Radio Communication

May 1989

The 13 March Aurora —

Charlie Newton gives us the background

Review: Yaesu FT-747 budget HF transceiver

KENWOOD

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

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Radio Communication

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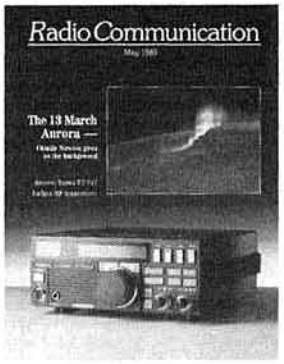
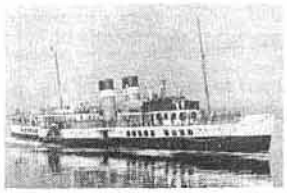


Main Photo: The latest budget HF rig from Yaesu. Inset: Photograph of the Aurora Australis, taken from Spacelab III by Robert Overmyer for the University of Alaska as part of an auroral study organised by Thomas Hallinan and Don Lind. The aurora extends from an alttitude of 100km to 300km above the surface. (Photo: Courtesy of the Geophysical Institute, University of Alaska, Fairbanks, Alaska)



Paddle steamer 'PS Waverley' will celebrate the Caledonian Steam Packet Company centenary on 13 May by running GB0WAV/MM during a cruise on the River Clyde (p14).

Eleven year old Joanne Bedford proved that you are never too young to learn by passing the RSGB morse test after only ten weeks study (p82).

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 secretary, from whom full details of Society services may also be obtained.

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In addition to enjoying much lower interest rates on extended credit, you will also get, absolutely free of charge, insurance cover up to £2000 against theft, loss or accidental damage for 6 months on goods purchased using the card, through the unique Merchandise Cover Plan. Of course, when the six months cover runs out, we strongly recommend that you take out insurance cover with Amateur Radio Insurance Services, who have been offering a new for old insurance policy for RSGB members for many years. (Details from the Membership Services Department at RSGB HQ)

As well as the free insurance cover there are several other benefits such as Travel Insurance, a Payment Protection Plan, Commission-free Travellers Cheques, a Card Protection Plan and money saving offers such as 15% discount on BUPA or PPP Health Plan, when you pay with your RSGB Credit Card.

"What will my credit limit be?"
As with all credit cards, your limit will be individually assessed by the bank which runs the card on our behalf. The Society will NOT be privy to any of the personal information which you give to the bank when filling in your application, nor do we need to know what your personal limit is. The agreement is between you and the bank.

"What does the RSGB get out of it?"
As you probably know, establishments which accept credit and charge cards have to pay a levy on each transaction of up to 6%. By having our own card, the RSGB is supplied, free of charge, with a card-swipe telephone system (you've probably seen them on shop counters) which is linked to a central clearing computer. By using this facility, the RSGB pays a single standard levy of only 3.5%. That means we can make savings on ALL our credit and charge card transactions. In addition, money will be in the Society's bank more quickly which, will result in additional interest being earned. All this, in turn, means that we can put those savings to better use and continue to expand our services

RSGB QSL BUREAU

All QSL cards and correspondence relating to the RSGB QSL Bureau should be sent to the QSL Bureau at the address below:

Mr E G Allen, G3DRN
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to members. So, not only do you benefit by enjoying a lower APR but, in the long term, you will also benefit from the savings made by the RSGB.

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RSGB Zone D Open Meeting at Plymouth Rally

The Plymouth Radio Club has invited the RSGB to hold a Zone D Regional Meeting at its rally on 28 May at Plymstock School, Church Road, Plymstock, Plymouth. The rally opens at 10am and features the usual trade stands, demonstration station, bookstall, bring & buy, refreshments and raffle.

Peter Chadwick, G3RZP will give a talk on repeaters at 11am and the RSGB Zone D Open Meeting will commence at 2pm. Around 50 people can be accommodated at the meeting which will feature a short slide-show followed by an open forum.

OBITUARIES

Maj WC Alcock, G2CAT, 18.12.88
Mr RF Alden, G3VUN, 25.1.89
Mrs P Barwell, G4ZCY, 23.1.89
Mr CJ Barnes, ZL2QH, 15.4.88
Mr G Berrisford, G3HIS, 23.12.88
Mr JT Blackmore, RS88779
Mr DI Bourne, GOCIH, 6.2.89
Mr GA Biggs, G1ZKV
Mr JI Boyle, G3EXV, 12.89
Mr R Bray, GW4ESV, 11.89
Mr S Brown, G4UOC
Mr G Braithwaite, GI4NBE
Mr LH Bush, G60CH, 11.9.88
Mr AC Burkett, RS19084, 28.11.88
Mr JA Carr, GM4 SJC, 23.9.88
Mr TC Clements, GW4KRY
Mr AR Cooper, G0FUB, 29.1.89
Mr JE Cordeaux, G3EEE, 28.12.88
Mr SA Deeley, G8FLS
Mr T Dearlove, G3FMN, 7.11.88 aged 81
Mr HR Drape, G0GBJ
Mr E Edmonds, G2KY, 12.88
Mr CD Edwards, G4KYR, 11.1.89
Mr BW Fewkes, G4NUI, 16.4.88
Mr LG Gay, RS90795, 2.12.88
Mr DH Greenway, RS43120, 3.2.89
Mr E Gooden, G0GIK, 16.11.88
Mr R Hibberd, G4MVW, 31.1.89
Mr V Hickman, G3LXR, 26.11.89
Mr M Hobbs, G0GSI, 12.88
Mr WC Hodson, G2CWH
Maj CW Holt, G4VQA, 29.11.88
Mr R Hooper, G3SCW, 28.12.88
Mr AE Howard, G4FZ, 12.88
Mr RJ Hunting, G30C, 17.11.88

75th Anniversary — congratulations from afar

In our enthusiasm to publish all of the congratulatory letters we somehow missed the one from the Wireless Institute of Australia. This was particularly relevant as the WIA is the oldest Society in the world, founded in 1912 - one year before the RSGB. No record of 1988 would be complete without this very much appreciated letter.

"Sir Richard Davies, KCVO, CBE, C.Eng, FIEE, G2XM.

Dear Sir Richard,
The Wireless Institute of Australia has asked me to convey to you its congratulations and very best wishes on the occasion of the 75th Anniversary of the founding of your Society.

The Institute, the oldest amateur national society in the world, was honoured by the presence of representatives of your Society at the celebrations marking its own 75th Anniversary in 1985. Now we can take this opportunity to say to you why we feel that we have a very special relationship and admiration for your Society.

As a Commonwealth country, we have at a National level a special relationship with Great Britain. These ties, emotional rather than legal, are very strong. Historically, as radio amateurs, we have been conscious of the distance between our two countries, and we have recognised that amateur radio has bridged those vast distances. We have also recognised the contribution of your Society in two important areas, the valuable technical contribution made to the art by your members, and the representation of the amateur service internationally, particularly to the International Telecommunications Union and by its participation in the International Amateur Radio Union.

As amateur radio faces the challenge of the future, in a world where the magic of talking across the earth has become commonplace, but in a world where the challenge of communications, in all of the meanings of that word, remain as one of the great challenges facing mankind, the amateurs of Australia extend their best wishes to the Radio Society of Great Britain, one of the great amateur radio Societies of the world.
Yours sincerely,

David A. Wardlaw

David A Wardlaw, VK3ADW
Immediate Past President, for
P H Gamble VK3YRP

FROM THE SECRETARY

First UK aeronautical mobile operation

A number of countries currently permit their radio amateurs to operate from aircraft and balloons, but this facility is not available to UK radio amateurs, despite keen interest from a small group of members. As an ex-British Airways Commercial Airline Pilot, I count myself as being amongst those few who are interested in such a facility and it was an aspect of licensing mentioned by many members at the time of the 1987/88 review. Indeed, the prospect of /AM operation has been discussed with the UK licensing authority on several occasions during the past two decades.

While the licensing authority appears sympathetic to the question of aeronautical mobile operation, it is the Civil Aviation Authority which needs to be convinced that /AM operation is appropriate. The safe and secure operation of commercial and light aircraft is of prime concern to all, especially at a time when aircraft accidents have recently dominated the media.

The RSGB believes that under certain conditions amateur radio equipment can be operated from aircraft without any risk. Yet at the same time, the Society very much appreciates the need for caution. Clearly, the RSGB is keen to pursue any form of aeronautical operation which is safe, for example from manned or unmanned balloons and during the past few years a number of such operations have been proposed, but without success.

It is therefore with much pleasure that the Society can announce that the first ever UK amateur radio aeronautical mobile operation will take place from an RAF Canberra during the periods of either 8-12 May or 15-19 May 1989. GB2CAN/AM is the callsign which will be used in order to commemorate the 40th Anniversary of the Canberra's maiden flight.

In granting permission for such an exceptional case, the DTI does not regard this as being a precedent for other airborne amateur radio operations. Nevertheless, the Society welcomes the DTI decision in the general spirit of liberalisation which has been much in evidence in recent years.

GB2CAN/AM will operate for one flight only as part of a routine training sortie within the UK Flight Information Region. The station will be operated on HF SSB (80/40/20/15/10 metres) on an aircraft from RAF Wyton. Further details will be available via GB2RS and the Headline News Service as and when they are known.

In supporting the RAF to make this historic flight, the Society joins the DTI in saying "Good luck GB2CAN". .

David Evans, G3OUF

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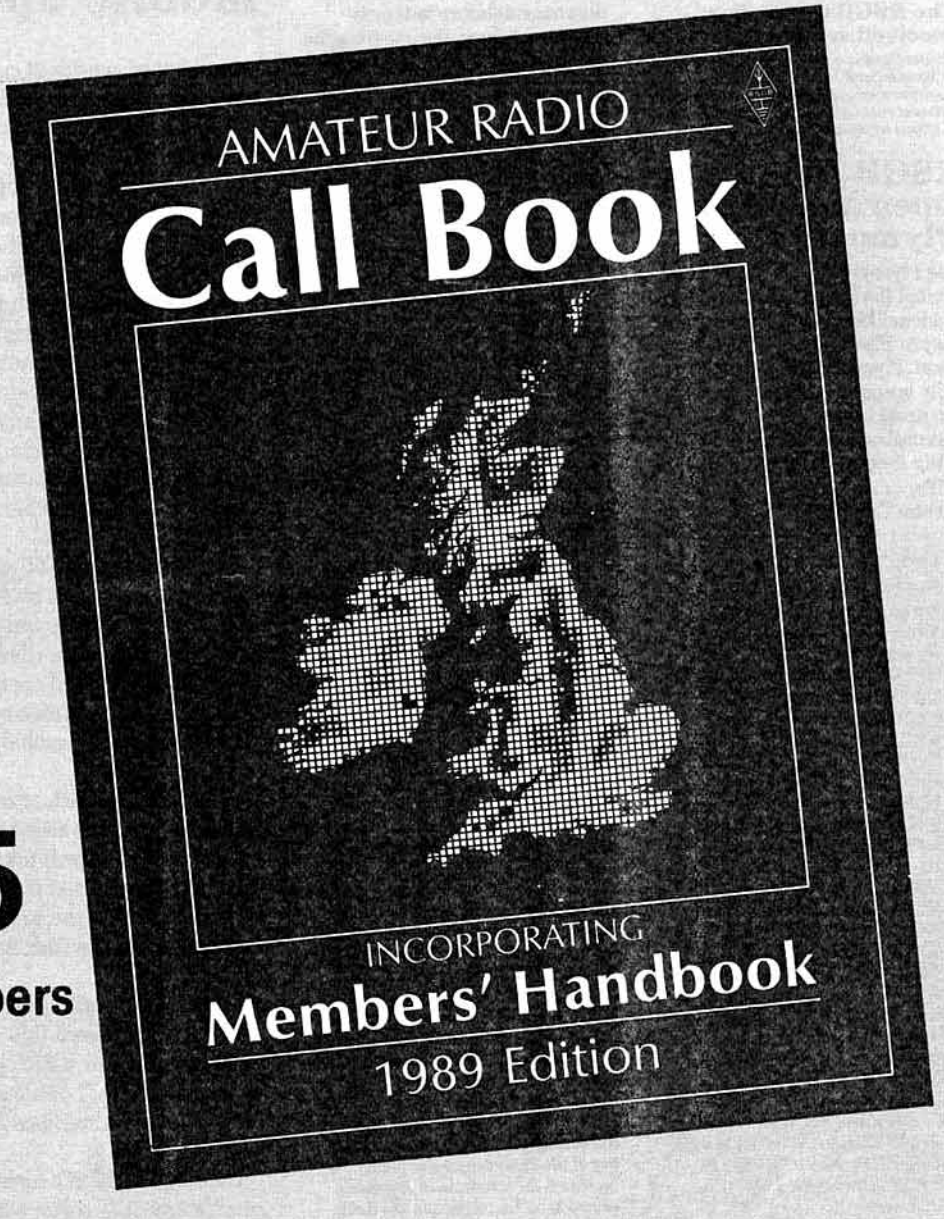

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AVAILABLE NOW

The 28MHz saga - getting clearer

At last we're beginning to make some headway with the note 'aa' 28MHz saga. The DTI has issued a Gazette Notice which solves most of the problems caused by the notorious note 'aa' in the new licence (text below) - and they've also replied to a number of questions we asked them on this subject.

You'll no doubt remember that Note 'aa' in the new licence drew attention to legislation in August 1988 which - amongst other things - made it illegal to build or modify single-band equipment for the 28MHz band without obtaining a letter of authority from the DTI. This caused considerable concern amongst the amateur community, since - when all's said and done - the ability to build and modify equipment is a fundamental part of the hobby. We'd expressed our dissatisfaction with this legislation to the DTI in earlier discussions, but Waterloo Bridge House was unwilling to grant an overall exemption for amateurs at that time.

However, we managed to make some progress at subsequent meetings - and the DTI has now agreed to give a blanket authority for amateurs. Here's the text of the Gazette Notice which does the business:

"This authority was gazetted on 17 February 1989 in Belfast, Edinburgh and London Gazettes."

AUTHORITY GIVEN UNDER SECTION 7 OF THE WIRELESS TELEGRAPHY ACT 1967

WHEREAS: A. the manufacture (including construction by any method and the assembly of component parts) of certain wireless telegraphy apparatus is restricted by the Wireless Telegraphy (Citizens' Band and Amateur Apparatus) (Various Provisions) Order 1988 (a) (the "Order"); and

B. the Secretary of State is satisfied that this Authority and the terms and conditions attached to it are compatible with the international obligations of the United Kingdom;

NOW THEREFORE

1. THE SECRETARY OF STATE, in exercise of the powers conferred on him by section 7 of the Wireless Telegraphy Act 1967 (c.72), gives his authority to any person holding a valid Amateur Radio Licence (A) or (B) issued by him (a "licensed amateur") to:

(a) manufacture wireless telegraphy apparatus designed to operate in the frequency band 28 to 29.7 MHz and no other frequency band; or,

(b) convert or adapt CB apparatus which complies with the requirements of article 3 of the Order in order to enable it to transmit messages in the frequency band 28 to 29.7 MHz and in no other frequency band,

subject to the terms and conditions specified in paragraphs 2, 3 and 4.

2. The apparatus shall not be manufactured, converted or adapted for any commercial purpose or in the course of any business.

3. The manufactured, converted or adapted apparatus shall be intended for use by the licensed amateur who manufactured, converted or adapted it (as the case may be) under and in accordance with his Amateur Radio Licence (A) or (B).

4. This Authority shall remain in force until it is revoked by the Secretary of State with or without notice.

5. Words and expressions used in this Authority shall have the same meaning as they have in the Order.

6. The Interpretation Act 1978 shall apply for the purposes of interpreting this Authority as if it were an Act of Parliament.

Signed:
M V COOLICAN on behalf of the Secretary of State for Trade and Industry
Date of Issue: 9 February 1989
(a) S.I.1988/1215

EXPLANATORY NOTE
(This Note is not part of the Authority).
The manufacture of single band amateur apparatus operating at 28 to 29.7MHz is prohibited by the Wireless Telegraphy (Citizens' Band and Amateur Apparatus) (Various Provisions) Order 1988 (SI 1988/1215).

This Authority allows the manufacture of such apparatus and conversion and adaptation of CB apparatus which falls within the purview of MPTI 1320 or MPT 1333 to operate on the frequency band 28 to 29.7MHz by licensed radio amateurs on a non-commercial basis. The Authority only covers manufacture, conversion and adaptation of apparatus by a licensed amateur for the purpose of use by him under and in accordance with the terms of his Amateur Radio Licence.

Those persons wishing to carry out manufacture or conversions as part of their business must first apply for (and be granted) an individual authority to manufacture or convert under section 7 of the Wireless Telegraphy Act 1967 by writing to the Department of Trade and Industry, Radiocommunications Division, Room 102, Waterloo Bridge House, Waterloo Road, London SE1 8UA. Such authority may be granted by the Secretary of State at his discretion.

Steven Maskrey, G6FDK (right), Managing Director of DCD Communications was the first prize winner of Granada TV's 'Flying Start Competition' for 1988. Flying Start is Britain's biggest enterprise competition organised and televised by Granada TV to stimulate the growth of small firms and the creation of new jobs in the north west. The panel of judges awarded DCD Communications the first prize of 40,000 for its innovative approach to providing major computer users with complex cabling systems. DCD Communications is projecting a turnover to September 1989 at £800,000 and employs 17 staff, including a team of eight installation engineers.

Steven received his trophy from John Lee, Employment Minister (centre) with Geoffrey Turton, Northern Sales Director of Digital Equipment Co, the main private sponsor (left), looking on. (Photo TDM Marketing Associates)

NEWS & REPORTS

MEL north polar trek '89 - latest

As you've probably already heard (assuming you're an avid GB2RS listener) Sir Ranulph Fiennes, Dr Mike Stroud and Morag Howell, GM1ILL, have now returned to the UK following the abandonment of the trek to the north pole because of unusually mild weather and heavy snow falls.Laurence Howell elected to remain on Ward Hunt Island in order to complete some of the scientific experiments and continue his radio propagation trials.

In a telephone conversation with the News Editor on Monday 10 April, Laurence, GM4DMA/VE8, said that he expected to be home at the end of April and that he had been calling CQ on 50.110MHz on the hour (GMT) throughout his waking hours. He had had to dig the hut out every morning because of the heavy snowfalls and the daytime temperature had been around -35° Celsius, quite mild for the time of year!

Laurence had managed to work several UK stations on all HF bands from 3.5MHz to 28MHz, as well as some via the Russian RS10 satellite. However, at that time, he had not been able to make any amateur radio contacts at 50MHz, although he did receive Norwegian television signals between 1908 and 1936 GMT on 6 April.

Contact between Ward Hunt Island and Resolute Bay had improved considerably after having been virtually wiped out during the massive aurora of 13 March and subsequent disturbances.

Laurence has promised to give us a full account of his activities on Ward Hunt after he's had time to warm up back at his home in Scotland!

So - that's the official text. What it amounts to goes something like this. There are no problems with multi-band equipments, as these are not subject to any controls. All amateurs now have authority to build and convert single band equipment for 28-29.7MHz under some fairly simple conditions:

1. The equipment must be intended for use by the amateur doing the work.
2. The conversion must not be carried out for commercial purposes.
3. Legal CB equipment may be converted, illegal CB equipment may not.

Individual applications must be made to convert illegal CB equipment, or where the conversion is for commercial purposes.

Permission will still be needed for the import of single-band equipment for 28-29.7MHz.

Possession of illegal CB equipment is illegal, and it seems unlikely that DTI will grant any exemptions.

So all in all, it seems that most of the original problems have now been resolved. The only unsatisfactory area is that it looks to us as though there's no way of legally owning an old AM or SSB CB set. This is a great pity, since they were frequently used as an IF for transverters whether they operated on 27MHz or were modified for 28MHz and were available cheaply. It also took them away from the illegal CB users!

Morse fees go up

A few days after the April issue of *Radio Communication* was passed for press, the Department of Trade & Industry issued a press release (dated Wednesday 22 March) announcing an increase in the fees for operating amateur radio Morse tests. The increase, from 7 to 10, took effect from 1 April 1989 and is the first increase since the RSGB took over the running of the test from British Telecom on 1 April 1986.

Any applications to take the Morse test which were received prior to 1 April 1989, for test dates already announced were accepted at the old rate of £7.

When the RSGB took over the running of the Morse test it did so on the understanding that the test fee would not be increased for two years. In fact, the Society was able to maintain the fee of £7 for three years and, during that time, the RSGB has set up a network of over 70 test centres around the UK, with tests being held every two months where there is a local demand.

DTI Q&A SESSION

While we were at it, we took the opportunity to write to the DTI and ask them for clarification of a number of points which were bothering us - and you, to judge by the letters we received. Boiled down to simple questions and answers, here's Waterloo Bridge House's current thinking:

***1** Why was this legislation introduced?*
"The legislation was introduced in 1968 to prevent import and manufacture of unlawful CB apparatus in view of serious interference problems. It has now been extended to cover the sale and possession of CB, but not amateur apparatus, except where it contains facilities permitting its adaptation to operate on CB frequencies."

***2** Why was 28MHz included?*
"The legislation covered the 28MHz band because of the number of AM CB sets converted from 28MHz amateur sets."

***3** Will the DTI readily grant permits for conversion of UK-legal CB kit?*
"Yes. The new gazette notice avoids licensed amateurs having to obtain permission for the conversion of legal CB sets (to DTI Specifications MPT 1320 or MPT 1333) into 28MHz band sets."

***4** What information will be needed for a permit?*
"To obtain authority for possession for conversion of non-approved CB sets, an application should be made in writing to Room 102 at the Department of Trade & Industry, Waterloo Bridge House, London SE1 8UA, giving full details of the make and model number of the set to be converted and the nature of the proposed conversion. The authority issued for possession for conversion will normally be valid for a period of two months."

***5** On what grounds will amateurs be refused permits?*
"It is unlikely that we would refuse a request from a licensed amateur unless he wished to manufacture 28MHz equipment for commercial gain and we considered that the apparatus contained facilities for conversion to CB frequencies. In practice, in such circumstances we should be more likely to become aware of this from enforcement action after the issue of an authority - if an authority were misused in this way, it would be withdrawn. See also item 11."

***6** Will permits be transferable between owners?*
"No. The authorities will be either general (conversion of MPT sets or home construction), or specific to licensed amateurs."

***7** Will a fee be charged?*
"No. The Department will issue authorities free of charge."

***8** Will the authority need renewing?*
"We would expect amateurs to carry out conversion within a reasonable period, but we will renew individual authorities if there are good reasons why conversion work has not been carried out."

***9** Will an individual be expected to be able to prove that the equipment in his possession was built or imported legally?*
"Only if it came to the attention of the RIS as being capable of transmission on CB frequencies."

***10** Is the legislation retrospective?*
"No, except insofar as where sets are operating on CB frequencies or contain facilities permitting their adaptation to operate on CB, their continuing possession is an offence unless such sets meet either DTI specification of 27MHz CB. If you are in any doubt whatsoever then apply for an Authority."

***11** Does the legislation cover possession of 28MHz single-band equipment?*
"Only if it contains facilities permitting its adaptation to operate on CB frequencies. Examples include sets where conversion is effected by insertion of a jack plug, or by a simple screwdriver operation."

***12** How do amateurs legally use 27MHz CB equipment as an IF for a transverter?*
"The answer depends on whether the 27MHz equipment is legal in the first place. If the apparatus does not conform to DTI specifications, then its possession for whatever purpose is unlawful."

***13** When buying commercial equipment, will the authority have to be obtained by the importer or the purchaser?*
"Authorities for 28MHz single-band equipment not containing facilities for adaption to 27MHz frequencies (see item 11) are needed only for manufacture or import. It is therefore not illegal to sell such apparatus, and the purchaser thus needs no authority."

***14** Are we entering a phase where equipment as well as operator will need a licence?*
"No. The EEC EMC Directive will affect commercially-available apparatus, in that - like all other electrical apparatus - it will have to conform to an EMC standard, and will have to be certified as such by the importer or manufacturer. It will NOT affect home construction" (our emphasis - Ed).

***15** How will this affect companies converting equipment for 28MHz?*
"We are examining all applications for authorities from commercial companies on their merits. However, since it is unlawful to import, manufacture, sell or possess unapproved CB sets, companies wishing to convert such sets into 28MHz amateur sets would be unable to obtain a supply."

***16** How will this order be affected in 1992 when same rules apply in all countries?*
"The draft EMC Directive gives member states the right to take measures to remove interference to public service and certain other transmitters. We shall review the legislation in the light of experience and before the EMC Directive enters into force on 1 January 1992, but it looks as if it is compatible with this provision."

***17** Might this clause prevent building of non-transmission equipment such as preamplifiers, receivers or aerials?*
"No. The legislation is confined to transmitters."

***18** Is this the thin end of a wedge?*
"No. this has been necessary legislation to deal with a specific problem. There is a problem with the unlawful use of high-powered linear amplifiers by the CB fraternity, and this is a source of interference. We must reserve the right to introduce measures controlling the marketing of these, but would not wish to restrict the amateur's right to use them. We would of course consult the Society before introducing any measures, and at this stage they are not a high priority."

***19** Could a blanket exemption be applied to kits intended for construction by young people as part of their training for the projected student licence?*
"The Gazette Notice contains a general authority for the home construction of 28MHz single-band sets by licensed amateurs. This will avoid individual amateurs having to apply for authorities. However, the authority will not allow the construction of sets containing facilities permitting adaption to CB frequencies. See item 11."

***20** Why is it necessary to aim legislation at the importers, and those who modify or construct equipment for 28MHz, rather than prosecute those who carry out the conversion form 28MHz to 27MHz?*
"The need for the legislation is based on the removal from the marketplace of unapproved CB equipment. It is not possible always to establish, on finding CB equipment in use, who has carried out a conversion - the removal of the initial sources of supply of the equipment is a much surer way to proceed. Of course, we shall prosecute converters or at the very least we shall have the equipment forfeited, where evidence exists."

YOUNG AMATEUR OF THE YEAR AWARD

The Department of Trade & Industry has announced its sponsorship of the Young Amateur of the Year Award for 1989's outstanding achievement by a young amateur radio enthusiast.

Anyone who is under 18 and;
— is keen on DIY radio construction; or
— is interested in using radio and gaining operating skills; or
— is using radio for community service, such as helping the disabled or in emergency communication networks; or
— is good at encouraging interest in amateur radio; or
— is involved in amateur radio in any way such as in a school scientific project,
is eligible for the 1989 Award and its £250 cash prize.

The prize, for the most outstanding achievement between 1 April 1988 and 31 July 1989, will be awarded by the DTI and presented at the Radio Society of Great Britain's 1989 HF Convention.

The closing date for applications is 31 July 1989. Entrants do not need to be a radio licence holder to enter and the competition is open to anyone in the UK, the Channel Islands, or the Isle of Man, who is under 18 on 31 July 1989.

Through its sponsorship of the Award, the DTI is encouraging young people to become involved in amateur radio which gives invaluable 'hands-on' experience for anyone considering a career in radio or electronics. It complements part of the RSGB's education and training initiative 'Project YEAR' which aims to introduce more people into the hobby, and the Department's Enterprise and Education initiative which encourages young people to gain the skills, aptitudes, and abilities they will need for the world of work.

Entry forms for the award (printed right) must be sent to; The Secretary (YAOTY), Radio Society of Great Britain, Lambda House, Cranborne Road, Potters Bar, EN6 3JE, NO LATER THAN 31 July 1989

£250 CASH PRIZE FOR THE WINNER

PLUS a guided tour of the Radio Monitoring Station at Baldock goes to this year's winner. Every entrant gets a DTI Frequency Allocation Chart and the RSGB will present the proposer of the winner with a commemorative plaque for all his encouragement and efforts. So take a look around you and consider the likely candidates for this year's award. Entry forms can be submitted by individual members or clubs. Young amateurs who lack a sponsor are asked to fill in their own form and get it to us before 31 July.

Andrew Keeble, G1XYE the winner of the first 'Young Amateur of the Year Award' in 1988, is now deeply into his GCSE examinations. Andrew's success in this DTI scheme has already led to discussions on his possible employment with the BBC once he has completed his higher education Project YEAR's first success!

ENTRY FORM

FOR THE 1989
YOUNG AMATEUR OF THE YEAR AWARD
sponsored by the Department of Trade & Industry

CANDIDATE'S DETAILS

Name _____ Age _____
Address _____
_____
Town _____ Postcode _____
Home telephone No _____
Male/Female (indicate)
Callsign/BRS (if any) _____
Club memberships _____
_____
Uniformed organisations _____
_____

Enter brief details of OUTSTANDING ACHIEVEMENTS here or on attached separate sheet

PROPOSER'S DETAILS

Name _____ **Callsign/BRS** _____
Address _____
_____
Town _____ **Postcode** _____
Club title (if club proposal)
_____
Contact telephone No. _____

Signed _____
Date _____

NB: Photocopies of this form appropriately completed or personal letters are equally acceptable as entries.

SCOUTS & GUIDES ON AIR

31st Jota UK report just published

We've just received a copy of the 31st Jamboree-on-the-Air UK Report for the 1988 event and it makes very interesting reading. As usual, the first part of the report gives the statistics of the numbers of scouts and guides involved in the event and the countries worked.

108 report forms were received in time to be included in the report and, based on the number of stations known to be active, an estimated 490 scout operators and 1120 non-scout operators took part. An estimated 4410 scouts and 350 guides were involved in running the stations with 7035 scouts and 1085 guides paying short-term visits. Other visitors are estimated to have been around 9300. The average UK JOTA station probably made contact with 23 other UK and seven overseas JOTA stations during the weekend of the event.

In the table of contacts, the Netherlands came top with 132 contacts made with the 108 UK stations which sent in reports. Italy was second with 40 contacts and West Germany a close third with 37 contacts. Other countries contacted included Australia, Ascension Island, Brazil, Bolivia, Nigeria, Surinam, Liechtenstein and Zimbabwe, to name a few. Bottom of the list were the Faroe Islands, Andorra and Botswanna with one contact each.

Much of the second part of the report is taken up with extracts from the reports of some of the 108 stations which sent them in. Many of the regulars are there, including GB4NDS and GB8NDS, the Northampton District Scouts; GB75GWP, Gilwell Park; and, for the first time, GB75RS, RSGB Headquarters station, which was operated by Les Mitchell, G3BKK and Bill Livens, G2CKB.

Also among the reports was one from the City District Scout Council, Kano, Nigeria who ran 5N8BSK. A total of 115 scouts and guides, with many visitors, were at the station sometime during JOTA weekend but, unfortunately, no contacts were made with stations outside Nigeria. However, not to be deterred, the group expects to be on the air again for this year's event.

Many press cuttings were also sent in and some of them are reproduced in the report.

This year's Jamboree-on-the-Air, the 32nd, takes place over the weekend of 20-22 October.

1989 also marks the 70th Anniversary of Gilwell Park and many events have been planned to celebrate the occasion.

Cub Days will be held on 17, 18 and 24 June.

The 70th Anniversary Week, 22-29 July, will be a week of major celebrations, including a camp fire and barbecue on 26 July.

The West Yorkshire County Camp is planned for 12-19 August and some 2000 cubs, scouts and venturers are expected to camp for the week.

The 63rd Gilwell Reunion takes place on the weekend 1-3 September and is the major annual event for adult leaders.

PATREX '89 is the Scout Patrol camp activity weekend and will be held on 22-24 September.

Steve Beazley, G7BIM, the Assistant Warden at Gilwell Park, would like to see an amateur radio station at most, if not all, of these events. However, this cannot happen without some help. If you can assist, please contact him at:
Gilwell Park, Chingford, London E4 7QW.
Tel: 01-524 1582.

The Scout Radio Fellowship

The Scout Association has issued a proposal for the formation of Radio Scouting Fellowships in Counties and Districts. The full text of the proposal (below) should be read in conjunction with the Scout Association booklet entitled *The Scout Fellowship*, 2nd Edition, April 1988, which is available free of charge from Baden-Powell House, Queen's Gate, London SW7 5JS.

Introduction

"There are many hundreds of members and ex-members of the movement who are radio amateurs, short wave listeners and serious CB enthusiasts, who would like to share some of their expertise to support local scouting.

"Many are Commissioners and Administrators; some are ex-members of the movement and a number have passed the retirement age for Leaders, of 60 years. Some have a lot of time they could devote to these activities and others have much less time but are nonetheless still interested in helping to provide young people with increased opportunities.

The Problem

"The problem is to find some form of organisation which could draw together such diverse offers of help and direct it along channels which would be of maximum benefit to local Scouting. Such an organisation would need official recognition and support but it would be unwise and unnecessary to suggest any formation which would involve Scout Headquarters or indeed the projected membership in extensive, costly and time-consuming administration. Also, the organisation would have to be flexible enough to me at both the needs of local Scouting and the interests of the members concerned.

The Solution

"It would solve practically all aspects of this problem if these enthusiasts would all join the Scout Fellowship which caters for those over 18 years of age and with no upper age limit! As members of the Fellowship, individuals are full members of the Scout Association and are fully covered by insurance and other benefits.

"In many cases such a specialist group of members may form a segment of a local Scout Fellowship. Where no Fellowship exists at present, the local District Commissioner or County Commissioner will welcome the formation of a Radio Scouting Fellowship in the District or County as a valuable resource dedicated to helping the movement.

"The Suggestion is that, where you wish to help with the introduction of Radio Scouting activities locally, you either join an existing Scout Fellowship and start a Radio Scouting 'segment' or, where there is no Fellowship, you start your own Radio Scouting Fellowship (RSF). Such action cannot be taken without the permission of the District or County Commissioner, with whom discussions should take place prior to any form of recruitment (full administrative details are given in the official booklet). The Assistant County Commissioner (Scout Fellowship) will be in business to help.

GB75155 — A typical JOTA station.

Discovery '89

Perhaps the biggest scouting event this year will be 'Discovery '89' which will be held from 25 July to 4 August. There will be a network of linked camps around the UK and amateur radio, particularly 144MHz packet, will play a major part in the programme. Further information on this event can be obtained from the Discovery '89 Office at Baden Powell House. We expect to be giving more details of the event before it takes place and to be reporting on it afterwards.

GB0BGG was the TDOTA station run on behalf of guides in the Barrowford, Lancs area. Some 150 contracts were made during the event, many of which were with other TDOTA stations. Special thanks must go to Jack, G1LNO, and all those wh helped, especially the lads from the Rossendale club.

Membership

"It is obvious that there will be many potential members living in areas where they will not find enough support to form a RSF. These members should join their nearest RSF even though it might be some distance from their homes. As membership increases they might at some time in the future discover that it would be possible to form a more local RSF. It should be remembered that Fellowship Members do not have to be members or ex-members of the movement and anyone wishing to help young people will be welcomed. An extensive recruitment field already exists.

"Those joining a RSF would need to have an active interest in amateur radio, short wave listening, serious CB, electronics, radio orienteering, kit building or similar technologies.

Activities

"Some of the suggested activities for RSF members might be as follows:

1. Encourage, advise and assist Scouts who have an interest in any Radio Scouting activities, especially those wishing to take Student or Amateur licence examination.
2. Become badge examiners and/or instructors for badges associated with these activities.
3. Organise courses for these activities where a need arises.
4. Advise on the setting up of amateur radio stations at local scout events, possibly organising and running the station themselves.
5. Try to ensure that there is genuine scout participation in JOTA in their local Districts. District RSFs could actually organise and operate stations during this event.
6. Organise speakers and demonstrations of these activities at scout gatherings as requested.
7. Provide a service team for a continuous activity, eg. running an amateur radio station throughout the year at a permanent scout camp site.
8. Organise teams to introduce such activities as radio orienteering and kit building at large scout gatherings.
9. Liaise with local amateur radio clubs and societies and note where they could provide technical assistance if required.
10. Support any new activities in this field including those which Scout Headquarters might wish to introduce.

"It would be the responsibility of individual RSF groups to formulate a programme of activities to suit the interests of their own members. While the accent would be on the provision of a technical service to the Movement, activities of sole interest to RSF members would also be encouraged. Fellowship Membership should be enjoyed and not become solely a duty. However, RSFs should not become just another form of amateur radio or CB club, for this is certainly not the intention. There MUST be a high level of service to the Movement in their activities.

"The present local Scout Radio Groups, Clubs and Societies could re-form as RSFs if they wished. Becoming a Fellowship need not markedly affect their present activities or such aspects as their affiliation to the Radio Society of Great Britain, for example.

National Activities

"Once a reasonable number of RSFs have been formed it would be time to consider some form of National Committee. This committee might be responsible for a National RSF Newsletter or the production of a National RSF Handbook, etc. They might also be responsible for the organisation of an occasional National RSF 'reunion' type gathering. At present, the Scout Fellowship already holds an annual camp and RSFs could join this or, if they so wished, organise their own reunion.

Under 18s

"Membership of the Fellowship is restricted to those over 18 years of age and younger scouts might feel that they are not being catered for. Actually, the very service the RSFs will be providing is for the under-18s and they will be able (with their Scouter's permission) to attend any training courses and activities provided. For instance, a Scout radio amateur under the age of 18 would be invited to operate stations at any local scouts activities. The under-18s would also be able to subscribe to the National RSF Newsletter when it is in production. In other words they would be able to sample the RSF facilities without having to actually join the organisation as they are already members of the Movement. Such a policy avoids a scout being forced to make an unacceptable choice between his Scout Group and Radio Scouting activities.

"Conclusion

"The formation of RSFs should satisfy the aspirations of the vast majority of those who wish to see Radio Scouting activities introduced on a larger scale within UK Scouting. You can turn an opportunity into a success!"

If you would like to discuss any aspects of this proposal, you are invited to contact:

Les Mitchell, G3BHK,
Trehelig, New Road, Zoals,
Warminster, Wilts BA12 6NG.
Tel: 0747 840189

or:

John Fogg,
Public Relations Officer,
The Scout Association,
Tel: 01 584 7030

GIRL GUIDES ASSOCIATION

New badge

The Girl Guides Association recently introduced a new Radio Communication Interest badge for the guide section (10-14 years).

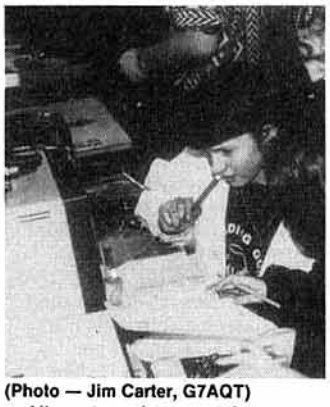
This badge was introduced in response to requests from Guides who had enjoyed taking part in Thinking Day On The Air (TDOTA). Many have put considerable effort and shown great interest in this event and they want it to be recognised. An Interest Badge enables them to enjoy their radio and be rewarded for their achievements. An interested Guide could work towards the badge over a period, or it would be possible to complete most of the sections at a TDOTA station.

The structure of the badge reflects the key elements of amateur radio at a level suitable for girls of this age. The first section is concerned with listening to and logging stations heard on the amateur bands. Girls are expected to know how to log the essential information required in the amateur log. Where possible, overseas stations are required in the log. This is to show girls that amateur radio, like Guiding, is an international hobby.

Knowledge of the phonetic alphabet, country prefixes and Q-codes allows the girls to understand conversations more easily and this forms the second section requirement.

Since technical knowledge is an essential part of amateur radio, the third section is concerned with knowledge of the components of a radio system, of propagation, and of safety.

Sixteen year old Scott Kewley, GD7BMF (left), with 1st Arbery Guide Laura Critchley at the TDOTA station GB4MGR on the Isle of Man, the first time in many years that such a station had been run on the island. (Photo: GD4OEL)



(Photo — Jim Carter, G7AQT)

All amateurs have certain aspects of the hobby which they prefer and which they choose to pursue in particular. The fourth section is based on the various typical activities which are relevant to a Guide interest in amateur radio. The Guide may choose, from the list, two items which appeal to her.

Some amateurs may be asked by a District Commissioner to test Guides for this badge. There is a comprehensive booklet, available from the Guider, which gives hints to badge-testers generally. However, there are some important points. A girl is awarded a badge if she has completed the syllabus to the best of her ability. Generally, this means that a 14 year old should be able to achieve a higher standard than, say, a 10 year old. The badge syllabus has been worded carefully to allow the tester to test the girl at her level. This applies particularly to the technical section. The girl's Guider should be able to offer advice if the candidate is exceptionally bright, or if she has particular problems, so that testing can be done accordingly.

A convenient way of enabling Guides to take a badge is to run a course. This may last for a few weeks or could be a special weekend course. Guides will fit in with what is best for the course director. It may be convenient to have a course which culminated in a TDOTA or other special event station, since this gives an opportunity to complete much of the syllabus.

The Syllabus

1. Keep a log of at least 20 different amateur radio stations heard within a two-month period. If you have suitable equipment, at least five stations should be outside the UK. The log should include the date, time, callsign, frequency and, when known, the location of each station.
2. a) Know the internationally recommended phonetic alphabet. Spell aloud phonetically simple words including your first name and home town. Interpret words which the tester spells aloud phonetically.

b) Know the country prefixes for the callsigns of ten countries and the callsign prefixes for the different areas of the UK.

c) Know the meaning of five international Q-codes. Explain the reason for their use.

3. a) Discuss with the tester the basic sections of a radio system.

b) Explain how radio waves are propagated over long and short distances.

c) Discuss with the tester safety at an amateur radio station.

4. Do two of the following:

a) Help with a Thinking Day On The Air or other special event station.

b) Prepare and read out aloud a greetings message to last not more than two minutes.

