQU QTHR. (Diss) 0379 624875.

● FT221RD 2m tcvr. Good cond: £375ono. N.Wysocki G6CPO. (Stourport) 02993 2473.

● FT767GX c/w 6m/2m/70cm: £1595. ICR7000 scanner: £675. Meteor 600MHz counter: £95. Tranzmatch with Ezitune: £95. Drae wavemeter: £20. Tonnas, 2m 9XY: £18. 70cm 19Y: £18. 6m 5Y: £20. 11m minibeam, new: £50. TPC2000 computer plus packet/business s/ware: £295. (Rayleigh) 0268 774089 after 3pm.

● TH205E 2m h/held, 12V lead, chrgr, extension mic: £150. Kent twin paddle key: £25. GM4SVM QTHR. (Stirling) 0786 75834.

● YAESU FT901DM mobile, leads. Good cond, used mostly for receiving. Genuine offers only. 0793 823621 eve.

● NAVICO AMR1000S 2m FM rig. Less than 1yr old: £250. Ten-Tec Century 22 HF, CW. T/RX QRP. Both exc.cond: £250. Would consider swap of either for KW2000B/E in mint cond. Can deliver/collect. Mike G0JXX. (Southampton) 0703 443781 after 6.30 or w/e.

● QRM Eliminator Mk2 by SEM. Brand new, mint with inst sheet: £70. Cost £85. (Herts) 0923 52496 ansaphone.

● RADCOM Jan 1981-Dec 1985 and Sept 1987-present: £60ono. Robert. (Northampton) 0604 714218.

● AZDEN PCS6000. 5/25W mobile tcvr, plus R/X AM/FM. 118-180MHz, 12.5/25/50MHz. Volmet 5kHz spacing. Mint cond: £275. Delivery extra. G6XRL QTHR. (Macclesfield) 0625 876192.

● HQ1 mini-beam ant for 10-15-20m incl hy-gain balun and insts: £100. Buyer collects or carr.extra. G4KPT QTHR. (Taunton) 0984 23762.

● FT767GX plus 2m unit. Fully modified. Exc.cond with manuals and orig.packing: £1125ono. 40ft heavy duty triangular section lattice tower in 4-sections. Closed height 13ft. Plus head unit. Needs post or will wall mount: £195ono. TB3 Mk3 for spares: £85. AKD TV1 filtrs model HPFS: £2.50ea. Thandar PFM200A freq.meter 20Hz-200MHz: £60. Buyer to collect all above or carr.extra. G4DXG QTHR. (Tunbridge Wells) 0892 35830.

● SWAN Astro 102BX solid state tcvr, 160-10, F/S break-in IF gain FV AGC NB, SP, PBT N.filter, USB/LSB, CW/CWN: £495. Matching Swan 1500Z linear amp 1500W input, spare 872Bs: £375 or both: £800. Both in exc.cond. G3XKF. (Marsh, Aylesbury) 0296 614128.

● YAESU FTV107R tvtr, 2m module fitted. Exc.cond: £150. MM 144/50S linear, 3mths old: £80. Both items boxed. G0DNQ QTHR. (Wallasey) 051-678 6052.

● KW Atlanta HF tcvr c/w mic, PSU and manual: £225. G3RDG QTHR. (NW London) 01-455 8831.

● YAESU FRG7700 comm rcvr, boxed with manual: £225. (Wolverhampton) 0902 783299 after 6pm.

● HOWES 2-20m tvtr-drive with FT290 for compact mobile. 10W PEP O/P. Worked W6 and all Europe with 5ft whip: £45. Another idential unit on 40m developed from HC280. Same spec: £45. Will restore to 80m if reqd. G3MOE QTHR. (Cheltenham) 0242 524217.

● HALLICRAFTERS S27 comm rcvr, covers 27-144MHz AM/FM/SSB, narrow/wide filter. Recently overhauled, with manual: £75. FT200 tcvr covers 5 HF bands. With manual: £180. G0DFA. (Bognor Regis) 0243 586838.

● YAESU FV707DM, mint, boxed: £60. IC201 2m SSB m/mod needs PA, trans: £50. Zycom h/held, nicads, chrgr FM26:L. Ideal 70MHz FM: £25. BC221 x2: £20-£25. FT708R 70cm h/held NC8 chrgr, s/mic, h/set/ s/case DC PSU. VGC: £150. 708R 70cm h/held r/duck, batt: £80. Tim G0AUI. (Haywards Heath) 0444 458390.

● RN 6m tvtr 28MHz IF. Immac: £150ono. G3YEL QTHR. (Brixham) 08045 55732.

● COMPUTER. Amstrad PC 1640. DD, ECD and Star LC10 colour printer: £650. Kantronics TNC, KPC2: £95. Kenpro KT200EE handie: £95. Camcorder, Sony V200: £700. G7ABT QTHR. (Leicester) 0533 778626.

● FT290R Mk2, boxed, nicads, Wood & Douglas 144PA4/S preamp and 144LIN 30W linear: £300. G1FGS. (Bournemouth) 0202 422916.

● 23CM tvtr, UKW Technic, 28MHz drive: £40. 23cm 23ele tonna, indoor use only: £15. PF2 mobile mounts: £1. G4ECY. (Bingham, Notts) 0949 37917.

MEMBERS ADS

● TH41E 70cm h/held 2x nicads, chrgr, service manual, s/case. VGC. £150ono. Mike G1YGH. (Herne Bay) 0227 740732.

● VIBROPLEX bug, mint, plus carrying case: £65. 250PFD variable 1/8in spacing: £10. Pair National Vernier dials: £10. Roller coaster: £10. Turns counter new as used ARRL projects: £15. Hy-gain BN86 balun: £10. Buyers collect please. 0244 545177.

● TS940S tcvr, hardly used: £1400. FT980 tcvr. VGC: £900. MN2000 Drake ATU: £250. MM 10/100 2m linear: £125. Oscar swr meter: £30. Weltz SP380 swr: £35. MD1B8 desk mic: £50. Kenwood MC85 desk mic: £50. Howard. G0HZH QTHR. (Woodbridge) 0394 460474.

● YAEUS FTONE gen.cov, all options FM board, keyer, filters. One owner from new. Mint cond: £1100. Yaesu FT225RD 144MHz Mutek F/E mem unit £560. Trio TS711E all-mode 144MHz base-station: £600. G4FNI QTHR. (Bournemouth) 0202 24848.

● MAPSAT decoder for weather satellite transmissions. Built and working: £80. PF1 RX for RB0: £4. MOD geiger counter: £5. John G8FDJ. (Sheffield) 0742 333847.

● MORSE key paddle: £20. Hammond organ 126J 2 manuals plus Leslie and sound simulator: £350. GDO meter: £12. SWR meter: £5. 1:1 balun: £5. 5-way ant switch: £5. 2x 4in spkrs 8ohms plus stand: £8. RadCom mags 1979-Feb 1990: Offers. Trap ant 40m: £12. G3NZY QTHR. (York) 0904 410385.