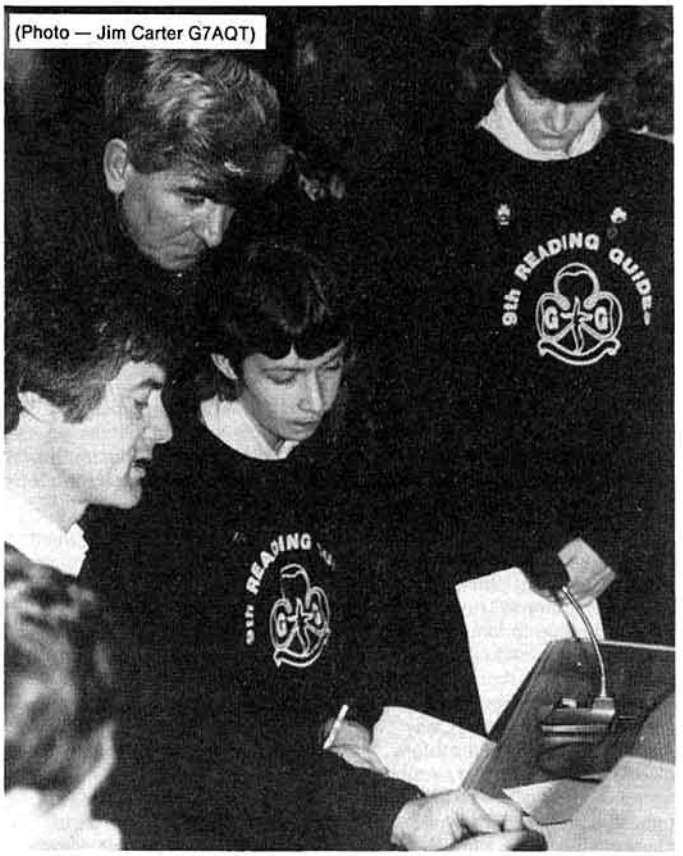
c) Design a QSL (confirmation of contact) card for a Guide station. Show how to fill in the details of a contact.

d) Construct a simple receiver for any radio frequency and tell the tester how it works. Published circuits or kits may be used.

e) Show how to tune a receiver on more than one frequency band to give the best reception.

f) Arrange for your Patrol to visit an amateur radio station. Be able to talk to your Patrol about the station. A Guide who holds an Amateur Radio Licence or who holds an Amateur Radio Certificate qualifies for the badge.

(Photo — Jim Carter, G7AQT)



(Photo — Jim Carter G7AQT)

Thinking day on the air — 18 February 1989

The Reading ARC was one of many clubs which ran amateur radio stations on behalf of Girl Guides for Thinking Day On The Air this year. The Reading club provided facilities for the 9th Reading Guide Company at the Reading Scout & Guide HQ. As well as 2m, 80m and packet radio stations running under the callsign GB6RG, the guides were able to try their hands at Ohm's Law, morse code and a mini-foxhunt. To ensure that they got the most from the various exhibits, each guide was given a questionnaire which required a visit to each location to find out the answer to each question.

One of the most popular exhibits was the morse code demonstration. A pair of keys and sounders were set up in adjacent rooms and guides were able to 'send' messages to each other using morse code.

Other popular exhibits were a computer-based game which taught the NATO phonetic alphabet, and a microphone which was connected to an oscilloscope to show voice patterns.

The mini-foxhunt was the highlight of the afternoon with the girls eventually tracking down the 'fox' after some time had been spent following false trails.

The whole event was inspired by the RSGB's Project Y.E.A.R initiative and provided a good opportunity for introducing local guides to amateur radio, many for the first time.

Creative technology

A Creative Technology Weekend will be held at Gilwell Park on 16-17 September 1989. Many aspects of modern technology which can be used in Troop of Unit will be explained and demonstrated.

The weekend is aimed at Leaders, Commissioners and Fellowship Members with an interest in modern creative technology. Areas to be covered include video, desk-top publishing, lighting and radiophonic sounds.

Full details from:
Programme & Training Dept, The Scout Association, Gilwell Park, Chingford, London E4 7QW

WAB News

Overseas activity - particularly in the 40m band - is increasing with the growing solar activity. This gives UK stations an ideal opportunity to work towards the Overseas Bookholders Award. Only 10 overseas members are required and this can be achieved quite easily on a good weekend by joining the DX net, which meets around 28.660MHz.

Firsts

The all time 'firsts' issued in March were rather a mixed bag.

VE3OZN acheived the WAB Basic, WAB Bronze and Counties Class II Awards on 28MHz SSB.

Andy, K5/GW0ECO, was also active on 28MHz SSB and gained the first Districts Class III Award for contacting 200 districts from 'across the pond'.

On VHF, G0JHC obtained the first District Class III Award on 50MHz SSB.

G0BQP received the first Large Squares Award Class III for working 30 100km squares on 144MHz CW.

G1EUU became the first to reach 1100, 1200 and 1300 3rd Series booknumbers on 144MHz SSB.

Forthcoming Events

The WAB Annual General Meeting takes place on 14 May at the Drayton Manor Mobile Rally, Drayton Manor Park.

The LF Phone Contest takes place on 21 May between 1400 and 2100 GMT. Rules and log sheets can be obtained by sending a large (9"x4") stamped addressed envelope and three first class stamps to:
G6TNW,
Cornerways, Orchard Road,
St. Neots, Huntingdon,
Cambs PE19 3AN

G0HWL and G1PXM will be activating WAB areas in Devon over the weekend of 20/21 May. The highlights will be two very rare areas: SX94 Devon, on the Saturday afternoon, and SY38 Devon, on the Sunday afternoon. The operating frequency will be 144.430MHz SSB.

WAB Newsletter

The WAB Newsletter is published quarterly in March, June, September and December. It costs just £2 in the UK and £3 ($6) worldwide by surface mail. Airmail rates are; Europe £4 ($8), E.Africa, Near and Middle East £5 ($10), W.Africa, N.America and Asia £6 ($12), and Far East and Australasia £7 ($14).

Further information on all WAB matters can be obtained by sending a stamped addressed envelope to:
Brian Morris,
22 Burdell Avenue,
Sandhills Estate, Headington,
Oxford OX3 8ED

First 'G-Mex' rally a great success

Over 3000 radio amateurs and electronics enthusiasts turned up to the first Great Northern Amateur Radio Rally held in Manchester's G-MEX Centre (formerly the Central Station) in the city centre on 12 March. The rally, organised by the Trafford Amateur Radio Club, is the first of its kind to be held in the very centre of Manchester for many years; from the attendance, it was clear that such a rally has been sorely missed.

Traders pronounced the event a great success - especially the antenna dealers, who were able to hoist arrays high into the air without fear of getting tangled in the roof.

Next year's event has already been booked provisionally for 4 March, such was the success of this years event many of the traders reserved their space for the 1990 Rally before they left for home. See you next year!

Scandinavia VHF/UHF/SHF meeting

Soren Pedersen, OZ1FTU, has sent the latest information on the Scandinavian VHF/UHF/SHF meeting scheduled for 9-11 June.

The Horsens division of the Danish national society EDR has pulled out from the organising which is now the sole responsibility of the DAVUS Group. The venue is an education centre near Silkeborg, which is situated in the middle of Denmark about 35km west of Aarhus. Most visitors will probably camp out - cost 50Dkr for two nights - but limited indoor accommodation may be possible for 150Dkr.

Lectures are planned on EMC, microwave equipment, computer simulation of Yagi antenna gain and low noise preamplifiers. There will be gain and radiation pattern measurements of antennas for 430MHz and up, gain and noise figure measurements of preamps. and general RX and TX measurements.

The social side includes a barbeque and a 'Ham Dinner' all at reasonable prices.

In view of the short time scale it would be best to contact Soren by telephone for further information and to make reservations. The dialling code from UK is 01045 and his home telephone number is 2844615 after 1600GMT. His work number is 2651122, ext 3290. After May 1 the numbers will change to 42844615 and 42651122 respectively. The correspondence address is OZ1FTU, Krumstien 10 A, DK-2730 Herlev, Denmark.

Five Bells group's 1989 DXpedition plans released

After visiting many rare Scottish squares over the past few years, the Five Bells Group felt that St Kilda - which it activated last year - was "...by far the most difficult Outer Hebridean island to activate". However, the group is convinced that this year's DXpedition will be even more demanding...

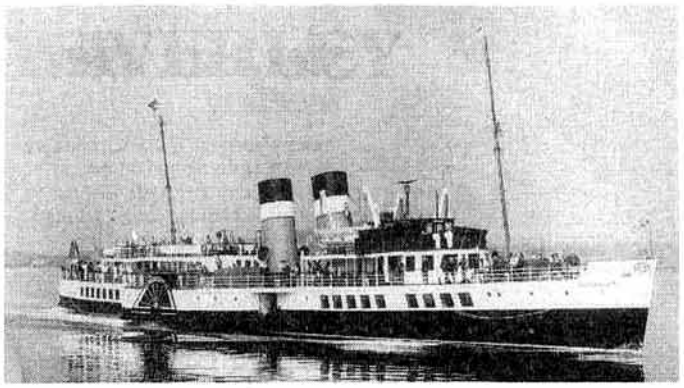
Permission has been obtained to visit the island of North Rona, which is located 45 miles NW of Cape Wrath in QRA square XT71b (WAB area HW83).

The island is completely uninhibited apart from sea birds, seals and sheep, and landing by sea is difficult since most of the coastline consists of cliff faces.

The group plans to land on the island on 11 July and to be operational between 12 and 19 July. Final details have still to be confirmed but operation is planned on 6m (frequency to be decided), 2m (144.028MHz CW and 144.215MHz SSB) and possibly 70cm (432.215MHz). The group has applied for the callsign GB4XT.

In view of the fact that a successful landing is very dependent on good sea conditions, NO prior skeds can be taken; keep an ear on the 20m 'VHF Net' on 14.345MHz and the nominated 144MHz frequencies for MS and tropo contacts.

Confirmed operators so far include Chris, G8IJC; John, G4NPH; Julian, G4YHF; and Keith, G40DA. More details ASAP.



Steam packet — 100

Not, as you might think, a new fangled data mode but the centenary of the Caledonian Steam Packet Company, which is being celebrated on 13 May. The last seagoing paddle steamer in the world, 'PS Waverley' will cruise down the River Clyde estuary calling at a number of coastal towns. It will depart from the Waverley Terminal, Glasgow at 9.30am, calling at Helensburgh, Gourock, Dunnon, Wemyss Bay, Rothesay, via the Kyles of Bute to Brodick on the Isle of Arran, round the Holy Isle, returning to Helensburgh in reverse order.

A special event demonstration station with the callsign GB0WAV/MM will be on the air throughout the day on HF, 144MHz and 430MHz, as well as (yes, you've guessed it) 144MHz packet radio. The HF station will primarily run CW on or around 7020kHz but with the occasional excursions to the other bands around +20kHz CW.

The station is being run by the West of Scotland ARS with the kind permission of the Waverley Steam Navigation Co. Ltd., in association with the Paddle Steamer Preservation Society, and it is hoped that similar events will be possible in the future. A colour QSL card of PS Waverley will be sent for all contacts and SWL reports. If you'd like some information about the PS Waverley or the Paddle Steamer Preservation Society to be sent with your QSL card, please send a large A4 stamped addressed envelope before the end of May to Allan Buchan, GM0EFH (WAV), Special Events Co-ordinator, West of Scotland ARS, PO Box 599, Glasgow, Scotland.

GB QSL sub-bureau divided

Because of the increase in the number of GB calls issued over the last few years and the subsequent increase in the number of QSL cards handled by the bureau, it has become necessary to sub-divide the GB calls sub-bureau.

Organisers of GB special event stations with suffixes in the range NAA to ZZZ should now send their envelopes to:

Mr A Devereaux, G8PJJ
39 Lower Green Road
Rusthall
Tunbridge Wells
Kent TN4 8TW

Envelopes for GB QSL cards in the suffix range AAA to MZZ should still be sent to Mr M Stoneham, G4RVV.

The reason for spliting on the suffix is to enable groups which hold more than one GB call to have all their incoming cards handled by the same QSL Sub-manager. For example, if a group holds the callsigns GB0XXX (A class) and GB6XXX (B class), envelopes should be sent to G8PJJ. Conversely, if the callsigns are, for example, GB2AAA (A class) and GB8AAA (B class), the envelopes should be sent to G4RVV.

All outgoing cards should still be sent to Mr Ted Allen, G3DRN.

News Photos

We would like to thank Martin Thurlow, G1GCT, for providing the photographs which appear at the foot of pages 9 and 10 in the April edition of *RadCom*.

GB2BHS

GB2BHS will be on the air from 11am on 6 May in the LF, HF and VHF (2m FM) bands at the Balshaw's High School Annual Spring Fair.

The station, first established in 1975, will, for the first time, be privately sponsored on a 'per contact' basis by pupils and parents in order to raise funds for the school.

Balshaw's High School, formerly a mixed grammar school but now a mixed comprehensive, has 850 pupils in the age group 11-16 years. It has 50 staff and dates back to 1782 when it was established by Sir Richard Balshaw.

The station will be looking for as many contacts as possible on the day, particularly with ex-pupils, ex-staff or anyone with any connection with the school. All contacts will be confirmed by a special QSL card bearing the school crest.

Accurate SWL reports will be very welcome.

Further details from Mr R. Banister, G4BEE on 0254 831605, after 7pm.

QSL bureau summer break

Ted Allen, G3DRN has written to say that the RSGB QSL Bureau will be closed for the summer break during the whole of June 1989. Please DO NOT send any cards to the bureau either during June or the few weeks before, if they are likely to arrive during June. Although the bureau is closed for a month, Ted spends much of that time catching up on the backlog and he would be very greatful if all members would be kind enough to give him a break from sorting through the sacks of mail and parcels he receives daily.

High speed telegraphy championship 1989

This event will be organised by the Deutsche Amateur Radio Club (DARC) and will be held in Hanover between 10 and 12 November 1989.

New draft rules have been written and will be used for this year's event. After the event they will be put before the 1990 IARU Region 1 Conference for approval by member societies.

Draft Rule B2.5 requires the organising society to send invitations to participate at least eight months before the event. "Draft Rule B2.6 requires societies wishing to take part to send a registered letter of intent to participate to the organising society not later than six months prior to the date of commencement of the Championships. This letter shall indicate the number of participants and others which will be attending. No other information need be provided at this time.

"Societies which have registered their intention to take part will receive more information five months before the Championship."

Any UK amateur interested in taking part, is asked to contact COLIN TURNER, G3VTT QTHR as soon as possible.

Morse seminar

The Arnold & Carlton College of Further Education ARS in Nottingham will be running a one-day Morse Seminar on Saturday 27 May between 10am and 4pm.

A number of talks will be given throughout the day and several activities have also been planned and include:

TRY A KEY - A range of keys will be attached to sounders enabling visitors to have a go.

TEST YOUR MORSE - 10p buys you a test session against a computer. If you are perfect you have another go. If not, the money goes to RAIBC.

MOCK TEST - Speaks for itself...

HIGH SPEED TESTS - Try your speed using your own key for a certificate endorsed for your choice at 15, 20, 25 or 30wpm.

MORSE CLINIC - A session with one of the 'experts' will help you to get the best out of your morse.

The fee for the whole day's activities is just 1 and any profits go to RAIBC. Refreshments will be available and there is a number of good local hostelries which provide excellent lunches.

The Arnold & Carlton College is known locally as 'Digby' College and is located in Digby Avenue,

Norwegian antique field day

The Norwegian Radio Historical Association reminds us that this annual event will take place on Saturday, 3 June. Their main station will be as before - the Radio Set Mk.II produced in the UK during WWII and dropped to Norwegian resistance forces. Their station plans to be on 3.515MHz between 0700 and 0900 and on 14.055MHz from 1000 to 1200. LA2ID says, "We would be very pleased to contact British stations during our field day in order to relive the atmosphere and excitement of the old days. Perhaps we could even establish a weekly antique net on 14.055MHz between England and Norway?"

For more information write to Arnfinn M. Manders, LA2ID, Magnus Bergsgt.2, 1266 Oslo 2.

AWARDS

NATIONAL

The G2DX Memorial Award

This is being issued by the Farnborough & District Radio Society in memory of the late Ken Alford.

To obtain it, it is necessary to work 100 or more countries *outside one's own continent* since 1 April 1986. No QSLs are needed but the submitted list of contacts must be in alphabetical order of countries and certified by a leading club official or two licensed amateurs.

The award can be endorsed for band or mode and is available to listeners on a heard basis. The cost is £2.50p, US $5, or eight IRCs. Applications go to:

Mr I F Ireland
118 Mytchett Road
Mytchett
Camberley
Surrey GU16 6ET.

INTERNATIONAL

Five-band W-100 diploma

The Central Radio Club of the Soviet Union started a new diploma in 1988. The 'Five-Band W-100 Diploma' requires applicants to work at least 100 diferent 'Oblasts' on each of the 10m, 15m, 20m, 40m, and 80m bands since 1 January 1988.

This award is in addition to the long-standing W-100 and other Soviet awards.

From the point of view of amateurs outside the Soviet Union, the greatest difficulty is presented by the 80m band since access is restricted to a small part of the band in the USSR. The large number of commercial stations using the band and the time of day during which the eastern Republics of the Soviet Union can be contacted makes the award that much more difficult to obtain. Don't be put off though; we've recently heard that Alan Gray, G3XQU, finally contacted his 100th Oblast on 80m to complete the fifth band on 4 March. In the meantime he managed 138 contacts on 10m, 160 on 15m, 137 on 20m, and 108 on 40m. However, John does say that "...particularly on 80m, a rudimentary knowledge of the Russian language is essential".

NOTE: The *Radio Amateurs' Conversation Guide* by OH1BR and supplementary language cassettes are available direct from RSGB HQ.

The 'Golden Antenna' Award

The town of Bad Bentheim has given the 'Golden Antenna' award for outstanding humanitarian achievments in amateur radio, for the last seven years and will be doing so again this year.

The 8th 'Golden Antenna' award will be presented to the winner during the German-Dutch Radio Amateur Week (DNAT), 24-27 August. Amateur radio organisations are invited to submit proposals for this award by 15 May 1989. They should be sent to:

Stadt Bad Bentheim
Schlossstrasse 2
D-4444 Bad Bentheim.

It should be noted that only those proposed who have achieved an outstanding humanitarian feat in the field of amateur telecommunications will be considered for the award. The decision will be made by a committee of representatives from the town of Bad Bentheim, the IARU and the German and Dutch national societies.

All expenses incurred by the winner in connection with travel to and accommodation in Bad Bentheim, will be borne by the town.

ARRL Diamond Jubilee Award

A reminder that contacts made during the whole of 1989 count towards this award. It can be earned in three ways:

(1) Work 75 ARRL/CRRL Sections (out of the possible 76) on any combination of bands/modes.
(2) Work 75 different DXCC countries on a combination of the 18 and 24MHz bands (or all on one of the two bands).
(3) Work 75 US Novice or Technician stations below 30MHz with QSOs which are more than the 'rubber-stamp' type.

Listeners may also apply and applications have to be made on the official form (and before the end of 1990). These can be obtained from:

ARRL Diamond Jubilee Award
225 Main Street
Newington
Conn. 06111
USA

...in exchange for an SAE and return postage.

The award itself costs US $5.00 or 12 IRCS, and no QSLs have to be submitted.

WORLD NEWS BRIEF

BERMUDA

The Radio Society of Bermuda has just (!) reported that a new Amateur Radio Novice Class licence was established in Bermuda in late 1987. Apparently it's an entry-level licence which expires in two years unless it is upgraded to Advanced level sooner. The HF privileges are limited to CW only in parts of the 3.5, 7, 21 and 28MHz bands, including the US Novice segments. The callsign consists of VP9N followed by two letters (eg VP9NZZ). When the licence has been upgraded, the letter N drops out.

GERMANY

Ham Radio'89, the international ham radio exhibition which incorporates the 40th DARC Lake of Constance meeting, will be held at the Friedrichshafen Exhibition Grounds between 23 and 25 June 1989. Over 100 exhibitors and visitors from over 30 countries, regularly attend the exhibition.

PITCAIRN ISLAND

On 9 February the DTI was contacted by the leader of a Girl Guides unit who asked if there was any possibility of being able to send greetings messages to Pitcairn Island. The Guides had planned to run a special event station on 26 February and had already corresponded with a licensed radio amateur on the island with a view to establishing contact.

The DTI immediately telexed the Commissioner for Pitcairn Island (who is, incidentally, resident in New Zealand) and suggested, with the normal criteria, that the UK and Pitcairn Island have a third-party traffic agreement. To the department's surprise, the Commissioner replied immediately and said that he had no objections. That being the case, the DTI is pleased to announce that the third-party agreement took effect on 10 February 1989. The DTI must be congratulated on obtaining what must be the fastest third-party agreement between the UK and another country on record.

SINGAPORE

The Singapore Amateur Radio Transmitting Society (SARTS) invites all amateurs to the 17th South-east Asia Network Convention to be held in Singapore between 17 and 19 November 1989. Full details can be obtained direct from SARTS.

TURKEY

The IARU member society in Turkey, known as Turkiye Radyo Amatorleri Cemiyeti (TRAC), has been renamed as 'Telsiz Radyo Amatorleri Cemiyeti' (still TRAC).

This is as a result of a new law of the country which requires all private institutions to seek governmental permission for using the word 'Turkiye' in their names.

TAIWAN

Wayne Wilson, WB8TSO, and Denton Bramwell, K7OWJ, returned recently from a visit to Taipei in Taiwan. While there, they operated a mini-DXpedition which included the first authorised packet radio operation from that country. Although operating time was very limited, they left behind a Heathkit HK-232 digital node terminal unit, a Heathkit SB-1400 HF ısceiver and a Heathkit SB-1000 linear amplifier for future use by the China Radio Association's club station. Look out for Tim Chen, BV2A or BV2B, and other helpful and friendly China Radio Association club members on 20m packet radio in the future. (TNX-Wayne Wilson, WB8TSO, of Heathkit)

USA

The first meeting of the ARRL's No-Code Study Committee took place on 12 March at New Harmony, Indiana. Among those attending the meeting were ARRL Vice-President and Chairman of the Committee George Wilson, W4OYI; ARRL Pacific Division Director Rod Stafford, KB6ZV; ARRL Executive Vice-President David Sumner, K1ZZ; several representatives of amateur radio industry and Tom Atkins, VE3CDM of the Canadian Radio Relay League (since Canada is in the process of instituting its own code-free entry level licence).

We hear that there was a lively discussion on every point brought before the committee by concerned amateurs who had taken the time to write and, in the end, the decisions that were reached were unanimous. The exact nature of the discussions and decisions reached will be made public a few weeks after they have been presented to the ARRL Executive Committee at its meeting in early April. If the Executive Committee forwards the matter to the Board in July, the decisions may not be made public for some time.
(TNX- Westlink Report)

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When only the best will do

TS-940S £1,995

This is the most respected HF transceiver in the world, and has maintained its lead over all the competition. Check what the leading contest stations are using, and you will find the TS-940S at the top of the list. Uncompromising performance, unrivalled facilities, and uncanny ease of use make the TS-940S the HF transceiver which you will want to own one day.

TS-440S £1,138

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

TS-140S £862

The TS-140S was in effect designed by our customers, who demanded Kenwood performance and facilties at modest cost. The TS-140S has all mode, all band HF coverage, and of course a high performance general coverage receiver. 100W output and a first class receiver combine to make the TS-140S a really satisfying rig to own. It's also available in the form of the TS-680S which has all the bands and modes of operation of the TS-140S but with the 6 metre band as well.

TR-751E £599

The TR-751E is one of those transceivers which actually has no competition at all, combining as it does the all mode performance of a 2 metre base station with the convenience of mobile use as well. Whether you want to operate on FM, SSB, or CW, the TR-751E will do the trick. Real ease of use (in the Kenwood tradition), and sensible facilties, have made the TR-751E a firm favourite all over the world. Call in to any of our branches and see for yourself.

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25 years in amateur radio

Random Ramblings.

Joseph Addison wrote, sometime around 1690 "Unhurt among the war of elements, the wrecks of matter and the crash of worlds." In other words, he had chosen an aerial rotator which wouldn't hold his beam in a high wind!

It is foolish to economise on your aerial rotator, because if you do, and install it on top of a pole or mast, you will be extremely sorry when it breaks and you have to take the whole thing down again. When it comes to top quality aerial rotators, it's hard to beat those from DAIWA. The MR-750 series rotators are capable of holding the aerial still and rotating the house, but one has inevitably to pay for such performance.

We have just started selling two rotators from the EMOTO company, which was founded by a respected mechanical engineer, and has built a substantial reputation in Japan for high quality mechanical design. These rotators complement the DAIWA MR-750, and give you a real choice for your rotator requirements. They all use a safe 24 volt supply to feed the motors, and the controllers are easy to use and easy to read.

I can only give the briefest of details in this small space, but when you need further advice, give us a call or drop a line, and we will explain in great detail why these rotators are the best, and tailor the right one for your needs. As I started with the quotation, I may as well end with one equally appropriate: "Down, thou climbing sorrow, thine elements below", which comes from King Lear, so even poor old Shakespeare had his beam fall down.

DAIWA MR-750PE **£290.00**
Turning torque.....700kg/cm to 2800kg/cm
(depending upon number of motors)
Braking torque .....6000kg/cm to 21000kg/cm
(depending upon number of motors)

The MR-750PE is unique in that the rotator is supplied with one drive motor fitted, but up to three additional motors can be fitted, each one multiplying the turning and braking torque. With all four motors, the MR-750 could almost be used for powering a railway engine turntable, such is its turning power. Must also mention that the additional motors can be fitted without dismounting the rotator from the aerial system.

EMOTO 105TSX **£159.69**
Turning torque.....520kg/cm
Braking torque.....3000kg/cm

EMOTO 757SRX **£347.24**
Turning torque.....700kg/cm
Braking torque.....7000kg/cm

Both EMOTO rotators are extremely well made and weatherproofed, with hard epoxy based paints and stainless steel hardware. Both rotators are supplied for flat base (i.e. tower) mounting, and lower mast clamps are optionally available.

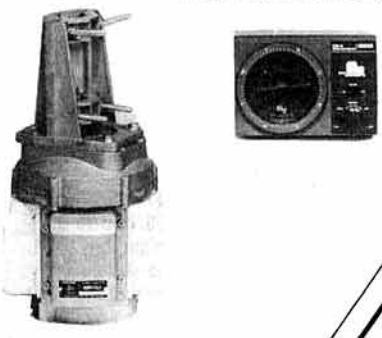
For more details, just ask for the rotator leaflets from us.

John Wilson
G3PCY/5N2AAC

EMOTO 105 TSX

EMOTO 747 SRX

DAIWA MR750 PE



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The Aurora of 13 March 1989

Charlie Newton, G2FKZ

We said last month that we'd be asking our fount of all auroral wisdom, Charlie Newton, G2FKZ, to tell us all about the spectacular events of 13 March. Well, not only do we have Charlie's piece but we've a fascinating mini-article from the British Geological Survey about how the aurora looked from their point of view. First of all, here's G2FKZ:

"For some months now the sun has shown us a pattern of a quiet side followed by a more active side: the very quietest period has moved slowly and appears a day or so later in each rotation. More recently, however, the active side peak began jumping ahead by 4 or 5 days. This meant that a classic case of solar restructuring was under way and that something was going to happen. At this stage of the cycle it was most likely to be a surge of new activity.

"From 1 March solar activity began to increase in spurts, with geomagnetic levels being very unsettled at mid-latitudes and reaching storm levels at high latitudes. As each new region appeared over the sun's east limb, so the levels of activity increased - and by 5 March we had storm levels everywhere. On 6 March the solar region numbered 5395 (located at north 34 degrees heliograghic longitude L=257) rotated over the east limb into view. At 1354 UT on that day a major X-ray flare began, which lasted 137 minutes. It has been estimated that it reached a level of X15/3B; unfortunately the figure has to be an estimate because the satellite X-ray sensors looking at the event became saturated at X12! Certainly it was the largest flare this cycle, and may be the largest of the present century.

"The region continued to be very active, and by 12 March - when it was crossing the central meridian - it had produced 6 X class and 26 M class X-ray flares. This active region had about 50 spots in a very complex beta-gamma-delta magnetic configuration, and was 2810 millionths of the visible disc in size. It was classified as an EKC magnetic BGD.

"On 8 March at 1735 a proton event began: particle levels continued to increase and there was a pole cap absorption event. The flares, the proton events and the pole cap events continued every day until 13 March. By then an enormous number of protons (3500 per square centimetre per second per steradian) were arriving, and the pole cap absorption measured 6dB. Meanwhile, massive 10cm and 3cm bursts of solar flux were being reported - up to 18,000 units on the 6th and 12,000 by the 10th, with 3cm bursts up to 1200 percent above normal. At a frequency of 245MHz the peak flux reached 220,000 units, and at 2695MHz there were 18,000 units.

"With regard to sudden ionospheric disturbances, I must admit I lost count! They were reported from all over the world - not just fadeouts but phase anomalies, enhancement of atmospherics and other odd items. The radio quality index (**Fig 1**), which compares HF band conditions with that of the previous 27 days and is possibly the best guide of ionospheric conditions world-wide from Europe, showed a classic pre-storm enhancement. During the peak of it, on 25/26 February, the 50MHz band was open to Japan: G4UPS made a first with JH4IUO and another with VS6UP. Chinese television was also being heard. Just prior to this, on the 20th, G4FJK also had a first to VK6KXW and LU8MBL had 30 QSOs with European stations. By 1 March a steep decline started and lasted until the collapse of the 12th: no recovery had occurred by the 21st.

"Visual auroras were reported by observatories in France, Belgium, and the Netherlands. The southern hemisphere was not so seriously affected since the magnetic levels only reached an A index of 128 at Kerguelen (S49 E70) for the 13th. The Inda index recorded 355 units out of the maximum possible of 400. In **Fig 2** I've plotted the spot count, solar flux and geomagnetic 'A' index - note the low level for the enhancement period.

"I don't know for certain yet

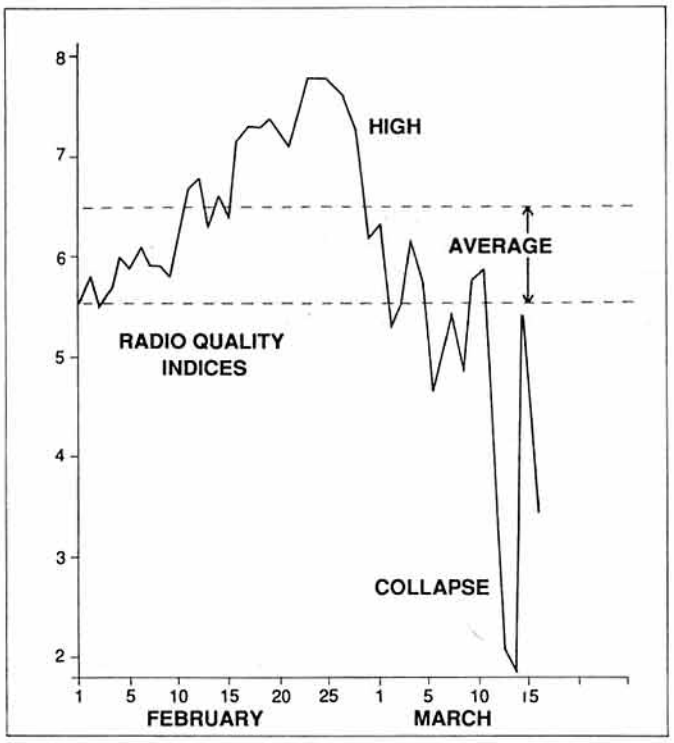
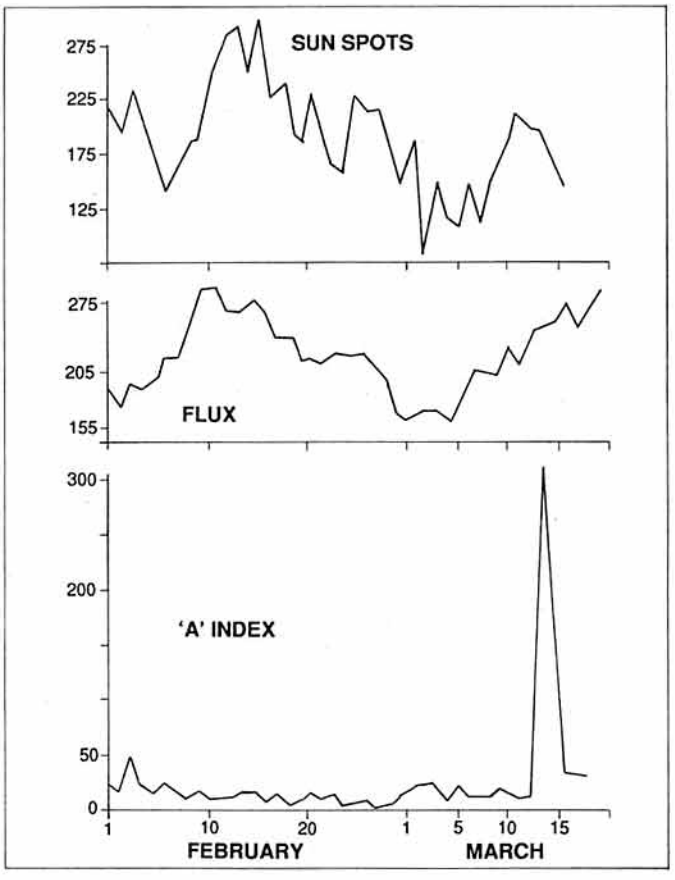


Fig 1. This shows the pre auroral enhancement where HF bands peaked up to the 26, then the collapse with the Proton events and Auroras.

Fig 2. Note the very low 'A' index, only 2 on the 26 during the enhancement period, (arrowed) compared with the peak of 284 during the storm and aurora.



because the data is not yet to hand, but the flare on the 6 March did not result in any radio aurora. One reason for this could be that the interplanetary magnetic field was a north-seeking field at the time, and as the earth is always a north field there was little or no coupling. By the 13th we had crossed a sector boundary, meaning that we now had a south field. By this time the sun's disc field was level with the earth so good coupling for particle input resulted."

Great stuff and indeed we gather from our friends in the Royal Air Force that the aurora was visible from a height of about 3000ft just south of Gibraltar!

Just before we went to press Charlie said that some extremely interesting data was due from Boulder in the course of the next few weeks, so we've asked him to write that up for us - watch this space.

As well as Charlie's piece, we thought it'd be useful to bring you another point of view. Ted Harris and David Kerridge, of the Geomagnetism Research Group, British Geological Survey, sent us the following report:

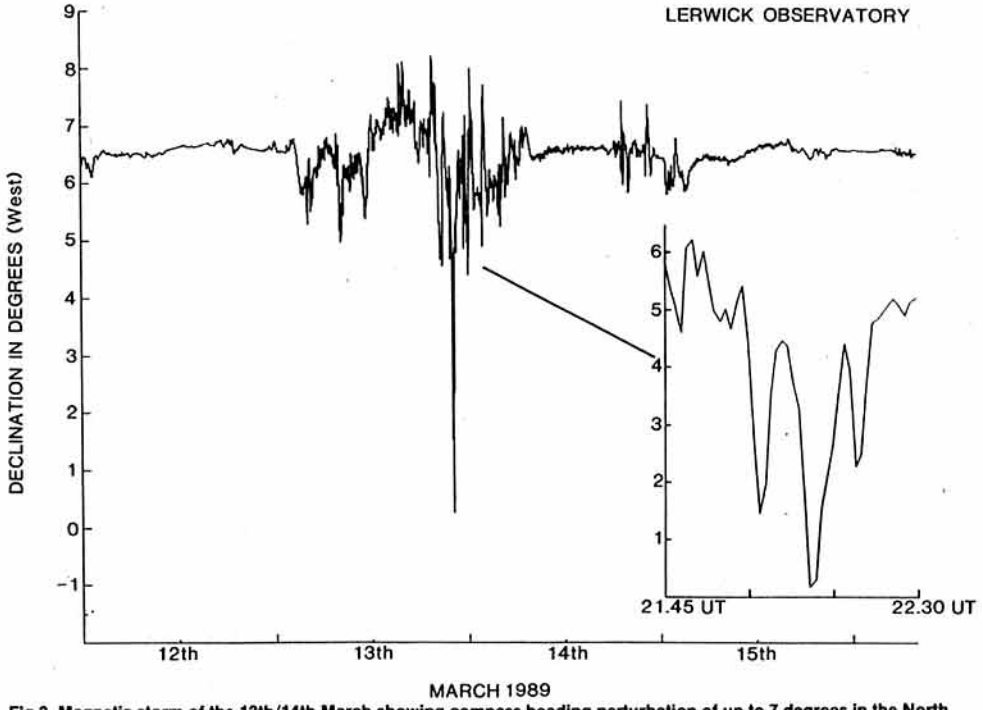


Fig 3. Magnetic storm of the 13th/14th March showing compass heading perturbation of up to 7 degrees in the North Sea. The inset shows geomagnetic field direction changes of up to 1 degree per minute.

The geomagnetic storm of 13 March 1989

Ted Harris and David Kerridge, Geomagetism Group, British Geological Survey, 29 March 1989.

"The largest magnetic storm for 40 years started at 2am on 13 March 1989. At Lerwick Observatory compass swings of almost 8 degrees were observed in a few hours with changes of almost a degree a minute at the height of the storm. (The typical swing during the course of a day is about 0.2 degrees.) The K-index is used to classify magnetic activity on a scale of 0 to 9. A K-index of 9 is rare and, at Lerwick, requires that the magnetic field changes by 1000nT over a three hour period. This storm produced a change of 2500nT in the three hours around midnight 13/14 March.

"The Geomagnetism Research Group (GRG), of BGS in Edinburgh, operates three automatic geomagnetic observatories in the UK and also receives data continuously by radio link from a site 25km south of Edinburgh. The development of the storm was monitored by GRG by regular interogation of the observatory systems by telephone link. This enabled GRG to issue an early warning of the storm to agencies relying on magnetic measurements.

"The intensity of the storm was such that the aurora borealis (northern lights), normally restricted to high latitudes, was seen clearly in the south of England, and there are reports of observations of the aurora in Italy and as far south as Jamaica.

"The rapid changes in the geomagnetic field during the storm induced voltages in power lines, transoceanic cables, and telephone and cable TV networks. In Quebec, transformers in the Canadian electricity supply grid tripped, blacking out large areas of the Province and plunging more than a million people into darkness. (No doubt with a consequential blip in the birth-rate in nine months time!)

"Ionospheric disturbances caused disruption of radio communications and resulted in the loss of TV reception in some areas. Satellite communications were also affected - as were satellite orbits as the increased ionospheric density produced extra drag.

"The enhanced radiation at high altitudes created such potential danger that a Concorde airliner on a transatlantic route took a more southerly flight path to avoid subjecting its passengers to the radiation. Astronauts aboard the space shuttle 'Discovery' would have been prevented from working outside the space craft because of the radiation danger. The shuttle mission was recalled a day earlier than planned because of computer malfunctions which could have been caused by the storm.

"At sea-level, North Sea exploration companies reported that 'down-well' instruments, used to steer drill heads, had experienced violent swings in compass readings of up to 12 degrees! A Norwegian geophysical exploration company reported that all surveying has been halted after receiving warnings of the storm and its severity from GRG. The director of operations reported that two navigation systems used to fix the position of survey ships, which were in agreement prior to the storm, were now diverging. GPS (Global Positioning System) satellites experienced increased drag which retarded their orbits so much so that positional accuracy at the Earth's surface was lost.

"Charged particles are continously emitted from the sun forming a stream known as 'solar wind'. On 10 March, a major solar flare was observed. During this eruption charged particles were ejected from the sun into the solar wind creating a region of enhanced speed and density. This region travelled across interplanetary space and caused the geomagnetic storm when it 'collided' with the Earth's magnetic field. Particles were injected into the upper atmosphere along magnetic lines, and created the aurora by excitation of atmospheric gases.

"The sun goes through an 11-year activity cycle, during which the solar magnetic field reverses. Sunspots are an indication of the level of solar activity and in the current cycle, which began in September 1986, sunspot numbers have been increasing at a record rate. Solar activity is likely to peak during 1990 (Solar Maximum), resulting in more major magnetic storms and a generally high level of magnetic activity over the next two years at least."

See also this month's Spectrum Analysis for a write-up of who worked what in this event.

SPECTRUM ANALYSIS

HF

JOHN ALLAWAY G3FKM

Unfortunately the closing date for this issue appeared as the 5th and not the 15th March and this caused problems particularly with this part of the column. However, G2AFV, G3s GVV, KSH, NWG, YRM, G4s QK, MUW, NXG/M, OBK, SDK/M, SJG, XAH, and G0CKP did send in info - for which, many thanks. Stations listed in italics were using CW.

3.5MHz

0000	A92BE.
0200	*ZD8JP.*
0600	*C56/G3TXF, K4LTA/J8, NQ7M, W6BIP, ZL1, ZL3.*
0700	*KW8G/J6L,* ZL4LZ.
2200	*TU4CO.*

7MHz

0000	A92BE, *FM5CL, 6W8DX, 8Q7HH.*
0300	*W7.*
0600	*HC5AI/7, K4PJ/J8,* KP2A/KP5, *TU4CO,* V31BB.
0700	*W6, W7, WL7BEM,* ZL0ABR.
1600	*VE7CC, VS6UO.*
1700	*VK3EZN, ZL3GQ, ZS5BK.*
1900	*KL7Y, VK6LW.*
2000	*KD7P/KH2.*
2100	JA, *T5GG, VQ9QM, ZD8JP.*
2200	*JA, VU2PTT,* YI1BGD.
2300	*KP2A/KP5, UA1OIL, 7X3DA,* 9X5NH.

10MHz

0000	*OA4IU, 9Y4NW.*
0700	*W5PWG/J8, W5, W6, ZL3.*
0900	*N6DX.*
1700	*UL7LB.*
1800	*JA1GQN.*
2200	*W6OKX.*
2300	*ZC4JL.*

14MHz

0000	*6O1GG.*
0600	KH6IJ.
0700	*FK8FS, 5W1YL.*
0800	ZL7TZ.
0900	DL5UF/KW8, *P40GD.*
1800	*C9MKY, 3W8KZ.*
1900	FK8FG.
2100	FG5/KA3DSW, PJ4/AD8J.
2300	*VP5V, VU2NRO/JOS.*

18MHz

0800	*VK4AAG, ZL1AM.*
0900	*OE8NOK/ZL5.*
1000	*VK2, VK3.*
1100	*9Y4NJ.*
1500	*W6.*
1700	*EA6ZY, W6OV.*
1800	*CT3CU, KH6CD.*
1900	*VK5FE.*
2200	*KP2J.*
2300	*VK4, W1,4,5,7.*

21MHz

0800	3D2EW.
0900	JT1KAI.
1100	*J6LSN,* P29KH.
1300	*KP2A/KP5, VK9NS.*
1400	TG9GI.
1900	KP2A/KP5, VU7NRO.