● TS830S, exc cond: £750. TR9130 + extras: £350. VFO120 suitable TS120/130, unused: £35. SB200 linear, works well: £300. Katsumi MK1024 needs repair on mems: £35. All prices ono. G0BVS QTHR. (Bedworth) 0203 490483 after 4pm.

● SHARP PC5000 portable computer, bubble mem, Ext 3.5in drive, int printer c/w manuals, spare bubbles, s/ware: £250ono. GW3UOO.

● AR88LF rcvr. V.clean. Overhauled, caps and resistors replaced: £70ono. G3ISD QTHR. 0795 477431.

● £500 complete station. Kenwood-Trio TS530S tcvr. Kenwood ATU230 with inst manuals. Trio mic h/phones, key. Ham radio books. Diamond DPGP5 5-band trap vert ant. G5RV aerial c/w poles, wire fixtures. All in working order. Operating cabinet. G4PG. 0245 72881.

● 60FT Versatower, tilt facility, rotator cage, winches, new cables, ground post requires extended: £550. GM4ZNG QTHR. (Crosshill, Fife) 0592 860591.

● TONO 5000E C/W/RTTY/ASCII/AMTOR terminal with built-in 4in monitor and keyboard. Cond as new: £300. G4ZEK. (Colchester) 0206 851343.

WANTED

● 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. 0908 668169.

● PSU for Radiomobile car radio model 100 or scrap set. Dashboard control unit for 1935 Philco car radio model 11. No.19 set, 22set or 18set or parts, any cond. Jim, G4XWD QTHR. (Kidderminster) 0562 823674.

● EDDYSTONE EC958 HF RX with manual. Write JKR, G6OSG QTHR. Alton, Hants.

● GERMAN WW2 ex-service equip parts, literature WHY? Swap or cash. Will collect. Ragnar Otterstad OZ8RO. Vejdammen 5. DK-2840 Holte. Denmark. 010-4542 801875.

● 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.

● ARGONAUT TX/RX and other QRP TX or RX. Datong FL1. Also folding mast. (Bedford) 0234 711538 w/e.

● NEED ball bearing retainer for AR40 rotator or consider complete unit. G. Elliott, GI4OWA QTHR. (Londonderry) 0504 41384.

● CODAR AT5 TX. National SW3 RX. Sky Buddy. Write Marris, 35 Kingswood Hse, Farnham Rd, Slough, Berks, SL2 1DA.

● SPKR/mic SDX-316 for Azden PCS-300. G0GXB QTHR. (Oxford) 0865 890461.

● HRO M ie glass valves. Prefer working order. PSU and cabinet unimportant. Prefer to collect within reasonable travelling distance of QTHR. GW4EJT (Aberdovey) 065472 7705.

● PYE PF8 wanterd. Converted or standard but must be exc.cond. Good price paid. Tony G8UZJ. (Cheltenham) 0242 676789.

● 2M multimode. Prefer Trio but WHY? Dave, G0IBW QTHR. (Guisborough) 0287 633816.

● VC10 VHF cvtr (for Trio R2000 RX). (Elgin Moray) Longmorn 391.

● EXTERNAL VFO and spkr to suit FRDX400/500 rcvr. Also narrow filter for same rig. Ian. (Morecambe) 0524 410097 eve w/e.

● DOCTOR DX and Doctor Q50, Morse training cartridge for Commodore computer. David Cole. 01-594 3495 day 04023 74043 eve.

● BUSH TV22 9in B/W 405 line TV. Also 3 early pip top 4 pin valves and horn spkr. G3WIF (Bristol) 0272 293738.

● USED QSL cards. Any quantity used or spare cards preferably overseas. Mixed UK considered. Post paid. G3KMR QTHR. (Etal) 089082 306.

● G2DAF TX and or RX. G3IIN QTHR. (IOW) 0983 754397.

● GEM quad spider, Corsair 2, FT7. (Cheshire) 0565 873205.

● MEMORY unit PB1787 for Yaesu FT901. G3HLP QTHR. (Chester) 0244 346596.

● FT690 Mk2, absolutely mint cond. Used only twice c/w mic, nicads, chrgr, telescopic ant and s/case with shoulder strap. Orig box: £299ono. G0AQS QTHR. (Ashton-u-Lyne) 061-339 9116.

● HELP to change Ambit MW to LW cvtr into xtal set for Droitwich 198kHz. G6FBR QTHR. (Bournemouth) 0202 531996.

● FOR wireless museum. Radio books, mags, Galaxy PU. Valve TV camera/equip. Pye 2130D6Y camera info. G3KPO QTHR. (Ryde) 0983 67665.

● AP1086, RAF stores ref nos all sections particularly 10-10A to 10Z. Also air publications relating to radio, radar and navigation equip ie Babs, Oboe, Loran, Gee etc. RAF radio stores index publications AP1086-Sec 10. Exc. prices offered. Would purchase post-war to current magnetrons, klystrons, T/R cells, and special types of M-OV valves. M.Gee, RS91943, 17 Foxley Cl, Mountford Est, Ferncliff Rd, Hackney, London, E8 2JN. 01-790 2846 or 01-254 9083 anytime.

● IC2E in good cond. Mark G4RGB. (Medway, Kent) 0634 30822 eve-w/e.

● KENWOOD SP230 spkr unit, Kenwood SWC1 or SWC2 coupler for SW200A. George G0NAQ. (Stockton-on-Tees) 0642 552059.

● £5 offered for black moulded UX6 valve holder max dia 11/8in. Also needed green painted Eistone output transformer and choke. Bernard Litherland, G4IMT QTHR. (Chippenham) 0225 891254.

● ROCKWELL Collins KWM380 tcvr, Eddystone 1650 RX, mint cond only. Stuart Senior. G4MIB QTHR. 01-674 6452.

● MODERN motor cycle 3vols, Caxton Press 1945 era. Auto Mobile Electrical Maintenance, A Judge, 1945 era. Modern Electrical Equipment for Auto Mobiles, A Judge, Caxton. Any Lucas, BTH, Miller, Bosch, Wipac, Wico, CAV, Simms publications on dynamos, alternators, magnetoes. Also wanted, magneto magnetising coils/magnetiser for remagnetising old magnetos. Fletcher, 114 Scholes Park Rd, Scarborough, YO12 6RA. 0723 362537.

● EDDYSTONE Bug key. Also American Dow and Speed-X bugs, prefer Model 500 but any considered. G3TSS QTHR. (Corbridge) 0434 633125.

● DRAKE ATU wanted for C-line and TR7. Ken, G0HJA QTHR. (Horsham) 0403 52023.

● ICOM 215 mobile m/bracket. Also Adonis compressor mic model AM503G connection. G1BWW QTHR. (Hitchin, Herts) 0462 711722.

● BUG key, Vibroplex or similar mechanical key. GM4SVM QTHR. (Stirling) 0786 75834.

● SINCLAIR QL radio s/ware. Copy of Amateur Radio Techniques 7th ed. Inst manual for MM2000. John Squires G7BNT. (Doncaster) 0302 323650.

● NEW project needed to keep up the wireless interest. Seeking early USA octal valve sets, especially Hallicrafters, such as SX42 and other models. Spkrs R44, R42, working or repairable. Denco BFO/2 46S coils. BFO coil for S20R, 52 Bramble Lane, Mansfield, Notts.

● HELP! Cir.diag or fault finding/adjustment insts for Redifon tape slide synchroniser, as auto slide change sequence doesn't work. Also Philips cable remote control, type 6719 for N4511 reel recorder and user h/books for both. G4CCW QTHR. (Selsdon, Croydon) 01-651 1410.

● CIRCUIT diag/manual for R210 and BC348 rcvrs. Either to buy or borrow. All expenses paid. G4CCN QTHR. (Woodbridge) 03943 6529.

● AR88 spkr/cabinet, RCA. AR88 spkr/cabinet, RCA. AR88 spkr/cabinet please. Tony GW7EEP. 0352 55069.

● VERSATOWER 60 or 80ft standard or heavy duty P60 or P80 type. Tower head unit also wanted. G4NPH. (Ely, Cambs) 0353 741354.

● I urgently require a USB 9MHz filter for my Drake TR4C. Original wanted if poss, but something same size or near would do as long as can be fitted on the fixing plate with LSB filter. I think orig ones made by Arizona Scientifi Inc. So if anybody can supply me with one, stating price, I would be most grateful. All letters answered. GW0FPY, 4 Bryn Deinlol, Valley Rd, Llanfairfechan, LL33 0SR.

● JAYBEAM Minimax tribander MM3 HF beam. Must be top cond. Collect or pay rail. G0FRM. (Herts) 0707 322862.

● TUNING meter for satellite TV dish. Books, videos on motorised installations. K.Lee G4HYQ. Xalet Torre Juberri, St.Julia, Andorra. (Andorra) 41923.

EXCHANGE

● FT73R, case, nicad, remote, s/man: £230. Minolta 5000AF SLR, 70/210TEL, cases, data back, flash/G: £260. PK232MBX 4wks old, manuals, IBM s/ware: £280. Want AM/FM + Accuract dig synth or Marconi TF2171 synth. Swap/sell above as new. 0473 85203.

● I would like to exch my FRG7, Dragon 32 computer, 6 solid state relays and various caps, resistors and some low voltage transformers, for an old, but still working, HF tcvr (valve or transistor) so that I can use my licence to the full. CW is my interest. M.Penny G0LJO. 0703 476367.

● SUPERSTAR 2000 26.065-28.305 ideal convertion to complete 10m band. AM/FM/SSB/CW. 12W PEP. Mint cond, boxed with manual and VAT paid receipt. Exch for 2m mobile or portable. Must be GWO. Chris G0MZX. (Canterbury) 0227 765321 eve.

● YAESU FTV707 28-144MHz tvtr, boxed, immac, for 2m mobile or base in VGC. G7EWT. (Stalybridge) 061-303 0409.

HELPLINES HELPLINES HELPLIN

GIRLS SCHOOL NEEDS GEAR

Watford Grammar School for Girls needs help in setting up its new amateur radio station. They are attempting to fulfil the requirements for the Duke of Edinburgh Scheme radio construction projects. The £10 allocation for funding this project does not go very far, and so they wonder whether any amateurs have equipment to donate to the school. They are willing to collect and will accept anything, irrespective of age or condition. Please contact Mr Tony Kelsey-Stead, G0COQ, on Watford 223403.

SCARAB REQUEST

Mr Brian Thompson, G1YAE is attempting to get his Scarab Systems MPTU-1 rtty terminal unit up and running. He requires information on setting the system up and would like a copy of the circuit diagram for this unit. Mr Thompson is QTHR.

LADIES AMATEUR RADIO CLUB?

If any XYLs are interested in forming a Ladies Amateur Radio Club in the Tavistock, Devon, area please contact Pam Goddard, G7GYL on telephone number Mary Tavy (082 281) 792.

BULGARIAN PENPAL

Milen Postadshieff, LZ2MP, has written to us from Russe in Bulgaria requesting help in finding an English penpal. He is a 33 year old electronics engineer and has been licenced since 1982. He is based at PO Box 237, 7000 Russe, Bulgaria.

PANCAKE MOTOR . . .

Alan Raistrick, RS92773 is trying to repair a piece of equipment containing a faulty 12V electric motor. It carries no maker's name and various attempts to find information on this have so far drawn a blank. It appears to be rather like a pancake motor, but the body is 3-3/4" in diameter with a circular mounting flange, with two small lugs on it, about 4-1/4"diameter on the end opposite the shaft. The body is about 1-1/4" long, or thick, with a 9/32 diameters shaft about 1-1/2" long. Peering through a small screw hole suggests the armature is flat, but wound, not printed circuit board. Please ring Mr Raistrick on 0844 54036 if you can help.

GREAT CIRCLE MAP

Ian Galpin, G1SMD is looking for a map which will cover approx 2000-3000km radius from the UK for use on VHF. If anyone can help him to locate such a map would they contact him QTHR.

OLD CALLBOOK REQUEST

Mr HW King, GM0CVV has been in touch with Sergej, UA9SAW in Gaj, about 30km SE of Orsk in the Soviet Union. Sergej, as a keen contester, is anxious to obtain some old copies of the US and International Callbooks (1986 on) and, if any amateur can help in this connection, please contact Mr King on Luing (08524) 240.

CIRCUIT DIAGRAMS

A request has been received from Mr TR Keats, G4CCN regarding a circuit diagram and any other technical details for his ex-army R210 receiver. In particular he is looking for information on how to connect an external power supply to the multi-way plug on the front panel. All photocopying expenses will be reimbursed. Mr Keats is QTHR.

Mike Pavely, G3GWD requires a circuit diagram/servicing information for a TK20 Grundig reel to reel tape recorder. If you can help he can be reached on 081 650 3163.

FIRST AMATEUR TV DEMONSTRATION

On 21 April 1950 Ivan Howard, G2DUS, gave the first ever amateur TV demonstration at a meeting of the Shefford & DARS. They are attempting to obtain some information/memorabilia relating to this event, and would be grateful for anyone who has recollection (or indeed cuttings, photos, etc) of the event to contact Nigel Leaney, G1JKF, 17 Riverside, Buntingford, Herts, SG9 9HJ.

Helplines is designed to help put people in touch with each other. If you have a problem, it's more likely there's someone out there who has the solution; if you are looking for an old colleague or amateur friend, there could be a reader who has some news of their whereabouts; if you have solved a particular problem, write and tell the rest of us. 'Helplines' is there to help you and to give you the opportunity of helping others. Write to us marking your envelope 'Helplines' and we'll do what we can to get the message out.

PYE UHF SIG/GEN TYPE SG1U

A circuit diagram or, preferably, complete manual (on photocopies) would be appreciated for the above by Mr Patrick Howell, G1CHB, QTHR.

HBR ELECTRONICS RTTY SYSTEM

Denis Lynch has just acquired a DM170d demodulator and TD960 Data system, 45-300 Band but with no technical info/operating instructions. Please ring 01 864 6404 if you can help.