24MHz

1100	*W5PWG/J8, PT7AA, VU2ZAP.*
1200	*J80A.*
1500	*TA2BK, 3B8CF.*
1600	*J79JD, W6, ZS6CEV.*
1700	*J28CY.*
1800	*LU7DOG.*
2000	*W6.*

28MHz

0800	JT1KAA, KH6SB (via SP).
0900	*AP2TN,* T5GG, UV3CC/UA1P, YI2LVB, YI0VP, 3WA.
1000	JT1BV, KH0AC, KL7XD, VQ9PN, YJ8JS, *ZL3GQ,* 9N1RN.
1100	HL9TF, *TA2/G3UIN,* J28DN, *VU7NRO/SU, ZD7CW.*
1200	*UA0BDU/UA1O,* 7X2ARA.
1300	*K0GVB/C6A, KP2A/KP5. VS6UP, YN3CC,* 3C1MB.
1400	*HK0BKX,* HV3SJ, *W5PWG/J8, P43GR.*
1500	*TU4CO, VQ9QM,* YB.
1600	*D68CV, VU7NRO/JOS.*
1700	*C9MKT, J52US,* ZY0FX, 5V7WD.
1800	K7MM (Wyo), P40GD, *V31BB, VP5V.*
1900	*J73D.*
2000	KH6IJ, *PA0GAM/ST2, 5H3TW.*

I would like to thank the editors of the following for items extracted: the *Long Island DX Bulletin* (W2IYX), *DX News Sheet* (G4DYO), the *Ex-G Radio Club Bulletin* (WA8TGA), *DX Report* (VK9NS), the *Lynx DX Group Bulletin* (EA2JGO), *DX'press* (PA3CXC), *CQ Magazine* (W1WY), the *DX Bulletin* (VP2ML) and *DXNL* (DL3RK). Please note the closing date for the **July** issue which is 15 May

DX NEWS

OX3JUL, a club station in **Greenland**, will use the callsign OX1O this year to celebrate the 10th anniversary of Greenland's independence. The Sveriges Radios Radio Club SK3HK will be on the air from 20 to 28 May as 7S3HK.

There is another new **Antarctic** station this time Korean. Its callsign is HL5BDS and it is located in the **S.Shetland Is** and has been on 14.030MHz around 2300. KC4USV is on 14.300MHz most days at 0545. LU5EAS/Z is on the **S.Orkney Is** and has been very active in the 28.5-28.525MHz area around 1700. LU2ZC should have been on the air from **S.Shetland Is** by now, mostly on CW. He is located on King George V Island (the same QTH as HL5BDS).

The Long Island DX Bulletin says that the Natal DX Group's five operators will be on the air from **Peter and Paul Rocks** starting about 2 May for a week. The callsigns will be ZY0SS on SSB, ZY0SW on CW, and ZY0SY on RTTY. Likely frequencies are 25kHz above lower band edges on CW - listening 030 and up, and on SSB 'the usual DX channels'. It is hoped that XE2TCQ and a number of other Mexicans will operate as XF4T from **Revilla Gigedo Is** for 10 days early this month — CW frequencies likely to be 25kHz up (on CW) and (on SSB) 1.830, 3.795, 7.050, 10.110, 14.250, 21.300, and 28.500MHz.

Richard, KH6JEB/KH7, from **Kure Is** was very active at the time this was written. He was a regular check-in to the JY3ZH Net on 14.183/14.250MHz at 0500 as well as the VK9NS Net on 14.220MHz at 0600 and with PA3DZN on 21.150MHz at 0730 and slightly later and at 1800 on 28.650MHz. AH9AC on Wake Is has been on a great deal also around 0700. According to *DX News Sheet* F6FYD is in **Somalia** until early autumn and hopes to become T5YD or 6O1YD. GW4KYN is also there for an eighteen month stay. TR8SA is expected to be in **Benin** as TY1SA in late July. Lloyd and Iris made some 3000 QSOs from Nigeria as W6QL/5N0 but were not able to get licences in Niger so returned to the USA. They are hoping to be allowed to operate from all 15 republics of the USSR. TZ6VV had transmitter problems before leaving **Mali** but hopefully he will be back there in late July. *DXpress* repeats a rumour about an Italian amateur who works with the UN Forces and will be in **Angola** for another few months who will be trying to get a licence as D2ONU or D2/I5DEX (or D2/I2DEX?). The prospect does not seem to be too good to me but stranger things have happened!

Various rumours concerning impending action from **Laos** are current at the moment. HA5PP was alleged to have been in Laos with his equipment but was advised not to use it and returned home. However, he was said to have been told that the situation may improve and he may have another try this month or in June. 4W0PA, in **Yemen**, now operates below the low edge of the American phone band on 14MHz (often on 14.145MHz) and listens up. A Butternut antenna has been sent to him by ON5SQ. However, some of the bad operating by those calling hyim is said to be jeopardising his licence and at the time of writing it is reported that he has in fact returned to Holland. His QSLs are being supplied by the Heard Is DX Association.

There are two new special event stations on from **Japan**. 8J6APX will be on the air until 3 September from the Asian-Pacific Exhibition in Fukuoka, and 8J1YES from Yokohama Exotic Showcase until 1 October. 8J6APX will use CW, SSB, and packet on 3.5 to 50MHz, and 8J1YEST all modes and bands 1.8 to 1200MHz.

QTH CORNER

HL5BDS	HL1ASS, Jinkyung Park, 41-25 Yongmundong, Yongsanku, Seoul 140, Rep of Korea.
DF2UU/KH8	Hans Peter, Hardbergstr. 8, D-7550 Rastatt, F R Germany.
DL5UF	H Moehringer, Bulacherstr 13, D-7507 Ettlingen, F R Germany.
KP2A/KP5	N6CW, T.Baxter, 4639 Katherine Pl, La Mesa, Calif, 92041, USA.
VK4CJB	G3HCT, Brooklands, Ullenhall, Henley in Arden, Warwicks, B95 5NW.
VU7NRO	via VU2APR, NIAR, 5-B, P S Nagar, Hyderabad, 500457, AP, India.
ZD8RP	G0BNA, Box 32, Gainsborough, Lincs.
ZK1XI	SM7PKK, Wallenstrales v 54, S-69200 Kumla, Sweden.
ZK1SJ	via HB9CUW (see 3D2EW).
ZL7TZ	N Rio, Tuku Rd, Waitangi, Chatham Is, New Zealand.
3D2EW	HB9CUW, CE Wulz, CERN EP, CH-1211, Geneva 23, Switzerland.
6O1GG	I1MQP, P Ambrosi, Via A Stradella 13, I-20129, Milan, Italy.
7S3HK	via SM3CER, Lisataet 18, S-86300 Sundsbruk, Sweden.

Finally, if you are looking for a contact with **Jersey** the Guernsey ARS will be there on 6 and 7 May. Favoured frequencies will be around 3.765, 7.065, 14.265, 21.365, and 28.565MHz. The group will also use the WAB frequencies. CW operation will be 25kHz above band edges and callsigns will be GJ3HFN, GJ4NYT, GJ4GNS, and GJ0JCI. For further info contact Nigel Le Page, GU4NYT.

DX NEWS SHEET ZONES GUIDE

This is a list of the DXCC countries in each *CQ* zone and each ITU zone given in alphabetical order of prefix. A companion to the *DXNS Prefix List*, being a useful 15-page cross-reference to all the other prefixes and special prefixes used in each country. This is the latest *DXNS* publication. The other are the *Prefix-Country-Zone-List* (15 pages), the *DXCC Countries Guide* (11 pages), and the *USSR Oblasts Guide* (plus maps) (13 pages). They are updated regularly and each costs £1 (inland), US $3.00 or six IRCs by overseas airmail. A version printed on one side only of each sheet costs £2.25p or US $4.00. Geoff Watts may be contacted at 62 Belmore Rd, Norwich NR7 0PU (I can personally recommend these publications - G3FKM).

PROPAGATION

Smithy's report for this month goes as follows: "Solar activity continued to be very high in February and though the monthly average solar flux at 223 was a little lower than in January, the provisional monthly sunspot number moved up to 164.5. The cumulative effect of three very active months was very much in evidence, particularly in the second half of the month when the geomagnetic field settled down. Conditions on all the HF bands varied from good to excellent and even the 28MHz band was sometimes overcrowded, being open world-wide and with the North Atlantic path being usable for ten hours or more on many days.

"As seen in early March, Cycle 22 continues to be about two months ahead of 19 and to be gradually increasing its lead. It has been suggested that since it is an even numbered cycle it would be more appropriate to compare it with Cycle 18. If this is done, Cycle 22's lead is nine months and simple proportional scaling predicts a smoothed sunspot number of 280! The latest prediction from NGDC Boulder, based on data up to January, is for a most probable peak smoothed sunspot number of 195 early in 1990 with a 90% probability that it will be between 153 and 242.

"Readers should note that the solar flux values for Cycle 22 used in these contributions to *Radcom* are the provisional values broadcast on WWV and used in the Ursigrams since these are available daily and are what most amateur 'cycle-watchers' collect. The final figures are published by the Algonquin Radio Observatory in Ottawa during the following month and usually do not differ greatly from the provisional values. It is of interest, however, that the observed flux did twice exceed the 300 SFU mark in January - 301.5 on the 13th and 301.8 on the 16th - whereas the highest reported by WWV was 299 on the 16th."

1989 28MHz COUNTRIES TABLE

GOCKP	112(CW)
G4XAH	90(SSB)
G4YZQ	88
G4MUW	81(SSB)
G4OBK	70
G4DXW	69
G4NXG/M	67
G4SDK/M	54
GOJSM	41
G4SJG	29
GM4ELV	26

VHF/UHF

NORMAN FITCH G3FPK

There is no doubt about the main topic of this month's report - the phenomenal aurora which occurred on 13 March. It was so intense that many operators made very long-distance contacts on 430MHz, some of which are bound to have been 'firsts' between the various countries by this mode. Also, the

HF F-LAYER PROPAGATION PREDICTIONS FOR MAY 1989

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 colums.

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..	...11222231.	..1345555641	2135666667874	7666666666898	875333334689	6521....1367	32.....34
MALTA	.....1111..	...12233332.	1.1455666753	424777778886	878766667899	998543334689	885211112468	+52.....4+
GIBRALTAR	.....	.....1111..	...132333431	211355565763	755776667898	998654444689	886421112478	++3.....4+
ICELAND	.....	.....	.....11.	12222331	421245555776	876654444568	676321112346	443.....3
** ASIA								
OSAKA	.....1...	....11122.1.	...132234231	...132124562	....1...2573	.....35.	.....2.	.....
HONGKONG	...1121222..	...13333442.	1.1233345752	2...22125775	2.....2686	364	132	.....
BANGKOK	...22333331.	..1334445531	211234346763	41..12125886	5.....2688	2.....367	145	2
SINGAPORE	...123333331.	..1344445531	212234346874	411.22125887	5.....2688	3.....367	145	2
NEW DELHI	..1233333332.	.2344445541	222224346774	531..2125887	73.....2689	5.....368	2.....146	3
TEHERAN	..1344444421	113444556652	435432446886	66521.225898	973.....2689	84.....368	62.....146	3.....3
COLOMBO	..1344444431	112445556652	333324446886	6411.2225898	83.....2689	61.....368	3.....146	3
BAHRAIN	..2445555531	213555567764	546332347887	87511.125899	973.....2689	85.....368	62.....146	3.....3
CYPRUS	..1444555531	213666667753	546777778987	878766568899	997533235799	8842...12578	752.....257	42.....24
ADEN	212545666643	434655667876	766422347898	9872..125899	985.....2689	862.....378	63.....146	4.....3
** OCEANIA								
SUVA/S	.....	.....11..	....1111232.	..1221113541	..242...154.	...2.....31.	.....	.....
SUVA/L	4223.....64	54462.....86	346831...185	126731...473	..451....54.	..12.....31.	.....	.....
WELLINGTON/S	.....	....1111....	...12222..31	112332121152	.1441....1462	..22.....33.	.....1.	.....
WELLINGTON/L	4223.....14	5445.....36	66672.....67	567731...176	23652....464	..33.....241	.....1.	.....
SYDNEY/S	...1222.....	..133331....	1.25533321.2	112642123324	1..41....2565	...1.....362	.....13.	.....
SYDNEY/L	21.11.....3	42122.....25	533541....57	424741....77	1.262....285	...3.....262	.....3.	.....
PERTH	..13444.....	11256551....	32345442....	53134222111.	61..1....245.	3.....364	1.....145	2
HONOLULU	.....	.....1..	....1111221.	..112111331.	..332...12..	..32.....	.....	.....
** AFRICA								
SEYCHELLES	212545566443	4245556676 76	766423347898	9861.1125899	984.....2689	851.....378	63.....146	4.....3
MAURITIUS	2.2546666654	5.4656667877	837424346899	9572.2125899	985.....2689	862.....378	64.....146	4.....3
NAIROBI	322546677755	644655678877	877623347999	9984.1125899	9961....2689	884.....378	661.....146	43.....3
HARARE	421556777766	7437566788 88	986743446999	998611125899	9983....2689	886.....368	763.....146	43.....3
CAPETOWN	1..455777864	2..666678986	6..864346999	82.742124899	97.51...1689	8842.....368	763.....146	43.....3
LAGOS	531355777865	753565668987	986753336999	998731114899	99851...1689	8862.....368	763.....146	43.....3
ASCENSION Is	322.55567752	554266567884	887464335897	998652113899	99852....689	8862.....368	763.....36	44.....3
DAKAR	321254676764	643565566886	987764333899	9987521.1799	99852....489	8863.....168	763.....36	44.....3
LAS PALMAS	1..133454531	311355676764	644687777887	877887677899	998765444699	997532111478	87521....157	552.....24
** S. AMERICA								
Sth SHETLAND	677761	1667882	2446896	2....1114898	622.1...1589	8752.....367	663.....35	44.....2
FALKLAND Is	3....1576763	51...3667886	832..3446898	965212114789	99841...1579	8863.....257	663.....25	44.....2
R DE JANEIRO	321..4566763	543115666786	876434334698	998642111589	99852....279	8863.....48	663.....26	44.....3
BUENOS AIRES	3111.4566653	5333.5566775	8766.4344688	998712112489	99862....169	8863.....37	663.....15	44.....2
LIMA	1...11343442	311132454554	754453343357	976652121138	99862.....6	8863.....3	663.....1	33.....
BOGOTA	1...12233332	31.1243444454	643344332347	87555221.127	99852.....5	7863.....2	563.....	23.....
** N. AMERICA								
BARBADOS	1...13333342	311134444455	753454322367	9766531..148	99862.....27	8863.....4	663.....1	33.....
JAMAICA	1....1122222	2...12232343	632233332236	86444211..26	89752.....4	6863.....1	363.....	.3.....
BERMUDA	1....1111222	2....2232344	531123322256	86433211.137	89752.....16	7863.....3	463.....	.3.....
NEW YORK	1111	1....1112232	42...2222245	742212111136	78642.....4	5863.....1	263.....	.3.....
MEXICO	11111	1.....121222	42..11222223	6422211211 2	58642.....	3763.....	.43.....	.2.....
MONTREAL	11	1.....111122	41...1122245	6421111111136	78642.....15	5763.....2	253.....	.2.....
DENVER	.....	1	21.....1112	4311....11112	46541.....	1563.....	.23.....	.....
LOS ANGELES	.....	11	1.....11111	2211....12111	25531...1...	.452.....	.13.....	.....
VANCOUVER	.....	.....	1.....1	2111....1111	14431...1...	.352.....	..3.....	.....
FAIRBANKS	.....	.....	....1...1...	111121.11211	.2332...12..	..22.....	.....	.....

The provisional mean sunspot number for March 1989, issued by the Sunspot Index Data Centre, Brussels, was 164.5. The maximum daily sunspot number was 216 on 12 March, and the minimum was 127 on 5, 6 March. The predicted smoothed sunspot numbers for May, June, July and August are respectively: (classical method) 127, 171, 176, 182 and 184; (SIDC adjusted values) 165, 171, 178 and 186.

first G/VK QSO on 50MHz has been achieved. The only mail I have received has come from readers who listened to the GB2RS news broadcast on 19 March. The majority would not have known of the change of scribe until reading about it in the April issue. Unfortunately letters sent to G8VR have not been passed to me.

50MHz

There are recurring suggestions that only those stations running more power than our current licences allow can work the more exotic DX on 50MHz. It is likely that, if a North American station running a kilowatt to a 10-ele beam is only putting in an S3-4 signal, your 100W to a low dipole will be lost in his Rx noise. However, evidence is growing which suggests that whether or not you work long DX is more a matter of your being on the band at the right time to catch what may be a brief opening. Monitoring the liaison frequency of 28.885MHz is one way to make sure you are aware of what is happening globally, and one who does this for 14 hours a day is Ted Collins, G4UPS (DVN). Consequently he is a mine of information and produces very long and detailed reports of monthly activity. He offers beacon and DX lists free to any reader on receipt of an SASE, and reckons his beacon list is the most up to date available. The March issue contains over 100 entries and covers callsign, frequency, location, locator, ERP, antenna, mode and status notes. Ted's list of QSL addresses dated 3 March occupies nearly three pages and he lists the calls and locator squares of the 63 active OH operators. If anyone wants to join SMIRK, the US-based Six Metre International Radio Klub, Ted has application forms; membership is $6 per annum and well worth it.

Now a resume of general information - starting with the good news that 50MHz permits were issued to 24 Swedish stations at the beginning of March. They are shown in the table above.

Callsign	Locator
SM0HP	JO89
S2CEW	KP15
SM3MXR	JP81
SM6AEK	JO66
SM6ESG	JO67
SM7AED	JO65
SM7FWZ	JO77
SK0UX	JO99
SK2BF	KP05
SK3SN	JP81
SM6ASD	JO57
SM6CVL	JO57
SM7BAE	JO65
SM0CHH	JO89
SM2BYA	KP07
SM5DRV	JO77
SM6CKU	JO67
SM6DWF	JO57
SM7BKH	JO65
SM0MXR	JO89
SM2LTA	JP94
SM0DRV	JO89
SM6CMU	JO57
SM6PU	JO67
SM7FJE	JO65

MORE 50MHz NEWS:

TF6MM is now QRV on 50MHz with 25W/5-ele from IP24 (SY) - telephone +7 81663

OE6IWG, Walter, going to Greece 8 July to 26 August, call /SV, listening Es/tropo 144.300, Perseids QRV SSB random 144.200, him Tx first minute.

9Y4VU (Trinidad) has an FSK keyer on 50.725MHz and is crystal controlled on 50.110 and 50.400MHz.

TU2MA (Ivory Coast) is QRV with 10W and a 5-ele Yagi.

ZD7CW (St. Helena) is using an FT-620B and 3-ele Cushcraft Yagi.

HK0HEU was making a 3-ele beam so could be active by now using equipment previously used by HK0BKX.

J6LAH/8R1 has the new call 8R1AH (Guyana) from GJ06 square and should be QRV till the autumn.

PJ9EE (Bonaire Island) is active and reported to be running a beacon, PJ4B, on 50.015MHz.

In **Gabon**, the TR8s now have permits for two years and TR8CA (JJ40) reports that TR8BL and TR8RLA are licensed. From Zambia Z23JO had his first QSO on 12 February.

9H1B and **9H1GB** are two new stations in Malta.

TG9AWS is running 100W to a J-pole antenna and may be the only station active from Guatemala.

VK9NS is QRV from Norfolk Island and AH9AC from Wake Island, mainly at weekends, using 18W and a 3-ele quad antenna.

A Swan 250 transceiver is on its way to **VQ9SG** in Diego Garcia and the SMIRK folk are trying to supply FR5DN (Reunion Island) with a 50MHz module for his rig.

Next some operating news from G4UPS from mid-February to mid-March.

Ted had QSOs with TU2MA and G3GJQ/5N0 on 16 February; J52US and LU5EZT/MM (3N 27W) on 22 February; on 25 February VS6UP (OL72) at 0858 and JH4IUO at 0909, both G 'firsts' then JA4MBM, ZS6WB and ZS6BMS (KG44); from 1535 on 26 February W3JO, W2CNS (FN13) and N5JHV (DM62) in New Mexico; VE1YX (FN74) on 27 February. Coming to March, TR8CA on 4 March; on 5 March PA0AOT at 1132 via backscatter at QTE 160 degrees; ZS3E (JG89) at 1340. On 6 March there occurred the biggest solar flare so far in Cycle 22, designated 3B X15 (*see Charlie's piece on this amazing event elsewhere in these pages - Ed.*) There was an X-ray burst lasting 137 minutes and another one from 1405 to 2035, resulting in severe disruption to the LF and HF bands. There was more flare activity on 7 March when QSOs with ZS3AT, ZS6LN (KG46) and ZS3E were made. High solar activity continued, culminating in the aurora on 13 March. GM4DGT alerted a Scottish type event at 0800 and Ted heard strong Ar signals in Devon from 1415. He was active till close down at 2359 and worked into D, EI, F, G, GD, GI, GJ, GM, GW, PA and SM6PU (JP67) at 2305.

By a rather circuitous route I have received the March printout of *Daily Six News* generated by G4JCC. Most of the items duplicate what has been culled from G4UPS's input but I note that the following stations are reported active: from Sri Lanka, 4S7AVR, 4S7ET and 4S7NMR; from Chagos Island, VQ9QM and, from Indonesia, YB0ARA.

David Evans, G3OUF, lists QSOs in the 13 March aurora with PA3BFM, GJ4ICD, EI4CL, PA0ERA, GD3AHV, GM4SFW, GM3WYL, EI9BG, GM4IGS, PA0HIP and SM6PU on CW and with GI8YDZ on SSB. In the early hours of the 14th OH9NLO - near the arctic circle - was worked with RST599 reports both ways - no tone A at all. Signals faded in about three minutes.

Ela Martyr, G6HKM (ESX) now has 72 squares worked on the band - new ones being ZS6XJ (KG33), ZS4AAB (KG11) and K3MLD (FN10) on 26 February, ZS3AT on 7 March and ZS3E on 11 March. The March 13 aurora brought G4IFX (IO94), G7CMK (IO81), FC1CDS (IN77), G4IZQ (IO95), GI0GDP (IO74), PE1ADE (JO22) and OH7AXB (KP32). Finally ZS6WB on 20 March and ZS6XL (KG43) on 27 March. Best DX heard was LU8MBL (FF57) on 20 March.

John Fitzgerald, G8XTJ (BKS) worked J52US on 16 February using 10W to a dipole and got an S9 report; the J5 was looking for new stations only. In the aurora he heard all the countries on offer and worked G4WQL (CNL), GM4IGS (IO75), GJ6TMM, G1AHA (MSY) and G1JDP (DHM).

Ritchie Craib, GM1LKD (GRN) noticed the very high solar noise in the days prior to the big aurora, which just about swamped the signal from GB3RMK - usually received at S7-8. The visual display on 13 March was spectacular, covering 360 degrees with a hole overhead. This lasted for an hour from 2030 and (most unusually) the main part was south of Aberdeen. It did not matter where the beam was pointing - I suspect that was because the signals were coming down from such a high angle. There was some auroral-E propagation to Finland during the event and GM1LKD worked OH8MT (KP24) via this mode. This phenomenon should always be looked for during - and immediately after - intense auroras on the lower VHF bands.

Fen Wood, G0JFW (NLD) also heard OH1YAR at T9 and remarks on the random beam headings, eg, due west to work Cornwall and ESE to contact Fs and PAs. The aurora was so intense that I do not think it mattered where you were beaming; as long as you fired some RF into the ionosphere, it was bound to be scattered back. Also, the stronger signals might not have sounded anything like the distorted ones we are used to on 144MHz. This seems to be borne out by Fen's comment that "...almost all signals sounded tropo." G0JFW also queries what we refer to as Sporadic-E contacts on 50MHz. I agree that the mechanism is not necessarily the same as on 144MHz, when a common reflecting area can be deduced from an analysis of reports

subsequently received. Fen seems to be questioning whether the mode for long DX QSOs is multi-hop Es. Could the signals instead pass through a 'hole' in the E-layer to be propagated via the F-layer then back to Earth, maybe through another hole? Your comments please!

In a telephone conversation with G4UPS, I learned that the first G/VK contact was made between Tim Hugill, G4FJK (AVN) and VK6KWX at 0833 on 20 March; reports exchanged were 57/45. Congratulations to both operators. It seems the contact took place just as Tim was about to switch off to go to work: the moral of the story is "always take a last listen before closing down." Ted also mentioned that, in one amazing opening, P43AS worked 46 VKs - so they are going to make him a special award.

A new UK beacon started operating on March 21 on exactly 50.000MHz, callsign GB3BUX (IO93BF). I understand this is phase-locked to the signal from MSF in Rugby. According to G4UPS's latest Information Sheet it sends dashes for 50 seconds between callsigns. On 22 March it was copied by ZS6CE.

70MHz

Tony Collett, G4NBS (CBE) noticed the S9 solar noise on 12 March, so he was prepared for the aurora on the next day - which, for once, coincided with his day off. He worked EI9FK (IO63), GI4ONL (IO64), GW4HBK (IO81), GM3TAL (IO86) plus G6DER, G4IJM and G1YEM.

VHF/UHF Awards Manager Ian Cornes, G4OUT (SFD) is a keen CW operator but, outside of contests, seems to find activity rather low on the mode. Up till mid-March, this year's count of different stations worked was 10. Incidentally, I would welcome more reports on all kinds of 70MHz activity.

144MHz

This month's report is devoted almost entirely to auroral events since tropo propagation has been rather mediocre. The major solar flares on 6 March were bound to affect radio propagation drastically and we were all expecting an aurora on the 8 March; however, nothing significant happened on 144MHz for a whole week. Then at 1345 GMT on 13 March Eddi Ramm, DK3UZ, telephoned me to report an aurora in full swing. Unfortunately I could not get going till about 1630 and parked my antenna facing south due to the near-gale-force winds up on the North Downs. Even so, I was copying GMs at S9A, so it was clearly going to be a very rewarding few hours.

Ian McCabe, G0FYD (LNH) started at 1742 using 30W to a 15-ele Cushcraft Yagi, his first contact being with OL1BSY (JO70) on CW. During the evening he made CW QSOs with SP3BLR (JO72), SM5DCX (JO89), OK1OA (JO70) and Y24BO (JO62) plus EI and DL stations, all on the key. After midnight Ian worked four more OKs, YU3ES (JN65), I1DMP (JN35) and hopefully HG0HO (KN07) whose CW and operating procedure were rather poor. He heard many more stations in other countries but soon realised he had insufficient ERP to compete in the big pile-ups. QTEs varied from 40-90 degrees. In another aurora on 19 March he worked GM4IPK/P (IP90) when Andy was at the GB3LER beacon site.

G4NBS spent most of the time on CW and worked a couple of EIs in IO51 around 1700 and SP8AOV (KO11) at 1730. Tony found the evening session to be extremely hard work due to the high activity, his only QSOs before midnight being with OK2KZR/P (JN89), YU3ES and OK1OA. Several YUs were heard but every time a Belgian station would start a CQ call on top, presumably not being able to hear the YUs. At 0030 on 14 March he found a spot to call CQ and I4XCC (JN63) answered: during the next two hours he made 24 contacts with best DX YU1EV (KN04) at 0100, a QRB of 1714km. QTE was 70-80 degrees. From time to time later in the day he heard weak DLs and OZs.

G4OUT kept to CW and was rewarded by QSOs with DL, EI, F, G, GM, HG, I, OE, OK, ON, PA, SP and Y stations. HG, I, OE and SP were new countries. Ian got a dozen new squares, although I think the "SP8AO" he listed was really SP8AOV (KO11GG). Ian worked HG0HO and SP9CSQ (JN99) at 0145 on 14 March.

Derek Austin, G4BLX, (SXW) uses an IC-251E with MuTek front-end, a 200W PA and two 17-ele. Yagis, the top one at 45ft. His QTH is 350ft ASL and badly screened to the east, through south to the west. He operated in the March 13/14 aurora, using 100W of CW, beaming 60 to 70 deg. and worked 18 new squares in just under four hours. From his long list the best DX included SP2HHX (JO94), UB5BAE, UB5YAR and UO5OX (KN46KW) at 2149km, YU7AU (KN04HU), YO2IS, HG8CE and HG5KF (JN97ML).

Ross Neilson, G4ZNZ, (YSN) uses an FT-726R and 100W PA with a 14-ele. MET Yagi and got on the band at 2222 on March 13. On CW he worked ten countries with best DX including SP4MPB, SP8AOV, SP5CCC, OK2KJ/P and SM5MIX (JO78) after which he closed down at 0230. The late evening aurora on the 14th saw CW contacts with GM3WAT, LA3OJ (JO59), SM6CYZ (JO66) and OZ1FGP (JO46).

Andy Cook, G4PIQ (ESX) uses an FT-901DM and transverter with a BF981 front end; the PA uses a pair of 4CX250Bs and the antenna is a 14-ele NBS Yagi at 35ft. He sent a photocopy of his log for the event and made about 170 QSOs. Andy got on the band at 1705, found a clear spot and put out a CQ, to be greeted by "..a barrage of noise." He seems to have worked most of what was on offer. QTEs were 45 degrees for SP, UP and Y; 65 degrees for OK1, southern DL and northern UB; 75 degrees for OK2/3 and southern UB and 85 degrees for HG, I and YU. At 2147 Andy worked DK7ZH (JO40) who peaked at 120 degrees. Very little was heard from northern Europe in the main part of the event, and RQ2GAG (KO26) was no stronger than in the more average auroras. Around midnight SM5DCX was very loud from due north. Andy worked all Polish call areas except SP8, and SP1HGU (JO74) and SP3CEQ (JO82) are worthy of note. Ukranian stations worked were UB5YAR (KN28), UB5BAE and UB5BDC (KN29), RB5PA (KO21) and UB5KY (KO31). Other Russian QSOs were RC2AA and UC2AAB (KO33) and UP1BWR (KO04).

G6HKM took part in the Derby Club's contest on March 12 and made more QSOs than in the 1988 event. However Ela found the conditions very poor with very high solar noise, but the aurora the next day made up for all that. The cream from the log were worked between midnight and 0230 on the 14th and her SSB CQ calls were answered by I1DMP, F6EPE (JN23), IK4ISR and IW4BFF (JN54), OK1FDJ (JO60), IK2FIV (JN45), IV3BBR (JN65), YU3JY (JN75), OE6DGG (JN87), SP9MQU and SP9EWO (JO80), SP7OGR (KO01) and HG8CE (KN06).

John Nelson, GW4FRX (PWS) has an excellent QTH for working stations in auroras and has taken extreme care to optimise his four 18-ele Cushcraft antenna array. Although it has a very sharp and clean pattern, such was the activity in the March 13/14 event that he said he wished it was even sharper! He was able to identify several different reflecting regions, enabling him to work stations whose signals would otherwise have been swamped. In a subsequent inquest, John was pleased when I reported his auroral signal at G3FPK was nowhere near as loud as some of the other stations in his area running similar power but single Yagis. He mentions three distinct reflecting areas; 10 degrees for locals, GI and GM; 60-70 degrees for the HGs, SPs and some DLs and about 85 degrees for the Is and YUs. Very high winds prevented John from rotating the antenna till early evening and he opened his innings at 1819. Best southerly DX was I4XCC; to the southeast it was YO2IS (KN05) and sundry YUs, and to the east there were SPs in KO03 and KO11. He switched off at 0300 when the OKs and Is were still S9. In summary John wrote "... I never thought the day would come when I would be on the wrong end of a 45-minute auroral pile-up from SP, HG, YU and OK. Times like that make all the hard work of getting a reasonable station together worthwhile."

GW4FRX also reports on another aurora discovered at 1420 on 19 March, mostly with loud GMs at QTE 10 degrees and some Scandinavians at 20-30 degrees He worked DL, LA, OZ, and SM5CBN (JO78) was best DX. He mentions that GM4IPK/P (IP90JD) made 122 QSOs using an IC-251E, a 100W BNOS amplifier and the 3-ele GB3LER antenna: best DX was SM2. By 1656, Andy was the only signal still audible at GW4FRX - then at 1711 he vanished abruptly.

Without doubt, this was the most intense aurora I have heard in the 20 years I have lived in South London. I have tape-recordings of good auroras as heard in northern Scotland and this one sounded just like those! It was nigh-on impossible to find a clear spot on which to call CQ, so I spent my time on CW calling others. It was tough going until around midnight, after which I worked some YU and I stations well above 144.150MHz. Most of the time I beamed at around 70 degrees and found three new squares thanks to SP8AOV, SP5CCC (KO02) and OK2BXE (JN89). I went to bed at 0200. At 2247 on the 14th, in another 'normal' aurora, I contacted GM3WTA (GRN), who described the visual event in detail. In a QSO on 14MHz with ZL4AK, Bill told me that the Aurora Australis was visible in Auckland, New Zealand - which is at about latitude 37 south. I also contacted Laurence Howell, GM4DMA/VE8, on Ward Hunt Island on the 15th and he said they had suffered a complete radio blackout for five days due to total D-layer absorption.

430MHz

Several readers used 430MHz in the 13/14 March aurora and the QSO

list of John Quarmby, G3XDY (SFK) reads more like a 144MHz Sporadic-E report. He started at 0012 on the 14th and contacted the following: DF5LQ (JO44), DL7APV (JO62), HB9BZA (JN36), OK1GW (JO70), I4LCK (JN54), YO2IS (KN05) - his best DX of 1619km - DL7QY (JN59), HG8ET (KN06), HG2RD (JN87), DJ5BV (JO30), OK3YCM (JN98), SP9HWY (JO90), YU3ZO (JN86), OK3PV (JN88), YT4AM (JN84), OK3LQ (JN88), DL6WU (JN49) and DL5MCO (JN58). HG, I, YO and YU were new countries and the QTE was 75 degrees.

G4NBS came on the band at 1740 on 13 March and worked G8KBQ (IO81) on SSB, then on CW Tony contacted PA3DZL and PA3AEF (JO21), DK5AI (JO51), DJ9BV and DJ9RX (JO42), GW0HOL (IO81) and PA0WWM (JO22), finishing at 1815.

Dave Dibley, G4RGK, (BKS) spent a good deal of time on the band in the big aurora but reckons it really livened up in the early hours of the 14th. In half an hour from 0130 he worked DK5AI, HG2RD, DL6WU, OK3DV, HB9BZA and - best DX - YO2IS at 1735km. I wonder if OK3PV and OK3DV were both on, though?

G6HKM operated in the contest on 5 March and worked into HB9. Ela made her first auroral contacts on 13 March with G8KBQ (SOM) and PE1GHG (JO21) but found it very difficult to copy the SSB. This is not surprising as the Doppler shift will be three times that on 144MHz - a point to remember when using CW with a narrow IF filter.

1.3GHz

As you will have read in the April issue, it is Mike Dixon's intention to report activity on 1.3 and 2.3GHz but input has been low this month. During his auroral QSO with DJ5BV on 14 March, G3XDY attempted one on 1.3GHz with nothing heard. John concluded that there was no auroral propagation on the band as there were no radar signals audible.

G6HKM wrote, "No contacts at all on this band during the last month - where has everybody got to?" Here again, we would welcome your reports of any activity on these two bands.

REPEATER NOTES

I have received the Spring edition of *Talkthrough*, the news letter of the UK FM Group (Western). It was edited by Frank Charnley, GW6LSO, who is to be congratulated on compiling such an interesting magazine at his first attempt. It features a lively correspondence column and several contributions ranging from "Fifty-nine Years in Amateur Radio" by G2AMV, through Raynet activities to "Nuclear Power in Peace." Naturally information on the Group's fifteen repeaters is included but I suggest a Contents page would improve it. The annual subscription is £4.00. Details from PO Box 73, Crewe, Cheshire, CW1 1GB.

TABLES

As I outlined in the introductory piece last month, this feature will include a couple of tables. We should be operating normally by next month so I hope you will send in your claims, based on unconfirmed contacts. I have prepared a sheet of notes for anyone who is not quite sure of the rules; if you would like a copy please send me an SASE.

DEADLINES

The new production methods for RadCom will enable us to reduce the lead time substantially. By using electronic mail, as soon as copy is completed and checked it can be on the Editor's monitor screen within the hour. I will include deadline dates by which I would like to receive your letters; the next two are May 19 and June 23, so please note them in your diaries.

My address is correct in any Call Book since 1970 and is also on the Contents page.

For those with E-mail facilities, my Telecom Gold Mailbox number is 76:MSX022.

SWL

BOB TREACHER BRS32525

LISTENER REPORTS

Two reports from regular contributors David Whitaker and Robert Small adequately sum up the fine conditions we experienced in February and early March.

Robert, BRS8841, reported a wide range of DX on all bands with some new countries to report. DY9JD and A92BE as new on 1.8MHz, while 3.5MHz gave C56/G3SXW. Digging around 7MHz provided KC6MHz as the best catch, but some strong signals had been heard from the Far East, especially JA in the evening. FH4EF was also new, and HL9TF, J80A, and VU7NRO/JOS (Laccadives) gave worthwhile loggings. As always, Robert had spent much time on 14MHz, courtesy of his Dad's (G3ALI) beam. The Russian trip to Vietnam — 3W0A — had been gratefully put in the log. Otherwise, DL5UF/KH8, 9M2OR/P, P29VOX and 601GG were highlights. Nothing new to report on 21MHz, but some good DX had been logged, including JA7FTJ/JD1 (Minami Torishima), JG2CLS/JD1 (Ogasawara), FG5/KA3DSW, DF9RB/DU1, 4F6PC (Phillipines), and VK9LA (Lord Howe VU7APR/BL and KX6DS logged for new ones. Other interesting calls heard were XX9MD, KC4EVE/HP1X (Coiba Is), YI0ACC, YJ8JS, HK5JPS/HK0, and KP2A's expedition to Desecheo Is.

David, BRS25429, listened to the CQ 160 Contest, but conditions were poor. He also listened to the ARRL Contest and thought conditions were a bit of a mixture whilst on the Saturday the LF bands were better than HF, 3.5MHz DX included J80A, XE2FU, 8P6SH, VP5T, PJ9JT and V31C. 7MHz gave David J6LSN, P40V, FG5/KAA3DSW and ZF2MV and 28MHz was buzzing at times with 100 countries being heard during that weekend.

It was good to hear from Martin Parry, BRS52543, again who had been hospitalised for a while. However, his convalescence has meant a very healthy 1989 score and also caught the OY and A9 on 1.8MHz to give him two new countries. On 7 and 3.5MHz he had caught much the same as I've already mentioned, but 28MHHz came up with KH0AC, and ZF, TL8, 3X, T2, XX, VS6, YJB and J2 to take him to 124 countries on the band so far this year.

Reports from other SWLS include Albert Tideswell, BRS48462, who logged HL1IUA, AP2KS, VK6HD and KC6SI (No. 279) on 3.5MHz. Brad Bradbury BRS1066, had not been too active, but nevertheless managed ZY0FX on both 21 and 28MHz, N3JT/HK0 on 21MHz, 9G/JA9IDS on 14MHz and ZD8JP on LF. Colin Watson BRS46598, had a busy month with FP5DX, JH1ROJ/VP2, HB9BAG/XE on 3.5MHz, and an assortment of DX on 14MHz.

THE WARC BANDS

A few listeners have been taking a look at these bands, especially 18 and 24MHz and the former band was particularly caught David Whitaker's attention. He has heard all States in W1, 2, 3, 4, 8 and 9, but has not heard any W5's and the W0's are quite scarce. One W6 and 7 have been heard, together with two KL7's and KH6. Thirty-eight countries were heard in February, with the best DX coming from 3DA0AH, WL7IB, VE7AHI, TG9VT, NH6JC, HZ1AB, P29ZL, EL2E, VE8ID, 6W7OG and 3X1SG. Colin Watson had also listened on the band, logging Europeans.

At this QTH, 24MHz had provided AL7I, TA2AP and 3X1SG to take the heard total to thirty-three. On 18MHz, FM5CW, PT7BZ, VK3HW, KP4YD and KV4AD took the final tally to fourteen.

DX NEWS

Readers might care to note that a few expeditions are due to hit the bands in May. N1CIX will be in Aruba signing P40P from 8-18th. The 1st Natal DX Group will be mounting a major bash from St Peter and Paul Rocks, signing ZY0SS on SSSR using the usual frequencies and ZY0SW on CW, 25kHz from the band edge. Revilla Gigedo should also be on for ten days during the first two weeks of May, signing XF4T on CW, they again expect to use 25kHz up, while SSB frequencies should be 1.830, 3.795, 7.050, 14.250, 21.300 and 28.500MHz. They will also be on 30 and

HF SWL TABLE 1988

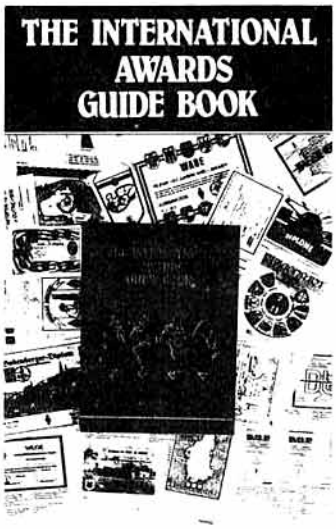
Not too many scores so far, but the year is still young

Station	DXCC	28	21	14	7	3.5	1.8	Total
BRS25429	211	133	126	148	139	101	33	680
BRS52543	211	124	133	156	128	100	33	674
BRS8841	196	119	98	120	117	88	43	585
BRS1066	110	58	53	66	74	35	37	323
BRS32515	147	113	—	76	—	—	23	212
BRS91244	59	24	17	35	12	9	—	156
BRS20249	72	33	40	36	17	17	7	150

ALL THE TIME HF COUNTRIES LIST

It is a long time since this list has been published. It now only includes scores set in the last six months. Therefore if you have a score for the table, please submit it as soon as you can.

Station	DXC/	28	21	14	7	3.5	1.8	Total
BRS25429	345	290	320	341	280	255	129	1615
BRS32525	329	278	309	325	278	274	120	1584
BRS8841	325	267	303	313	267	250	93	1493
BRS52543	293	212	246	268	217	198	107	1248
BRS1066	301	201	225	278	194	136	95	1129
ORS45992	306	233	269	291	172	140	19	1124



The International Awards Guide Book is a 422 page book which describes more than 750 awards with 634 in full colour, from 70 DXCC countries. It is available from YB0WR, M S Lumban Gaol, J1 Garuda NMo.62, Jakarta 10620, Indonesia. Price is 22 US dollars. Payment only accepted in US dollars by notes, bankdrafts, or International Money Order.

50MHz. The following will be RT soon, so look for them now: J52US, 9X5AA, TN4NW (and 9Q5NW), and TL8TG; C9MKT is reported to be active on certain weekends this year, the May dates being 12-14th.

How many readers work a station in Antarctica and spend the time until the QSL card arrives wondering which country the station counts for because the prefixes used on Antarctica vary so much. Some recent ones include AT0, CE9, CX0, DP0, EA0, FT4W, Z, HL5, KC4, LU/Z, QR4, VK0, VP8, Y88, ZL5, ZS8, 3Y, 4K, and 8J. With thanks to *Inside DX* let us have a quick look to see who is where.

Antarctic Mainland — KC4USV, KC4AAA, KC4AAC are the most active US based stations.
VP8BUY is at Halley's Base (via G4GCK). ZL5BA is at Ross Base. Y88POL is at Volker Base.
Falklands — VP8BUO is currently the most active.
South Georgia — VP8BRR and VP8BUB were on from here, but may be QRT as you read this.
South Sandwich — No activity.
South Shetlands — Not very rare now as there has been much activity from 4K1F, ED0MA, HL5BDS, LU1ZC and CE3EVG/CE.
South Orkney — No activity.
Marion Island — ZS8MI should have started activity from here last month. He should be there for some time with decent antennas.
French Austral Territories — FT4ZE is on Amsterdam Island and is the most active.
Bouvet Island — No activity.
Peter 1st Island — No activity.
Macquarie Island — VK0AK, DS and GC should be more active now.
Heard Island — No activity.

Now for something different, G4VJK was having difficulty obtaining a card from Nepal. He had sent twelve IRCs and dollar bills to 9N1RN, 9N1MC and AP2SK/9N1 without success. If anyone can help, please drop John a line. If anyone needs IRCs, I am advised by G4VJK that GU0ELF might be able to help — 13 for £5. Any profits go to "Children in Need".

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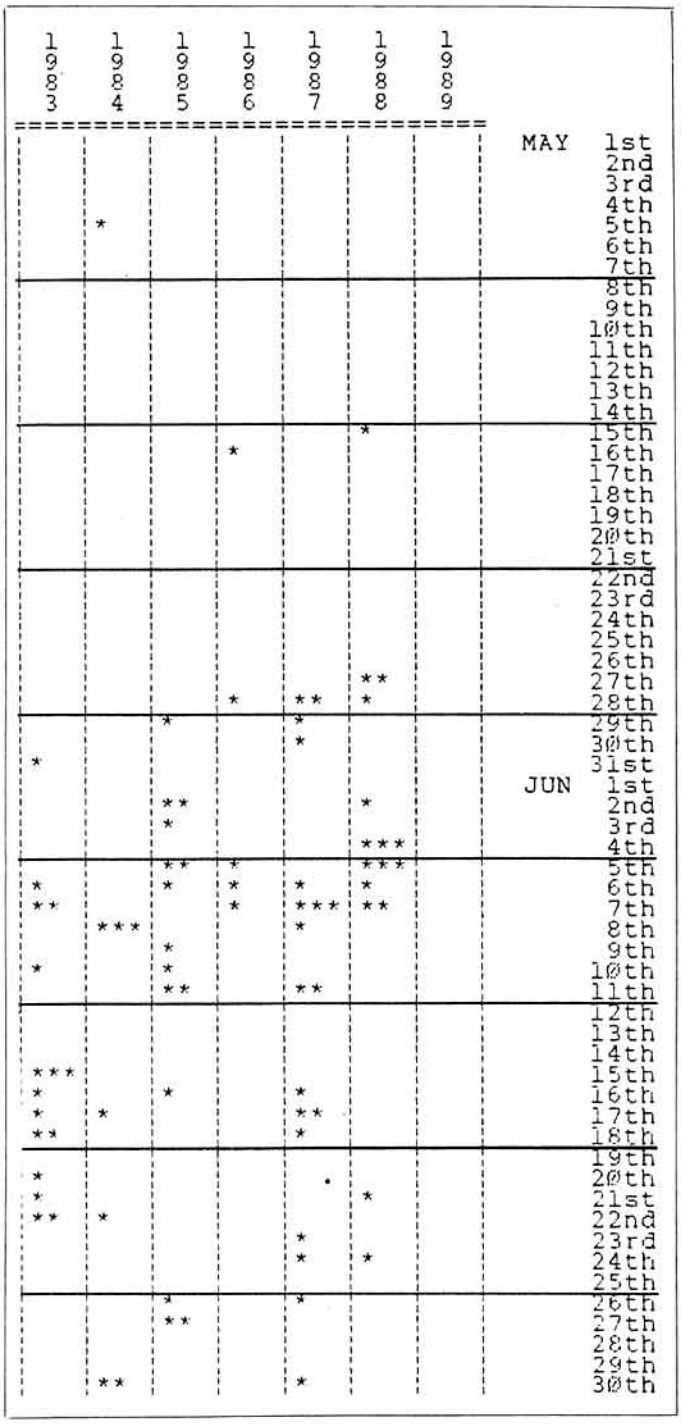
VHF HAPPENINGS

Until 13 March, this heading would have been devoid of any comment. However, the Aurora that evening changed all that! Having been alerted by G4DFI, the event was not discovered until 2245 at my QTH, when 144MHz was crowded with Auroral signals from DL. Stations in deepest Germany were heard at 59 here and SP9EWO (JO90) was heard at 2303. A QSY to 50MHz paid dividends with a number of firsts and new squares. PA0JOP, PA3AOT and PA0RDY were the first stations on SSB from Holland with OH1AYQ (KP12) and OH7AXB (KP32) being heard by Auroral-E. The first SM -7BAE was heard from JO65, while G1MEJ provided IO84 for the first time. A rather late QSY back to 144MHz at 0130 gave OE6DGG (JN87), HG8CE (KG), SP5ATS and SP5MBT (both KO02), Finally, I1CPN (rare JN34) was heard at 0210. This was by far the best Ar ever heard here, and it will be interesting to read what other DX was worked. G3SXE (Worthing) reported hearing GM4AFF and OZ1FG in a repeat aurora on 14 March around 2250.



144MHz Es matrix prepared by Mick Toms BRS31976 showing openings over the last 6 years.

Just a few words about 50MHz F2 propagation. Between mid-February and early March, G3GJQ/5N0, J52US, ZS6BTL and ZS3E had been heard at this QTH. Martin Parry is now active on the band, and had heard GM3WOJ and VE1BPY on a homebrew ZL antenna. He hoped to have a pre-amp before the real Es season started in ernest.

Lastly, readers might find the table, prepared by Mick Toms BRS31976, on Es happenings over the last few years of use in planning which days to take as annual leave in June and July. This appeared last year, but has been updated to include 1988 Es openings. Part II will appear next month.

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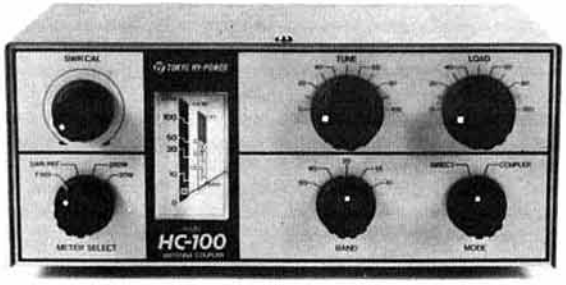

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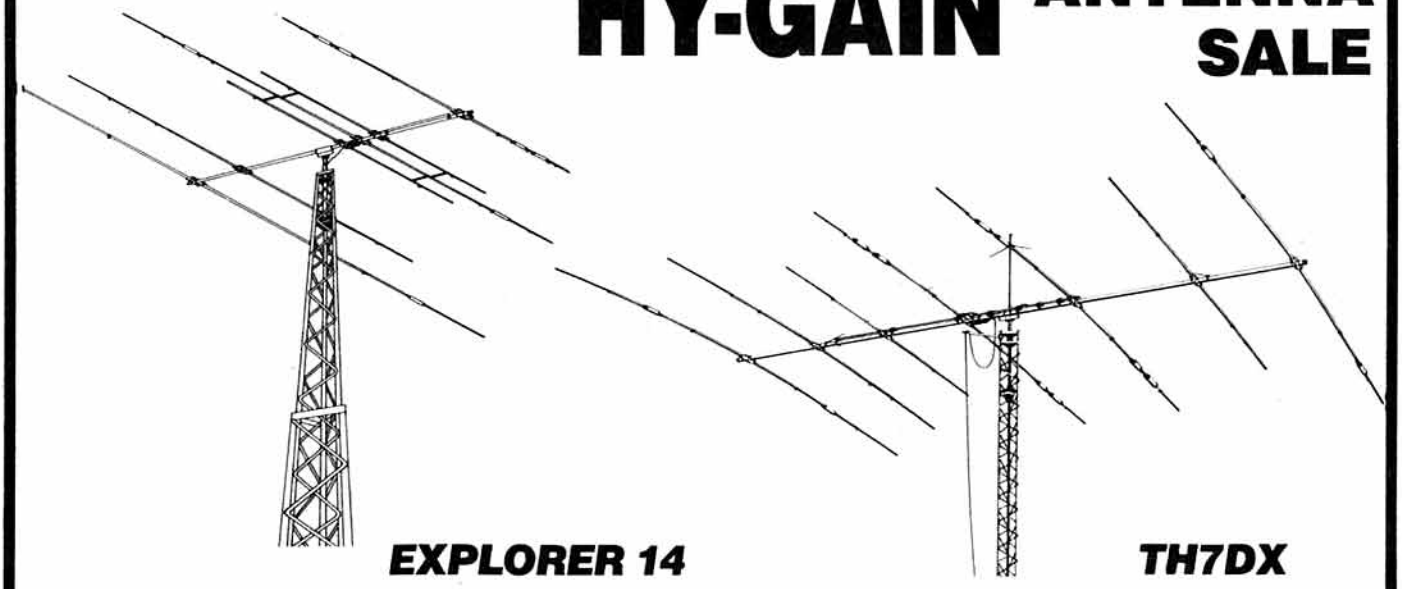

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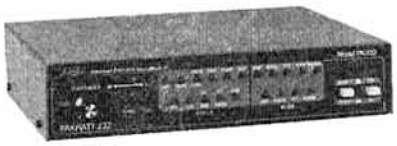

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TECHNICAL TOPICS

PAT HAWKER G3VA

PHANTOM TRANSMISSIONS

It has sometimes been observed that as soon as your neighbours realise that you operate a transmitter every subsequent disturbance to their television or radio reception, whether or not you were at home, is laid at your door. An unusual example of such 'phantom' transmissions was in evidence on BBC and ITN News Bulletins following the recent sentencing of 'Erwin van Haarlem' to 10 years imprisonment for 'Acts preparatory to the commission of an offence under Section 1 of the Official Secrets Act.' Evidence was given that he had been working for over 13 years as an agent of SFGF, the Czech Secret Service and had been arrested while *receiving* morse transmissions from Prague.

Statements made in open court indicated that over the years more than 200 such messages had been sent to him, enciphered on one-time pads. But it was clear that these messages had been sent 'broadcast' and when arrested he was using a standard all-band broadcast-type receiver. Although part of the trial was held in camera, there seems to have been no evidence that he had used a *transmitter*.

It is evident that two-way clandestine radio contacts are not a common feature of peacetime espionage in European countries: outgoing reports are normally conveyed by less-detectable methods.

Yet the television bulletins featured an interview with neighbours who were convinced that 'Van Haarlem' had been regularly using a transmitter that had been interfering with their television reception, and cameras were focused almost accusingly on broadcast-receiving antennas. The neighbours even claimed to have recognised the interference as morse code. Perhaps the answer to such TVI is to fit 'phantom' filters!

For those experiencing 'real' EMC problems, often in the form of interference *from* digital appliances, a massive amount of technical information is becoming available now that this topic figures high on the list of professional investigations and research projects.

In 'Modelling the electromagnetic radiation from electrically small table top products' by Todd H Hubing and J Frank Kaufman (*IEEE Trans on EMC*, February 1989) it is concluded that: "Electrical small circuits are very inefficient sources of radiation. When these circuits are operating in the vicinity of relatively long power or signal cables, the currents induced on the cables are generally the primary sources of electromagnetic radiation. This is true even when the circuit has been isolated from the cables with ferrites, filters, transformers or metal plates." In effect mains-borne interference is not necessarily overcome solely by installing effective filtering at the input to the appliance. The leads beyond the filter act as a receiving antenna and can re-inject RFI into the mains or act as radiating elements.

The IEEE paper illustrates the importance of the environment of the source in determining the overall radiation. This implies that one needs to know how small radiation sources interact with relatively large metallic objects or wires in their neighbourhood. Surprisingly, it is shown that in some circumstances radiation can be significantly higher from a shielded circuit than from an unshielded one. Perhaps not so surprising when one recalls how a transmitter cabinet can become 'hot' to RF, particularly when used in an upstairs shack.

Another paper in the same issue of the *IEEE Trans* 'Shielding effectiveness of "pigtail" connections' by Hassan A N Hejase *et al* (Syracuse University) provides another look at a problem that was highlighted in the item 'Minimising RFI from digital equipment' (*TT*, April 1988, pp266-7) where it was shown that the inductance of a 'drain-wire' (pigtail) connection in a poor 'cable-boot as in **Fig 2** can cause appreciable RF noise to appear on the outside of a screened cable. The IEEE paper provides a detailed analysis, based on the method of moments, of the effectiveness of various forms of pigtail connections at various frequencies. The type and length of pigtail connection is shown to be crucial, although the pigtail itself does not radiate significantly. It is shown that not all pigtails are equal, even when electrically short in terms of wavelength: "A short pigtail is significantly better than a longer one ... multiple pigtails yield significant improvement over the single pigtails; the difference in shielding effectiveness may be 10dB or more ... Different load impedances lead to different input parameters and may cause appreciable changes in shielding effectiveness, especially at frequencies close to resonance." A practical example of the importance of earthing connections of minimum RF resistance was described in the November 1988 *TT* item '50MHz VCRI — a case history' stemming from Jerry Sanderson, G2DBT, **Tables 1-3** provide useful information when tackling EMC problems.

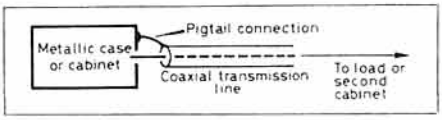


Fig 2. A poorly 'booted' shielded cable with a long 'pigtail' connection results in RF radiation from the outer braid of the co-axial cable or conversely reduces the immunity of the shielded equipment: for more detailed explanation see *TT*, April 1988.

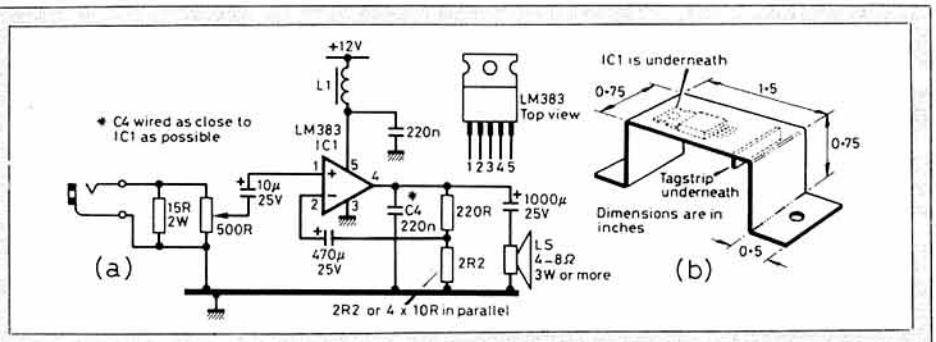


Fig 1. K8KWD's external one-Watt audio amplifier for use with handheld transceivers etc in noisy environments.

BEEFING UP HANDHELD AUDIO

The use of 'handheld' transceivers in vehicles or in noisy environments where an additional power source is available is by no means uncommon, although it should be recognised that if actually held in the hand by the driver of a moving vehicle this practice goes against the recommendations of the current Highway Code. An article 'A speaker amplifier for handheld transceivers' by Leonard Van Prooyen, K8KWD (*QST*, January 1989, pp20-22) is introduced as follows: "Does background noise make it difficult for you to hear your handheld talking to you? By spending a couple of enjoyable hours at the workbench, you can build this external amplifier unit **(Fig 1)** to boost your transceiver's audio output.

L1 is a choke used when the amplifier is powered from a 12V vehicle supply to eliminate alternator whine. While K8KWD suggests that suitable chokes can be salvaged from some broadcast car radios, he notes that one can also be made from two '8d' 1½-in nails wound with about 100 turns of 18g enamelled wire secured at the ends by a layer of electrical tape. The LM383 requires a heat sink which in K8KWD's design takes the form of U-shaped aluminium strip (Fig 1(b)) which is also used to hold a tag strip. If power is drawn from the vehicle electrics make sure that the lead is suitably fused close to the source.

While the LM383 is readily available, it seems appropriate to note that Philips Components have recently claimed to be first on the market with two audio ICs that require no external components, apart from decoupling components, to form a 1W mono (TDA7052) or 2 x 1W stereo class B high quality audio power amplifiers. Featuring 'bridge-tied load (BTL) configurations', the new ICs can be used over an unusually wide operating voltage range (3-15V). The mono TDA7052 has a typical quiescent current of only 4mA, a closed-loop voltage gain of about 40dB, low total harmonic distortion (typically 0·2%) and an output protected against short circuits. The announcement adds: "Both ICs have a high supply ripple rejection of 40dB (typical) between 100Hz and 10kHz and produce no switch-on or switch-off clicks". This new device would thus seem useful both for an add-on amplifier for handhelds etc and also for a receiver output stage. The stereo chip (two mono units on the same chip) could also be of interest to anyone experimenting with pseudo-stereo or binaural reception (see *TT*, February 1989).

Table 1. Noise-immunity level (NIL) and noise margins for some popular logic families

Logic family[1]	NIL, mV	Nominal voltage swing, V	Noise margin,[2] dB
CMOS	1000	5	14
CMOS-HS	1000	5	14
LS-TTL	300	3	20
S-TTL	300	3	20
LP-TTL	400	3	18
TTL	400	3	18
ECL-10k	100	0·8	18
ECL-100k	100	0·8	18

Source: Vendors' data sheets and catalogues
1. Legend: CMOS — complementary metal-oxide silicon; CMOS-HS — high-speed CMOS; LS-TTL — low-power Schottky transistor-transistor logic; S-TTL — Schottky transistor-transitor logic; LP-TTL — low-power TTL; ECL — emitter-coupled logic; 10k — medium-speed version; 100k — high-speed version
2. Ratio of voltage swing to noise immunity level, expressed in decibels

Table 2. Relative radiation levels for some popular logic families

Logic family	Typical gate current, mA	Typical bandwidth, MHz	Relative radiation level,[1] dB
CMOS	0·1	3	-10
CMOS-HS	0·1	30	10
LS-TTL	8	40	50
S-TTL	30	120	71
LP-TTL	8	21	45
TTL	16	32	54
ECL-10k	1	160	44
ECL-100k	1	420	52

Source: Vendors' data sheets and catalogues
1. Relative radiation in terms of the product of gate current and bandwidth, expressed in decibels with respect to 1 milliampere megahertz

Table 3. Effectiveness of shielding materials

Shielding material	Surface resistance,[1] ohms/square	Shielding effectiveness, dB At 10MHz	At 100MHz	At 1GHz
Silver acrylic paint	0·004	67	93	97
Silver epoxy paint	0·1	59	81	87
Silver deposition	0·05	57	82	89
Nickel composite	3.0	35	47	57
Carbon composite	10·0	27	35	41
Arc-sprayed zinc	0·002	106	92	98
Wire screen (0·64-mm grid)	NA	86	68	48

Source: Vendors' data sheets and catalogues
1. For 25-micrometre thickness and for frequencies for which the largest dimension of the shielding plate is less than a quarter of a wavelength

(Source of Tables 1-3 'Taming EMI in Microprocessor Systems' by White, Atkinson, Osburn in *IEEE Spectrum*, December 1985)

RUSTY-BOLT TVI

Although it is almost always possible to filter out harmonic and other spurious content from a transmitter sufficiently to prevent TVI/BCI, there remains the possibility of problems being caused by the so-called 'rusty-bolt effect'. It has long been known that a non-linear junction can be created by rusty metal contacts and that these can generate harmonics from induced RF currents, by acting as diode mixers and rectifiers. This problem is particularly important at professional mobile base stations, where a single mast may support the antennas of half-a-dozen transmitters. In such circumstances rusty-bolt rectification can result in the generation of hundreds of intermodulation products which seriously affect local reception.

A research project a few years ago at City University, London supported by the Science & Engineering Research Council and the Home Office, then the Radio Regulatory authority, sought to provide a practical engineering solution to the suppression of such structural intermodulation interferences ('Intermodulation interference in radio systems' by P S W Ho *et al*, AGARD-CPP-420, NATO).

As background, this report noted that intermodulation interference (IMI) can be divided into two types: "First, those due to active devices in the communication systems, such as the non-linearity of the power amplifiers where common antennas are employed, and overloading the receiver front-end. The second type is due to the passive components and these include cables, feeders, aerials and supporting structures. Effective methods have been found to solve the problems of the active type by careful shielding of equipments, using filters in the transmitter outputs and receiver inputs. However, the passive type is a much more intractable problem, and once generated cannot be removed by filtering."

The City University team noted: "There are two major causes for the generation of passive IM products, namely non-linear junction effect and B/H non-linearity which is inherent in any ferromagnetic material. Earlier investigations into ferromagnetic materials have shown that nickel-plated RF connectors can cause a high level of IMI and should be avoided for coaxial cables carrying large RF currents in systems susceptible to IMI. Steel masts can also cause problems. But the B/H non-linearity of bulk ferromagnetic materials is much less important than the non-linear junction effect, ie the rusty-bolt effect."

The most effective way of overcoming rusty-bolt IMI problems appears to be to offer an alternative high-conductivity path to RF, by-passing the non-linear junction once this has been located, but this is not always an easy task as noted later. The amateur situation, where it is unusual for several transmitters to be operating simultaneously at the same site, is less commonly affected than with shared mobile base antenna towers. Nevertheless, a 'rusty-bolt' generates harmonics from a single transmission and it is not uncommon for this to give rise to TVI etc.

In describing experimental results using a test cell in which deliberately corrroded metal junctions were fed with two 50-watt signals working into a dummy load (f_1 155·2125MHz, f_2 152·0875MHz, f_{im} 148·9625MHz, ie 2 x 152·0875 = 304·1750 - 155·2125 = 148·9625) the City University report states:

"Joint samples, in a test cell, were made and were corroded for IM measurements. By doing this we were able to convince ourselves that the rusty joint is a first order effect in IM generation, although the ferromagnetic effects of steel are still important... For a new antenna tower, the structural elements are galvanised. However, the joints between structure elements could lose their initial protection during construction of the tower, and suffer more rapid deterioration giving rise to corrosion due to fretting at the joint. Moreover, a joint will tend to be a moisture trap. Corrosion at these joints can probably be assumed to be the major source of intermodulation. Our approach to solve the IM problem is to offer an alternative high conductivity path to RF current. An initial experiment involved the covering of a corroded cylindrical steel sample with zinc coating (by electroplating)... the IM level was (then) very close to the system floor level... The problem now is to develop a practical way to carry out the metallic coating of the joints. Methods being considered are metal spraying and electroless plating... It was found that metal-based paints would not work because the bulk conductivity of the paint is much less than of the metal."

WHERE THERE IS NO TELEPHONE

"Low-cost systems aid the third world", a *TT* item last October (p779), discussed some ways in which radio amateurs are attempting to help those vast areas of Africa where at present virtually the only way of sending a message is to take it in person or find a runner: "no telephones, no regular postal services — and little of the hard currency needed to buy, install and maintain the advanced telecommunications services that we take for granted."

This problem affects not only the indigenous population but also the many missions and aid agencies even where these do have limited funds. The outstations often need a relatively cheap way of talking to their regional headquarters in the capital cities or with other outposts over distances of some hundreds of kilometres. The obvious solution is HF radio, using amateur-grade transceivers and such systems are increasingly filling the gap left by the absence of telephones.

John Corbett, G3TWS has recently written a most useful 100-page booklet 'Where there is no telephone' specifically intended to assist those with or without formal electronics education to whom the successful operation of an HF radio system appears shrouded in mystery: 'something more akin to art than science'. Although written from the perceptive of experience of HF radio communications in Zaire, much of the information is applicable to HF radio in any underdeveloped, Third World country. Indeed much of the contents would prove interesting also to newcomers to amateur radio anywhere though not aimed at the setting up of a 'hobby' station. The main sections include: 1, How radio waves travel; 2, aerials; 3, transceivers; 4, how to plan your radio network; 5, costs and choices; 6, how to install a radio system; 7, how to operate a radio network; 8, how to maintain a radio network; and 9, additional facilities.

The booklet has been printed and published in Kinshasa, Zaire but is available in the UK from the Baptist Missionary Society, 93 Gloucester Place, London W1H 4AA (price £2·50, A4 format, paper covers).

It is believed to be the only radio publication specifically written for the conditions experienced in some Third World countries. Written in a thoroughly practical, yet technically sound, manner it should assist both technical and non-technical readers as a reliable guide to planning, selecting, installing, operating and maintaining an SSB radio-telephone network in difficult circumstances.

LIVING WITH ELECTROMAGNETIC RADIATION

On many occasions, *TT* has referred to the long-lasting and seemingly insoluble controversies surrounding the biological effects of electromagnetic, non-ionized, radiation at frequencies all the way from near-DC to visible light. These controversies, in the years since the publication of a book *The Zapping of America*, have changed from being a matter of specialist concern to the stage where they are regarded by a growing minority of the public as part of the environmental pollution debate.

For radio amateurs, the important consideration is the question of exposure to strong RF fields in the immediate vicinity of transmitting antennas. It has long been accepted that when RF energy is absorbed by biological material, particularly moist material such as tissue and the eye, there will be a rise in temperature, just as must occur in a dummy-load resistor. In most cases a modest rise in body temperature has no permanent adverse effect but it is clearly necessary to limit this rise.

There have long been official safeguards designed to limit continuous exposure to a safe figure that includes a 'factor-of-ten' safety margin. The present safety guidelines are designed to limit exposure to a maximum of 0·4W/kg of body weight. This translates into a power flux level of 10mW/cm² for continuous exposure (Note: G6HD has pointed out that there was an error in the equivalent figures I gave in the December 1988 *TT* in attempting to equate mW/cm² with W/m²). More recently it has been recommended that the figure of 10mW/cm² should be reduced to 4mW/cm² at VHF, with a progressive reduction from 10mW/cm² between 10MHz and 30MHz and a progressive rise between 300MHz and microwaves. This reduction is to take account of the greater absorption of the human body at VHF due to the dipole and monopole resonances of the body in all its shapes and sizes from infancy to adulthood.

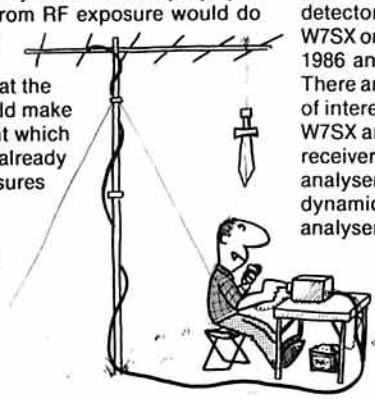
TT, November 1986, pp780-781 summarised how the American ANSI levels translated into distances from MF and VHF broadcast antennas at power levels below 1kW, indicating that amateur HF and VHF antennas sited out-of-doors at normal heights are unlikely to infringe these guidelines, although this may not always be the case within a couple of metres of ground-mounted HF verticals. It is also becoming important to recognise that due to the sensitivity of our eyes, a problem could arise when using VHF handheld transceivers with short (rubber-duck etc) antennas held within a few inches of our eyes: in these circumstances it is now usually recommended on the basis of American work that the RF output should not exceed seven watts — a figure approached in some recent models. Care may also need to be exercised close to a mobile VHF/UHF antenna.

In *TT* (December 1983) I included a note from Bill Hall, G6ZRB reporting how he had suffered severe head pains the night after watching a demonstration of a 25W mobile transceiver while standing alongside the vehicle quite close to the antenna. Roberto Craighero, I1ARZ. sensibly included a warning in his article on an 'Electrically tunable HF loop' (*Rad Com*, February 1989, pp38-42) on the potential hazard that could arise from the strong near-field magnetic component of an HF loop at other than QRP, particularly a loop used indoors without remote tuning.

Peter Simpson, G3GGK adds a further warning. He writes: "Having more time to experiment since taking early retirement, I decided to try my hand at building a one-metre diameter loop antenna for use with a 100W HF rig. Having no method of remote tuning, I was obliged to stand quite close to the loop whilst making adjustments ... After a few minutes, I became aware that I had developed a slight headache, not a condition I am usually troubled with. It was mealtime, so I switched off the rig and left the shack thinking no more about it. A few days later I resumed work on the loop and, after about five minutes or so, back came the headache. I decided there might possibly be a hazard so I have abandoned work on the project until I can motorise the tuning capacitor. *One hears now and again warnings about RF damage to human tissue at UHF and microwave but can there really be risk at 14 to 30MHz?*" (Italics added).

The answer, as noted earlier, is a definite *yes!* although an HF antenna element does not represent a 'point source' in the near field so it is not possible to calculate the power flux close to the element(s); obviously, a compact loop produces an unusually strong magnetic component in the immediate vicinity. Amateurs should not be misled into believing that the thermal effects of EM radiation are confined only to UHF and microwaves.

One suspects, although it is not possible to be sure, that the headaches experienced by G6ZRB and G3GGK were manifestations of thermal effects, possibly absorption in the high water content of the eyes, the most vulnerable organ of the human body. There is some evidence that high levels of radiation can result in eye cataracts, a very much more serious matter than a passing headache. It is thus important that amateurs should be fully aware of — and avoid — the hazards of exposure to RF fields appreciably above the safe limits recommended by the National Radiological Protection Board. As G3GGK puts it: "The publicity attached to any injury to a radio amateur from RF exposure would do untold damage to the hobby and heaven knows what the tabloid press would make out of any incident which involved a hobby already under social pressures due to RFI/EMC problems."



Indeed hanging as a Sword of Damocles over all users of the radio spectrum is the growing concern, found among sections of the public and a number of scientists, about both long-term and short-term biological effects of low-level radiation as a form of 'environmental pollution'. The power of suggestion and fear is very strong, particularly when fuelled by those individuals who are always ready to suspect that there may be a 'conspiracy of silence' on the part of the authorities.

Widespread publicity was given recently in the Surrey/Hampshire area linking 'cot deaths' with nearby radar stations. Ned Row, G8GZZ sent me the front-page of the *Surrey Mail* (February 18, 1989) headlined: 'Why are we killing our children? Sinister secret could hide truth of cot deaths mystery.' G8GZZ assumed this was the fervent imagination of a local journalist but enquiries show that the story was based on statements by qualified medical researchers, although other experts point out that a far more tenable theory is that these particular infant deaths coincided with a sudden drop in temperature.

I recently attended a IEE discussion meeting 'Biological effects of electromagnetic radiation' at which a number of workers in this field described attempts to reproduce the many 'positive' results achieved, for example, by the use of pulsed EM radiation to stimulate bone growth, as now used widely throughout the world. Yet 14 years work at Sheffield, including the use of 'double blind' experiments, have failed to confirm that the radiation plays any significant part in effecting the many successful cures. But it is clearly extremely difficult to prove or disprove whether there are any long-term effects of low-level radiation. It was apparent during an unusually heated 'discussion period' — not often a feature of IEE meetings — that the idea of 'electromagnetic pollution' is taking firm root in what at present appears to be 'fringe circles' unwilling to be swayed by engineers or to appreciate that a biological effect may not in fact be hazardous. My personal view is that if eventually it is shown that there are still unproven long-term athermal effects then, compared with other natural hazards, they will prove to be statistically very small indeed. But it is becoming more difficult to state positively that there are *no* athermal effects of low-level RF radiation, possibly at microbiological levels.

AUDIO DECIBEL LEVEL METER

The April *TT* referred to the Signetics application notes reissued by Philips Components (Mullard) on the NE602 and NE604 devices. This series also includes: 'AN1991 Audio decibel level detector with meter driver' by Robert J Zavrel, W7SX originally published by Signetics January 1986 and republished by Mullard June 1986. There are several uses for such an audio meter of interest to amateurs. Among those listed by W7SX are: S-meter for direct-conversion radio receiver; VU meter; microphone tester; audio analysers; portable acoustic analysers; audio dynamic-range testers; and audio spectrum analysers.

The NE604 can provide a logarithmic response proportional to the input signal level over an 80dB range, at frequencies from audio up to about 15MHz. **Fig 3** shows a sensitive (10·5μV) audio level indi-

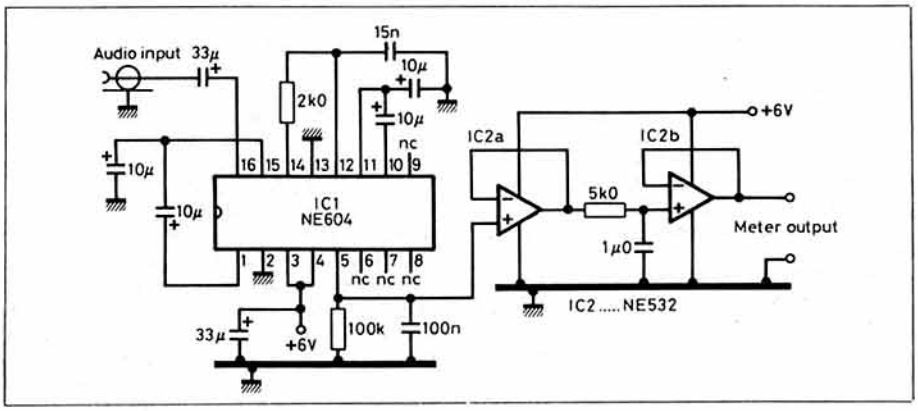


Fig 3. Audio decibel level meter based on the Signetics NE604 IC.

cator circuit based on two IC devices (NE604 and NE532) that draws less than 5mA from a 6V supply. A standard 5V FSD voltmeter can be linearly calibrated in decibels (within ±1·5dB) over a single 80dB range for audio frequencies from 100Hz to 10kHz: **Fig 4.** If higher level measurements are required an attenuator should be incorporated ahead of the input capacitor. Input impedance is high, about 50k, so lower impedance terminations, 50 or 600ohms, will not be affected. The application note provides a description of the circuit functions of the two amplifier sections in the NE604 used to provide a current proportional to the $\log_{10}$ of the input audio signal. The 532 op-amp is used as a buffer and meter driver although a digital voltmeter could replace both the op-amp and the meter shown reducing the device to a single 604 and the few external components.

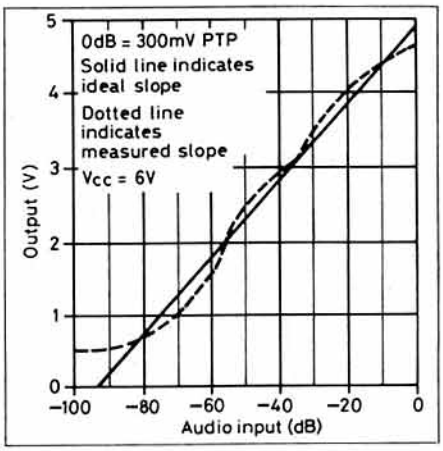


Fig 4. Comparison of measured with ideal decibel calibration of the audio level meter.

MORE ON ELEVATED VERTICALS

The April *TT* introduced the important concept, put forward by Les Moxon, G6XN, that the popular elevated ground-plane antenna should be regarded as basically a *dipole* rather than a quarter-wave monopole antenna. Some readers may have been tempted to say: "So what. As long as it works with my rig, I couldn't care less that the boffins say it's a dipole!"

But it *does* matter. For years the reputable sources of technical information, such as the *ARRL Antenna Handbook,* have described the radials of a ground-plane antenna (GPA) as 'simulating' a solid (circular) plate, and thus resembling a grounded monopole, adding that four radials are sufficient to achieve this effect but implying that the more radials the better. It was not until 1981 that I was able to reveal, following a pleasant lunch with the late Dr George Brown and his wife Elizabeth, that the GPA, as originally conceived in the 1930s, used only two radials, later increased to four in order to make it more marketable for American police radio communications. Some years before this, I had successfully tried out and described in *TT* an 'inverted ground-plane' in the form of a T-antenna or single-element 'Bobtail antenna' with two quarter-wave horizontal radials: **Fig 6.** I still believe this is a useful antenna for those wishing to use vertical polarisation, have two supports and are prepared to use an outdoor antenna matching network to provide a high-impedance, voltage feed. It has the advantage of raising the high-current section of the radiating element well above surrounding fences, shrubs etc which can

TRACING RUSTY-BOLT AND DIODE INTERFERENCE

A method of sniffing out non-linear junctions has been described recently by Jack Holmes, W6BUY (Technical Correspondence, *QST,* December 1988, p46). He wrote:

"About 30 years ago, I had a TVI problem that nearly drove me mad! It didn't take long to analyse the problem — RF rectification — but it took nearly three years to locate the *source*... TVI can be caused by RF rectification in unexpected places: a rain gutter, a fence, a household appliance or any number of other sources.

"The method I devised for locating a rectification source is a relatively simple one that hit the bull's-eye. My RF sniffer produces a small radiation field. When this field encounters an object that rectifies the RF, the harmonic energy is picked up by an antenna and sent back to a portable TV set: **Fig 5.**

"The sniffer probe consists of a broom handle on which is mounted a dummy load with a wire loop, the receiving antenna, around it. Energy from a low-power transmitter is fed to the dummy load (50ohms, non-inductive resistor of appropriate wattage) ... The sniffer must be within approximately 10ft of the rectification source (to produce observable TVI) and this immediately narrows the search area. Prior to use, place the test set-up in a clear area and check that there is no TVI with power applied to the dummy load ... save time and energy by initially trying to locate the general area of rectifictaion ... In my case I found the house walls were the culprits. They were plaster on PegBoard and had overlapping 10ft lengths of six inch wide heavy wire mesh between the plaster and the boards. The pieces of wire mesh were at the top of walls. Rectification was at some of the overlapped joints ... That's when I called my builder."

I believe that a basically similar techique (but using a radio receiver rather than a portable TV set) is sometimes used for 'sweeping' rooms to ensure that no electronic 'bugs' have been installed. The transistors in the 'bug' act as diodes and generate harmonics or IMI, although I cannot recall seeing any published designs for such 'sweepers'.

Further examples of IMI/harmonics generated by 'diodes' in unpowered equipment have been described by David Barker and AK7M in *QST* (November 1988, p38) in an item 'Unpowered computer generates RFI.'

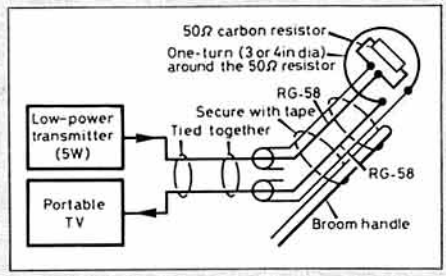


Fig 5. The RF sniffer used by W6BUY to trace 'rusty-bolt' (diode junction) radiation causing TVI.

David Barker contributes: "Reception from 1·8 to 30MHz was marred by severe splatter from a broadcast station one and a half miles away. The interference came and went for no apparent reason. After several weeks I tracked the apparent source to a 30ft shielded RS-232-C data cable connected to my unpowered computer. Disconnecting the cable made the interference go away but attaching a new cable brought it back. Further investigation revealed a poorly soldered joint on the computer's RS-23-C DB25 connector. Evidently this solder joint was acting as an effective frequency multiplier."

AK7M added the following editorial note: "Turned-off electronic equipment can generate interference even *without* faulty wiring. Investigating pops, sizzles and crackles on all medium and high frequencies, I discovered that my unpowered, general-coverage receiver was generating the junk in step with the modulation peaks of a medium-wave broadcast transmitter one and a quarter miles away ... My hunch is that the interference is caused by the unpowered receiver's unbiased input network switching diodes and/or the RF amplifier (MOSFET). Turning the receiver 'on' makes the problem disappear. Solution: Disconnect the antenna from the receiver when not in use."

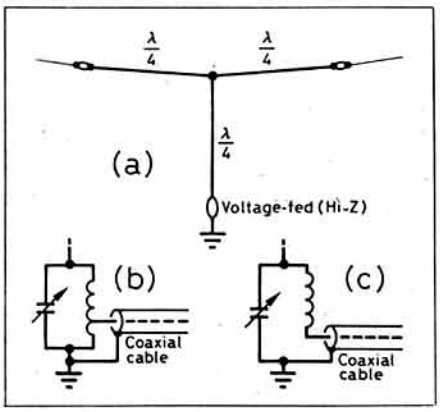


Fig 6. The 'inverted ground plane' antenna using two horizontal radials. (b) and (c) show two possible matching networks for voltage feeding at the base of the quarter-wave radiating element.

absorb an appreciable amount of the RF energy from ground-mounted verticals.

As explained last month, G6XN takes the further step of advocating the use of a single *short* loaded radial, otherwise counterpoise, an arrangement that must seem illogical if you still regard the GPA as a monopole with a simulated earth plane.

In *Ham Radio* (October 1988), Bill Orr W6SAI retold my account of how the RCA ground-plane antenna came to have four radials and my 1981 conclusion that "a two-radial ground plane certainly serves the purpose the inventor had in mind!". In the March 1989 issue, W6SAI returns to this subject on the basis of letters received from readers. He writes:

"A letter from Don Norman, AF8B says that experiments he ran in 1982 on an elevated 147MHz ground-plane showed two radials were a considerable improvement over one, three radials were a considerable improvement over two. He said his tests also showed conclusively that the radials served to decouple the feedline from the antenna. Don's opinion is that HF multiband verticals planted in backyards around the world would probably perform much better if they were placed on rooftops and equipped with two radials for each band."

Certainly, as mentioned last month, the degree to which RF currents can be kept off the feedline is an important factor in determining the vertical radiation pattern of a GPA no matter how many radials are used. Nevertheless it should be possible to minimise such current by the use of chokes, including a coiled length of the coaxial feeder, stub filters etc or ferrite absorbing toroids as in the zero-extent GPA described in *TT*, November 1987, rather than depending on multiple radials.

Another *Ham Radio* reader, Bill Bringler, K5CSJ ran the ground-plane programme on his computer using MININEC (see April *TT*) and compared the field patterns of two and four radial configurations for a GPA with base 25ft above 'average' earth and with the radials sloping down to 15ft elevation at their ends: "At a vertical radiation angle of 10°, the horizontal pattern of the two-radial design was omni-directional within a fraction of a decibel. In the vertical plane, the angle of the main lobe above the horizon was less than 20°." This corresponded to the pattern of the equivalent four-radial design. K5CSJ concluded that there was no significant difference in operation between the two antennas. He also did a computer-run to compare a ground-mounted monopole vertical against the elevated two-radial design and found it about 1·5dB worse at an elevation angle of 10°. His conclusion was that "A two-radial ground plane, when elevated, works just fine!" □

L-MATCH ATU WITH FINE ADJUSTMENT

Doug DeMaw, W1FB in introducing 'A VFO with bandspread and bandset' made me feel my age when he wrote: "Are you old enough to recall those days when we amateurs had receivers that had two readout dials? One was a bandset dial for coarse tuning and the other was for bandspread or fine tuning. When I compare that method to modern digital-readout techniques I wonder how we managed to get on frequency...". Old enough to *recall* ... gosh, I still *use* a 40 year old general coverage Hammarlund HQ129-X receiver with its two readout dials! The trick now, as then, is to use a crystal band-edge marker when setting the coarse tuning and then who really needs to know the *precise* in-band frequencies?