REDIFON SAFARI

Mr Westmoreland, G3HKQ, has a new process panel from a Redifon Safari radio telephone which is a solid state transceiver for SSB suppressed carrier, for operation in the frequency range of 2-16MHz. The process panel contains all low level transmitter circuitry and all receiver circuitry with the exception of the receiver front end tuned circuits, and the transmitter tuned circuits and PA section. The receive section is a single conversion superheterodyne with an IF of 1.4MHz and a product detector.

The process panel was apparently on sale at one of the stalls at the Granby Halls Radio Show in Leicester. It is obvious that the panel can be the basis of an excellent transceiver. Could any of our readers who bought one of these panels and built the transceiver get in touch with G3HKQ on 0777 704597.

CUMBERNAULD RADIO SOCIETY?

Could anyone interested in starting an amateur radio society in Cumbernauld please contact Colin Watson, RS46598, 10 Torbrex Road, Carbrain, Cumbernauld, or telephone him on 02367 24630.

APRICOT F2 COMPUTER

Mr Switzer, G0DFJ is experiencing problems when loading his Apricot F2 computer. It appears that his master disk was put away safely but, unfortunately, not safe enough! The master disk is no longer available from the usual suppliers as they have discontinued this particular model and the newer version is not compatible with his F2. He is willing to purchase a copy of this disk and any other disk at a reasonable price, as obviously without the disk the computer is unusable. If you can help Mr Switzer, please write to him at 57 Cuckoo Lane, Whitefield, Manchester, M25 5WQ.

COME IN G4 . . .

Earlier this year Dick Biddulph, G8DPS, was disposing of two chart recorders and a G4 contacted him. Unfortunately he did not make a note of the callsign but is anxious to get back in touch with him. Dick's telephone number is 081 399 8787.

USED STAMPS

We have received a letter from John Allsopp, G4YDM thanking members for sending in the vast quantities of stamps that he has received in support of his attempt to purchase a transceiver/receiver for a disabled friend. He is anxious to continue with this project, and any used stamps should be sent to him at 30 Manor Park, Concord Village, District 11, Washington, Tyne & Wear, NE37 2BT.

MAYDAY!(?)

In the unlikely circumstances of hearing a distress call on the amateur bands the most important thing to do is to ***LISTEN.*** Note down everything that is transmitted by the station in distress and also the time and frequency.

Pass all this information to the police. You may have some difficulty convincing them of your sincerity as this is unlikely to be an everyday occurrence, so be patient. They will pass on the details to the Coastguard Rescue Co-ordination Centre.

Only transmit in response to a distress if you are absolutely sure that it is going to help. Remember that a local station will be of much more use than someone half way around the world.

NEVER reply to a distress call heard out of amateur bands.

CLUB NEWS

DEADLINE - Items for inclusion in the August 1990 issue must be sent to HQ marked "Club News - DIARY", to be received by 22 June 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.

AVON

Bristol RSGB Group - 18, TBA; 24, Longleat Amateur Rally.

North Bristol ARC - 15, talk by a representative from JANDEK kits; 24, Longleat Rally. Details from Chris Budd, G0LOT, tel: 0454 616267.

South Bristol ARC - 6, film & slide "Bring and Show" evening; 13, "Bullseye" contest with NBARC; 20, briefing for Longleat Rally; 20, committee meeting; 24, Longleat Rally; 27, briefing for NHF-NFD; 30, VHF National Field Day; Jul 4, talk "Pictorial History of WD & HO Wills"; 11, bring & buy.

Thornbury & DARC - 6, Foxhunt; 20, HF activity night; July 4, talk "Message Handling for RAYNET" by Ted, G1ABT; 18, HF activity night. Details 0454 411096.

BERKSHIRE

Maidenhead & DARC - 7, TBA; 19, preparations for VHF Field Day; July 5, talk "3cm SSB" by Roger, G3VCT.

Reading DARC - ***NEW VENUE*** From 14 June meetings will be at the Woodley Pavilion, Woodford Park, Haddon Drive, Woodley. 14, Alignment evening chaired by G4THN; 28, VHF NFD Organisation chaired by G3WGV; July 7, VHF NFD at Watership Down; 12, talk "Antenna Tuning Units" by G3RZP. Details 0734 744042.

BUCKINGHAMSHIRE

Aylesbury Vale RS - 6, talk "Low Frequency DX'ing" by Don Field, G3XTT. For the summer months of June, July, August there is only one club meeting on the first Wednesday of each month.

Chiltern ARC - 6, compare test equipment; July 4, planning for VHF NFD. Meetings held at "Equity & Law" Social Club, Hazlemere, High Wycombe. Details 0494 776420.

CAMBRIDGESHIRE

Cambridge & DARC - 1, Morse class and HF contest briefing; 2/3, HF contest; 8, TBA; 9, display station at Fulbourn Primary School Summer Fair; 15, informal and Morse class; 22, TBA; 24, SES at Hinchinbrooke Police HQ. 25th Anniversary of Cambs police; 29, informal and Morse class; July 6, VHF NFD contest briefing; 7/8, VHF NFD; 13, informal & Morse class.

CLWYD

Delyn RC - 5, talk "Animal Rescue Service"; 19, Chairman's night. What has he got up his sleeve!; July 3, visit to Chester Police Station; 17, Bar-B-Que at the QTH of GW7AAV & AAU. Details 0244 819618.

Wrexham ARS - ***NEW SECRETARY*** Martin Rees, GW0KYT, 12 Colemere Street, Wrexham, Clwyd. Tel: 0978 261482. 5, constructors contest; 19, junk sale.

CORNWALL

Cornish RAC - 7, CRAC main meeting; 11, CRAC Computer Club; 12, radio & constructors workshop; July 5, CRAC main meeting; 9, CRAC computer club; 10, radio constructors workshop; 14, Cornish Rally, Richard Lander School, Truro.

DERBYSHIRE

Derby & DARS - 6, junk sale; 13, barbecue at Drum Hill, Little Eaton; 20, talk "Simple HF Aerials"; July 4, junk sale. Details 0332 669157.

DEVON

Exeter ARS - 11, surplus sale; July 9, construction contest evening. Details 0392 78710.

DORSET

South Dorset RS - 24, Longleat Mobile Rally.

ESSEX

Chelmsford ARS - 5, constructors competition.

Loughton & DARS - 1, map reading; 15, top band DF hunt; 29, RSGB video night; July 13, talk "The Grid Dip Oscillator and Its Uses" by Ray Pedley, G0LWF.

GRAMPIAN

Aberdeen ARS - 1, NFD site preparations/ ragchew (club); 8, junk sale; 15, mini talks. Details 0224 780519.

GREATER LONDON

Coulsdon ATS - 11, 'Infamous' G6YOG DF Hunt. Details 01-684-0610.

Edgware & DARS - 3/4, National Field Day; 14, informal; 28, talk "World War II Radar - Part 2" by John Crabbe, G3WFM; July 7/8, VHF Field Day; 12, informal; 15, Low Power Field Day (see G3SJE). Details 09274 22776.

Sutton & Cheam RS - 2/3; HF National Field Day; 17, PW 144MHz QRP Contest; 24, Longleat Mobile Rally; July 7/8, VHF National Field Day.

Whitton ARG - meets every Friday at the Whitton Community Centre, Percy Road, Whitton, at 7.30. Full club facilities available. 10, Special Event.

Wimbledon & DARS - 8, joint meeting at home with Sutton Library Computer Club; 29, CATS v WDARS quiz at home; July 13, Op-Amps; 22, DF Hunt. Details 01-330 2703.

GREATER MANCHESTER

Eccles & DARS - 5, demonstration "SWR Measurements" by G8ZZF; July 3, talk "My Student Days" by G7CNP. Details 061-773-7899.

Greater Manchester Police ARS - 10, Scouts "Links" Camp at Billinge.

Stockport RS - 13, NFD post mortem and video "Secret Listeners"; 20, 70th anniversary buffet/social evening; 23, 70th anniversary Open Day; 27, talk "Jodrell Bank into the Nineties" by Ian Morrison, G0DMU. Details 061-439-3831.

HAMPSHIRE

Basingstoke ARC - 4, talk "Top Band DF" by Chris, G8APB; July 2, talk "Radiopaging" by Noel, G8GTZ; 14, demonstration station at LeCourt Cheshire Home Fete.

Fareham & DARC - 6, talk "Computer Programs for the Radio Amateur" by Andrew, G0AMS; 20, The Noise Bridge (Project) by Mick, G4ITF; July 4, talk "HF ATU's" by Ron, G3XPH; 18, talk "Vodafones" by Chris, G8JFJ.

Farnborough & DARS - 13, Silver Jubilee construction contest hosted by G8ATK; 27, HF Field Day summary and VHF Field Day preview and planning. Details 0276 29231 or 0252 519773.

Horndean & DARC - 7, talk "Roll Your Own" by G4BEQ; July 5, junk sale. Details 0705 483676.

Liphook (Three Counties ARC) - 6, talk "QE2 Wireless Room" by Phil Williams; 20, club night for your own activities; July 4, talk "10/ 10 International" by Robert Coombes.

HEREFORD & WORCESTER

Bromsgrove & DARC - 2/3, CW NFD; 8, talk TBA; 9 club bar-b-que; 16, SES - Finstall First School (GB0FS); 30, GB0BC - SES - Bromsgrove Hospital Carnival, Sanders Park; July 1, Droitwich Strawberry Rally; 13, club night - JANDEK kits. Details 0527 33173.

Hereford ARS - 1, talk "ATUs/Matching" or "Expedition to Streetholm Island"; 2/3, National Field Day.

HERTFORDSHIRE

Cheshunt & DARC - 2/3, NFD CW Field Day & BBQ Herts Young Mariners Base, Windmill Lane, Cheshunt; 13, talk "Bee Keeping" by Herts Bee Keeping Association; 27, portable evening - Baas Hill Common, Broxbourne; July 11, talk "Prison Visiting" by Tony Slater.

Stevenage & DARS - 2/3, National Field Day, Weston Park; 5, talk "How Good are your Bend Allowances" by Ralf; 12, HF night on air and computer conflab; 19, DF Hunt, 2m and 70cms. (Fairlands Car park); 23/24, summer 1.8MHz contest; 26, low pass filters and other homebrew projects; 28, committee meeting - 82 Lingfield Road; July 3, planning club VHF station; 7/8, VHF National Field Day; 10, HF night on air and project evening.

Welwyn-Hatfield ARC - 4, Bar-B-Q; 18, VHF FD preparation; July 2, Cellular Radio; 16, Foxhunt.

HUMBERSIDE

Goole R&ES - 1/2/3, National Field Day; 8, log- fill evening; 15, junk sale; 22, talk; 29, social evening; July 6/7/8, VHF NFD; 13, log-fill evening; 20, talk.

Hornsea ARC - 2/3, HF Field Day; 6, HF Field Day inquest; 13, survey of old East Yorkshire contest sites; 20, talk "SWR" by Geoff, G3PWN; July 4, VHF Field Day preparation; 7/8, VHF Field Day. Details 0964 533331.

KENT

Maidstone YMCA RS - 1, Field Day lecture. HF NFD set up; 2/3, HF NFD Contest; 8, Morse Class and RAE (Antennas); 15, Annual General Meeting; 22, Morse Class and RAE (Propagation); 29, demo of equipment from ICOM.

South East Kent (YMCA) ARC - 13, Dick's choice; 20, GB2WVW final arrangements; 23/ 24, Waldershare Vintage Weekend GB2WVW; 27, video presentation "Special Olympics '89" by G4GAN. Details 0304 852533.

West Kent ARS - meets 1st and 3rd Friday each month in the Annexe of Albion Road School, Tunbridge Wells, at 8 p.m. 15, talk "Micro Ovens" by Dennis Collins; July 20, talk "SOS" by Phil Sale.

LANCASHIRE

Lancaster Universty ARS - 11, talk "Satellites" by G8TZJ.

North-West Packet User Group - 3, Packet radio evening at the Grappenhall Community Centre, Grappenhall, Nr. Warrington. Details from G6FCI, QTHR, tel: 0253 300004.

Thornton Cleveleys ARS - 4, barbeque in club grounds; 25, preparations for VHF Field Day.

LEICESTERSHIRE

Welland Valley ARS - meets 7.30 1st and 3rd Monday of month at Welland Park College, Welland Park Road, Market Harborough, Leics, excluding public holidays. Details 0858 410811.

LOTHIAN

Lothians RS - 13, Annual General Meeting; 27, social evening.

MERSEYSIDE

Wirral & DARC - 13, SMD construction for amateurs - Bill Mooney, G3VZU; 27, The Eileen Medley Challenge Cup DF Hunt. Heswall, 8 p.m.; July 4, mobile treasure hunt. Starting point TBA; 11, talk "Slow Scan TV" by GW0HWK.

NORFOLK

Fakenham RC - 5, talk "Air Traffic Control" by John, G4RBJ; 19, Dave, G4DCJ - discussion and final arrangements for special event station on 23 June at the Litcham Village Festival; July 3, tips and demonstration on Flying Radio Controlled Model Aircraft; 17, informal.

Norfolk ARC - 2/3, HF NFD at Cart Gap, Happisburgh; 6, "Real Radio" evening; 13, talk "Slow Scan TV" by Robert Scarfe, G4TUK; 20, informal; 27, talk "Backyard Moonbounce" by Doug Mallett, G3HUL; July 4, "CQ Stateside", night on the air; 11, Mobile DF hunt; 18, committee meeting. Details 0508 78258.

Yarmouth RC - 2/3, National Field Day - YH Racecourse. Details Yh 721173.

NORTHAMPTONSHIRE

Northampton RC - 14, Mobile DF.

NOTTINGHAMSHIRE

Worksop ARS - 5, foxhunt.

SHROPSHIRE

Telford & DARS - 6, HF demonstration station; 13, junk sale - British Legion Club, Dawley; 20, Foxhunt 7.30 & barbecue; 27, VHF NFD preparations; July 4, club station on UHF bands. Details Telford 616166.

SOMERSET

Mid Somerset ARC - 1, talk "Building A Receiver" and demonstration of his own home brew, by G0KGV; 15, bring and buy; July 7, auction of goods, VHF/UHF from the late G8KBQ's shack.