However, the point I wish to make this month is that the coarse/fine adjustment principle has other valid applications. Hector Cole, G3OHK uses a 100ft end-fed Marconi antenna, using 20g enamelled wire, with his TS530SP HF transceiver. Over the years he has made and used many different ATUs for end-fed random-length antennas including some with roller-coaster variable inductances. The most satisfactory has proved to be his present ATU which achieves variable inductance without the use of either a roller coaster or a variometer.

He writes: "It's an L-match using an old idea that seems to have fallen out of use for many years **(Fig 7)** that enables me to select an inductance of any number of turns. There are three adjustments, the variable capacitor and two multi-position rotary switches but it is not at all complicated to tune. One switch provides fine 'unit' adjustment with the first 10 turns of the coil tapped at every turn; the remainder of the coil is then tapped only at intervals of 10 turns with the taps taken to the 'tens' switch.

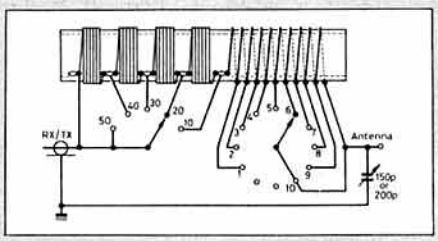


Fig 7. G3OHK's L-match ATU permits switch selection of from one to 50 turns of a 50-turn coil with just 14 taps. This two-switch technique can prove more economical and more convenient than using a roller-coaster inductance. As shown it provides a step-up impedance transformation suitable for use with end-fed antennas.

The single turn taps go to the 'units' switch and the 'tens' taps go to the 'tens' switch. With the 'tens' switch at position '1' you can select a coil of 1 to 10 turns, likely to prove suitable for use on at least the 28, 24, 21 and 18MHz bands. On the lower frequency bands, with the 'tens' switch at '2' this allows the 'unit' switch to cover from 10 to 20 turns; with the 'tens' switch at '3' you can select from 20 to 30 turns and so on.

Unlike a roller-coaster, you do not need to have a turns counter and the coil can be quickly re-set to any number of turns previously found to be suitable. The ATU can be set more quickly to a different band than one with a roller coaster.

"The switches I use are similar to those sold by Cirkit and Maplins; all plastic body and shaft. These have given no trouble at the power levels of my transceiver although higher-grade components may be required at legal-limit powers."

G3OHK is puzzled why the simple, two-component L-match circuit is not more popular. It is as efficient as the 'Ultimate' T-match and can provide better harmonic suppression. It is very convenient for voltage-fed antennas and, by reversing connections, can also provide an impedance step-down. At G3VA much use has been made of both L-match and Pi-network antenna matching units, both configurations providing satisfactory results — G3VA.

G3OHK recalls that the first radio he ever built was a crystal set using two stud switches to vary the inductance and no tuning capacitor. But it's a long time since he twiddled with a cat's whisker!

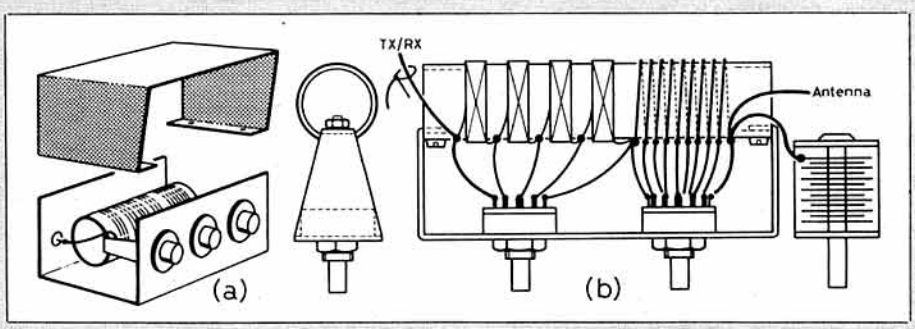


Fig 8. Constructional details of the L-match ATU.

AN INTRODUCTION TO SPORADIC E

Jim Bacon, BSc, G3YLA

INTRODUCTION

The new 'season' of sporadic E (often written as 'Es' for E-sporadic) is now upon us, and no doubt many members will be waiting with bated breath by their rigs for the DX which this fascinating mode brings. I hope that this article will unravel a few of the mysteries of Es and perhaps help you to get some exotic DX in the log during the coming months. At the very least, I hope it will make you think about how sporadic E might work and bring about an exchange of ideas. In talking to people about Es, it seems that some theoretical aspects have been known for some time and yet barely feature in the amateur radio literature on the subject at all. I hope to correct some of these omissions in this article.

We'll start with a review of some recent research papers published about Es and a discussion of the current theories being put forward to explain it. Next, I'll deal with the observations and reports collected during the last year or two and include an analysis of the 1988 RSGB Es trial. Finally, there'll be a general operating guide on how to get the best from sporadic E by using simple prediction techniques developed during the recent trials.

Incidentally, there are three types of Es identified in the literature. The principal subject of these articles is mid-latitude Es: the other two types are equatorial Es and auroral Es, both of which have different characteristics from the mid-latitude type. There's also a brief look at auroral Es, which can appear to resemble the mid-latitude type on occasions.

Our current knowledge of Es is due partly to a broad spectrum of work by professional research groups over many decades. Equally importantly, it is due to data gathered by yourselves - fellow radio amateurs. Indeed, this is an area where amateurs can use their widespread observing network to make an extremely important contribution to the overall understanding of the phenomenon. I'd like to say a very big thank-you to everyone who has helped in the past - and don't forget to take part in the 1989 trials later this season!

DEFINING THE PROBLEM OF SPORADIC E

Sporadic E or Es is the exciting phenomenon which occurs when E-layer ionisation becomes locally dense enough to affect the propagation of HF and VHF radio waves. It enables some very impressive DX to be worked, and even on 144MHz this can amount to distances of up to about 2,500km. Much has been written to explain how this works, but - in the amateur literature at least - there seem to be as many theories as there are stations on the bands in an opening! However, these are exciting times for professional Es research, with new papers being published almost monthly on the results of some new radar experiment or other. It may not be long before a more complete picture is revealed. Amateurs usually gain from Es, but other radio users can be considerably inconvenienced by its random appearance and for them there is a real value in advancing the state of knowledge and seeking some measure of predictability.

The fundamental problem of Es research is that this is difficult territory, where measurements - even professionally - are hard to obtain. It is not really surprising that, up to now, a full account of all the mechanisms at work hasn't appeared.

The reason for my recent involvement with Es is largely as a result of question-and-answer sessions following talks to radio clubs about 'tropo' (which is caused by 'weather'). A very common question is "Is there a link between thunderstorms and Es... they often seem to occur together?" In reply I had to admit that I could not think of how such a link might bridge the gap between thunderstorms which happen at perhaps 15km above the earth and Es taking place at 110km (see **Fig 1**) ....next question! This happened with increasing frequency, doubtless prompted by various suggested co-locations of thunderstorms and Es then being mentioned in the VHF columns of the amateur radio press. My previous response was becoming less acceptable and I decided to try to find out how such widely separated events might influence each other.

Certainly there is a similarity of scale and character between Es and weather events like thunderstorms - both are localised and may appear to be random or 'sporadic'. However, to a meteorologist such things as thunderstorms are not necessarily random; there is often some order present. It may be that the storms are forming along a trough line in the pressure pattern, or perhaps are due to local topographical features like a range of hills acting as a trigger mechanism by lifting the air. Perhaps these localised causes were a logical starting point for Es after all. Incidentally, the link with thunderstorms was first described as long ago as 1933 [1], and there have been many similar papers since then suggesting links with other weather events. What with all the professional papers and amateur theories, there's been a vast amount said about Es over the years.

The general conclusion to be drawn from all the published research and theorising is that Es may have as much to do with weather in the troposphere and stratosphere as with the state of the ionosphere. The major problem with a puzzle like this is that because the occurrence of Es depends upon more than one cause (and probably many more than one) it becomes difficult to test any prospective theory unless *all* of the variables are known. Indeed, it turns

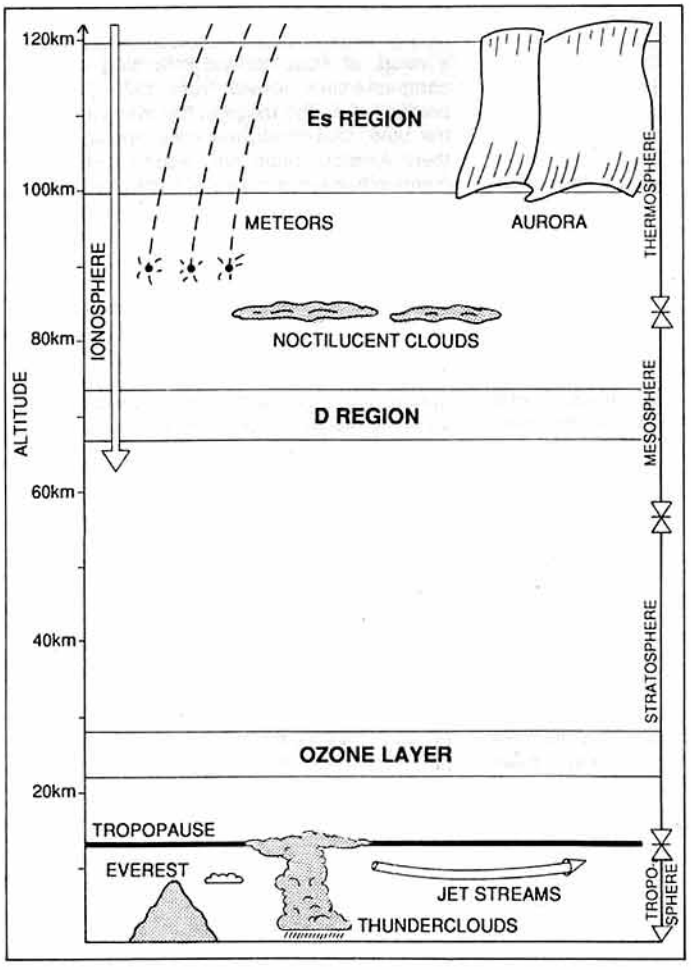
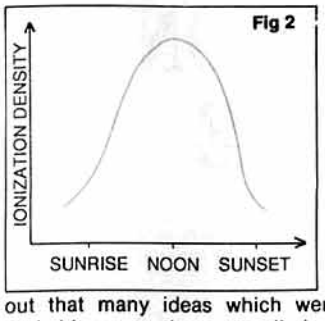
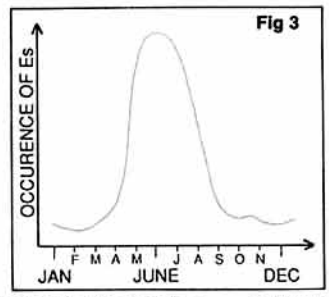


Fig 1. The earth's atmosphere up to the E region.





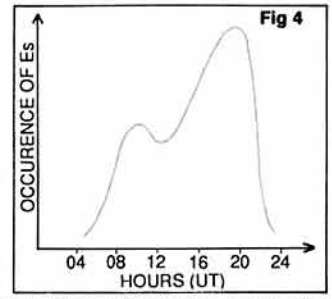


Fig 2. E region ionisation
Fig 3. Seasonal Es distribution
Fig 4. Diurnal Es distribution (summer).

out that many ideas which were and are probably correct have actually been through periods of rejection at some time or another due to this difficulty.

I imagine that many Es DX-chasers have a 'weather proverb' of their own which has proved useful in the past. In fact, it is relatively easy to find a theory about Es which seems to work - provided it is not required to work on all examples of Es! If you have a pet theory which seems to work for you, then use it; however, it's likely that a better system will result from a proper understanding of the physical processes behind Es, and this is essentially what this article is about. First, we need to look at some basic facts about the ionosphere because these will prove useful later on. Of course there are many more thorough texts on this subject, which should be consulted for a detailed background [2].

THE E LAYER

The E layer of ionisation at about 110km (see **Fig 1**) is essentially a daytime feature which is formed by the ionisation of the constituent atoms of the lower thermosphere by solar ultra-violet radiation. At these heights the atmosphere is relatively dense and there is a high recombination rate (four times the value in the F1 region) owing to collisions with other ions. The ionisation density is only maintained by the continued presence of ionising ultra-violet radiation. The intensity of the E layer varies with the solar zenith angle; it practically disappears after dusk (see **Fig 2**) but there is always some residual ionisation overnight, especially during solar cycle maxima.

The E layer is not usually effective as a reflector of VHF signals because the ionisation density is too low. However, at times of solar cycle maximum the ionisation density is greater and can certainly become significant at low VHF (ie, 50MHz - as those on that band will know only too well). This makes Es studies difficult during times of high MUF and busy bands. Clearer data is obtained during minima of the solar cycle when the Es events are the only means of making contacts and are thus easier to identify.

The background values of ionisation for the E region are of the order 2.0 - 10E9 electrons per cubic metre at night, rising to 1.0 - 10E11 in the daytime. These figures are also highly variable with the solar cycle but they do serve as a useful guide to compare with similar figures for Es layers given in the next section.

CHARACTERISTICS OF Es

In view of the solar control of the E layer, it is tempting to think of the same direct solar influence in sporadic E. While this may be reasonable at first sight, it would clearly be difficult to explain certain types of Es - for example, those which occur during the evening. It also fails to explain why the probability of Es events peaks in the late afternoon and not around solar noon when ionisation is greatest. It is true that there is a form of solar influence, but it turns out to be indirect and takes place via other atmospheric means rather than by direct solar ionisation.

The yearly distribution of Es is probably quite familiar to DX-chasers — see **Fig 3**. The main 'season' typically starts in April and lasts through into August. There is, of course, a frequency dependence to Es. Since there is a tie-up with ionisation density, Es will become apparent on high HF before low VHF and so on and progressively higher frequency bands will be affected as the event develops. However, there is considerable variation from year to year and Es can occur virtually at any time of the year. The diurnal variation of Es shows a double peak (see **Fig 4**), implying that something more complicated than direct solar ionisation is taking place.

Various estimates and measurements of Es have been published and most seem to support a range of sizes for the reflecting area. A comprehensive review from 1970 [3] also comments on the range of theories current at the time; thunderstorms were not in favour then! Amateur radio and research literature mention horizontal scales of Es ranging from a few tens of metres to hundreds of kilometres, a distance of 200km frequently appearing in print. Subjective descriptions of shape refer to "platelets, ribbons and clouds" and movement as being quasi-stationary up to speeds of 80m/s. Work by Serge Canivenc, F8SH - the IARU Es co-ordinator - provided many interesting plots of the movement of particular Es patches during openings. Sadly, Serge passed away last year, but the value of his detailed analysis of specific events carries through into the methods used later in this article.

Most amateurs will be aware of the transient nature of Es and the majority of individual events have durations of less than 5 minutes, although the period of the opening itself may on some occasions last for a few hours.

In the world of professional ionospheric research, many scientific papers have been published on the results of rocket soundings and radar experiments to measure ionisation density and determine the species involved. A most interesting finding is that Es layers seem to be composed primarily of metallic ions, especially magnesium and iron [4],[5],[18]. Some of these results come from experiments using a joint European UHF radar in Scandinavia called EISCAT (European Incoherent Scatter Radar). This important work shows very clearly the fine structure of Es layers by plotting contours of the electron density against time and height (see **Fig 5**). Remember that this is at one location and represents the passage of the Es over the radar: in that sense it's a similar picture to what happens at your QTH. Again, we see typical Es thickness of the order of 1km and peak electron densities of order 2.0-5.0 x 10E11 per cubic metre.

The next stage of this article is to examine some of the components of theories currently available to describe how such characteristics might occur.

ATMOSPHERIC GRAVITY WAVE

These are the key to many of the 'weather' theories for Es. The vast space between 'weather' in the troposphere (which is the area between the earth's surface and a height of some 15km) and Es at around 110km is the region through which any link must operate. Two options are open to theorists. One is the utilisation of some form of air motion which can 'communicate' upwards: this is known as a gravity wave. The second is by causing modifications to the electric field in the region above a given weather event - for example a thunderstorm. I'll come back to this option later.

What are atmospheric gravity waves (hereinafter referred to as AGW)? The answer is not

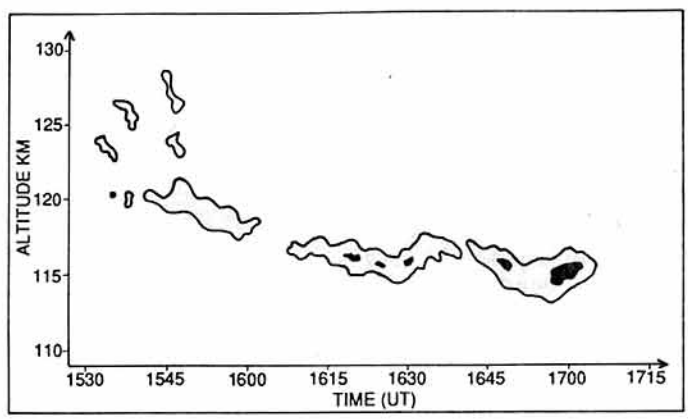


Fig 5. Sporadic E layer observed by EISCAT UHF radar [5].

the one which might appear obvious. The name refers to a wave motion which depends upon gravity as the restoring force. It is not - as the name might seem to imply - a variation in gravity itself. The waves on the surface of the sea are gravity waves: these are technically 'surface gravity waves.' The type required for our theory are known as 'Internal gravity waves' and can propagate through a medium rather than along a surface discontinuity.

The key to the propagation of internal gravity waves is that they actually increase in amplitude as they move upwards and away from their source. So what may start as a small initial disturbance in the lower atmosphere can grow exponentially as it propagates upwards. This is basically due to the fact that air density decreases with height. A non-mathematical review article in *Nature* by Hines on the subject of gravity waves will make worthwhile reading for those who wish to pursue this piece of atmospheric physics further [6].

One good example of internal gravity waves is the effect produced when air flows over a mountain range. Distinctive cloud shapes called 'lenticularis' meaning lens-shaped, can occur because of this type of wave motion and make it possible to see the AGW activity (see **Fig 6**). Noctilucent clouds are a similar indicator in the mesosphere around 85km and these can also show a distinctive wave-like structure. Unfortunately, however, no such visual indicators exist in the E region. Now if you measured the wind speed and direction in the ionosphere above one location where AGW activity is present, the pattern might look something like a cork-screw — see **Fig 7**; actually there are other wave motions present in the upper atmosphere which would modify this schematic, but it serves to illustrate a few basic characteristics of AGW. Note that the wind direction appears to rotate with height, repeating at intervals equal to the vertical wavelength of the AGW. Note also that the amplitude of the AGW increases with height. It follows from the schematic that opposing wind directions occur at spacings of a half-wavelength - the importance of this will emerge later.

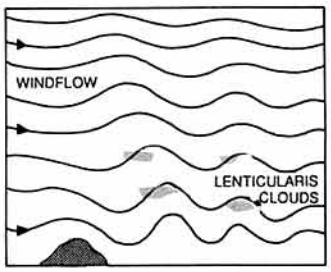
It's known that some of the early atomic bomb tests were detected when the AGW they produced interacted with the ionosphere. It is even believed that earthquakes and tidal waves are capable of generating AGW. The atmosphere can produce gravity waves for a number of reasons: however, some causes have been seen to be associated with Es and I will concentrate on these lower atmospheric triggers next.

There are three principal contenders:

* thunderstorms
* jet streams
* mountains

THUNDERSTORMS

It is widely known that thunderstorms are sometimes located near Es and there seems to be a good case for assuming that they play a contributory role in its formation. A recent research paper reports an example of AGW activity observed in the upper atmosphere nightglow emissions as being generated by a thunderstorm [7]. There are numerous other examples in amateur radio literature [8] and some useful background articles can be found in American magazines [9]. These show that



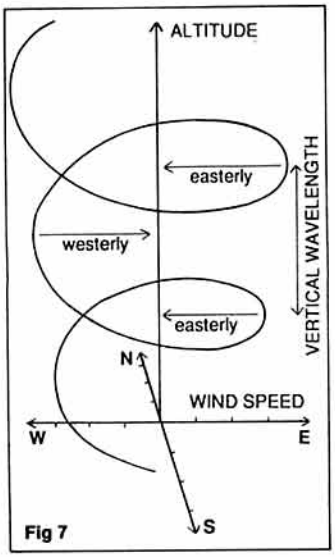


Fig 7

Fig 6. Internal gravity waves produced by windflow over a mountain range.
Fig 7. Variation of wind with height in upper atmosphere due to gravity wave activity.

there is still much debate about the part played by the weather — especially thunderstorms! I'll be presenting some further evidence for a weather link in the results section, but first it is necessary to bring in a little basic meteorology.

Thunderstorms are usually a result of strong surface heating which generates vertical convective currents of air. These 'thermals' rise and, as they do so, the rising parcels of air cool by adiabatic expansion against the decreasing pressure. Eventually a height and temperature is reached when the air can no longer hold the moisture it contains, so a cloud forms at this 'condensation level'; at the same time the rising parcel of saturated air slows down its rate of cooling because of a release of latent heat. However, provided the parcel is warmer than its surroundings the rising motion continues and can be sustained over many kilometres. When the parcel has cooled to the temperature of the surrounding air it loses its buoyancy. This process I've described is the making of a large 'cumulonimbus' cloud, typical of those associated with thunderstorms.

In the case of severe storms the upward momentum is great enough to penetrate the tropopause and continue for some distance into the stratosphere before the excess energy is dissipated — (see Fig 8). This can cause an oscillating disturbance of the tropopause which may initiate AGW or - looked at another way - we now have a case where AGW could be generated in the stratosphere and steered by winds just above the tropopause (like the mountain wave example). This is called 'penetrative convection' and has been the subject of several papers [10].

The seasonal variability of thunderstorms is such that one would expect a summer peak, and indeed a peak in the afternoon when the daytime heating has generated the necessary cumulonimbus clouds. It is even possible that the morning peak in Es is the result of storms that have lasted through the night into the following morning before decaying. However, there is a better explanation of the daily Es curve, which we'll come to later.

There is some evidence from the EISCAT results [5] that an electric field alone can produce Es. This raises the interesting possibility that the electric field of a thunderstorm may be capable of causing Es. There is little evidence for this in the literature as yet, but it will be worth bearing in mind when correlating Es and thunderstorms.

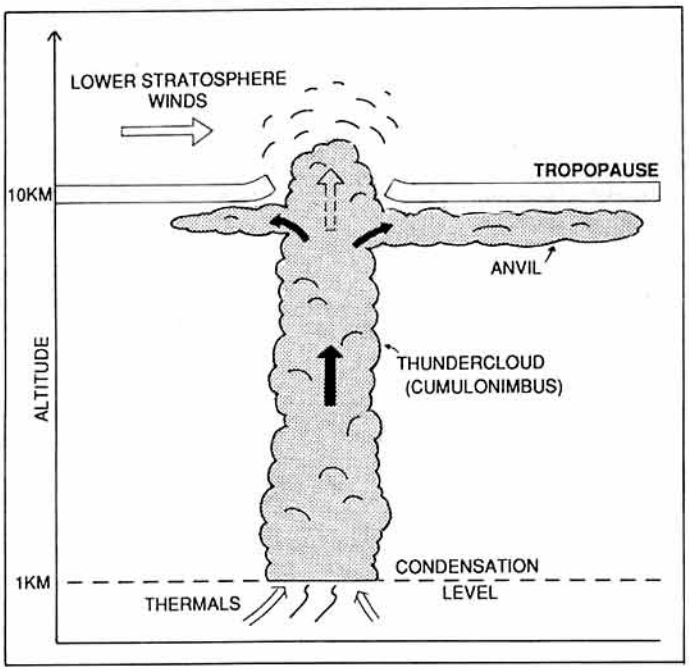


Fig 8. Typical thundercloud.

JET STREAMS

The second suspected 'weather' cause of Es is a 'jet stream' which is a core of strong winds in the upper troposphere. It is important to note that these are not located in the ionosphere near the E layer but much lower in the atmosphere just below the height of the tropopause (see Fig 1). Jet streams are approximately horizontal tube-like regions of strong winds which can reach up to 100m/s (200 knots) in the core. A jet stream is a result of thermal contrasts in the atmosphere, and they are normally found in association with weather fronts (see **Fig 9**).

In general terms, the greater the air-mass temperature contrast across a weather front, the greater will be the strength of the jet stream. Because of the large 'windshear' near a jet stream (a rapid change of speed with height), it is also a region of marked clear-air turbulence. It is believed that this turbulence may be the mechanism for generating AGW [11]. However, there is some feeling that AGW produced in this way may not be able to propagate through the tropopause: although direct evidence is hard to obtain, it is possible that only certain parts of the jet stream may be effective at generating AGW. Meteorologically speaking, the exit and entrance region of a jet stream is the location of greatest acceleration and deceleration and these may be the most likely places to look for Es. Indeed, the results of last year's Es trial may have isolated a very good example of jet stream Es - more of this in the results section.

On a European scale there may be several jets present at any one time, each associated with a different frontal system. However, on other occasions there might be only very weak jet streams present (30-40m/s). A climatological point about jet streams is that they are more marked in the winter season, with several examples of core strengths approaching 100m/s. In the summer they are less strong and generally less common, tending to favour the north-western fringes of Europe.

MOUNTAINS

Mountain-generated AGW are not very common in southern Britain, but they are quite regular features in some parts of the world - for example, over the Alps, Rockies, Andes, Scandinavia and even to a lesser extent over northern Britain. Indeed, a strong windflow blowing across any mountain range is capable of generating AGW. It is possible that the effects of these mountain waves may reach the E-layer region, but there is a certain amount of doubt about how much attenuation would take place at the tropopause.

Mountain-generated AGW have most of the characteristics of those generated by the previous two methods, but there is one notable difference worth stressing. Thunderstorms and jet streams are variable triggers which are not fixed in time, location or strength and may be difficult to locate accurately in relation to a given Es event. By contrast, the mountain wave example is clearly fixed except for the strength of the wind which causes it, which in turn will alter the amplitude of the response and the distance it reaches downwind from the mountain.

So all in all, there may appear to be two types of weather trigger - the ones which tend to repeat in roughly the same location each year (mountain AGW) and those which are truly sporadic (thunderstorm and jet stream AGW).

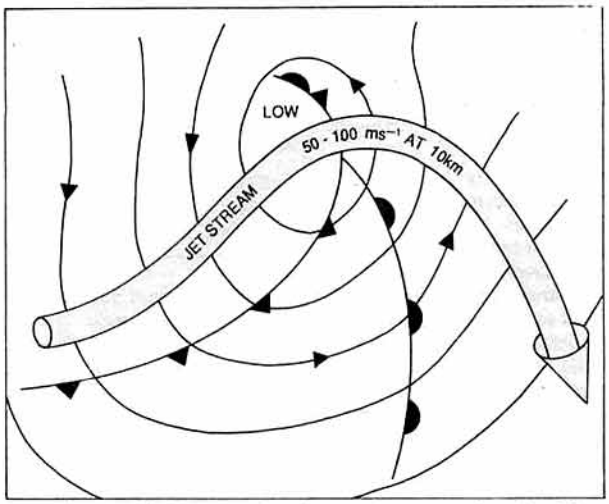


Fig 9. Surface pressure map of frontal depression showing location of jet stream in upper troposphere.

It is quite possible that mountains could trigger instability in an overlying jet-stream, or even be responsible for setting off a thunderstorm. In these examples, it would appear to be a mountain-generated AGW, whereas the jet-stream or thunderstorm would be the true cause. As ever, care is required in any statistical analysis.,

THE MIDDLE ATMOSPHERE

This is the region of the atmosphere which has great influence on the ability of AGW to produce results in the E layer. In essence, the middle atmosphere can act as a filter which restricts the direction of propagation and selects the period of the wave motion which is allowed to pass through. It has been found that the AGW is absorbed and does not propagate when the background wind in the stratosphere is the same as the horizontal phase speed of the gravity wave.

This has some important climatological implications for the seasonal distribution of Es - should it be caused by such things. In the following comments I am restricting my examples to the northern hemisphere mid-latitudes typical of Europe and to a lesser extent America. First, the wind regime in the stratosphere as between winter and summer is very different. Generally, strengths are greater in winter than summer and the direction reverses from westerly in winter to easterly in summer. The result of this on the propagation of AGW is perhaps best described by the table below (see also **Fig 10**).

The launching wind direction should therefore be westerly or meridional in summer and easterly or meridional in winter. Meridional winds blow in the north-south direction or vice versa; they are usually found in association with active frontal depressions and particularly slow moving cold fronts or active warm fronts (see Fig 9 again).

It is therefore possible to identify certain meteorological conditions to be found over Europe which favours the generation and upward transmission of AGW. Remember that this is determined by the direction of the generation wind flow aloft and the stratospheric wind regime through which the AGW must propagate.

THE WEATHER INFLUENCE

So far, we have explored the possibility of weather being a major influence on the development of Es. The link relies upon the atmos-

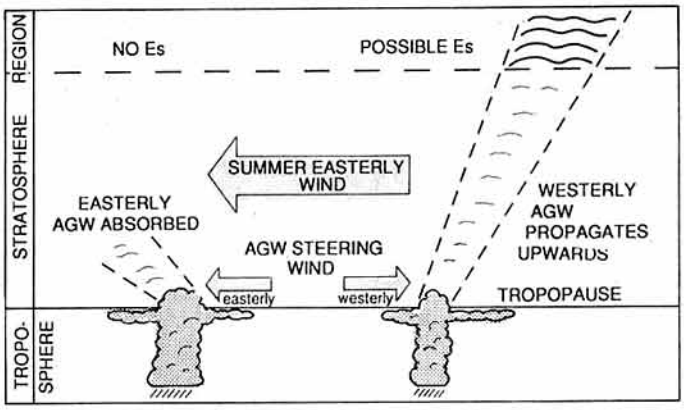


Fig 10. The winds in the stratosphere acting as a filter of gravity waves, summer case.

TABLE 1. SEASONAL AND WIND-BASED AGW BEHAVIOUR

Season	Stratosphere	AGW absorbed	AGW propagated
summer	easterly	easterly	westerly/meridional
winter	westerly	westerly	easterly/meridional

Note that wind direction refers to the direction the wind is blowing from.

TABLE 2. SEASONAL AND WIND-BASED AGW BEHAVIOUR

Season	Weather trigger	Occurrence
Summer:	a) Thunderstorm (meridional/westerly wind aloft)	common
	b) Cold front (westerly jet stream aloft)	occasional
	c) Cold front (southerly jet stream aloft)	occasional
	d) Warm front (northerly jet stream aloft)	rare
	e) Westerly low level flow over mountain range	occasional
Winter:	a) Thunderstorm (meridional/easterly wind aloft)	rare
	b) Cold front (southerly jet stream aloft)	occasional
	c) Warm front (northerly jet stream aloft)	common

Subjectively, it seems there are more chances of generating AGW which can propagate vertically in the summer months than in the winter, based upon these meteorological considerations alone.

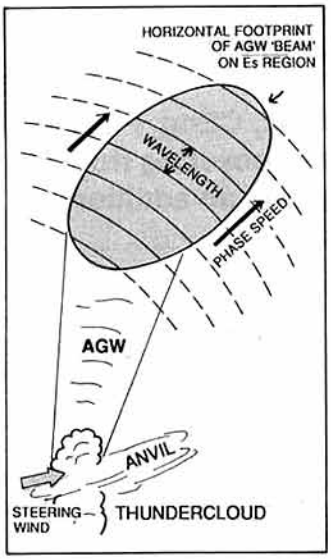


Fig 11. Horizontal gravity wave pattern in the Es region.

phere's ability to generate an internal gravity wave motion which can propagate upwards to the E region or, indeed, to the higher F regions. The causes of these atmospheric gravity waves (AGWs) may be a variety of events in the troposphere; thunderstorms, jet-streams and mountains have been considered as the principle triggers for further investigation.

Once the AGWs have been launched upwards they have to propagate through the stratosphere to reach the ionosphere. The stratosphere acts like a filter on these waves. Some will be completely absorbed while others will be filtered to pass only a certain range of horizontal wavelengths. It may be easier to visualise the resulting AGW which gets through as a 'torch beam' of wave motion pointing steeply upwards and illuminating a patch of the E region - see **Fig 11**.

Within this 'torch beam' there are certain characteristics of AGW which may prove important in the formation of Es. The AGW looks like a series of ripples radiating outwards from the source, but filtered to allow only the segment within the 'torch beam' to propagate. These ripples within the beam are not in line vertically but tilt with height, and this has the effect of varying the horizontal wind with height - also see Fig 7. This produces a pattern of windshear within the 'torch beam' which moves along with the ripples. The speed of the ripples is the horizontal phase speed of the AGW (typically 80m/s) and the spacing between successive ripples is the wavelength (typically 100-200km) giving periods of 20-40 minutes.

NEXT MONTH - We get to the key part of the series and look at what happens when these beams of wave energy reach the E region (we get Es if we're lucky and the tide's in!).

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BIOGRAPHY

Jim was born in 1950 and grew up in the fens of west Norfolk where all that sky soon fostered an interest in meteorology. He joined the Met Office in 1968 and studied meteorology at Reading University. He has worked in operational weather forecasting for most of his career, either at RAF stations or latterly in the media part of the weather business at the London Weather Centre. In 1986 he left to join Anglia Television and return to Norfolk.

In 1969 Jim became G3YLA, purely as a hobby since he has never been interested in electronics professionally. He like home-brewing and runs a home-brew 2m FM transceiver and various other bits and pieces. He is also a keen CW operator and has been known to enter contests just to make up the numbers!

SPORADIC E HOTLINE

You may remember that this time last year Anglia TV weatherman Jim Bacon - who's done the first part of a fascinating series on sporadic E which you've just read (if you haven't read it, go back four pages) - ran a little trial in which he invited people to ring a Voicebank number to obtain Es predictions.

Well, because everyone seemed to enjoy the facility and also because Jim would like to have another go, we're doing it again this year. He writes:

"As you can see in this edition of *RadCom*, I'm now putting on paper some of the ideas gleaned from the results of your Es monitoring during the 1988 season. Each year seems to come up with something new to check out in the following season. The main ingredient in this trial is the possible weather link to Es; however, as you'll see from next month's RadCom, there are other factors too. The dates which I have chosen are primarily to gather data on one of these '...other factors' which will hopefully coincide with some good examples of weather-generated disturbances in the E region.

"Some of these dates are weekdays, but don't worry too much since quite often the band doesn't really get going until late in the afternoon - say between 1530 and 1830 GMT. Also, it seems that many DX-chasers book days off work at this time, since they're well-known Es dates. The early part of June, in particular, is a strong contender amongst the fraternity which supports meteors as a cause of Es, hence two sets of trial dates are designed to explore this link. The weekend of VHF NFD is there to collect maximum activity and has also provided Es in the past.

"The dates for your diary are:

- *Tuesday 6 June*
- *Wednesday 7 June*
- *Saturday 1 July*
- *Sunday 2 July*
- *Wednesday 12 July*

"The trial, like that of last year, will consist of recorded messages on the RSGB 'Voicebank' to say where the particular Es triggers are located, if any. This will be updated during the day as new information becomes available. I would, of course, appreciate as much information as possible on what happens, but some things are more important than others. I'd very much like to know:

- *times of contact or hearing DX (SWL reports welcome)*
- *beam headings - both stations if possible*
- *signal strengths and characteristics - fading?*
- *any changes to DX or beacons over a period*
- *BOTH locators*

"The information will be available on the following number:

021-400 0977.

So - go to it, work some good DX and help the noble cause of science whilst you're at it. Remember, it could be *YOUR* report that makes the crucial difference. Oh, and don't forget to read Jim's article on possible causes of Es.

HF/UHF DEVIATION METER

E Chicken, MBE, BSc, MSc, CEng, FIEE, G3BIK describes a FM deviation meter which is capable of covering from 3 to 450MHz at deviations of up to 30kHz and offers an additional audio monitor facility.

Any radio engineer or experimenter involved with the construction or maintenance of FM transmitting equipment, will appreciate the need for an instrument by which to measure the deviation of the frequency-modulated signal.

The purchase cost of suitable commercial equipment can be prohibitively high, and the frequency limitations of lower-cost CB or Radio Amateur deviation meters unacceptable, hence the development of this simple to construct, relatively low-cost unit, based on readily available components and housed in a small RF shielded plastic enclosure. It can be used with FM signals over a wide frequency range from HF to VHF, embracing the 27MHz Citizens' band, 28, 50, 70 and 144MHz amateur bands, and the Low, Medium and High bands of Private Mobile Radio. The prototype performed well from 3MHz to 450MHz.

Power supply requirement is 15-20V DC at 50mA from an external source, which is regulated downwards to 12V within the unit, but there is no reason why two PP3 alkaline or ni-cad batteries in series should not be incorporated as an alternative to the external supply. **Fig 1** shows in block format the various stages of the instrument, their interconnections and signal routings, whilst **Fig 2** gives the full circuit diagram; the component values for which are given in the component list.

Fundamentally, the circuit is a type of superheterodyne receiver, the FM demodulator output from which is displayed on a moving coil meter using a scale calibrated in kHz of deviation. The instrument can also be used to monitor the demodulated audio signal on a small internal loudspeaker, and provision has been made for external access to the pulsed RF harmonics of the VFO, as an elementary source of test signals (extending up to VHF) which could be useful for calibration or general receiver testing.

FREQUENCY CHANGER

The FM signal to be examined (f1), is mixed with a locally generated signal (f2), in a balanced-bridge diode mixer incorporating two Hot-Carrier Schottky diodes D5 and D6, slightly reverse biassed via resistors R35-R38.

Schottky diodes were chosen for this application because of their high-speed switching capability and low internal capacitance, which combine to maximise the upper frequency response of the mixer. Capacitor C28 provides DC isolation for the input signal f1, which feeds into the balanced-bridge diode mixer via C31 and C32. Resistor R34 presents an input impedance of approximately 50ohms to the RF signal source.

By simultaneous application of a local oscillator signal f2 to the bridge, the FM input signal is down-converted to a relatively low Intermediate Frequency which faithfully reproduces the original frequency modulation but now on a carrier frequency of about 150kHz.

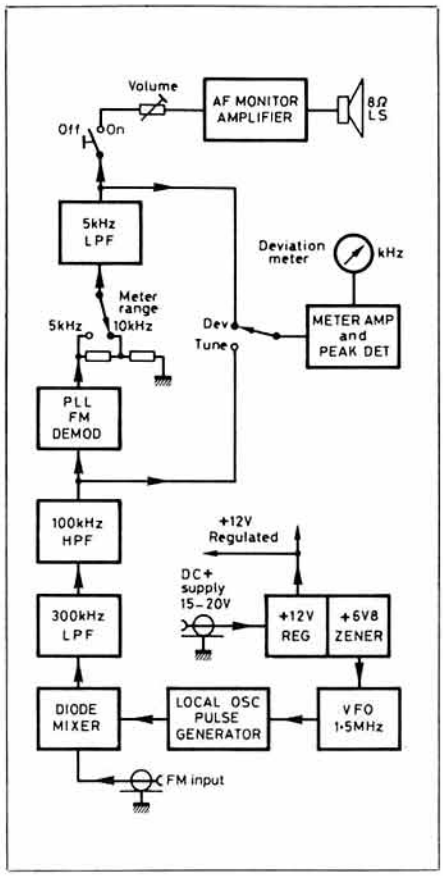

Fig 1. Block Diagram of the Deviation Meter.

Basically, the difference between this receiver and the usual superhet receiver, lies in the method adopted for the generation of the local oscillator signal. In a conventional receiver, the local oscillator provides an unmodulated continuous wave signal at a frequency close to that of the incoming RF signal, and is arranged to follow exactly any change in signal frequency such that the difference in frequency between the local oscillator and the signal frequency remains constant at the chosen Intermediate Frequency.

In this deviation meter circuit, the local oscillator signal is not an unmodulated continuous wave but is instead a pulsed-train signal with a repetition rate of approximately 1·5MHz, the appropriate harmonic of which is mixed with the FM signal frequency to yield the required IF. The variable frequency pulse train is derived from a standard Colpitts Variable Frequency Oscillator (VFO) designed around transistor TR1, centred on 1·5MHz. Varicap diode D1 in association with a linear potentiometer RV1 allows the frequency of the VFO to be externally adjusted by about 100kHz on either side of 1·5MHz

Frequency calibration of the VFO is not required, it being sufficient for the purpose that the actual frequency can be externally adjusted by a few kHz about its nominal centre frequency. Because the choice of centre frequency is somewhat arbitrary, it conveniently allows the use of a 100μH fixed-value moulded RF inductor, which together with sound mechanical construction and the stabilised 6V8 DC supply provided by Zener diode D2, ensures adequate frequency stability.

The sinusoidal output signal from the VFO is buffered by emitter follower TR2, amplified and amplitude-limited by transistors TR3, 4, 5 and diode D3, then differentiated at TR6 and TR7 to produce a train of sharp pulses with a repetition rate equal to the VFO frequency. These pulses are applied to a high-frequency switching diode D4, at a voltage amplitude sufficient to overcome the forward bias present on diode D4 via resistors R28, R29, R30, causing the diode to switch off and on in sympathy with the pulse repetition frequency.

The rapid switching action of this diode produces current pulses through the primary winding of pulse-transformer T1, which are rich in harmonics of the VFO frequency, extending well up into the VHF part of the spectrum. In that the usable upper frequency limit of the unit is to a large extent determined by these local-oscillator harmonics, it is possible to extend the range of harmonics produced in this stage by replacing the switching diode D4 with a microwave Step Recovery Diode, but such devices are usually very expensive compared with the 1N4148 silicon diode used in the original design.

Pulse transformer T1 comprises two windings each of four turns of insulated thin wire, using a different colour for each winding, wound in bifilar fashion through a small ferrite ring of about 10mm diameter, or less. The term bifilar means that the two wires are wound through the ring side by side as though they were but one wire.