Yeovil ARC - 7, talk "Product Detectors" by G3MYM. Details from G1MNM, QTHR.

SOUTH GLAMORGAN

Cardiff RSGB Group - 11, general discussion on members' technical problems; July 9, slide show on his recent trip to South Africa, by Don Green, GW3MRI.

STAFFORDSHIRE

Stafford & DARS - 12, night on the air; 19, used and surplus equipment auction; 26, construction evening. Details 0785 662350.

SUFFOLK

Bury St Edmunds ARS - 19, talk "The Work of the RAIBC" by Miss Margery Hey, Vice-Chairman of the RAIBC. Details 0359 70527.

Felixstowe DARS - 17, DF Hunt & barbecue; 19, quiz - the annual bout against Leiston (away); 25, talk "Crime Prevention" by member of Suffolk Constabulary; July 9, ten-pin bowling evening, RAF Bentwaters. Details 0473 642595 (daytime).

SURREY

Dorking & DARS - 12, D/F Trial, organisers Chris, G1PXH & Nick, G7DND. Assemble 7.30, start venue TBA; 26, VHF NFD briefing; July 7/8, VHF NFD at Boxhill, off Fort Road.

Reigate ATS - 19, surplus equipment sale; July 17, members' evening.

WARWICKSHIRE

Mid Warwickshire ARS - 12, 2m DF Foxhunt 145.350 horiz FM - 7pm start TX; 26, talk and demo "The CAIRO Unification Scheme" by Peter, G8CQH; July 10, 2m DF Foxhunt. Details Kenilworth 513073.

Rugby ATS - 5, aerial rigging demonstration; 19, 144MHz direction finding competition, round 2; July 17, 144MHz direction finding competition, round 3.

Stratford upon Avon & DARS - 11, community radio (provisional); 25, Mercury Communications, July 9, 2m Foxhunt.

WEST MIDLANDS

Coventry ARS - 1, outdoor operation evening - Burton Dasset; 8, visit to Coventry Police Black Museum. Numbers limited to 16. All persons attending must be over 16 years of age; 15, night on the air and Morse tuition; 22, canal trip (see G3TFA) for details; 29, night on the air and Morse tuition; July 1, treasure hunt; 6, 2m DF contest (outdoors); 13, night on the air and Morse tuition.

wMidland ARS - 19, treasure hunt; July 17, annual rig check.

South Birmingham RS - 6, rig check night; 10, Elvaston Castle Radio Rally; July 4, VHF/ NFD planning meet; 7/8, contest: VHF/NFD Waseley Hills Country Park.

Walsall Raynet Group - meets at the Turf Tavern, Wolverhampton Road, Bloxwich, Walsall, on the 1st Monday in the month. Details from G4PPC, tel: 0922 479737.

WEST YORKSHIRE

Halifax & DARS - 19, antennas - members' discussion evening.

Keighley ARS - 26, talk "The Ambulance Service" by G0LLL; July 17, packet radio on the air.

Northern Heights AR&ES - 20, treasure hunt, start 7.30, club room; July 4, Field Day preparation, 8.15, club room; 7/8, VHF Field Day.

Spen Valley ARS - 7, foxhunt, 2m direction finding contest; 21, construction contest for the Swindon Cup; July 5, closing night on the air. Details 0274 875038.

Todmorden & DARS - 4, bits and pieces - David, G4HYY; 18, video "Japanese Morse"; July 2, talk "Construction for Beginners" by Steve, G4RAW. Details from Mrs. E. Tyler, G0AEC.

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'.

3 JUNE

British Telecom (S. Wales District) ARS 2nd Annual Radio Rally - BT Headquarters, Coryton, Cardiff. Bar. Restaurant. Bring & Buy etc. Bring & Buy stall display fee £1 per item. Entrance fee £1 per person and 50p for OAP and children under 14. Talk-in on S22 Details from Martyn Jenkins, GW7EYP, tel: 0222 379634 (office hours).

Southend & DARS Mobile Rally at Rocheway Youth Centre, Rochford Essex. Details from John Stone, G0DFE, tel: 0702 202216.

Spalding & DARS Mobile Rally. Springfields Arena Spalding. Traders. Car Boot. Bar snacks. Talk-in. Details from T. Kettlewell, G4TWR, tel: 0775 722940.

8-10 JUNE

Amateur Radio Caravan & Camping Club is organising a rally at Elvaston over the week-end of the Radio Rally. Any prospective members of the Club who might wish to attend should contact the Rally Marshall, G4SGY, for details. G4SGY is QTHR, telephone: 0509 215487.

10 JUNE

21st Elvaston Castle Mobile Radio Rally, Elvaston Castle Country Park near Derby. Technical Bookstall. Bring & Buy. DTI Exhibit. Craft Marquee. Anniversary Grand Prize Draw sponsored by traders. Arena attractions throughout the day. Catering. Talk-in on 144 & 432MHz. Car parking £1, coaches £2. Admission to rally activities is free. Details from John, G4PZY on 0332 767994.

Norfolk Raynet Annual Rally. Barford Village Hall, 5 miles west of Norwich. NGR: TG 113078. Opens 10.30am. Local traders. Bring & Buy. Car Boot Sale etc. Details from 0603 667189 (daytime) 0692 650865 (evenings).

Royal Naval ARS 30th Annual Mobile Rally - HMS Mercury, Nr. Petersfield, Hants. Trade, RSGB, RAIBC, BARTG and RAYNET stands. Crafts exhibition. Have-a-go archery. Radio-controlled power boats, helicopters, cars and trains. County Sound Radio Mobile Rig. Refreshments. Morris Dancers. Many other attractions. Talk-in on 2m and 70cms. Details 0703 557469.

17 JUNE

Denby Dale Rally - Salendine Nook School, 2 miles west of Huddersfield on A640. Opens 11.00am (10.30 for disabled visitors). Usual good food. Ample parking. Traders. Talk-in S22 and SU22. Details from G3SDY, tel: 0484 602905.

Newbury & DARS Car Boot Sale - Recreation Field and Acland Village Hall, Cold Ash, Newbury, Berks. Opens 10am. Free admission and car parking. Talk-in on S22. Refreshments and children's play area. Details from Mike, G3VOW, tel: 0635 43048.

24 JUNE

City of Bristol Group 33rd Longleat Amateur Radio Rally, Longleat Park, Warminster, Wilts. Details Shaun O'Sullivan, G8VPG, tel: 0225 873098.

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.

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. 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, 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. 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

Torbay ARS Mobile Rally - STC Social Club, Brixham Road, Paignton, Devon. Details G3HTX QTHR.

2 SEPTEMBER

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 Scunthorpe road). Details from Sue Middleton, tel: 0522 531788.

Vange ARS Annual Rally - The Laindon Community Centre, Aston Road, Laindon, Basildon, Essex.

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

Bristol Radio Rally - Brunel's Great Train Shed, Temple Meads Station, Bristol. Details from David Farr, G4WUB, tel: 0272 839855.

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.

22 SEPTEMBER

QRP Beside the Seaside - The Garnham Centre, The United Reformed Church, Back Chapel Lane, Gorleston on Sea, Nr. Greath Yarmouth. Details from G3OEP.