As the polarity of the pulses from the pulse-transformer to the following diode-bridge mixer is important for correct operation of the mixer, care must be taken to ensure that the connections from transformer to mixer are as indicated by the two black dots on the diagram. The use of different colours for primary and secondary assists with that task.

Positive-going pulses are applied to the balanced-bridge diode mixer via capacitor C27, and negative-going pulses via C26, at an amplitude which is sufficient to overcome the reverse-bias present on the mixer-diodes D5 and D6 respectively. Bridge paths are thereby opened to allow passage of the FM input signal through resistors R39 and R40 in the form of pulses, which are a composite mix of the two signals being applied to the bridge ie the FM input signal f1, and the local oscillator signal f2. The signal voltage developed across high-

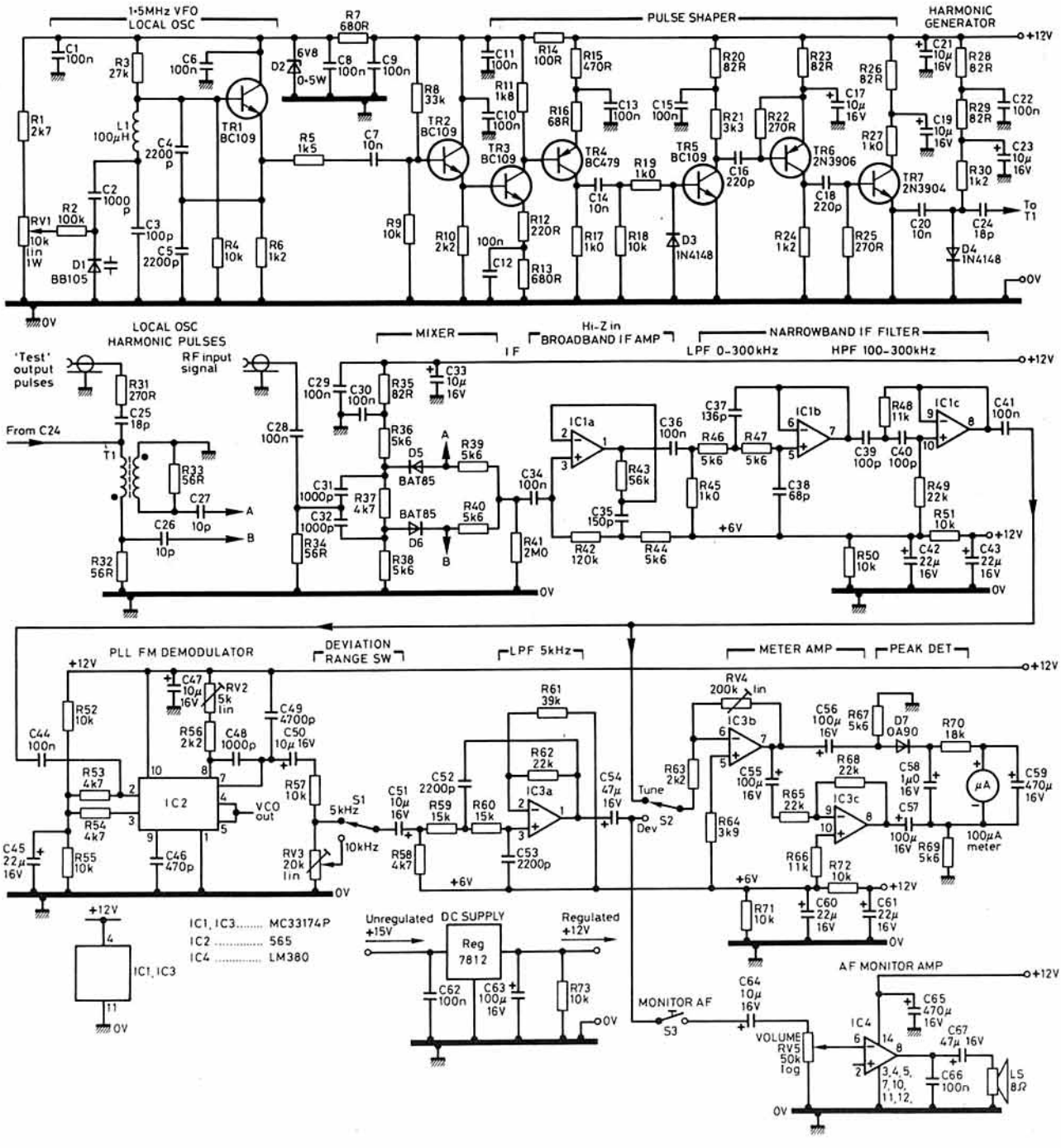

Fig 2. Circuit Diagram of the Project.

value resistor R41, is the algebraic sum of the two omni-directional pulsating signals from mixer diodes D5 and D6 alternatively.

Ideally, the output signal from the mixer should contain no more than the four frequencies f1, f2, f1+f2, and f1-f2, but in this design it contains a very broad spectrum of frequencies due to the harmonically rich local oscillator signal being applied to the bridge-mixer. This however does not present an operational problem, as it is taken care of in subsequent stages which seek to select only the f1-f2 component. From R41, the mixer output signal is passed via capacitor C34 to the input of broadband amplifier IC1a, an operational amplifier configured to present a high input impedance to the input signal from the mixer, with a stage gain of x11 (21dB). Whilst this is an untuned broadband amplifier (hence should strictly speaking not be referred to as an IF amplifier) it is by the very nature of an op amp not capable of amplifying the very high frequencies present at its input, so automatically provides significant attenuation of that range.

The amplified signal from IC1a is then passed through a tuned amplifier centred on 150kHz, to select the intermediate frequency for subsequent processing. This tuned amplifier which shall now be referred to as the IF amplifier consists of two successive unity gain amplifiers IC1b and IC1c. The first stage, IC1b, is arranged as a low-pass filter with a 3dB cut-off frequency of 300kHz, so passing on to the input of the succeeding stage only frequencies below 300kHz. IC1c is configured as a high-pass filter with a 3dB lower cut-off frequency

of 100kHz, hence is capable of passing only frequencies present at its input which are higher than 100kHz. The combined result of these two unity gain filters is to present at the output of IC1c only those frequencies which fall between 100-300kHz.

Actually, due to component tolerances, interstage loading effects and asymmetrical frequency response of the filters, the *in-vivo* pass-band of the prototype IF amplifier peaked at 130kHz, not 150kHz as was the design intent, but this does not detract from the intended performance of the circuit.

The IF signal is now routed via switch S1 to be processed so that the desired function is achieved. The prime function is to provide an indication of the FM Deviation in kHz, the secondary function being to monitor the demodulated AF on the internal loudspeaker.

Before either of these two facilities can be realised, it is necessary for the instrument to be 'tuned' by varying the frequency of the VFO until the local oscillator signal is such that it combines with the incoming FM carrier frequency to produce the required IF.

TUNING

With switch S2 in the 'Tune' position, any IF signal appearing at the output of the IF amplifier will be passed via C41 to the input of the meter amplifier stage IC3b, the gain of which is presettable by adjustment of RV4 in its negative feedback loop, within the range x1-x20 (0-26dB). The output signal voltage from IC3b is capacitively coupled to diode D7, which in association with capacitor C58 acts as a peak-signal detector. The rectified DC voltage appearing across C58 is directly related to the peak amplitude of the IF signal.

To optimise the sensitivity of the peak detector, the amplified IF signal from IC3b is simultaneously fed to a unity gain inverting amplifier IC3c, the output from which is used to enhance the magnitude of the peak voltage developed across C58, thereby allowing the use of a 100 micro-amp meter as the indicator.

Tuning is simplicity itself. The RF signal to be examined is applied to the input socket either directly by coaxial cable, or by plugging into the socket an elementary pick-up antenna of say 10-20cm length. In either case, the instrument will behave correctly with an input signal as low as 5μV pd, but it is better to apply a signal level higher than that, say 50μV.

With zero modulation on the RF carrier, the tuning knob of RV1 is slowly rotated whilst observing the meter, and tuned for maximum deflection of the needle. A number of maxima of different magnitudes will be seen, some of which may be similar. The choice is not critical, one which appears to dominate is selected, and the meter deflection carefully tuned for optimum. Switch S2 is now changed over to the 'Deviation' position, and the instrument is ready to be calibrated for FM deviation.

FM DEMODULATION

The bandwidth of the IF amplifier is more than adequate to handle the range of frequency deviation likely to be met in normal use. Although the prototype described here is calibrated up to 10kHz deviation, it has been satisfactorily tested for linearity of up to 30kHz. FM demodulation of the nominal 150kHz IF signal must of course precede any attempt to measure deviation or to monitor the AF signal.

IC2 is a phase-locked loop (PLL) integrated circuit type 565, which is arranged to act as the FM demodulator. It was chosen for the excellent linearity of relationship between frequency deviation of the input signal and the resultant DC voltage level appearing at the pin 7 output terminal.

Resistors R56 plus RV2, in combination with capacitor C46, determine the free-running frequency of the PLL voltage controlled oscillator, given by:-

$F(vco) = 0{\cdot}3/CR = 100\text{-}300kHz$

Presettable resistor RV2 allows adjustment of the VCO centre frequency to match the nominally 150kHz centre frequency of the FM signal present at the pin 2 input terminal; capacitor C48 offers protection against unwanted RF oscillation within the loop.

Frequency-locking range for this circuit is given by:-

$F(lock) = 0{\cdot}66 \times F(vco) = 100kHz$

Capacitor C49 connected between the output terminal and positive supply rail, in association with an integral 3600ohm resistor within the PLL, forms a low-pass filter which determines the frequency capture range of the loop, the expression for which is:-

$Fc = 0{\cdot}4 \times \sqrt{(F(lock)/CR)} = 31kHz$

The strap between pins 4 and 5 connects the output of the VCO to the phase comparator input, at the same time providing a convenient access point for measurement of the VCO frequency.

Before any attempt is made to calibrate or otherwise use the deviation meter, the free-running frequency of the PLL VCO must first be adjusted to 150kHz by means of preset resistor RV2, with either an oscilloscope or a frequency meter temporarily connected to pins 4 and 5.

When the frequency of the input signal falls within the capture range of the PLL, the loop locks into the input frequency. During lock, the average DC voltage level at pin 7 which is the output of the phase comparator, is directly proportional to the frequency of the input signal. Any subsequent variation in frequency of the input signal causes a change in the DC voltage level at pin 7, which is internally fed back to the voltage-controlled oscillator in an effort to maintain frequency equality between the VCO and the input signal.

The resultant variation in DC voltage level at pin 7 in both magnitude and direction, is in direct linear relationship to the variation in frequency of the input signal ie the frequency deviation of a frequency-modulated signal, hence the phase-locked loop acts as a very linear FM Demodulator. Assuming now that the input signal to the instrument is frequency modulated by an audio frequency source, the demodulated signal appearing at pin 7 of the PLL is a true reproduction of the original AF modulating signal.

This is passed via C50 to a potential divider comprising resistors R57 and RV3 which serve as a voltage attenuator to provide two different levels of output signal. These two levels will be subsequently related to full-scale deflections of the indicating meter to read 5kHz or 10kHz deviation, as selected by the Deviation Range switch S1.

From S1 the AF signal is passed via C51 to the input of IC3a, which is configured as a low-pass filter with an upper cut-off frequency of 5kHz, so filtering out any undesirable higher frequencies from the demodulated signal.

An interesting feature of this particular LPF circuit, is the use of equi-value frequency-determining capacitors and resistors. The stage gain, given in this case by (R63+R64)/R63 is little more than unity at about x1·6 (4·1dB). C54 offers DC isolation whilst passing the AF signal to one of two routes.

AF MONITOR

The AF signal can be fed to the input of the integrated-circuit AF monitor amplifier IC4 whilst the Tone/Dev switch S2 is in the Deviation position, by pressing the push-button switch S3 and adjusting volume level from the internal loudspeaker by means of the panel-mounted volume control RV5.

This allows the content as opposed to the quality of the demodulated signal to be monitored, and the use of a push-switch seeks to deter the operator from trying to use the monitor during the measurement of deviation.

DEVIATION

With switch S2 in the Deviation position, the AF signal from the FM demodulator is fed into the meter amplifier IC3b and IC3c and subsequent peak-detector, the operation of which was described earlier.

There is however a significant difference in the nature of the two signals presented to this stage as selected by the Tune and Deviation positions of switch S2. In the Tune position, the meter will indicate the presence of a signal whether or not it is frequency-modulated, but when the switch is changed over to the Deviation position, the meter will indicate only when there is modulation present on the original carrier signal.

This is because in the absence of frequency modulation, there is but a steady DC voltage at the pin 7 output of the phase-locked loop, hence there is no AC signal to be passed through the IC3a low-pass filter to switch S2 and onward to the meter amplifier.

As the carrier frequency deviates from its centre frequency due to frequency-modulation, so the amplitude on the DC output signal from the PLL increases and decreases in sympathy, to become in effect a low-frequency AC signal. This is a true replica of the original modulating signal, the amplitude of which is directly and linearly related to the peak deviation of the FM carrier signal. The demodulated signal is then passed via S2 and the meter amplifier to the peak detector to produce an indication on the meter which, being linearly related to the peak amplitude of the derived signal, can be calibrated to read frequency deviation.

At zero frequency-modulation the meter will read zero, but will rise from zero as deviation is applied. If the meter deflection is then arranged to indicate full-scale for a known level of frequency-deviation, all readings at full-scale and below can be readily translated into deviation. For example, the 100 microamp meter chosen for use in the prototype came with a linear scale of 0-10, so by pre-adjustment the full-scale reading of 10 was made to coincide with a deviation of 10kHz, hence scale reading 7 = 7kHz, 5 = 5kHz etc down to zero.

RESISTORS

0·25W Metal Film

R32,33,34	56R
R16	68R
R20,23,26,28,29,35	82R
R14	100R
R12	220R
R22,25,31	270R
R15	470R
R13	680R
R17,19,27,45	1k
R6,24,30	1k2
R5	1k5
R11	1k8
R10,56,63	2k2
R1	2k7
R21	3k3
R64	3k9
R37,53,54,58	4k7
R36,38,39,40,44, 46,47,67,69	5k6
R4,9,18,57	10k
R48,66	11k
R59,60	15k
R70	18k
R49,62,65,68	22k
R3	27k
R8	33k
R61	39k
R43	56k
R2	100k
R42	120k
R41 (2 x 1M0)	2M0

0·5W Metal Film

R7	680R
R50,51,52,55,71,72,73	10k

POTENTIOMETERS

RV1	10k Lin, 1W
RV2	5k Lin, min.preset
RV3	20k Lin, min.preset
RV4	200k Lin, min-preset
RV5	50k Log, Carbon, min.vol.control

RV1 and RV5 are panel mounting, all Cermet types except RV5.

CAPACITORS

Ceramic, radial resin-dipped, 63V DC

C16,18	220pF
C2,31,32,48	1000pF
C49	4700pF
C7,14,20	10n
C1,6,8,9,10,11,12,13, 15,22,28,29,30,34,36, 41,44,62,66	100n

Polystyrene, 160V DC

C4,5,52,53	2200pF

Silver-mica, 350V DC

C26,27	10pF
C24,25	18pF
C38	68pF
C3,39,40	100pF
C37 (2 x 68pF)	136pF
C35	150pF
C46	470pF

Electrolytic, 16V DC

C58	1·0μF
C17,19,21,23,33,47,50,51,64	10μF
C42,43,45,60,61	22μF
C54,67	47μF
C55,56,57,63	100μF
C59,65	470μF

SEMICONDUCTORS

IC1,IC3	MC33174P
IC2	565
IC4	LM380
TR1,2,3,5	BC109 or 2N3904
TR4	BC479 or 2N3906
TR6	2N3906
TR7	2N3904
D1	BB105
D2	BZY88, 6V8, 500mW
D3,4	1N4148
D5,6	BAT85
D7	OA90
12V REG	7812

MISCELLANEOUS

L1 RF Inductor	100μH moulded
T1 Pulse-transformer	Ferrite ring 10mm dia.max., 4 turns per winding, bifilar wound
S1,2	SPDT Ultra-min. toggle switch
S3	SP Normally open, min. push-button
Loudspeaker	8ohm miniature
Meter	100 microamp fsd, linear 0-10, 50mm
Enclosure	RF shielded ABS, 190 x 110 x 60mm
Socket, DC input	3·5mm chassis-mounting
Socket, RF signal input	50ohm BNC panel-mounting
Socket, test-pulses out	50ohm BNC panel-mounting

CALIBRATION

As for the calibration of most measuring instruments, the crunch comes with the requirement for a signal source of known accuracy. The ideal source for this particular application would be an RF signal generator with a frequency range 2 to 450MHz, a frequency-modulation facility with calibrated deviation from zero to 30kHz at an audio-frequency of 1kHz, and with calibrated output attenuation of the output signal down to 5μV pd into 50ohms. Assuming the availability of such a signal source, the signal generator is connected to the FM input socket of the deviation meter to provide a signal of 50μV pd at 50MHz, initially with zero deviation.

With the deviation meter switched on, and with the Tune/Dev switch S2 set to the Tune position, the VFO external tuning knob is slowly rotated until a maximum deflection is obtained on the meter. If the meter deflection is greater than full-scale, the output attenuator of the signal generator must be adjusted to bring the tuning-maximum back onto scale.

A number of maxima of differing amplitudes will be observed as the tuning knob is rotated, the choice of which is not critical. It is sufficient to opt for one which appears to be dominant, and carefully tune for maximum. On switching now from Tune to Dev the meter reading will fall to zero, because the input signal is not as yet being frequency-modulated.

With the deviation range switch of the deviation meter at its 5kHz position, frequency-modulation at the audio frequency of 1kHz and with a deviation of 5kHz, is now applied to the carrier signal. The resultant meter deflection is then adjusted by preset resistor RV4 in the meter amplifier feed-back loop, until the meter indicates exactly full-scale.

The deviation meter is switched to its 10kHz range, and the meter deflection will fall from full-scale to a lesser reading. Preset resistor RV3 at the output of the phase-locked loop IC2 is then adjusted until the meter reading is exactly at mid-scale. Assuming that the meter is scaled 0-10, it will be reading 5 to signify a measured deviation of 5kHz at mid-scale on the 0-10kHz range.

Deviation of the FM signal at the signal generator is now increased to precisely 10kHz, at which setting the deviation meter should indicate full-scale. If not, a slight readjustment of RV3 is called for. Deviation is now decreased in steps of 1kHz from 10kHz to zero, to confirm true linearity of the indicating meter circuit.

While the signal generator is still connected but with zero frequency deviation, it would be prudent to determine the upper-frequency limit of the deviation meter by switching to the Tune position and progressively increasing the carrier frequency in sensible increments and returning at each step, until it is no longer possible to obtain a suitable maximum on the meter. If required, the frequency tuning-range of the VFO may be conveniently measured at the test pulses output socket.

The instrument is now ready for use.

POWER SUPPLY

A single-supply voltage philosophy is adopted for the deviation meter via an integral 12V regulator, so ensuring stability of deviation calibration whilst affording a degree of flexibility in the choice of externally supplied DC voltage level.

All of the discrete transistors are fed from the full +12V regulated rail, except the VFO, the supply for which is further stabilised by a 6V8 zener diode. Split-voltage supplies for IC1, IC2 and IC3 are provided by resistive potential-dividers, with appropriate capacitive decoupling.

Adequate decoupling of the DC supply connections is of the utmost importance in this circuit because of the pulsed nature of the local oscillator and mixer signals, hence the provision of low value decoupling capacitors to filter out the higher frequencies from the supply rails, and microfarad values to deal with the lower frequencies.

CONSTRUCTION

The prototype circuit was constructed on SRBP copper stripboard of 0·1 inch hole-spacing and dual parallel lanes were allocated on the stripboard for each of the several DC supply and return rails.

Component layout is not critical, provided that as with any HF circuit, due attention is given to the shortness of component leads and interconnecting wires, and to mechanical rigidity. Sub-miniature 50ohm coaxial cable is employed for the interconnection between signal input socket and mixer, and miniature screened cable is used between all other panel-mounted components and the circuit board.

The RF screened enclosure is electrically bonded to the negative supply terminal, shown on the circuit diagram as the 0v rail, and the decoupling capacitors associated with the integrated circuits should be connected directly between the supply pins of the appropriate IC.

The panel-mounted miniature volume control was found to be not really necessary in practice, so this could be replaced by a pre-settable potentiometer mounted internally on the circuit board.

As the upper operational frequency limit of the instrument is largely determined by the performance of the local oscillator harmonic-generator diode D4, pulse-transformer T1 and the D5/D6 diode-mixer circuit, particular care should be taken to ensure shortness of component leads and symmetry of component layout for this section of the circuit.

It is worth noting that a suitable Step Recovery Diode and pre-wound ferrite pulse-transformer were seen to be available from J Birkett Ltd at about £1 each. □

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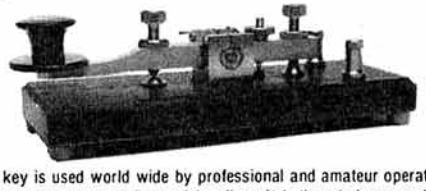

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YAESU MUSEN FT-747GX HF TRANSCEIVER

Peter Hart, G3SJX, investigates Yaesu's budget HF transceiver — does it offer good value for money?

A top flight HF transceiver, designed to meet present day needs, is a sophisticated piece of electronics. Even stripped of frills, a basic transceiver capable of supporting SSB and CW operation on nine amateur bands with 100watts of transmit power is a complex item, and represents a substantial investment. Although circa £1000 seems a high price to pay, the real cost of a transceiver in relation to earnings has continued to reduce since such items first became available. The improvement in value for money is further enhanced by the growing number of features provided. Indeed, it would be surprising, with the advancement of technology, if this was not the case.

This is little consolation for someone with a limited budget wishing to purchase an HF rig, however. My first transceiver (an FT101 Mk1) was purchased in 1971, at a cost of £240. Having just left University and started work, this represented nearly 2 months' salary. Someone in a similar position today could expect to purchase an excellent rig on a similar proportion of salary.

Yaesu introduced the FT-747GX early in 1988 to satisfy the demand for a minimum-cost set which still provided the essential features - an HF amateur bands transceiver including a general coverage receiver, multimode operation and a transmitter with 100W power capability. Additional hardware features such as speech processor and variable IF bandwidth have been omitted as these generally are expensive to implement. Software features come cheap, however, and so this rig retains the full complement of memories and scanning options.

PRINCIPAL FEATURES

The FT-747GX is a small, lightweight transceiver for 12V operation covering the frequency range 100kHz to 30MHz. Transmission is limited to segments around the amateur allocations. USB, LSB, CW and AM modes are included as standard, with FM as an optional extra. The review transceiver was equipped for FM operation.

The rotary tuning knob tunes in two selectable step sizes which are also mode dependant at 50 steps per revolution. On SSB/CW the step sizes are 25Hz or 2.5kHz (1.25/125kHz per revolution), on AM 1kHz or 10kHz per step (50kHz/500kHz per revolution) and on FM 5kHz or 12.5kHz per step (250kHz/625kHz per revolution). In addition, the tuning may be stepped from the microphone or via the computer interface. Band changing is also effected through the rotary tuning knob at 500kHz per step or at a giant 5MHz per step. Twin VFOs are provided which also store mode and may be used split over any separation.

In addition to the VFOs, 20 memories are included, also storing mode and both frequencies for split operation. The memories and VFOs are battery backed using a lithium cell for a claimed period of at least 5 years. The battery is easy to change, when required, being located in an accessible position on the rear of the front panel PCB. Scanning operates only on the memories and features selective memory scanning and auto-resume. Priority monitoring of a memory channel every four seconds when on VFO operation is also provided.

The display uses a backlit LCD panel with a wide viewing angle (often a problem with LCD displays). The display is bright and easy to read even under conditions of high ambient lighting such as direct sunlight; LED displays and, to a lesser extent, fluorescent displays perform poorly in direct sunlight. The display indicates frequency to 100Hz resolution, memory channel number, mode and various status indicators for the VFOs/scanning/memories.

Receiver functions include a noise blanker, switchable input attenuator, clarifier and all-mode squelch. Narrow CW and wider AM filters are also provided as standard, but the AGC time constant is not selectable. As supplied, SSB and AM modes have a slow decay characteristic with fast decay on CW and FM. An internal switch allows the selection of slow decay in all modes. There is no RF gain control, notch or variable bandwidth facility.

Transmitter functions include semi break-in on CW and thermostatically operated fan. Metering is only for relative power output on transmit (S-meter on receive of course). Speech processor and VOX are not provided.

A serial computer interface at 4800 bits/sec allows control of all frequency functions (VFOs, memories, clarifier), mode and narrow filter selection. This is common with other Yaesu rigs.

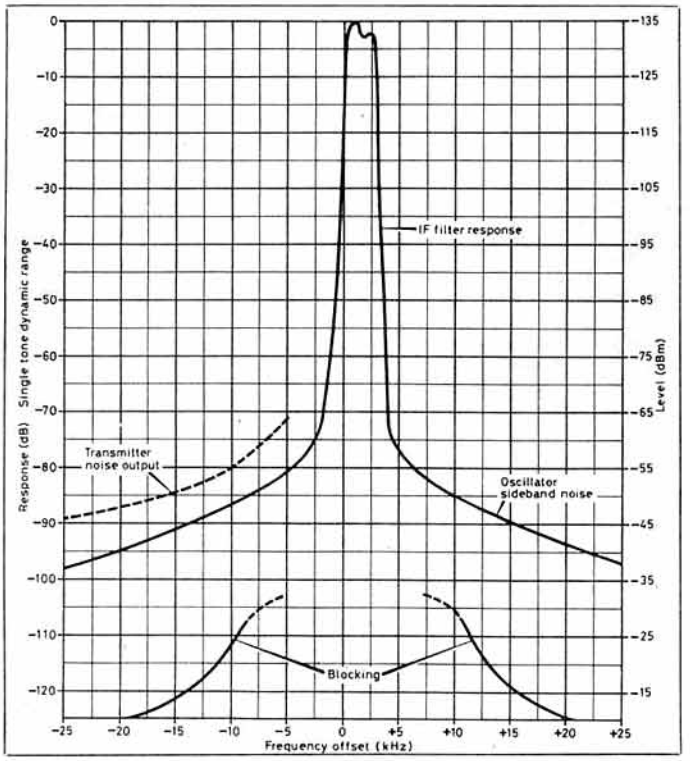
The rear panel carries connectors for 12V power input, antenna, key, external speaker, accessory power output, PTT, AF output and external ALC from a linear amplifier. An 8-pin DIN connector interfaces band data to the FC-757AT and FC-1000 antenna tuners or the FL-7000 linear amplifier. The computer interface is a 6-pin DIN connector which provides PTT and AGC lines in addition to the serial data link. Squelch status, eg for packet control, is not available on the rear panel and a transverter drive capability is not provided. The rear panel gives access to the carrier frequency adjust presets. For control of external linears, the normal relay contact is replaced by a switching transistor (150V/1.5A max). If the linear is not compatible with this switching, an external relay box is available, model FRB-757.

DESCRIPTION

The FT-747GX measures 238W by 93H by 238Dmm and weighs a remarkably light 3.3kg. This has been achieved by eliminating the conventional steel chassis and adopting a plastic case and front panel; the inside surface of the case and panel is metallised to provide screening. Low cost constructional techniques have been used: the case clips together in two parts, without screws, and it is very quick to remove the top. As can be seen from the photograph, most of the circuitry is built on three main PC boards. A diecast box with integral heatsink and fan contains the PA unit and output filters.

The front panel carries just three rotary controls (two are dual concentric) and the remaining functions are selected by push buttons. The mode and VFO/memory buttons provide a two-way toggle action. Pushing the left side of the mode button steps through the modes in one sequence, and pushing the right side steps through the modes in reverse sequence. Room has been found on the front panel for a forward-facing speaker. This is the ideal location but most rigs usually have too many controls to make this possible. The speaker is, unfortunately, rather small at about 5cm diameter.

The receiver is double conversion with IFs of 47.055MHz and 8.215MHz. The main IF selectivity is achieved at 8.215MHz. There is no RF amplifier - input signals feed directly into a push-pull 2SK125 mixer, a well proven approach for high dynamic range. On FM, a third



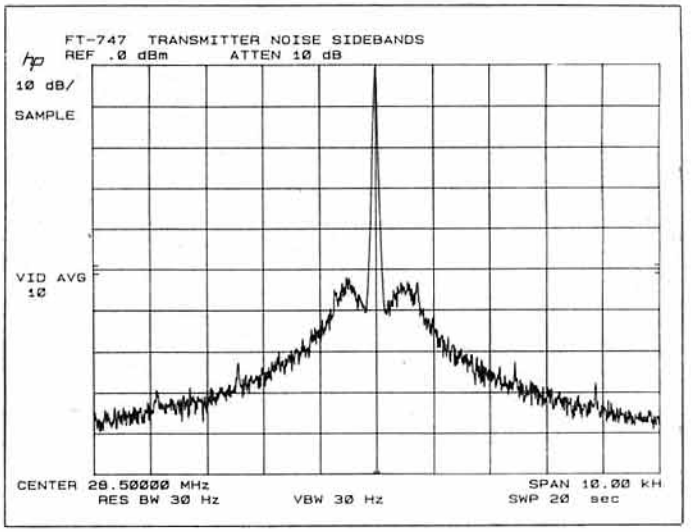


Fig. 1 Effective selectivity curve for SSB

Fig. 2 Transmitter norse side bands on 28MHz Horizontal scale 1 kHz/dzv, Vertical scale 10dB/dzv

conversion to 455kHz is used. The transmit signal is generated at 8.215MHz and mixed via 47.055MHz to the final frequency. The frequency synthesiser provides the oscillator source for the signal frequency mixer only and uses a dual loop design. A single micro-controller is used.

MEASUREMENTS

Results of the measurements are provided in the accompanying table. Additional comments are as follows.

RECEIVER MEASUREMENTS

SENSITIVITY

The sensitivity is fairly typical of most rigs and adequate for all normal antennas including mobile antennas. The sensitivity reduced by 20dB with the attenuator switched in.

S-METER CALIBRATION

The S meter calibration was similar on all modes including FM which is welcome. The figures are fairly typical of most rigs.

SPURIOUS REJECTION

Rejection of the 47.055MHz IF and primary image response is given in the table. Rejection of the 8.215MHz IF was in excess of 80dB except on 10MHz (74dB). All other responses were at least 90dB down. These are very good figures. With the antenna terminated in 50ohms, only one or two very weak internal spurii were heard and only the very strongest broadcast stations around 7MHz could be weakly heard. The case metallisation seemed very effective.

SELECTIVITY

Reciprocal mixing limited measurements to only 50dB down the filter characteristic. The SSB filter exhibited 3dB passband ripple which is somewhat on the high side. The selectivity/adjacent channel performance on FM was not measured. However, it was noted that the selectivity in the S-meter circuit was much wider than in the signal path giving a spurious reading on strong adjacent signals.

STRONG SIGNAL PERFORMANCE

The input intercept and front-end dynamic range for wide spaced signals is excellent, particularly at the higher frequencies. The close-in intercept degrades but not as much as many other far more expensive rigs.

The main problem is frequency synthesiser oscillator sideband noise giving poor reciprocal mixing figures close in to the carrier. The front-end design is good but the synthesiser is poor. The reciprocal mixing figures are identical to the FT-757GX figures (see Ref 1) Fig 1 shows the combined results of selectivity and reciprocal mixing.

In-band linearity is poor at higher signal levels. This normally improves as the RF gain control is reduced but unfortunately there is no RF gain control on this rig.

TRANSMITTER MEASUREMENTS

POWER OUTPUT

The front panel drive control gave smooth control of power down to below 1 watt output on CW but was disabled on SSB.

SPURIOUS OUTPUTS

Harmonic and discrete spurious outputs were generally acceptable. On 10,18 and 24MHz, a number of low level spurs between -70 and -80dB were observed.

TRANSMITTER NOISE OUTPUT

A plot of the close-in transmitter noise output is shown in **Fig 2**. This is a poor result but transmitter noise seems to be a problem with many rigs on the market today. The figures are virtually identical to the FT-757GX (see Ref 1)

SSB DISTORTION

Intermodulation products were generally on the high side. Higher order products at ±10kHz were -65 to -70dB and at ±20kHz, -75 to -80dB.

CW KEYING PERFORMANCE

Fig 3 shows the CW keying waveform at 40wpm. The character is relatively undistorted. The rising edge is well rounded although the trailing edge is a little sharp.

TRANSMIT-RECEIVE SWITCHING SPEED

Transmit and receive recovery times are just about adequate for satisfactory operation on AMTOR and Packet.

ON-THE-AIR PERFORMANCE

The FT-747GX was used from the home QTH and briefly from the car over a two-month period. During this time, a fault developed in the local unit but this was quickly repaired by the suppliers. The front-end performance in terms of sensitivity and intermodulation was good, and the input attenuator was not required very often, even on the LF bands. However, the receiver sounded rather noisy in crowded band conditions which is a direct consequence of the poor reciprocal mixing performance. The narrow CW filter is a useful feature to include in a low cost rig.

The quality from the internal speaker left much to be desired. The sound was "boxy" and rattled at higher listening levels.

The performance on AM broadcast stations with the wider filter was good although the

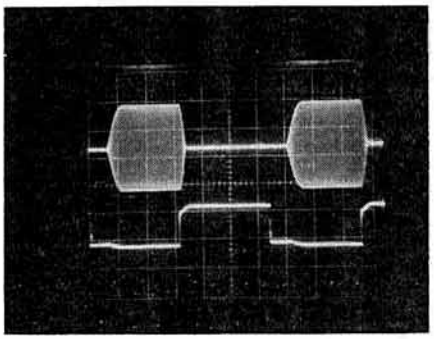


Fig. 3 RF envelope (upper) and keying waveform (lower) at 40 wpm. Horizontal scale 10mS/div

narrower SSB filter was of little use in this mode. A 9kHz step size for the frequency synthesiser would have been useful for medium wave use.

My major criticism with this rig is tuning ergonomics. I did not like the click-step tuning knob and with only 50 steps per revolution, tuning is painfully slow. A finger hole in the tuning knob would help here! In the fast position, the tuning rate is too course to achieve other than the selection of a wanted area of band. The result is a constant to-ing and fro-ing between the tuning knob and fast/slow button, and this is awkward for mobile operation. However, for mobile operation there is no danger of the tuning control inadvertently moving and the memories are easily selected. Band changing is cumbersome, requiring pushing the band button, turning the tuning knob and pushing the band button again. However, on the positive side, the front panel is uncluttered, easy to operate and the display most readable. The buttons are a substantial size and the ergonomics of mode and memory selection are good.

On SSB transmit, the rig was used with the MH-18B hand microphone. Reports on quality were reasonable although some sibilance was noted. The transmission was reported as fairly narrow. There is no power control on SSB as the drive control is inoperative, so reducing power (eg on 1.8MHz) is a problem in this mode.

On CW, although key clicks were minimal, keyed noise was audible to local stations up to 10kHz either side of the transmitted frequency. This is not uncommon with many present day rigs unfortunately. The sidetone level is presettable through a hole in the bottom panel.

The fan is exceptionally noisy but seems efficient at cooling the rig.

CONCLUSIONS

The FT-747GX is by far the cheapest full power HF SSB transceiver currently available. This must be borne in mind when comparing performance. Overall, the electrical performance is good; the only shortcoming is the frequency synthesiser noise. It is one of the poorer rigs on the market in this respect but by no means the worst.

My major criticism is tuning ergonomics. For very little extra cost this could have been improved.

Although this rig does not contain the bells and whistles of its more expensive brothers, it contains all the essential features including mode optimised filters as standard fitment.

The current list price is £659 inc VAT, although it is possible to purchase it for less than £800. This is over £100 less than the nearest competive product. To this must be added the cost of a microphone and suitable PSU if not already available. This can add a further £200.

ACKNOWLEDGEMENTS

I would like to thank South Midlands Communications for the loan of the rig and the various stations worked who provided comments. □

REFERENCES

[1] 'The Yaesu Musen FT757GX HF transceiver' P.J.Hart, G3SJX. *RadCom* May 1985, pp 352-6.

FT-747GX MEASURED PERFORMANCE

RECEIVER MEASUREMENTS

Frequency	Sensitivity SSB 10dB+n:n	Input for S9	Image rejection	47.055MHz IF rejection
1.8MHz	0.13μV (-125dBm)	35μV	94dB	82dB
3.5MHz	0.13μV (-125dBm)	35μV	92dB	84dB
7MHz	0.13μV (-125dBm)	32μV	92dB	83dB
10MHz	0.18μV (-122dBm)	35μV	87dB	87dB
14MHz	0.11μV (-126dBm)	28μV	90dB	90dB
18MHz	0.2μV (-121dBm)	40μV	85dB	88dB
21MHz	0.13μV (-125dBm)	32μV	87dB	92dB
24MHz	0.13μV (-125dBm)	35μV	86dB	79dB
28MHz	0.14μV (-126dBm)	35μV	83dB	78dB

AM sensitivity (28MHz): 0.8μV for 10dB+n:n at 30% mod depth
FM sensitivity (28MHz): 0.28μV for 12dB SINAD 3kHz pk deviation
AGC threshold: 1.4mV 100dB above threshold for +2.5dB audio output
AGC attack time: 1ms (CW/FM) 2ms (SSB/AM)
AGC decay time: 0.1-0.3s (CW/FM), 1-2s (SSB/AM)
Max audio before clipping: 1.1W into 8ohm at 3% distortion
Inband intermodulation products: -26 to -35dB

Inter-modulation Frequency	(50kHz tone spacing) 3rd order intercept	2 tone dynamic range
1.8MHz	+3dBm	92dB
3.5MHz	+9dBm	96dB
7MHz	+11dBm	97dB
14MHz	+14dBm	100dB
21MHz	+15dBm	100dB
28MHz	+20dBm	102dB

S-Reading (14MHz)	Input level SSB
S3	3.2μV
S5	7μV
S7	16μV
S9	28μV
S9+20	180μV
S9+40	1.8mV
S9+60	5.6mV

Tone spacing (7MHz band)	3rd order intercept	2 tone dynamic range
5kHz	-16dBm	80dB
10kHz	-1dBm	90dB
15kHz	+5dBm	93dB
20kHz	+10dBm	96dB
<25kHz	+11dBm	97dB

TX noise Frequency offset	Reciprocal mixing for 3dB noise	Blocking	wrt carrier in 2.5kHz bandwidth
5kHz	79dB	not meas.	-71dB
10kHz	85dB	-27dBm	-80dB
15kHz	90dB	-15dBm	
20kHz	94dB	-10dBm	-87dB
30kHz	98dB	-2dBm	
50kHz	104dB	0dBm	-96dB
100kHz	110dB	0dBm	
200kHz	118dB	0dBm	

SELECTIVITY response	SSB/CW(W)/AM(N)	BANDWIDTH AM(W)	CW(N)
-6dB	2.58kHz	6.45kHz	530Hz
-50dB	4.42kHz	10.79kHz	1100Hz

TRANSMITTER MEASUREMENTS

Frequency	CW power output	SSB(PEP) power output	Intermodulation products harmonics	third order	fifth order
1.8MHz	110W	115W	-54dB	-25dB	-48dB
3.5MHz	111W	118W	-58dB	-24dB	-40dB
7MHz	111W	115W	-58dB	-15dB	-30dB
10MHz	110W	115W	-52dB	-20dB	-35dB
14MHz	111W	116W	-55dB	-20dB	-38dB
18MHz	111W	116W	-58dB	-20dB	-38dB
21MHz	111W	118W	-58dB	-20dB	-42dB
24MHz	111W	118W	-58dB	-20dB	-43dB
28MHz	113W	118W	-58dB	-24dB	-40dB

Carrier suppression: -46dB
Sideband suppression: >-60dB at 1kHz
Transmitter noise: see table above
Transmitter AF response at -6dB: 550-2770Hz (LSB and USB)
Transmitter AF distortion: 1% at 10mV input. 10% at 100mV input
Microphone input sensitivity: >1mV for full output FM peak deviation: 2.5kHz
T/R switching speed (SSB): mute-TX 22ms, TX-mute 3ms, mute-RX 22ms, RX-mute 1ms

Power into load mismatch: 2:1 VSWR 42-70W, 3:1 VSWR 22-38W
Frequency accuracy (transmit and receive): within display resolution of 100Hz

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

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73 from Dave G4KQH, Technical Manager

NEIL LASHER, G6HIU
40 Farm Road, Edgware, Middx
HA8 9LT

DataSpace '89

We have a new event this year. It's to be named DataSpace '89, and will be an amalgamation of the RSGB Data Symposium and AMSAT-UK Colloquiums, each of which proved to be outright successes last year. The RSGB and AMSAT-UK have decided to link their events in order to allow more people, especially overseas visitors, to attend both events without making two trips away from home.

A date has been set for 28-30 July, and the venue is to be The Surrey University at Guildford.

Ron Broadbent, G3AAJ, will once again be heavily involved in planning and organising both events. Four days will be crammed into three this year, the middle day being occupied with items of interest to both groups. Everyone is confident that the added attractions for both groups, this event will be even more popular than the last ones, and so should not be missed.

HF packet news

A lot's been going on in the HF packet scene since this column last appeared.

New licenses have been issued on 14MHz - namely GB7BNI located in Belfast and GB7GUR in Guernsey. The DTI have approved three frequencies: 14.093MHz, 14.097MHz and 14.103MHz. Both stations are likely to use 14.103MHz initially.

Applications for 14MHz are going through a lot quicker than usual because 14MHz is an exclusive amateur band.

The use of 29.250MHz for 1200 baud FM packet radio has now taken off. An application for a mailbox (GB7MAC) in Airdrie is with the DTI. Mention has also been made of a node in Bradford with a very good link to a German mailbox. When conditions are good, are we going to see live paths to the USA on 10m FM?

For the future it is hoped that international packet bandplanning agreements can be reached at the Region 1 conference of the IARU in 1990. This should ensure that the frequencies in use for mailboxes licensed by the DTI match those in use by other mailboxes in Europe and Africa. The Society is putting forward its own proposals.

VHF/UHF packet system operators

The current list of mailbox Notices of Variation (NOV's) issued has passed the 120 mark and about four are being processed every week. It will be interesting to see how many Mailboxes disappear after the first six months when the initial novelty wears off. It is only then that the true network will be able to establish itself and for any need for further links in outlying areas to become apparent.

Two new pieces of mailbox software arrived at the end of March - WORLI 10.0 and YFB 2.05 (quickly followed by ver 2.07). My report this month dwells on the latter package by Steve Coleman, G4YFB. Next month I hope to have received enough reports to do the same for WORLI 10.0.