30 SEPTEMBER

Harlow AR & Electronics Mobile Rally - Harlow Sports Centre. Details from Alf, 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. 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

21 OCTOBER

4th North Wales Radio Rally - Aberconway Centre, Llandudno. Details from E. Shipton, 34 Argoed, Chester Avenue, Kinmel Bay, Rhyl, Clwyd LL18 5AY, tel: Rhyl 336939.

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, G10HH, tel: 0524 64239 or Mike Sherlock, G4ZYN, tel: 0257 452287.

OTHER EVENTS

2 JUNE

RAIBC (Northern Ireland Area). First Belfast Amateur Radio Convention - Ormeau Park Recreational Centre, Ormeau Embankment, Belfast. Commencing 12.30. Usual attractions. Demonstrations and talks on the hobby. Demonstrations on Microwave Cookery. Crafts and First Aid by Red Cross. Talk-in on S22. All the proceeds to go to the Northern Ireland Area to buy equipment for Club members in Northern Ireland. Details from David Caldwell, GI0HOW, tel: 0232 471370.

10 JUNE

Mid Lanark ARS Annual Open Day. Usual traders. Packet Radio will be in attendance. Talk-in on S22. Details from David Williams, GM1SSA, 32/32 Carfin Street, New Stevenston, Motherwell ML1 4JL. Tel: 0698 732403.

17JUNE

Eighth Annual Practical Wireless 144MHz QRP Contest. 0900 - 1700 UTC. Transmitter output power will be limited to 3 watts as usual. Full rules will be published in due course in Practical Wireless. Contest adjudicator: Neill P. Taylor, G4HLX.

1 JULY

Newport ARS 3rd Grand Surplus Equipment and Junk Sale, Brynglas Community Education Centre, Brynglas Road, Newport. 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).

15 SEPTEMBER

Scottish Convention - Cardonald College, Glasgow. Details from GM3EDZ.

29/30 SEPTEMBER

RSGB HF Convention - Coventry. Details from G3ZAY.

26/27 OCTOBER

RAF ARS Annual General Meeting - RAF Cosford. Further information from Warrant Officer M.J. Street; tel: Albrighton 2393, extn 2472.

the last...

10MHz MODES AGAIN

Since the allocation of the 10MHz Band, the debate on the prohibition of non-narrow band transmissions has continued without let up. There is one important point that has seemed to have escaped notice. The role of the amateur fraternity is surely to improve his existing means of transmitting and receiving, and necessity is the great impelling force to invest means of achieving such improvements. I can remember an amateur being told, when using SSB in the early fifties, to "take that rubbish off the band". If it was recommended that all types of licensed modes were permissible on the small band width, there would certainly be congestion and mutual interference. But what about those amateurs who with inventiveness, skill and dedication could produce equipment that would result in successful communication despite the high level of interference. High level error correcting codes is one line of thought, narrow-band slow speed morse code is another.

I would suggest that limitation on the use of the band is not the "amateur" way of achieving results. Perhaps if we were to recommend full use of the band, improvements would be made to transmission and receiving equipment, perhaps the envy of our professional colleagues.

A C Massie G3HZX

PRAISE FOR ERA

I bought an ERA Microreader to help me pass my CW test. It works very well indeed but, as my hearing is impaired and I cannot hear above top F on a piano, I asked if they could alter the pitch of the signal. No problem they said, and I returned it to them.

They made a small PCB and fitted a socket for phones and returned it. It now works well for me, though I fear it is the bit between my ears that is my handicap for the test.

ERA did this alteration free of charge and even paid the return postage, and in addition sent me one of the most pleasant letters I have ever received from a firm.

One tends to hear only complaints these days so perhaps this letter will redress the balance somewhat.

Alan Jones G7EPT

RAE TOPICS

May I congratulate those who passed the May 1989 C and G RAE examination and now know that the FLo is higher than Fs, and that they have an understanding of a Phase-locked loop oscillator.

So, the next question must be, how many of them could find the LO, and even if they did, what could or would 99.999% of them do about it if it was not functioning correctly?

Now, if they knew something useful about aerials and even more importantly, earth systems, (the latter seems to be an unknown subject even to the pundits at RSGB) something useful could, just could be the result.

The knowledge of a Phase loop oscillators and which way up an IF is, is as much use as a kit of tools is to the 1990 motorist. (Sorry Gov, it's a sealed unit and must be replaced!!).

I was teaching potential Radar operators in April 1939. The War Office decreed that they should know how a valve and a CRT operated and how to calculate the capacity of a condenser.

To this day, I do not know why, for they were not allowed to remove a panel and the only "tool" available was an army pocket knife.

The modern radio "black box" is, in most cases sealed, break the seal and the guarantee on several hundred, if not thousand pounds worth of equipment is lost.

Surely, "need to know" and "ability to use" should be the governing factor in all these types of examinations.

Leslie R K Gregory G2AVI

[We have always understood that knowledge of phase locked loops, and of the relationship between oscillator and i.f., is important in dealing with potential EMC problems, both on transmit and receive. It is radio amateurs' understanding of EMC which leads us to be permitted uniquely to operate home designed or home built equipment. Nevertheless, Mr Gregory's general point is appreciated and the Society has designed the training course for the Novice Licence to concentrate on what is necessary to know, rather than abstract theory. - Ed]

MORE ON MORSE

I would like to reply to a comment in the April issue of RadCom under "The Last Word", headed "Morse is Simple, Sure".

Sorry George, G2CIL, (TLW April), but I couldn't agree less as, unlike you, I am pro-RTTY. Just look at your argument as expressed in percentage of allocation. Of 3085kHz of HF spectrum available for CW, Phone, RTTY and Packet, CW has access to all but 4kHz. 529kHz for CW only - 2308kHz. CW shared with phone - 144kHz. CW shared with RTTY - 70kHz, shared with RTTY and Packet - 30kHz. CW shared with RTTY and Phone and please note 4kHz RTTY only.

So, as you see George, CW has 99.9%, Phone may share 75.75% with you, RTTY may share 8.05% with you and Packet has to make do with 2.27% shared. Increase my licence fee by a factor of 4 as you suggest and I will be paying 50 (fifty) times more for what I get compared to you. Now that does not sound too good to me so I just wonder if you are serious? You see, my RadCom arrived before noon on April 1st.

If you are finding it difficult to get a clear frequency somewhere within the 99.9% of the bandspace at your disposal, perhaps you should check your filters.

Bob Canning G0ARF

DX RadCom

I read with interest your article on the RadCom Postal Survey. I thought you might be interested in how long it takes for a magazine to reach Kiribati. I received the April 1990 edition on 9 April. I have not as yet missed receiving a magazine.

I did, however, used to live in the Caribbean where the post only took 3-5 days, considerably better than here I imagine.

Your magazine arrives promptly and I look forward to reading it when it arrives. Thank you.

N A Watts T30NW

[So, anyone with delivery problems now knows where they need to move to! Seriously, we are now working very closely with the Post Office to establish why a small percentage of RadComs arrive late or go astray each month. - Ed]

VIVA BULGARIA

I have just returned from an unforgetable holiday in Bulgaria at the very kind invitation of the local radio club.

The kindness and generosity of the Bulgarian people is beyond all praise. My especial thanks are due to the club station at Plovdiv, LZ1KAW, for the kind facilities offered which enabled me to contact over 50 hams back in the UK, and almost another 100 worldwide.

Also to my hosts, LZ1HY and LZ1HQ, who opened their home to me and acted as guide, chauffeur, interpreter, and much more, while I was in their country - even to providing my pocket money!!

Any ham visiting Bulgaria will be assured, I am certain, of a very warm welcome and a good insight into life behind the "Iron Curtain".

Eric J Horsey G0CKC

ECONOMIC CHALLENGE

How can we expect young people to get interested in amateur radio at present prices? Looking through the adverts in the current *RadCom*, I can't see any way that a newly-wed or even a young new employee could justify spending on a transceiver at present prices.

Just after the war, ex-WD gear could be obtained and adapted without thinking too much about the cost, making amateur radio relatively easy to get into. I know we can't expect to have those old times back again now, but perhaps someone might try to inject a little economic sense into our hobby and come up with a scheme for getting on the air for £100 or so. Any takers?

G H Ireland G3CCL

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.

Why is it that many letters decry the use of Americanisms, yet a truly British publication, ie *RadCom*, continues to perpetrate the same crime with the use of North American technical terms, eg, RS232?

Do the authors of these articles not know the European nomenclative or do they choose to follow the crowd by not using the term V24. I must note that even the ARRL Handbook at least acknowledges the existence of the V24's standard as being the European nomenclation.

Are we going to see North American nomenclative infiltrate our lives further by using the term "U" for integrated circuits instead of the present "IC".

I trust RadCom will continue to be a "British" publication.

B G Oldford G6UDX

[Sloppy, or un-British, it may be but I'd wager that if you asked computer enthusiasts which term they used, the majority would say RS232. Does any other reader have a view on this? - Ed]

10MHz STATUS

G3PLX states that "the case against SSB on this band (10MHz) is not a strong one" and "the argument gets weaker as other services move out" is based on a false assumption regarding the status of this band.

The 10MHz allocation is a Secondary one in a band allocated on a Primary basis to the Fixed Service: there is no question of any authorised user being moved out.

J M Dunnett G4RGA

COMMENTS ON RadCom

Re G2HBC's Letter (Last Word May 90):-

1) Could we have construction hints and tips from readers? For instance, a camera tripod makes a useful portable mount for a whip aerial. all it needs is a mounting bracket. In my case it is a piece of brass with two holes drilled in it, one of suitable size for the camera mount, the other for the aerial.

2) Many years ago, during the post-war paper shortage, a new modelling magazine appeared. It included photographs of model club members. The next issue contained a plaintive letter from a reader complaining at the waste of space. "I know they are a good-looking bunch of bods," he wrote, "but what sort of models do they make?" Regarding pages 12 and 13 of the May *RadCom* (HF Trophies), and similar pages on other issues, does not the same apply?

John Allison G0LYY

[Thanks for the technical tip. We would be absolutely delighted to publish this sort of thing as well as technical items extending to a page or less. Pat Hawker also includes tips from time to time. As for the pictures, it is Society policy to reward excellence in various fields, including contests, but how do you do a picture of someone actually winning a contest? - Ed]

...word

RSGB MAIL-ORDER PRICE LIST

RSGB BOOKS

	NON-MEMBERS	MEMBERS
Amateur Radio Awards Book (3rd Ed)	£9.35	£7.95
Amateur Radio Operating Manual (3rd Ed)	£6.84	£5.81
Callbook - RSGB 1990	£9.95	£8.46
G-QRP Club Circuit Book	£6.54	£5.56
HF Antennas for All Locations	£7.24	£6.15
How to Pass the RAE	£6.47	£5.50
Microwave Handbook Vol.1	£23.29	£19.80
Morse Code for Radio Amateurs	£3.21	£2.73
Practical Wire Antennas	£8.09	£6.88
Radio Amateurs Examination Manual	£6.47	£5.50
Radio Communication Handbook Vols.1+2 (PB)	£13.82	£11.75
Teleprinter Handbook (2nd Ed)	£2.29	£1.95
VHF/UHF Manual (4th Ed)	£10.88	£9.25
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Amateur Radio Logbook	£2.65	£2.25
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Great Circle DX Map (card for desk)	£0.59	£0.50
Great Circle DX Map (wall)	£3.21	£2.73
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OTHER PUBLICATIONS

All About Cubical Quad Antennas (RPI)	£7.00	£5.95
All About Vertical Antennas (RPI)	£7.65	£6.50
Amateur Radio Computer Networking Conference 5, 6, 7, 8 Papers (ARRL):Vols 1-4	£18.10	P.O.A. £15.39
Amateur Radio Satellites - The First 25 years (AMSAT-UK)	£4.65	£3.95
Antenna Compendium Volume 1 (ARRL)	£10.76	£9.15
Antenna Notebook, W1FB (ARRL)	£7.82	£6.65
ARRL Antenna Book	£13.71	£11.65
ARRL Operating Manual	£13.65	£11.60
AX25 Amateur packet radio link-layer protocol (ARRL)	£6.76	£5.75
Beam Antenna Handbook (RPI)	£8.53	£7.25
Better Short-wave Reception (RPI)	£5.87	£4.99
Callbook - International Listings 1990	£19.41	£16.50
Callbook - N American Listings 1990		Awaiting delivery
Complete Dxer (Idiom)	£8.47	£7.20
Complete SW Listener's Handbook (Tab)	£15.24	£12.95
DX Edge (HF propagation aid)	£21.07	£17.91
FCC Rule Book, (ARRL)	£7.00	£5.95
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USA Licence Manual - Advanced Class, ARRL	£3.86	£3.28
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Please note: These prices have been changed to reflect current production costs.

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CW into Foreign Languages (VE3EIM, VE3MGY)	£5.82	£4.95
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QST (including ARRL membership):		
One year - surface mail	£34.22	£29.25
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(Please wait 90 days before expecting delivery.)

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6 Metre and Up DXer (monthly)	£9.35	£7.95

Newsletter subscription rates are those for subscribers in the UK and countries in the EEC. For rates to other destinations please contact the Circulation Department at RSGB, from where free sample copies of newsletters can also be obtained.

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continued on next column

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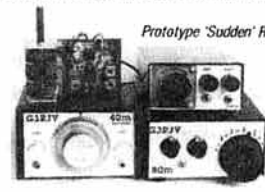

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The FT-1000 is a new top of the range all mode h.f. transceiver that is the result of more than 25,000 hours of intensive research by Yaesu's top design engineers. They have adopted a completely new approach to the application of digital and RF technology. The extensive use of surface mounted components has allowed *six* microprocessors and *five* Direct Digital Synthesisers to be integrated with a simple to use operator interface to give a highly reliable full featured transceiver that has been optimised for serious h.f. applications. Please write or call SMC or your local authorised Yaesu dealer for the full specifications of this dynamic new transceiver and discover how you can open up the bands.

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