G4YFB mailbox software

My first impression is that this software emulates the WA7MBL variety because the commands are very similar and the page layout could easily be mistaken for MBL. But that is where the similarity ends.

Using Desqview, the software will run in a window as small as 64k, which permits four windows on a basic machine with 640k. That includes the BIOS program and a utility called Manager. This utility is probably one of its best attractions because it completely removes the need for Btrieve which in the past has been one of the main causes of system crashes and corrupt files.

The forward files are simple, although currently a DOS command cannot be issued; version 2.1 due very shortly will alleviate this. Export commands are possible, but there seems to be a fault with the Import command. If the past few weeks are anything to go by this problem will be solved very quickly, because this software is English and written by a very willing and helpful amateur whose only wish is to improve it and correct faults almost overnight.

Having run this software alongside G8BPQ (The Node) for a little while, I can report that it is probably the best I've used to date. It incorporates auto-killing of bulletins (like MBL 5.12) and there's a list of future additions that will put this mailbox software among the best in the world. If your appetite has been moistened, copies are available by sending a formatted IBM-compatible disk to the distributor, G4MTP (QTHR).

9600baud Links

First reports indicate that this speed is being accepted as a very favourable step forward. Some people seem to think that 9600baud is only for 1296MHz, but this is most definitely not true; there is no reason at all why experimentation should not take place on 70cm, or even 50MHz. The frequency of 432.625MHz has, in fact, already been set aside for it. Note that all UHF licence applications are now being made for six frequencies (see table above).

TABLE 1 —

UHF PACKET LICENCE APPLICATION FREQUENCIES

432.625MHz	9600baud links
432.650MHz	1200baud links
432.675MHz	User access and links
433.625MHz	TCP/IP and real-time
433.650MHz	User access only
433.675MHz	User access only

On 1296MHz there seem to be a few problems with equipment - on the first count the RSGB circuit available has a few difficult-to-obtain components, and on the second the Cirkit RX board is presently unavailable owing to redesign through obsolete components. Here is a great opportunity for all budding designers to develop a one-box 1296MHz/9600baud packet terminal.

Nodes

News on the node front includes the closure of G4FAT's station at Malvern. Fortunately, however, there's an increase of nodes plus some better routing owing to more mailboxes running the G8BPQ software. There has been a big increase in node traffic in the London area with three new ones recently introduced: G0BST-1 Harrow, G6NHU-1 Ealing and G6HIU-1 Middlesex.

Licences

For the benefit of system operators I'll include a brief mention of licences.

News just received from the DTI states that they have issued the licence for GB7HH. This will be a 4m node to be located in Hemel Hempstead, Hertfordshire.

The DTI is at present processing many applications for UHF packet licences, although very few have been issued since Christmas. Several stations are nearing completion, and I will try to keep you informed of their appearance as soon as they 'happen'.

Packet end-users

Your local mailbox.

Many Mailboxes in the country will be making changes by switching to later versions of software. The first thing your local System Operator (SysOp) will need are some good reports on how his system is working, as it is the user who will detect any bugs or problems long before the SySop discovers them. Do, therefore, report any problems no matter how trivial they appear to be.

Many new commands will become available, and so a list for the latest MBL 5.12. WORLI 10.0 and YFB 2.06 will be published in this column next month. I will also include a command list for mailbox Nodes.

Below you will find a list of mailboxes that have had a NOV issued. Owing to the ever changing state of packet radio this is the most up to date list available and replaces the list that has been published in the new RSGB Callbook.

Too much traffic?...

Have you noticed how an increase in traffic has slowed the network down? What can be done to resolve the situation?

The answers to these vital questions lie with you, the user. If

LICENSED DATA MAILBOXES AT 28/3/89

All mailboxes are operational on 144.650MHz except where specifically stated otherwise.
Ports for bands other than 50MHz and 1.3GHz require DTI clearance and those marked "applied for" have been submitted to the DTI by the RSGB.

Mailbox	SysOp	Location	Notes
GB3KP	G8LWY	Kingston, Surrey	430MHz port (GB7KUT) applied for
GB3UP	G0/K8KA	Guildford, Surrey	DCE Satellite gateway operational
GB7PLX	G3PLX	Gosport, Hants	(HF AMTOR ONLY) 3.5MHz, 7MHz, 10MHz, 14MHz and 28MHz ports applied for
GB7AAA	G0HWC	Northampton	
GB7ABC	GW3TMH	Rhyl	
GB7AEU	G4AEU	Southampton	
GB7AKE	G6AKE	Shrewsbury	
GB7AOB	GM8AOB	Fort William	
GB7APC	G1APC	Swindon	
GB7AVM	G0DFP	Chinnor, Oxford	Formerly GB7DFP
GB7AWA	GM4AWA	Scone, Perth	
GB7BBS	G1DIL	Highley, Shropshire	430MHz applied for
GB7BEQ	G0BEQ	Swindon	
GB7BLY	G8UVE	Burnley	
GB7BMX	G1YAA	Alnwick, Northumbs	
GB7BNI	GI4XFN	Belfast	3.5MHz port applied for. 14MHz port licensed
GB7BNM	G4WPT	Wimborne, Dorset	
GB7BPL	G4YVQ	Blackpool, Lancs	
GB7BRK	G1AWD	Reading	
GB7BST	G0BST	Northwood	430MHz port applied for
GB7BYS	G1BYS	Bromley	
GB7CDM	G4BVE	Northwich	430MHz port applied for
GB7CHS	G3WCS	Northwich	430MHz port applied for
GB7CQV	GM0CQV	Aberdeen	
GB7CRG	G4WSD	Knutsford, Cheshire	
GB7CYM	G1FTA	York	
GB7DAD	G3MME	Matlock	430MHz port applied for
GB7DDX	G0DDX	Cambridge	
GB7DFT	G1DFT	Southport, Mersey	
GB7DGK	G4DGK	London	
GB7DOV	G4BBH	Dover	Closed down

continued on next page

continued from previous page

GB7DQW	G0DQW	Evesham, Worcs	432.675MHz port operational.
GB7ELO	G1SJU	East Ham, London	Formerly GB7SJU.
GB7ERA	G0DXX	Evesham, Worcs	432.675MHz port operational. 3.5MHz and 70MHz ports applied for
GB7ESX	G1NNB	Witham, Essex	430MHz port applied for
GB7EYM	G4HRM	Scarborough, N.Yorks	
GB7FCI	G6FCI	Blackpool	
GB7FRI	GM0FRI	Oban	
GB7GLW	GM4HCO	Glasgow	
GB7GMX	G3VOM	Manchester	
GB7GUR	GU4YMV	Guernsey	432.675MHz port operational. 3.5MHz port applied for. 14MHz port operational
GB7HAS	G1HSM	Hastings, E.Sussex	
GB7HDS	G4HDS	Peterlee, Durham.	Operational on 50.650MHz. 430MHz port applied for
GB7HEZ	GW8HEZ	Penarth, S.Glamorgan	
GB7HFF	GM4PLM	Paisley	
GB7HHH	G3OUF	Hemel Hempstead	50.670MHz port operational. 430MHz port application with DTI. 1.3GHz forwarding port operational. No 144MHz port.
GB7HIU	G6HIU	Edgware	430MHz port applied for
GB7HJP	G6HJP	Portsmouth, Hants	
GB7HMI	GI3TLT	Newtownards, Co.Down	
GB7HQQ	GB3RS	RSGB HQ, Potters Bar, Herts.	Formerly GB3HQ. Dedicated use port operational on 433.650MHz. 1.3GHz forwarding port operational.
GB7HSN	G1HSN	London	
GB7HUD	G0EOJ	Huddersfield	430MHz port applied for
GB7HXA	G4UXV	Huntingdon	
GB7ILO	G3ILO	Nailsworth, Glos	
GB7IMB	G8IMB	Bristol	430MHz port applied for
GB7JSC	GM1VBE	Bothwell	430MHz port applied for
GB7JTY	G4JTY	Daventry	
GB7KCM	G4KCM	Southampton	
GB7KEV	G3KEV	Scarborough, N.Yorks	
GB7KHW	G6KHW	Biggleswade	
GB7KIC	G0KIC	Andover, Hants	
GB7KJL	G0JNH	Stockport, Cheshire	
GB7KLX	G4KLX	Bolehill, Derbys	
GB7KVD	G1KVD	Taunton.	
GB7LDI	G3LDI	Norwich	3.5MHz, 14MHz, and 21MHz ports applied for.
GB7LED	G4XMH	Nottingham	
GB7LIV	G4LBJ	Liverpool	
GB7LNX	G4GOU	Lincoln	
GB7LRG	G0CND	Leicester	
GB7LRS	G8FCQ	Leicester	No 144MHz port
GB7MAC	GM4AUP	Airdrie	3.5MHz, 29MHz FM, and 430MHz ports applied for
GB7MAN	GD7BMG	Douglas, Isle of Man	
GB7MAX	G4JBX	Tamworth	
GB7MPE	G6MPE	Brighton	Formerly GB7VRB. Closed down.
GB7MUM	G6HOQ	Brinsley, Notts.	
GB7MXM	G4GBA	Stowmarket	
GB7NEM	G8EIA	Middlesborough	
GB7NET	GM7AOM	Larkhall, Lanarks	
GB7NHU	G6NHU	Perivale, Middx	
GB7NNA	G1NNA	Witham, Essex	
GB7NOS	GM0HBI	Golspie, Sutherland	
GB7NRC	G4NRC	Melton Mowbray	
GB7NTS	G4MTP	Daventry	50.670MHz port operational. 70.4875MHz port (GB7MTP-4) licensed. 430MHz port (GB7MTP-7) licensed. 1.3GHz forwarding port operational.
GB7NUN	G1KBB	Nuneaton	
GB7NWI	G4TUP	Southport	
GB7NWP	G1ULA	Altrincham	430MHz port applied for
GB7OAR	G4OAR	Birkenhead, Mersey	
GB7OCN	G1OCN	Portland	430MHz port applied for
GB7PEN	G6BSK	Penrith	
GB7PET	G4PYR	Peterborough	
GB7PHL	G4PHL	Sheffield	Closed down
GB7PLY	G0BSX	Plymouth	3.5MHz port applied for
GB7PVR	G1PVR	Bicester	
GB7RDG	G4YFB	Reading	
GB7RMN	G4RMN	Norwich, Norfolk	
GB7RTJ	G3RTJ	Market Harborough	
GB7SAM	G3TJP	Newcastle, Staffs	
GB7SAN	GM3SAN	Glasgow	
GB7SAU	GM8SAU	North Uist	
GB7SCA	G4SCA	Plymouth, Devon	
GB7SEK	G4IDX	Ashford, Kent	432.675MHz port operational. 3.5MHz and 28MHz ports applied for
GB7SIG	G6FPC	Blandford, Dorset	
GB7SNE	GM8SNE	Dunfermline	
GB7SPV	G4SPV	Stevenage	430MHz port applied for
GB7SRL	GM4SRL	Netherlee, Glasgow	
GB7SUF	GM4SUF	Edderton, Ross-shire	No 144MHz port
GB7SUT	G8AMD	Sutton Coldfield	Forwarding port on 1.3GHz
GB7TCM	G8ADH	Upton on Severn	
GB7TED	GI4AHP	Belfast	
GB7TLH	G1TLH	E. Dereham, Norfolk	
GB7TVM	G1HZI	Hexham	
GB7TXA	G4TXA	Basingstoke	
GB7UWS	G1UWS	Eltham	
GB7VLS	G4VLS	Norwich	
GB7VMR	G3VMR	Maidenhead, Berks	
GB7VRB	G8VEH	Lancing, W.Sussex	
GB7WIR	G1LMI	Slough	
GB7WMR	G7APL	Birmingham	
GB7WOK	G3WGV	Wokingham	
GB7WQM	GW1WQM	Milford Haven, Dyfed	
GB7WRI	GI4WRI	Co.Antrim	
GB7XJZ	G6XJZ	Eastleigh	
GB7YAX	G4CLI	Wakefield	
GB7YHF	G4SEQ	Batley, W. Yorks	
GB7ZAA	G6ZAA	Canterbury	
GB7ZBA	G4ZBA	Norwich	
GB7ZPU	G1ZPU	Sandy	50.670MHz port operational. 430MHz port applied for
GB7ZZZ	G1TDM	Burgess Hill,W.Sussex	

you are having a live QSO with a local station why not QSY to another frequency? The smaller the traffic on the frequency set aside for mailboxes the quicker the mail and the better your access to your local mailbox will be.

Once you are using your local mailbox, before putting out a flood bulletins stop and ask two questions. Is it really necessary? Is it legal? If the quantity of bulletins making remarks about other users' spelling and comments relating to local items were not sent around the country, the quantity of bulletins would be cut dramatically. And this would result in a much more efficient system for the end user.

TABLE 2 — COMMAND SUMMARY FOR NEWCOMERS

C	Connect command
D	Disconnect command
I	Information frame and response
UA	Unnumbered Acknowledgement response
UI	Unnumbered Information Frame
RR	Receive Ready command and response
RJ	Reject command and response
RNR	Receive not ready Command and response
FRMR	Frame reject response
DM	Disconnected mode response

Beginners

Each month I will try to help new users overcome everyday problems encountered with packet. For example, I have been asked by many people to reproduce the list of frame types with their meanings. The type of TNC you have will affect how much of the frame information you will see. (See table above).

The (C) Connect Command.

A header could look like this..

G1XXX<GB7XXX (C,P)

The () indicates AX25L2V2 is set to ON

The C indicates a connect command.

The P indicates that the poll bit is set and a final bit is expected in response.

The (UA) Unnumbered Ack Frame

GB7XXX<G1XXX (UA,F)

The UA indicates an accepted command from G1XXX and acknowledges receipt of his Connect request

The F indicates that the final bit is set,which is the proper response to the 'P' bit received. On receipt of the frame (UA,F) G1XXX's screen will echo Connected to GB7XXX.

The I information frame.

GB7XXX<G1XXX (I;0,1)

The I shows an information frame.

The first No. is the frame number the sending station expects to receive next.

The second No. is the frame number being sent now.

The RR Read to receive acknowledgement.

G1XXX<GB7XXX (RR,2)

RR States simply Yes your last frame was received I am ready to receive the next one. In the case above Ready to receive frame 2.

The RJ reject command frame

Let's assume the above frame was not received owing to a colliding packet. Instead of repeating the RR command, when the GB7XXX station tries to send (1;0,1) again, the resulting packet would look like this.

G1XXX<GB7XXX (RJ,2) Stating I reject frame number 1 as I have already got it. Please send frame number 2.

The DM Disconnect Mode frame.

Assuming you try to connect to a mailbox that has all of its ports occupied by other users you will receive a message stating BUSY FROM GB7XXX. This frame was sent as

GB7XXX<G1XXX (DM)

G1XXX system will read this busy and disconnect.

The UI Unnumbered Information frame

This frame is unique to amateur radio. Used in converse mode or when your system sends a beacon, resulting in an information frame being sent without a number and requiring no acknowledgement.

G1XXX<CQ (UI).

AMTOR

Peter Martinez GP3PLX has produced a paper entitled *"An Amtor Mailbox Standard"* to be published in a future edition of *Connect International*. Its main points highlight the need for an agreed standard for forwarding protocols when linking Packet - Amtor - Packet. It sets out to show how Amtor is more error prone than packet, giving a detailed method of error correction for getting routing and acknowledgements through with more success.

It does not, however, set out any method for correction of the main body of text contained within the message. This leaves the problem wide open because no program listings nor file transfers can take place using this method for fear of corruption.

The paper is very well-written and explains the problems in great detail. The system it sets out should form a usable system in the short term, but for the future we should be looking for Amtor running under an AX25 Level 2 shell.

If you have news, views or anything relevant to Packet (HF or VHF/UHF), RTYY, Amtor, Fax or any other form of Data Communication, please rush it to me.

SATELLITES

RON BROADBENT G3AAJ
94 Herongate Road, Wanstead Park, London E12 5EQ. 01-989-6741

MIR

As I collate this month's satellite news activity on the Russian MIR Space station is re-starting with a vengeance. I have been receiving reports of U5MIR being heard and worked from the USA and beyond for over a week, but there are no reports of QSOs from the UK. This doesn't necessarily mean that there have not been any - just that no-one has sent me any reports.

Today (Saturday, 1 April), however, we had a very excited young lady member of AMSAT-UK's Committee, Jenny, G1LIT, telephone to say that she had just concluded a nice QSO with U5MIR. Exchanges of "name, rank and number" and other pleasantries were the order of the day.

Apparently the QSO happened quite by chance. Jenny was listening on 145.550MHz for the old man, G6ZRU, to give her a call to put the spuds on, as he would be home in X minutes. Jenny heard a signal on the frequency (normally vacant in their neck of the woods) and lo and behold, there was U5MIR calling CQ. Fred also heard the same from his car, but could not make the contact. Well done Jenny. Since G1LIT telephoned I have had three other calls during the evening about contacts with MIR.

MIR has a *period* of travel around the earth every 153 minutes (in round figures), ie, 24 hours divided by the *mean motion*, which is 15.69402 as of this day. This will change slightly as the spacecraft is raised higher in orbit by the control station, and other factors.

Should you be interested enough to listen into the Net on 3780MHz and hear a crazy bunch of guys talking times of radio or visual passes of this bird, you will now be able to calculate when next it will arrive at your QTH by noting just a couple of the given times, and using a pencil, paper and your brain. QED, you do not need a computer after all.

Factors which govern when you are able to make a QSO or not have very little to do with the orbit times, once these have been ascertained. You will, however, have to establish the *elevation* from your QTH to MIR (in the UK MIR's orbit is East to West at Lat. 51-ish) and the frequency U5MIR, or his chums, are using. Check FM, 145.550MHz, but operation could be up and down from these frequencies by a couple of 'channels'. How I hate that word in amateur radio - we will all be restricted to them one day if we don't look out. Listen in to the Amsat-UK Nets on Sun, Mon, Weds to get the latest info and then have a go.

Anyone who really wants to get their act together and work MIR, but just cannot get into the bird, give us a call. As in all things, a little help can go a long way in respect of satellites; and MIR in particular.

Oscar-13

Printed on this page will be the Oscar-13 schedule/time chart for those casual readers/users of satellites who want to know instantly when the spacecraft is available. You will recall that I placed one such in the April issue, and, although it is too early yet to get reaction from readers, I have had a few friends conduct some checking with their receivers to see whether the chart functioned correctly. Reports indicate that it did, and in fact some of us have been using *only* that style of chart to indicate when Oscar 10 is available as well. I therefore hope to include the charts as a regular feature in this column. If anyone objects, Shout.

As indicated in previous issues, the schedule may change slightly during the first part of the month for AO-13, but at least the view times will be correct for the UK.

While on the subject of AO-13 it has been suggested by AMSAT-DL that more Mode L time could be available in a few weeks. This will give some of the technical users a bit more experimentation time on 1290MHz. May we suggest that some of the Mode L and S operators worldwide send in their equipment circuit and construction details. (Not, I may add, "The rig here is a XYZ feeding a ABC Co. linear with a 999 foot circ. Yagi.") At this frequency you must have gone some way to rolling your own, so let the rest of us hear how and why you did it your way.

```
                              SATELLITE SCHEDULE

        Satellite: AO13
          Station:  G3AAJ

DAY                                HOUR - UTC

        0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

5/01    BJJJJJBBBBBB--------------------------------BBBB----------OOOOOBBBBBBBBJJJJ
5/02    JJJBBBBBBB------------------------------BBBBB-------------OOOBBBBBBBBJJJJJBB
5/03    BBBBB-----------------------------JBBBBBB--------------OBBBBBBBBJJJJJBBBBB
5/04    BB------------OOOBBBBBBBBJJJJJBBBBBBBB-----------------BBBBBBJJJJJBBBBBB---
5/05    --------OOOOOOOBBBBBBBBJJJJJBBBBBBBB-------------------BBBBJJJJJBBBBBBB------
5/06    --OOOOOOOOBBBBBBBBBJJJJJBBBBBBBB---------------------BBJJJJJBBBBB--------OOO
5/07    OOOOOOOBBBBBBBBJJJJJBBBBBBBB------------------------JJJJJBBBB--------OOOOOO
5/08    OOOOBBBBBBBBJJJJJBBBBBBBB--------------------------JJBBBBBB-------OOOOOOOOOB
5/09    BBBBBBBBJJJJJJBBBBBBB-----------------------------BBBB--------OOOOOOOOOBBBB
5/10    BBBBBJJJJJBBBBBBBB------------------------------BBB---------OOOOOOOOBBBBBBBB
5/11    BBJJJJJBBBBBBB---------------------------------BB----------OOOOOOBBBBBBBBBJJJ
5/12    JJJJBBBBBB--------------------------------BBBB----------OOOOOBBBBBBBBBJJJJJB
5/13    BBBBBB-------------------------------BBBBB------------OOOBBBBBBBBBJJJJJBBBB
5/14    BBB-----------------------------BBBBBBB-------------OBBBBBBBBJJJJJJBBBBBB--
5/15    -------------OOOBBBBBBBBJJJJJBBBBBBBB----------------BBBBBBBJJJJJBBBBBBB-----
5/16    ----OOOOOOOBBBBBBBBJJJJJJBBBBBBBB------------------BBBBBJJJJJBBBBBB--------O
5/17    OOOOOOOOBBBBBBBBJJJJJBBBBBBBB----------------------BJJJJJJBBBBB--------OOOOO
5/18    OOOOOBBBBBBBBJJJJJBBBBBBBB------------------------JJJJBBBBB-------OOOOOOOOO
5/19    OBBBBBBBBJJJJJJBBBBBBBB--------------------------JJBBBBB-------OOOOOOOOOBBB
5/20    BBBBBBJJJJJBBBBBBBB-----------------------------BBBB--------OOOOOOOOOBBBBBB
5/21    BBBJJJJJBBBBBBBB------------------------------BBB--------OOOOOOOOBBBBBBBBJJ
5/22    JJJJJBBBBBB--------------------------------BBB---------OOOOOOOBBBBBBBBJJJJJ
5/23    JBBBBBBB-------------------------------BBBB----------OOOOOBBBBBBBBBJJJJJBBB
5/24    BBBB------------------------------BBBBBB-----------OOOBBBBBBBBBJJJJJJBBBBBB
5/25    B---------------------------JBBBBBBB-------------OBBBBBBBBJJJJJBBBBBBB----
5/26    ----------OOOBBBBBBBBJJJJJJBBBBBBBB----------------BBBBBBBJJJJJBBBBBB--------
5/27    --OOOOOOOBBBBBBBBJJJJJBBBBBBBB-------------------BBBBJJJJJJBBBBBB--------OOOO
5/28    OOOOOOBBBBBBBBJJJJJBBBBBBBB---------------------BBJJJJJBBBBB-------OOOOOOOO
5/29    OOBBBBBBBBJJJJJJBBBBBBBB-----------------------JJJJJBBBBB-------OOOOOOOOOBB
5/30    BBBBBBBJJJJJBBBBBBBB--------------------------JJJBBBB--------OOOOOOOOOBBBBB
5/31    BBBBJJJJJBBBBBBBB----------------------------BBBBB--------OOOOOOOOBBBBBBBBJ

        0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
```

— = Out of range
B = MODE B working
J = MODE JL working
O = Satellite is on solar recharge — do not use.

Oscar-10

VK5AGR, AMSAT ground command station, has noted that the signals from AO-10 have been heard FM'ing, which indicates that the sun angles have become quite poor and can no longer keep the batteries charged to the proper levels. **All amateurs are therefore requested not to use AO-10 for the next two months.** It is felt that by the end of that time AO-10 will come out of its hibernation and once again be available for use. All Oscar satellite users are reminded that, except for the fact that the ground command stations can no longer control the spacecraft attitude of AO-10, the Mode B transponder and its other subsystems are performing quite well. It has been predicted that if users are willing to tolerate these short hiccups AO-10 will be able to provide excellent communication for many years. For the time being, however, no operations are allowed until AMSAT ground command stations give us the green light.

I had a kind of abusive letter last week (not that I take much notice of same except to have a giggle), of no fixed abode, and unable to use joined up writing correctly, saying that he (or she - no gender provided) did not find this column useful, and that I seemed to be having a go at computers. What he/she wanted was information on "weather sats, and computer progs, and you got the date wrong". I am sorry, my dear friend, but not only can you not write, but you cannot read. If you read it again, slowly, you will see that I suggested that computers were not the be all and end all for tracking satellites. Despite the fact that 75% of enquiries to me start, "I have a Spectrum and want to QSO via the satellite..." Dozens of amateurs actually using satellites do not possess a computer - except for the one in their noddles. I, for one, have access to over 40 excellent satellite programmes *and never use one of them* for tracking purposes. I do, however, use a computer to read Telemetry and Schedules, and will shortly programme my antennas to follow the track of the various birds.

The Orbital Calendar is available to anyone for a very small charge which just covers printing. If our abusive correspondent would send me an address I will post the current issue to him/her, after which he/she may subscribe every other month to the tune of £1.25 per copy. On the other missive in the rude note I would answer thus.

Computer 'Progs'

On the subject of computer programmes for tracking satellites - WX or OSCARs - I can supply anyone with a list of programmes on BBC, C64, IBM, Sharp, Atari and Spectrum formats that have been proven and work 100% if you wish to use this method of tracking and telemetry information-gathering in your shack. A self addressed stamped envelope with UK stamps or IRCs will get you the list yesterday, if not sooner. What I cannot send you is the programmers source code for you to re-arrange the programme, call it your own work and give or sell it to your club members.

With the hope that we may get a few more readers USING satellites as a means of fun and communication, I propose to provide a mini tutorial every month on some of the buzz-words that we use in connections with satellites. A lot of people have complained to

me by letter that they are apprehensive of putting a signal into a satellite transponder in case they do get a contact and have to speak the jargon. Well, it is like every other hobby, you sometimes make a fool of yourself, but ultimately learn by your mistakes. I kid you not, *none* of the callsigns you hear or read about on satellite matters was born knowing what a transponder does, or who Kepler was.

They learnt their craft by reading and doing. Which brings us nicely to the term *transponder:* a device which, in this context, receives an RF signal into one port (say a 70cm antenna), changes the received frequency by a mixing process and sends it to a transmitter within the same box of tricks, eg, OSCAR 13. The transponder then sends the signal to another port (say, a two metre transmitting antenna) and this in turn is sent on it's way to your station. In the process the transponder can be made to do various jobs, like change from upper to lower sideband or go in at low frequency and come out at high frequency within the passband of the satellite.

Pass Band: that amount of useful frequency coverage which is regarded as usable output from a transponder and thus where most of satellite folk crowd. There are a lot of other ways of saying the same thing, but that's what is meant when you hear the buzz-word.

Kepler Elements: a series of mathematical formulae reduced to a set of tables which, when read over the air, cause great concern over to their date, time, and exactness! Seriously, to the satellite computer user they provide an easy means of input to most satellite tracking programmes. Kepler sets provide such data to your programmes as Mean Motion - the number of orbits of the earth, exactly in decimal notatzon, that a satellite has travelled over a 24-hour period. Sources are NASA, UOS, AMSAT Groups and others worldwide. They are always in Oscar News in a form which makes it easy to type in your programmes.

That would appear to be my lot for this month, but do not forget the re-entry competition which is being run jointly by AMSAT-UK and the UOSAT team. We have had very few entries so far. It's open to anyone - read all about it in last month's issue. Finally, do not forget to book early for the DATASPACE'89 fun weekend at Guildford at the end of July. Apply for a booking form and costing to RSGB or AMSAT-UK. The proverbial SASE would be a courtesy for return postage if sending to the above addresses.

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

I hope that readers will have now become familiar with the new style column, which allows the news content to appear in 'Spectrum Analysis', thus giving more space for other news to appear here.

Comparison of yearly table scores

The 1988 HF tables appeared in the March 'Spectrum Analysis' and the high scores of the leading entrants made me wonder whether they were the highest submitted totals since the table started back in the 1970's.

A search through previous year's *RadCom* showed that there were higher scores in 1980/81. So as some indication of how the scores have peaked and dipped over the years, I have prepared a table which shows the leading submitted score over the last 11 years (see table top right).

But what do these figures show? Firstly it is noticeable how, at the sunspot minimum, 28MHz is so poor. They also show the consistency of 14MHz, whilst also showing the increased number of countries to be heard on 1.8MHz. Surprisingly, figures for 7MHz show how consistent the band has been in the last few years, with an average of around 160 countries heard yearly. This demonstrates what the band can produce if the time is taken to seriously monitor it. As 7MHz is now less affected by broadcast QRM, the 1989 heard totals could be the best ever. With some high scores already being registered only two and a half months into the year, at the time of writing, the highest score of 1045 already seems in danger of being surpassed.

More about Delta Loops

Well known Dxer Laurie, G3UML, wrote with some further comments about the Delta Loop mentioned in my February column. As I said, the loop can be fed in a number of places but G3UML felt that the best feed position is in the bottom corner. He has one for 7MHz which is fed with 75ohm TV coax, the centre of which is attached to the upgoing side of the loop. Some like to feed a short distance along the bottom leg to get the impedance spot on, but for receiving it matters little. Bottom corner feed gives vertical polarisation and a good match to low impedance coax. On 7MHz, the loop's length should be about 141 feet, using 1007/F as the formula.

G3UML explains that this antenna also has several unplanned qualities. It works perfectly as a two-wavelength loop on 14MHz, with directivity along the plane of the triangle, mostly towards the end away from the feed corner. Therefore, a delta lying NW-SE, fed in the SE corner, would give gain to the NW. It also works out well enough on 21MHz, and there is a resonance around 29MHz. For some strange reason, the antenna provides a good match on 1.840kHz if the coax connector is disconnected in the shack. This may be nothing more than an odd resonance as a function of the length of feeder in use, but it has accounted for over 30 countries on 1.8MHz with low power.

All in all, the 7MHz Delta is a superb general purpose antenna which works well with a centre height of only about 35 feet. Try it for yourself and see.

YEARLY TOP SCORE SUMMARY

YEAR	28	21	14	7	3.5	1.8	TOTAL
1978	180	194	231	100	115	19	839
1979	202	227	257	124	110	32	952
1980	221	244	221	177	138	36	1037
1981	221	232	223	188	137	44	1045
1982	209	225	232	147	117	28	958
1983	149	221	231	155	134	44	934
1984	96	200	224	164	151	48	883
1985	60	162	219	168	163	58	830
1986	67	186	231	169	162	59	856
1987	130	191	234	175	157	62	949
1988	196	222	235	153	149	59	1018

VHF SWL CHAMPIONSHIP 1988

Once again the number of listeners partaking in the Society's UHF/VHF contests in 1988 was disappointingly low. However, congratulations to Bob Treacher, BRS 32525, who with council approval, wins the Hanson Trophy.

SWL	Mar 144/432	Apl 144	May 432	VHF NFD	July LP-144	July LP-432	Sept 144	Sept 70	Total —
BRS32525	1247	54	1000	—	1000	1000	1000	1000	6301
BRS31976	2000	1000	744	704	—	—	589	549	5586
BRS52543	—	—	—	1241	—	—	—	—	1241
BRS25429	—	—	—	—	—	—	770	—	770
BRS28198	—	488	—	—	—	—	—	—	488

Latest from the VHF awards manager

Since the last column, Ian, G4OUT, has provided details of a fresh application for the 144MHz 60/15 Squares Award from Michel Monteil, FE8957/F11ATZ. The Award is the 147th 60/15 issued and included cards from EA6IF, EI5FK, C30C, TK4DL/P and I2UPG as new countries to top-up his 40/10 Award. It was the first SWL award application Ian has dealt with and he looks forward to receiving further claims, which will then be mentioned in this column.

ISWL awards

Yvonne Blain, BRS91397, wrote to pass on the news that she had

The "USSR/Canada Polar Bridge" Diploma. This was awarded to Joan Slater BRS90400 last year for satisfying the Diploma rules, which included hearing one of the base camps during the Joint Canadian/Soviet Transpolar Ski Expedition.

been elected Secretary of the International Short Wave League. Many listeners are members of both the Society and the League, which also provides QSL bureau facilities. Her main reason for mixing ISWL/RSGB business was to let readers know of the wide range of Awards which are available to SWLs and licensed amateurs. To whet a few appetites, these are some of the Awards which are available.

Century Club — for verification of 100 countries, with stickers for each additional 25 countries up to a maximum of 350.

Continental Award — for verification of 10 stations in each of the six continents.

European Award — for verification of 50 different countries within the European continent.

Pacific Ocean Award — For verification of 45 countries having the whole or part of their coastline bordering the Pacific Ocean.

States Award — For verification of 50 US States.

Zone Award — For verification of 25, 50 or 75 ITU Zones.

5 Band Century Award — For verification of 100 countries on each of the five main amateur bands.

Awards attract a £2 levy for non ISWL members — full details can be obtained from Yvonne at 167 Wombridge Road, Trench, Telford, Shropshire TF2 6QA.

Monitoring Times

Interbooks of Perth publish a monthly magazine titled 'Monitoring Times' which covers virtually every aspect of SWLing. This includes broadcast bands, amateur, long wave, satellites, electronic projects, frequency lists, equipment reviews, aircraft and shipping monitoring, together with listening tips and feature articles.

A year's subscription costs £18.95, or £10.25 for a six month trial. Alternatively, a single issue will cost you £1.85. Interbooks address was given in my March column.

HF Challenge results

I need hardly say that conditions were exceptionally good for the Challenge last October and November. The SSB leg had slightly the better conditions with lots of DX on the HF bands, 28MHz was very good, whilst 21MHz was well above average. 14MHz was best on the Saturday, when DX was to be heard for most of the day and 7MHz had its moments too, especially during the evenings although both 3.5 and 1.8MHz were poor.

No doubt some would have liked to have spent all day on 28MHz, but the idea of the Challenge is to log countries on all bands so some sacrifices had to be made. Getting some sleep proved to be a problem too, with some making the wrong decision! Many of the entries claimed over 100,000 points which shows how good conditions really were. There were a few comments about the rules which I shall look at for this year's Challenge.

For the CW leg there were only the usual two entries. Jean Jacques again beating Robert Small by a fair margin. Some good DX was available, including BY4AA on 3.5MHz. Now for the results (see table below right).

Radio tools for the SWL

Having exhausted most of the antenna ideas (unless I receive any from readers), I have decided to diversify somewhat over the next few months to look at tools, test equipment, and various add-ons, before turning to a series on receivers toward the end of the year.

It is wise to treat yourself to a good set of tools that will enable you to do the maximum amount of work with the minimum amount of effort. Here is a list of basic tools which are most often used in the shack. Naturally buying them one at a time will be much easier on the pocket and before long you will have a first class tool kit.

A soldering iron or soldering gun — a decent soldering iron will cost around £10, while a gun will be about £20.

Solder — A 500g reel will cost around £7 to £8.

Six inch long-nose pliers — beware of the cheap varieties on the market, a good pair will cost about £10.

Six inch side cutters — these are also priced around the £10 mark.

A good set of screwdrivers — different sizes will be required and do not forget that there are two types of cross-head screws so you will need both Phillips and Pozidrive types. Prices vary.

Pair of pliers — cost around £10.

An assortment of files — cost varies by size.

A hack saw and assorted blades — important for chassis work. A standard model will cost around £7, but a junior model can be purchased for around £1.

A good drill and assorted bits — the most expensive item in the tool kit. If you can't afford one, borrow one! Cost around £30.

This list constitutes the minimum of tools you will need to set up shop, but you could also consider buying wire strippers, a hammer, chassis punches, trimming knife, desoldering tool and tweezers.

All these can be purchased from sources such as

RSGB SWL CONTEST 1989

OBJECT OF THE CONTEST

To log as many stations in QSO as possible. Operation is over 24 hours but only 18 hours may be operational during the 24 and a continuous 6-hour rest period clearly marked in the logs.

DATE AND TIMES

1200 gmt 8 July to 1200 gmt 9 July, 1989.

SECTIONS AND BANDS

(A) SSB only.
(B) CW only.
Only one section may be entered — mixed-mode entries will not be accepted. The 28, 21, 14, 7, 3.5 and 1.8MHz bands may be used. Please note that entrants from the British Isles must be members of the RSGB.

SCORING

For scoring purposes the station logged must be in QSO with another amateur station. It does not matter whether the station is taking part in a contest or not. CQ, QRZ or similar calls cannot be counted for scoring. One point to be claimed for each station heard on each band. A multiplier may be claimed for each different country heard on each band. In the case of the USA, Canada, Australia, New Zealand and Japan, each call area numbered prefix may be claimed as a separate multiplier, for example: W1, W2, VE2, VE3, VK5, VK6, and so on. All other countries will be determined by the APRL Countries List.

The final score is made up by the addition of the points scored on all bands *multiplied* by the total number of multipliers claimed on all bands.

LOGS

Logs should show in columns, time (gmt), callsign of station heard, callsign of station being worked, a RS(T) report on *station heard* at swl's QTH, multiplier (if any), points claimed. If both sides of a contact are heard, they may be claimed as separate stations, and the callsigns are to appear in the *station heard* column. Each station heard can only appear *once in* the *station heard* column on each band. In the column for *station worked* a callsign must only appear once in every three contacts logged (1 in 3) unless it is a new multiplier for the receiving station. The same 'station worked' may not be used for more than three successive multipliers.

Logs should be submitted with each band listed on separate sheets. A separate sheet listing all multipliers for each band should be included.

Duplicate loggings for which points have been claimed will be penalised at 10 times the contact value.

ADDRESS FOR ENTRIES

R. A. Treacher, BRS 32525, 93 Elibank Road, Eltham, London SE9 1QJ, England. Entries should be postmarket no later than 7 August, 1989.

AWARDS

Certificates will be awarded to the leading three entrants in each section in the British Isles section provided there are a minimum of 10 entrants. A certificate will be awarded to the leading station in each country in the overseas section provided that station scores at least 50% of that section winner's score.

HF CHALLENGE RESULTS

SSB LEG

	Station	Countries	Points	Score
1.	ONL-383	517	1034	534,578
2.	BRS8841	357	909	324,513
3.	G1PEF	257	663	182,325
4.	BRS90400	278	623	173,194
5.	I1-948GE	238	620	147,560
6.	BRS28198	220	562	123,640
7.	BRS20249	173	375	64,875
8.	ONL6945	170	351	59,670
9.	BRS91397	142	277	39,334
10.	GM1ZVJ	123	240	29,520

Check logs from: BRS25429, 32525, 88969, 62088.

CW LEG

	Station	Countries	Points	Total
1.	ONL-383	384	1064	408,576
2.	BRS8841	234	684	160,056

RS/Electromail, STC Electronic Services, Verospeed or Farnell and all will sell direct to the amateur fraternity. A proper kit could cost as much as £150, thus the earlier advice to buy items separately will make it easier on the pocket.

The soldering iron is one of the most basic tools and contrary to popular belief, it is not used to melt solder, but to heat the part to be soldered to the point where *it* will melt the solder! The soldering iron will supply heat whenever you want it, after the initial warm-up, but the gun will consume less power. For general use, an iron is favourite, but if you can afford it, a gun is very handy to have in the shack.

Side cutters are used to cut wire, and to strip off the end of your wire. However it takes some practice to remove the insulation without nicking the conductor or cutting it in two!

Odds 'n' ends

Bob Francis BRS88021 has collected much military wireless equipment and intends to collect enough to set up a museum. As a result he is on the look out for anything ranging from about 1939 to the present day, working or not. If anyone can offer any equipment, Bob can be reached by writing to me and I will be happy to pass the letter on.

David, G4CYW, the Society's SWL QSL Bureau Sub-Manager has noted that in his 15 years of doing the job, no-one has ever 'popped in' to claim their cards. With the holiday season just around the corner, David hopes that anyone holidaying in the West Country might just look him up to collect his cards.

John Lugg, BRS31350, wrote enclosing several photographs for inclusion in the column. Unfortunately, there was some camera shake which makes them unsuitable for publication. Hopefully, he will try again because they showed off some fine equipment, and it is worth noting that (because of printing limitations) magazines prefer black and white photos if possible.

Finale

I am pleased that news and views for this month have split nicely between what should appear here and what is appropriate for the News pages. So if you haven't read my words in 'Spectrum Analysis', I suggest you do so now!

Readers are reminded that the deadline for the July issue of *RadCom* is 21st May.

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

Technical snippets and Committee business

The latest RSGB Microwave Committee meeting held on 11 March included final discussions on the bandplanning issues which have been mentioned in the past few instalments of the 'Microwaves' column. Apart from a few minor corrections, the provisional UK variations from the IARU Region 1 plans are ready to go forward to the Licensing Advisory Committee for their consideration and are also to go forward to the Region 1 VHF Managers' meeting (7 to 9 April) in Dusseldorf. One of the ma jor topics will be the strategy and tactics for the next World Administrative Conference (WARC) due, it is thought, in 1990 or '91.

Two interesting technical developments were shown to the committee by Sam, G4DDK. The first of these was a prototype development of his well established local oscillator source, extended by an active doubler to give output in the range 2300 to 2400MHz. This should prove useful for both the DX segment of that band (for transverters) or Oscar Mode S.

His second item was a rather interesting conception of a simple PCB and coaxial resonator wavemeter for 1.3GHz – just the kind of simple approach which will be needed to assist beginners and Student Licensees. There are few designs for simple test equipment at 1.3GHz, particularly wavemeters. The high-Q coaxial resonators consisted of two coupled lengths of semi-rigid 0.141' coax with a simple diode detector – just the kind of thing which could be knocked up in an evening from cheap, readily available materials, built into a box and used for such purposes as oscillator source alignment. I'm hoping that these will be available for publication shortly.

The other major topic under discussion is how we (collectively!) can resource the Student Licence with simple, sure-fire designs for the two bands which have been nominated for the licence – a rather more difficult task than at HF! The wavemeter idea was born from this need. If you think you could help in generating ideas for this project, then myself or any other Committee member would be very pleased to hear from you. The objective is to support both narrowband and wideband (TV/data) on 1.3GHz and wideband on 10GHz. Yes, I know that 'standard' designs exist, but put to the test, many of these are not entirely satisfactory, nor are they suitable for novice construction. For instance we cannot rely on dwindling supplies of ex-doppler Gunn units to service the needs of 10GHz wideband; it's far better to identify a DRO source which is likely to be in continuous production for some years to come! For 10GHz we feel that the microwave 'head' should be fixed-tuned (apart from limited frequency pushing), the main RX tuning to take place at first IF.

Anyway, any thought that YOU, out there, might have will be welcomed.

Then there is the question of 'documentation' – student guides and the like. If you feel you can or would like to contribute the written word, please let us know. Right from the outset it has been apparent that the proposed new licence is probably the biggest undertaking to be floated by the Society for 25 years, and perhaps more! I'm sure I speak for the other spectrum committees when I say that no reasonable offer of help will be refused!

Operating news

I had a letter from Dave, GM3WIL (Prestwick, Ayrshire) outlining his recent activities on 24GHz and asking whether some of the contacts he's had on that band constitute GM 'firsts'. Unfortunately neither our new Awards Manager (Ian Cornes, G4OUT) nor I can answer directly, since neither of us is aware of any other such contacts – so I'll have to throw it open to readers to rescue us!

The contacts concerned were as follows: Cairnbarrow (NGR NX525565) to G3FNQ/P (NY052101) on 7 August 1988, and Portpatrick (NW998539) to G14SQL/P at Agnews Hill (50km) (NW475567) on 11 March 1989.

Later the same day another GI contact was made – to GI8GJX/P on the same site, Agnews Hill.

With the first contact Dave was able to claim the 'beginners' award on 24GHz, but I'm afraid that there's no special award for 'firsts' at present, Dave! Nevertheless, they're interesting contacts and were made with quite simple wideband gear consisting of the Plessey GDHM32 inline mixer module, 10.7MHz IF fitted with 50kHz filters and a 16' dish with 'penny' feed.

While talking of records and firsts, Ian has sent Dave's claim to SM5AGM, who is in charge of such records for the IARU Region 1 magazine: maybe this will also throw some light on the subject.

Newly arrived through the postbox is notice of the Scandinavian VHF-UHF-SHF meeting to be held at Silkeborg, Denmark on 9, 10 and 11 June. The programme includes lectures on appropriate topics and gain and performance measurements on antennas, low-noise preamps and general receiver performance testing. For full details, contact Soren Pedersen, OZ1FTU at Krumstein 10 A, DK-2730, Herlev, telephone +45 2 844615 after 1600 GMT or QRL +45 2 651122, ext. 3290. Indoor accommodation or camping is available.

VACANCY
RADCOM NEWS EDITOR

RadCom's News Editor, David Gough, G6EFQ, will very shortly be emigrating to Perth, Western Australia. We're very sad to lose him, especially at such a critical stage in the development of our new-style News & Reports pages, and most urgently seek his successor. It's an exciting, interesting and challenging staff position within our new editorial team; the successful applicant will be closely involved with the modern 'electronic' communication and production methods being introduced into the offices at RSGB HQ in Potters Bar.

The most important facet of the News Editor's role is to sleuth out and write interesting topical stories for our News & Reports pages and GB2RS news broadcasts. It also encompasses compilation of RadCom's Diary of Events/Helplines pages, and working in close liaison with our Spectrum Analysis Band Editors. It is also be very important for the News Editor to maintain regular contact with feature writers, such as DXpeditionists and propagation experts, to arrange commissions.

Skills must include recognising a good story, following up leads, 'writing to fit' and working to tight deadlines. Personality and telephone manner need to be appropriate to dealing with members, public and all levels of management in various organisations. He or she will need to be familiar with procedures for obtaining and reproducing photographs from all sources, including photo-libraries. An active knowledge of Amateur Radio is essential, and it will be particularly valuable if talents include photography and PC word-processing.

Salary will be negotiable according to age and experience.

Apply in writing to The Editor, Radio Communication, Radio Society of Great Britain, Lambda House, Cranbourne Road, Potters Bar, Herts. EN6 3JE.

Please mark the envelope "News Editor vacancy. Private & Confidential."

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We now have in stock the very last shipment at this special price!

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Designed for optimum performance combined with small size, the ALINCO ALR-22E reaches new heights in both technical performance and value for money. We've managed to keep the price down to a level that cannot be matched by any other manufacturer although we believe that a small increase will shortly be made to the price. What better time therefore, than now to purchase one of these super rigs. You won't see prices like this again! Technically it's superb and inside it looks very much like some of its more expensive competitors! Measuring only 5.5" × 6.5" it will fit into most places and if you ask, we will extend the frequency range to cover 140-170MHz on receive. We could bore you with the specification but frankly its just the same as all the others (apart from the price of course). We could tell you about all the various features it has, but again its not much different from the competition. Lets be honest, apart from being scome £100 cheaper than some of its competitors and having an extended receiver coverage, it really is like most other rigs. So if money is no object and you only want 144-146MHz coverage, you probably won't be interested in the ALR-22E. If on the other hand these things are important to you. why not send for the full colour brochure today.

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25 watts Full duplex

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- ★ Reverse repeater operation.
- ★ 12 months warranty parts & labour.

FREE CATALOGUE & PRICE LIST! We now have an illustrated catalogue of some interesting products for the radio amateur that we have never had the space to advertise. Also details of new items coming along. Just drop us a first class stamp and we will send you this plus our price list of over 700 items!

QRP & AERIALS!

We are about to introduce a range of compact single band hf rigs (80/40/20m) for the QRP enthusiast. Each one provides SSB/CW output of 2 watts. Features include VXO tuning, RIT, optional noise blanker and break-in module, built-in Morse key, internal dry cells or external supply, analogue power/S-meter, good dynamic range, excellent IF rejection and ultra stable. Send SAE for further details, prices and availability.

The GLOBAL, LF-80/40 dipole kit is now in stock and gives you a two band antenna for 80 & 40 metres with a total length of 70ft. £29 + £1.50.

GLOBAL Mini G5RV kit. We can now supply a trap kit that will enable you to turn your half-size G5RV into one that covers 80 metres. Total length becomes 66ft approx. (80-10m). £17.95 + 1.00.

NEW AZDEN PCS 2M FM rig in stock! Fitted Airband 25w FM plus AM/FM 118-180MHz rx. 12.5/25/50kHz steps (Airband 5kHz) Send for gen. **£329**

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CLP5130 1-50-1300MHz beam 12dB	£179.00
CLP5130-2 105-1300MHz beam 13dB	£89.00
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M265 2m Mobile 5/6th PL259	£14.95
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NR72M 70cm mobile 5.5dB PL259	£27.00
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MS1 Monitor Scope Pep etc	£269.00

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TR1MK3 Rotary Triband dipole	£117.30
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TH205E 2m FM Handheld Transceiver	£215.00
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Full range of accessories

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MFJ Accessories Range

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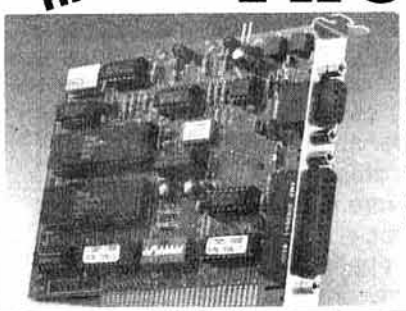

There are now 2 types of DRSI PC * Packet Adaptors. Type1 gives an on-board 1200 baud modem and allows the connection of an external modem. We offer the HF * modem for **£79.00.** Connection is also possible to the G3RUH 9600 baud modem which we can supply built for **£95.00.** The Type 2 card has 2 on-board 1200 baud modems, so all you need is the radio+ leads to get on 2 and 70. The boards come complete with multi-connect TNC software which offers Split Screen/Multi Window/Pull Down menus. A multi connect BBS is also available (AA4RE) and TCP/IP support. The node software (G8BPQ) provides a Netron node and multiple BBS COMBIOS/MBBIOS ports suitable for use with WA7MBL, WORL1 and G8UFQ BBSs.

Type 1 – **£129.00** + £3.00p.p. Type 2 – **£159.00** + £3.00 p.p.

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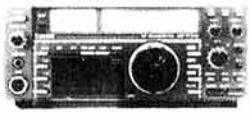
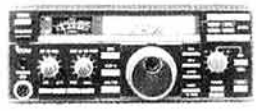
For the ICOM enthusiast, the IC735 is probably the most popular HF transceiver available under £1K. Still available at a very competitive price. Phone for details.





Icom have now introduced the new IC725 as an economy version. Available from stock at only £749.00

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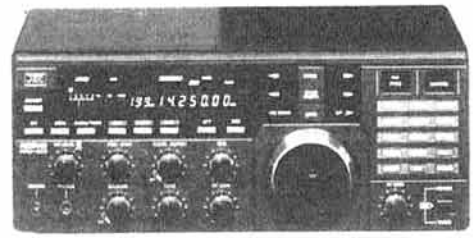

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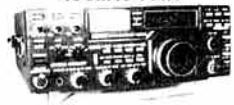
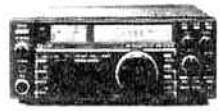
IC-761 ..... ~~£2459.00~~

ICOM IC-751A



100W, 1.8-30MHz Ham band TX, GCRX, 32 mems, SSB/CW/AM/FM/RTTY, 12v operation, 40 wpm OSK keyer
IC-751A ..... ~~£1508.00~~

ICOM IC-735



100W, 1.8-30MHz Ham band TX, GCRX, an ideal contest or mobile rig, 12v operation, 12 mems, AM/SSB/CW/FM
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Dual band mobile, 144-146MHz and 430-440MHz. 20 double memories, 25/5W on both bands, duplex capability
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Dual band HT, 144-146MHz and 430-440MHz. 20 mems, 5W on 2 and 70, duplex capacity, keypad entry
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Yaesu's classic compact HT's, 144-146MHz or 430-440MHz, 10 mems, 5W on 2/70, 0.25uV for 12db SINAD, many options

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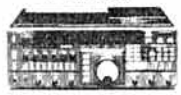
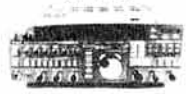
General coverage receiver, 0.15-30MHz all mode, 118-174MHz option, 12 mems, CAT system, keypad entry, 0.4uV sensitivity
FRG-8800 ..... ~~£649.00~~

FT-767GX



HF/VHF/UHF all mode 100W transceiver, 0.1-30MHz ham band TX, GCRX, 50/144/432 MHz option, built in ATU, digital SWR & power meter
FT-767GX ..... ~~£1599.00~~

FT-736R



VHF/UHF all-mode transceiver, 144-146MHz and 430-440MHz (50MHz and 1.2GHz options), 115 mems, 60 watts, TV option
FT-736R ..... ~~£1359.00~~

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VHF 25W mobile, 144-146 MHz, 12.5/25 KHz steps, IARU channels, R0-R7, S8-S23, auto repeater shift/tone burst, digital S-meter
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FT-212RH 2m/45W	~~£349.00~~
FT-711RH 70cm/35W	~~£349.00~~
FT-712RH 70cm/35W	~~£378.00~~
FT-2311R23cm/10W	~~£429.00~~
FT-4700RH dual band 50/40W	~~£676.00~~

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IC-228E 2m/25W	~~£369.00~~
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IC-448E 70cm/25W	~~£429.00~~
IC-1200E 23cm/10W	~~£449.00~~
IC-900 multi-band bxr	~~£489.00~~
IC-UX19 10m band unit/10W	~~£219.00~~
IC-UX59 6m band unit/10W	~~£249.00~~
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IC-UX29H 2m band unit/45W	~~£259.00~~
IC-UX49 70cm band unit/25W	~~£269.00~~
IC-UX129 23cm band unit/10W	~~£389.00~~
IC-3210E 2m/70cm/25W	~~£499.00~~
IC-3200E 2m/70cm/25W SPECIAL ..	**£399.00**

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AMR1000 S 2m/25W	£299.00

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IC-02E 2m/2.5W	~~£279.00~~
IC-2GE 2m/7W	~~£265.00~~
IC-A20 airband bxr/beacon	~~£488.00~~
IC-A2 airband bxr	~~£429.00~~
IC-04E 70cm/2.5W	~~£318.00~~
IC-4GE 70cm/6W	~~£299.00~~
IC-32E 70cm/2m/	~~£399.00~~

YAESU

FT-23R 2m/W	~~£209.00~~
FT-73R 70cm/5W	~~£229.00~~
FT-727 2m/70cm/5W	~~£426.00~~
FT-411 2m/5W/keypad	~~£269.00~~
FT-811 70cm/5W/keypad	~~£299.00~~
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CC701 TNC RFI filter 3-pack	£4.50
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MFJ-1278 7-mode TNC	£218.84
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Challenger BJ-200	~~£229.00~~
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Sony ICF-7600DS	~~£159.95~~
MARCII 0.15-950MHz	~~£395.00~~
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FRG9600 Standard Pack	~~£499.00~~
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* all the FRG9600 packs include a free **ROYAL 1300 discone worth £59.95** and a free mains PSU.

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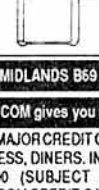

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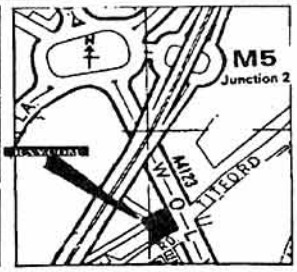

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CONTEST NEWS

RULES

LOW POWER FIELD DAY 1989 RULES

Please note the clarification of Rule 4 regarding identification of QRP Fixed stations.

1 Date and time: 0900-1200GMT and 1300-1600GMT, Sunday 16 July 1989.

2 Sections: (a) 10W RF output maximum. (b) 3W output maximum. RSGB Members resident in the British Isles. Single- or Multi-Operator.

3 Frequencies: 3510-3560kHz and 7010-7040kHz, (IARU Region 1 contest-preferred segments). CW only. Contacts may be made on both bands during each session and outside the UK.

4 Exchange: RST, plus serial number starting 001 and continuing through both sessions, together with location (defined by a place name)) and county code as published Contest News, *Radio Communication* January 1989. Fixed QRP stations are requested to send QRP instead of their location/county code.

5 Scoring: 15 points for each contact with another QRP Portable or Mobile station, 10 points for each contact with a QRP fixed station and five points for all other contacts. Points may be claimed for contacts with stations on both bands during each session and outside the UK.

6 Documentation: Standard RSGB HF contest log sheets (HFC1 Rev79) should be used, with column (5) headed 'Location and county code received'. Duplicates must be clearly marked without claim for points. Unmarked duplicates will be penalised at the rate of 10 times number of points claimed, and logs containing more than five unmarked duplicates, for which points have been claimed, would normally result in disqualification. Each entry must be accompanied by a cover sheet (HFC2 Rev80) or a standard RSGB declaration signed by the operator responsible for the entry.

7 Special Conditions:

7.1 Power. The power for all parts of the station must be derived from dry batteries, accumulators or 'natural' sources eg solar cells or wind-driven generators. Float charging batteries from petrol, gas or diesel driven generators is not permitted.

7.2 Equipment: The transmitter or out board PA stage should not be capable of RF output power in excess of 15W.

7.3 Antennas: The maximum height must not exceed 35ft (10·66m) above ground level and should not have more than two elevated support points. It is not permitted to use permanent buildings or structures as support points for antennas, trees are an exception to this.

7.4 Accommodation: The portable station may not be located in a permanent building.

8 Address for entries: Logs should be sent to: 'HF Contests Committee' c/o G Hinson, G4IFB, 41 Beechen Lane, Lower Kingswood, Surrey.

9 Date for entries: Logs must be post marked not later than 15 days after the end of the contest.

10 Awards: The Houston-Fergus Trophy will be awarded to the leading station in section (a) and the Southgate Trophy will be awarded to the leading station in Section b. Certificates of merit will be sent to the first three stations in each section and to the QRP fixed station submitting a check-log giving the most points to QRP portable stations.

SUMMER 1·8MHz CONTEST 1989 RULES

1 Date and time: 2100GMT Saturday 24 June to 0100GMT Sunday 25 June 1989.

2 Sections: Single or multi-operator. British Isles entrants must be members of RSGB. (a) British Isles (b) Overseas (including EI).

3 Band and mode: 1820kHz-1870kHz, CW only.

4 Exchange: RST plus serial number starting 001. British Isles stations must also give their county code as shown in Radio Communication January 1989.

5 Scoring:

(a) British Isles Section: three points for each completed contact, with a bonus of five points for the first contact with each British Isles county and for the first contact with each country outside the British Isles.

(b) Overseas Section: three points for a contact with a station in the British Isles (not EI), with a bonus of five points for the first contact with each British Isles county.

6 Documentation: Logs to be headed: date/GMT; callsign; RST/number sent; RST/number received; code received; bonus; points. Duplicates must be clearly marked without claim for points. Unmarked duplicates will be penalised at the rate of 10 times number of points claimed, and logs containing more than five unmarked duplicates, for which points have been claimed, would normally result in disqualification.

Each entry must be accompanied by a cover sheet and the following signed declaration: I declare that this station was operated strictly in accordance with the rules and spirit of the contest and agree that the decision of the Council of the RSGB shall be final in all cases of dispute.

7 Name and address for entries: Address logs to 'HF Contests Committee' as follows: British Isles entrants to J Bazley G3HCT, Brooklands, Ullenhall, Solihull, Warks B95 5NW. Overseas entrants to PO Box 73, Lichfield, Staffs WS13 6UJ, England.

8 Date for entries: Logs must be post marked not later than 15 days after the end of the contest.

9 Awards: Certificates of merit will be awarded to the winner and runner-up of each section.

HF-DF CONTEST

Banbury Date: 14th May 1989. RSGB Qualifying Event — *Map:* OS Sheet No.151, 1:50000 Series Stratford-On-Avon.

Assembly: 1300 BST for start at 1320 BST. *Location:* Drayton School, A422 road, Banbury, Oxon. NGR 435417. Competitors requiring teas should notify Mike Mallinson, 25 The Fairway, Banbury, Oxon. Tel. 0295 58036 by 7th May 1989.

South Manchester Date: 11th June 1989. *Map No.* 118, 1:50000 series Stoke-On-Trent. *Assembly* 1300 BST for start at 1320 BST. *Location:* Barley House Farm, Biddulph, Stoke-On-Trent, NGR 906605.

Competitors requiring teas should notify Chris Wells, 31 Madison Ave, Cheadle Hulme, Cheshire. Tel 061-485-1707 by 4th June 1989.

144MHz LOW POWER SWL CONTEST RULES

1500-2300 GMT 5 AUGUST 1989

The general rules published in *RadCom* January 1989, will apply. There will be three sections, section F for single operator fixed stations, section O for all other transmitting stations, and section L for listeners.

County/country multipliers will be used (general rule 14).

Output power must not exceed 25W PEP at the transmitter.

Only a single antenna may be used (eg no stacked, bayed, or colinear arrays, or switching between two or more antennas). A slot fed Yagi or Quad antenna is permitted. Disk or Backfire antennas must not exceed 2m diameter.

A certificate will also be awarded to the highest placed single operator station licenses for less than one year. Please state the date of issue of your licence if you wish to compete for this award.

All entries and check logs to: VHF Contests Committee, c/o BCS Llewellyn, G4DEZ, 110 South Avenue, Southend-on-Sea, Essex, SS2 4HU.

RESULTS

NFD Results 1988 Correction

Apologies to Chelmsford Amateur Radio Society, G4CUT/P, whose position in the Open section should have been 23rd and not 28th as printed. Keying the checked scores into the computer produced a score of 39 on 3·5MHz instead of 339. This obviously affected the total score and the final result.

RSGB 21/28MHz SSB CONTEST 1988 RESULTS

Superb conditions prevailed throughout the 1988 event and prolonged openings to JA and the States meant that, for the first time in a long time, 28MHz carried the majority of the contest traffic. Over 700 UK callsigns appear in the logs of the overseas competitors. Overseas support doubled over the 1987 level and the leading UK stations were able to average over 120 QSOs per hour. Al Slater, G3FXB performed this feat in a single-band 28MHz entry to take the Powditch Trophy for the best 10-metre score. The overall leader's position, and the Whitworth Trophy, were captured by GW4BLE, promoted from being last year's runner-up, whilst G4CNY moved up from fourth to second place. G3NAS, who did not compete in 1987, was placed third. Support for the multi-operator section continues to increase and this year offered a real challenge to the superiority of the established single-operator stations ... GW8GT took the lead from G4WQN, with last year's leader G3FYQ relegated to third place. 9H3EH headed the overseas single-operator entries, whilst LZ1KDP was placed first in the multi-operator section by a very convincing margin. In the receiving section, Bob Treacher BRS32525 again swept the board, winning both the Metcalf and the Powditch Receiving trophies with a margin of 300% over his nearest rival.

The standard of log-keeping was, in general, very good and there were a number of fault-free logs. On the other hand, some entrants lost points because their writing was illegible. Only a very few stations failed to include check-sheets, and it is perhaps due to this that not a single unmarked duplicate contact was found amongst the UK entries. The major cause of loss (and in some cases very substantial gain) of points was arithmetic error. It really is chancing one's arm to claim only one third of the correct score, and then hope that the adjudicator spots the mistake one has made in working out the multipliers ... several stations need take note here! Lastly, entrants are again requested to use the correct log and cover sheets. Supplies are available from RSGB HQ and masters which may be photocopied may be found in RSGB publications (viz. Call Book).

Congratulations to all trophy and certificate winners. Thanks also to those stations who submitted check-logs: G3GPZ, G4ZXC, LZ1KAZ, LZ2JE, UA3DPH, UA3EDH, UA3QJC, UA3TAM, UA4NCI, UZ4PXJ, UA6JD, UA6PT, UA9CVJ, UZOQXU, UB4VWN, RO4OW, W3ARK, Y22BF and Y62BH.

Disallowed entry, British Isles Receiving Section: BRS25429 (Rule 9 ... same *Station being Worked* appearing more than once in every three contacts logged). *G3UFY*

BRITISH ISLES RECEIVING

Pos	Call	Pts 21MHz	Mults 21MHz	Pts 28MHz	Mults 28MHz	Adj score
1	BRS32525	472	59	828	59	153,400
2	BRS90400	300	48	312	33	49,572
3	BRS20249	224	42	329	38	44,240
4	BRS28198	153	35	105	17	13,416
5	G7AOY	36	6	78	12	2,052

OVERSEAS RECEIVING

Pos	Call	Pts 21MHz	Mults 21MHz	Pts 28MHz	Mults 28MHz	Adj score
1	UB5-073-3135	324	15	369	14	20,097
2	LZ1-M-333	240	13	315	17	16,650
3	UA3-127-376	300	15	207	14	14,703
4	UP2-038-1751	444	19	39	6	12,075
5	UB5-066-286	210	11	288	13	11,952
6	LZ1-C-187	81	9	357	16	10,950
7	UA6-150-1326	216	11	144	15	9,360
8	ORS89020	240	12	162	11	9,246
9	UB5-059-447	165	15	165	12	8,910
10	UR2-083-913	405	17	21	3	8,520
11	UI8-053-2007	132	11	159	14	7,275
12	LZ1-I-196	378	14	27	3	6,885
13	UA9-165-55	237	12	51	5	4,896
14	UP2-038-1162	213	11	54	7	4,806
15	UA3-142-713	207	13			2,691
16	UB5-077-1791	261	9			2,349
17	LZ1-I-233	102	9	36	5	1,932
18	IT9-01295	54	7	99	5	1,836
19	UA9-090-601	144	10			1,440
20	SP-0189-GD	63	6	39	3	918
21	Y39-06-K	81	9			729
22	SP1-8537/5A	75	7			525
23	SP-0181-GD	21	5			105

OVERSEAS TRANSMITTING SINGLE-OPERATOR

Pos	Call	Pts 21MHz	Mults 21MHz	Pts 28MHz	Mults 28MHz	Adj score
1	9H3EH	429	16	2127	21	94,572
2	RB5FF	609	25	1146	23	84,240
3	LZ1KXA	546	19	1035	23	66,402
4	RB5IM	429	21	1071	22	64,500
5	NR5M	306	17	1053	21	51,642
6	KN2N	357	13	921	24	47,286
7	UB0QQ	369	15	867	18	40,788
8	NM2Y	321	16	723	19	36,540
9	LZ1V	231	11	969	16	32,400
10	VE1TG	141	10	873	20	30,420
11	LZ2VP	168	8	1047	17	30,375
12	YU1NR	483	18	425	13	28,148
13	CN8FC	180	11	834	16	27,378
14	UO5ONQ	492	15	405	13	25,116
15	W2/G4DZC	354	15	462	15	24,480
16	RB5MT	360	13	491	12	21,275
17	RW3AH	261	12	507	14	19,968
18	K5/GW0ECO	123	10	471	11	12,474
19	N4QIV/10	552	15	48	5	12,000
20	UB4IXZ	249	12	249	11	11,454
21	HA5AWT	555	13	27	6	11,058
22	RA3RK	126	7	453	12	11,001
23	EA7AVU	207	11	303	9	10,200
24	UA0ABK	135	10	327	12	10,164
25	RB5IA	204	11	234	12	10,074
26	UA1ZD	195	11	228	10	8,883
27	EA7DHK	213	15	150	9	8,712
28	G0AEV/CTI	252	14	129	8	8,382
29	KB0C	147	9	240	12	8,127
30	WA2UDT	219	10	207	9	8,094
31	RB5IIU	204	11	177	10	8,001
32	UR2QA	522	15			7,830
33	UR2RIY	267	15	69	8	7,728
34	UA9AKO	276	14	81	6	7,140
35	LZ2RF	153	9	237	9	7,020
	UY5TE	150	11	201	9	7,020
37	RB5CCO	75	6	306	12	6,858
38	UZ4WWB	291	12	89	5	6,460
39	LZ1CW	168	9	204	8	6,324
40	LZ2QV	102	9	210	11	6,240
41	HA4KYN	351	12	15	5	6,222
42	UC1WWF	264	12	81	5	5,865
43	KE2CG	177	9	114	11	5,820
44	LA1XDA	291	15	18	3	5,562
45	RB4MS	168	10	114	9	5,358
46	UA1ZA	90	7	222	10	5,304
47	UA4FAO	150	10	129	9	5,301
48	LA90FA	213	12	60	7	5,187
49	UA4RC	249	11	60	5	4,944
50	YU5DX	450	10			4,500
51	UA3LJB	123	7	243	5	4,392
52	RA3DNC	312	14			4,368
53	UO5ON	120	10	120	8	4,320
54	RA1AE	207	11	48	5	4,080
55	UA0QBR	153	9	114	6	4,005
56	HA6WR	261	14			3,654
57	OK2PCL	273	13			3,549
58	K7RDH	90	8	113	8	3,248
59	IK0JMS	171	10	36	5	3,105
60	I0KHY	177	10	27	5	3,060
61	OH6GZ	177	9	36	5	2,982
62	YO3BTC/7	108	8	120	5	2,964
63	UV6LGP	78	9	75	10	2,907
64	YO9ALY	231	12			2,772
65	VE2QO	77	6	117	8	2,716
66	UA4LEW	102	10	66	6	2,688
67	YO7LCB			243	11	2,673
68	UB5LRS	57	7	129	7	2,604
69	UC2WAO	128	9	42	6	2,550
70	LA9DFA	207	12			2,484
71	SP9EMQ	225	11			2,475
72	UA1NDI	147	8	39	5	2,418
73	YO9FL	63	8	98	7	2,415
74	OK1DKS	201	12			2,412
75	SM5CSS	150	10	21	3	2,223
76	YB2CTW	39	4	102	11	2,115
77	EA4CQF	192	11			2,112
	YU2TX	192	11			2,112
79	UA0SR	198	10			1,980
80	OK3YK	171	11			1,881
81	UA6ECU	150	12			1,800
82	YO7ARY	120	8	15	5	1,755
83	RA3DJA	140	10	6	2	1,752
84	EA5DMU	156	10	3	1	1,749
85	SP7FQI	189	9			1,701
86	HA6WX	150	10			1,500
	RA3XC	150	10			1,500
88	UA1AUA	147	10			1,470
89	I8IYW	123	8	18	2	1,410
90	SP9AVZ	150	9			1,350
91	SP4GFG	168	8			1,344
92	SP9BLF	147	9			1,323
93	UD6DR	51	8	29	8	1,280
94	WK4F	48	6	57	6	1,260
95	SM0JOQ	153	8			1,224
96	UA4WW	96	8	23	2	1,190
97	JA1BUI	36	4	80	6	1,160
98	CR7BWW	81	8	24	3	1,155
99	PA0ZH	51	4	63	6	1,140
100	JA7DOT	48	4	63	6	1,110
101	UV3DN			180	6	1,000
102	SP9IGY	101	10			1,010
103	IN3PEE	126	8			1,008
104	LA2AD	105	9			945
	PY2OU			105	9	945
106	JT1BG	36	5	49	6	935
107	UL7OB	90	6	24	2	912
108	EA3THT	129	7			903
109	Y22WF	90	10			900
110	SP9IWO	120	7			840
	YU7SF	120	7			840
112	UC2WBI	90	8			720
	RA9UAD	90	8			720
	WA9BXB	90	8			720
115	OK1TW	66	9	3	1	690
116	ZL2BED	81	7	3	1	672
	WB0O	84	8			672
118	UJ8JCM			102	6	612
119	OK1FPG	75	8			600
120	VE2AEJ			90	6	540
121	VE3NYT			75	7	525
122	EC7DMQ	44	4	21	4	520
123	YO2CMI	81	5	3	1	504
	IV3VFP	72	7			504
125	JH0HON			81	6	486
126	OK1KZ	42	7	9	2	459
127	SM7HSP	57	8			456
	N6JM			57	8	456
129	UC2AGB			63	7	441
130	LA9PT	54	8			432
131	UA0UCY	66	6			396
132	JA6QDU	54	7			378
133	LA1IE	51	7			357
134	YO9AZW	57	6			342
	I4CSP	57	6			342
136	VE30RN	66	5			330
137	JY9LC	45	7			315
138	RB5ICY	45	5			225
	UA3RNI	42	4	3	1	225
140	Y67UL	36	3	6	2	210
141	ZL1AGO	12	2	24	3	180
	NR8U	30	6			180
143	SP6CJK	33	5			165
	DF2HL	18	3	15	2	165
145	ON5FV	39	4			156
146	OK1KGR	36	4			144
147	CT1GM	21	3	6	2	135
148	W0WUU			27	4	108
149	JG7LBN			9	2	18
150	Y23TL	3	1			3
151	NB9K			3	1	3

OVERSEAS TRANSMITTING MULTI-OPERATOR

Pos	Call	Pts 21MHz	Mults 21MHz	Pts 28MHz	Mults 28MHz	Adj score
1	LZ1KDP	591	18	1311	21	74,178
2	UB3IWA	294	12	1367	22	56,474
3	UT4UXW	633	19	729	14	44,946
4	LZ1KMM	549	16	789	15	41,478
5	UZ9CWW	696	17	267	13	28,890
6	UZ4FWO	477	15	408	15	26,550
7	UB4QWW	204	14	516	17	22,320
8	UZ3XWC	216	11	570	14	19,650
9	LZ1KVZ	216	10	510	12	15,972
10	UZ3PXJ	258	14	305	11	14,075
11	UZ6HXK	321	12	219	12	12,960
12	UZ3QYA	225	12	258	13	12,075
13	4N2Y	582	14	6	2	9,408
14	UZ6HWH	135	9	201	11	6,720
15	UB4TWL	138	8	168	9	5,202
16	UL8CWW	213	11			2,343
17	OK2KMR	204	10			2,040
18	UZ3RZZ	126	8	12	2	1,380
19	UZ0SXF	135	9			1,215
20	UZ4FWA	105	9			945

BRITISH ISLES TRANSMITTING SINGLE OPERATOR

Pos	Call	Pts 21MHz	Mults 21MHz	Pts 28MHz	Mults 28MHz	Adj score
1	GW4BLE	1123	67	2758	65	512,292
2	G4CNY	1242	75	2067	78	506,277
3	G3NAS	672	59	2628	82	465,300
4	G4OBK	1257	75	1845	72	455,994
5	G3VOF	840	55	1938	68	341,694
6	G4BUO	651	57	1719	72	305,730
7	GW0ARK	864	58	1650	57	289,110
8	G3FXB			3740	75	280,500
9	G4PKP	1074	66	1347	48	275,994
10	GW4UZL	927	64	1449	49	268,488
11	G3NOM	855	56	897	72	224,256
12	G4FMO	1149	68	891	39	218,280
13	G3TBK	1086	62	486	48	172,920
14	G3SJX	849	56	798	42	161,406
15	G40DV	1062	65	450	40	158,760
16	G3SQX	948	64	474	32	136,512
17	G3WBM/P	849	57	614	36	136,059
18	GW4HSH	543	49	705	55	129,792
19	G0EVQ			1881	65	122,265
20	GW4OXB	987	61	261	34	118,560
21	G2QT	660	58	447	29	96,309
22	G4MET	981	60	153	22	92,988
23	G0IGM/P	731	44	156	16	53,220
24	G3XTT	237	29	285	36	33,930
25	GW3RGL	339	35	192	25	31,860
26	GM4HQF	354	36	150	17	26,712
27	G3NKC	209	27	225	28	23,870
28	G4PPR	276	32	111	17	18,963
29	GW0AJI	255	32	102	18	17,850
30	G3NKS	252	34	84	13	15,792
31	G0FGI			390	38	14,820
32	G6QQ	165	22	138	18	12,120
33	G0HGH	117	16	101	8	5,232
34	G3IQF	69	17	72	15	4,512
35	G3WRR	57	13	36	7	1,860
36	G3TGR			75	12	900

BRITISH ISLES TRANSMITTING MULTI-OPERATOR

Pos	Call	Pts 21MHz	Mults 21MHz	Pts 28MHz	Mults 28MHz	Adj score
1	GW8GT	1647	72	1770	69	481,797
2	G4WQN	1161	72	1818	55	378,333
3	G3FYQ	1047	68	1581	55	323,244
4	G4RCG	1065	63	1341	46	262,254
5	G3GQC	987	66	1095	58	258,168
6	G6RC	1167	77	732	55	250,668
7	G4SVV/P	1298	74	531	44	215,822
8	GW3CSA/P	549	50	1518	40	186,030
9	GW4RIB	1104	76	504	38	183,312
10	G4RFR	654	49	1137	51	179,100
11	GW4IOI	981	63	717	37	169,800
12	G4IRC/P	651	47	972	56	167,169
13	G3WRS/P	1512	75	195	19	160,458
14	G3BZU	843	59	666	42	152,409
15	G4SND	621	46	709	35	107,730
16	GW4EZW	666	49	378	36	88,740
17	G4FPQ/P	546	45	621	30	87,525
18	G8CA	615	42	549	29	82,644
19	G4XOM	618	44	246	27	61,344
20	G3PGU	720	44	189	22	59,994

CONTESTS CALENDAR

RSGB HF CONTESTS

4 May	28MHz Cumulative CW/SSB (Mar89)
12 May	28MHz Cumulative CW/SSB (Mar89)
20 May	County Roundup SSB (Mar89) SWL (Apr89)
21 May	County Roundup CW (Mar89) SWL (Apr89)
3,4 Jun	NFD/Region 1 CW Field Day (Feb89)
24,25 Jun	Summer 1·8MHz (May89)
8,9 Jul	SWL (May89)
16 Jul	Low Power Field Day (May89)
6 Aug	Ropoco 2 (Jun89)
2,3 Sep	SSB Field Day (Jul89)
8 Oct	21/28MHz Phone (Jul89)
9 Oct	28MHz Cumulative
15 Oct	21MHz CW
17 Oct	28MHz Cumulative
25 Oct	28MHz Cumulative
2 Nov	28MHz Cumulative
10 Nov	28MHz Cumulative
11 Nov	Club Calls Contest 'CCC' [nd] all modes & SWL (Sep89)
18,19 Nov	Second 1·8 MHz CW (Sep89)

RSGB VHF CONTESTS

6,7 May	432MHz-24GHz Trophy Contests & SWL (Mar89)
13 May	24GHz Cumulative (Mar89)
14 May	10GHz Cumulative (Mar89)
27,28 May	144MHz & SWL (Mar89)
18 Jun	50MHz Trophy & SWL (Mar89)
24,25 Jun	10GHz Cumulative (Mar89)
1,2 Jul	VHF NFD (Apr89)
8 Jul	24GHz Cumulative (Mar89)
16 Jul	10GHz Cumulative (Mar89)
5 Aug	144MHz Low Power & SWL (May89)
6 Aug	432MHz Low Power & SWL (Apr89)
13 Aug	10GHz Cumulative (Mar89)
2,3 Sep	144MHz Trophy/IARU VHF & SWL
9 Sep	24GHz Cumulative (Mar89)
10 Sep	10GHz Cumulative
17 Sep	70MHz Trophy & SWL
7,8 Oct	432MHz-24GHz/IARU UHF/SHF
13 Oct	432MHz Cumulative
21 Oct	1·3/2·3GHz Cumulative
29 Oct	432MHz Cumulative
4,5 Nov	144MHz CW
6 Nov	1·3/2·3GHz Cumulative
14 Nov	432MHz Cumulative
22 Nov	1·3/2·3GHz Cumulative
30 Nov	432MHz Cumulative
3 Dec	144MHz Fixed & AFS & SWL
8 Dec	1·3/2·3GHz Cumulative
9 Dec	50MHz CW
10 Dec	70MHz CW

OTHER CONTESTS

29,30 Apr	Helvetia,CW,SSB Contest (Apr 89)
1 May	AGCW-DL QRP/QRP Party (Apr 89)
13,14 May	CQ M Contest (May89)
20,21 May	World Telecommunications Day Contest (May89)

First Tuesday each month144MHz 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

CONTEST LOG SHEETS

Readers are reminded that both HF and VHG logsheets are available from Headquarters in packs of 100. Prices (which include postage and packing) are £3.29p for RSGB members and £3.87p for non-members. When ordering please remember to specify which type of log sheet is required. Send your orders to:

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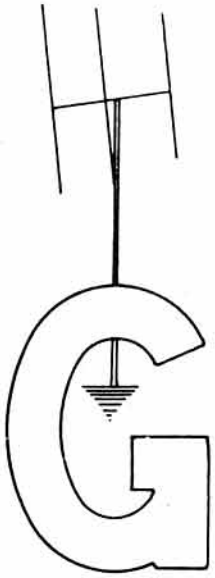

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NEW LOW LOSS CABLE PRODUCT

WESTFLEX 103

FEATURES **50 OHMS**

1. **LOWER LOSS THAN URM67/RG213 and H100**
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In response to many requests we have now introduced another super low loss Coaxial Cable... this is now being marketed under our own WESTFLEX Brand Name... type 103. In order to keep the loss as low as possible we have kept the braid and tape screening and the solid centre conductor... apart from this the construction is very much different from H100. For a Start it is the same size as URM67/RG213U... 10.3mm dia... hence the 103 in the name. Also the Jacket material is PVC rather than Polyethylene. This makes the cable much more flexible and very easy to secure all types of connectors... the fitting of any N Plug is as easily done as it is to URM67.
The Cable is of a 5 cell air spaced construction. This ensures that the centre conductor is firmly fixed in the dielectric and will not creep or pull along the length of the coax.
Another bonus of the construction is that the attenuation is less than H100 at all frequencies.

TECHNICAL SPECIFICATION

As a comparison with other types. All expressed in DB per 100 Metres

RG213/URM67 (Mil spec)	H100	Westflex 103
100 MHZ	7 db	4.4 db	3.2 db
144 MHZ	8.5 db	5.5 db	4.5 db
200 MHZ	10 db	figures NA	5.4 db
300 MHZ	13 db	7.3 db	6.2 db
432 MHZ	15.8 db	9.1 db	7.5 db
1000 MHZ	27 db	13.3 db	13.0 db

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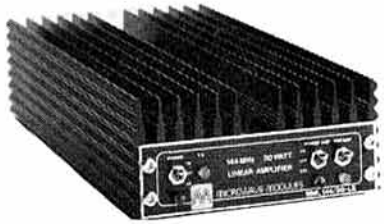

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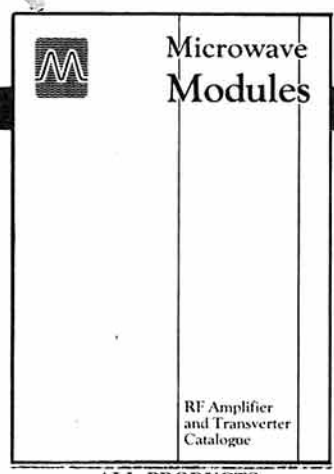

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All About VHF Amateur Radio is a new book from RPI in the USA. It contains ten chapters and covers information on propagation at VHF, repeater theory and operation, moonbounce, amateur satellite communication, feed lines, antenna theory and construction, the effects and causes of interference at VHF, and much more. All About VHF Amateur Radio contains 168 pages and costs **£6.95** to RSGB members by post.

Our third new item is a booklet by M. Mansfield, G6AWD, called **An Introduction to Weather Satellite Reception**. If you.are thinking of taking up this fascinating aspect of radio DXing, this booklet will give you all the information you need to get you off the ground. You can obtain a copy of this 28-page booklet for **£2.15** to RSGB members by post.

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• DRESSLER D200S in exc.cond and c/w spare valve. Idles at 400W for nice narrow and clean signal: £495. G6JNS QTHR. 0905 620041.

• KENWOOD VHF FM handheld tcvr TH215E. Charger and spkr, mic: £200. Kenwood TS520E. New PA valves: £300. MFJ de-luxe Versa tuner 2: £100. G4GHG QTHR. (Torquay) 0803 37050.

• 5x4 scanner 26-520MHz: £350. Co-ax LDF4-50 27m: £40. 25m: £37. Tele-reader CWR685E CW, Baudot, RTTY, ASCII. Built-in screen keyboard Novex, monitor 12in amber screen, Brother printer M1009. All in mint cond: £650 ono. 6in reflector telescope made by AE Luton. 4mm, 9mm, 25mm and 2xBarlow 1/4 wave optics. Very heavy tripod stand: £300 ono. Trio 201A 2m FM 5-25W: £200 ono. G4OYU QTHR. 0452 812216.

• AM7910 modem chip: £11 ono. NEC PC8201 lap-top portable, ideal dumb terminal: £90 ono. CBM hard disk drives x2: £300 each ono. FT707: £450. G4ANP not QTHR. (Doncaster) 0302 722450 or 787353.

• FT902DM all-mode tcvr. FM board with 8-pole 12kHz filter fitted. 300Hz and 600Hz filters. SP901 spkr, YD148 mic, fan and DC/DC cvtr. Ideal rig for nattering, transverting or contests: £575. G4KGK QTHR. 0704 24700.

• FT101 with spare OP valves: £230. FDK700E 2m FM: £125. Shure 444 desk mic: £30. GM0LKO ex GM8MUU QTHR. 0324 715454.

• COMMODORE 8032SK and LOS 96 mem.ext, 8050 dual floppy drive, keyboard, VDU and software. Mint cond. Sensitive offer. B/W video camera, 1in Vidicon (video/RF out) inc. optic: £75. Tektronix scope trolley: £40. 23cm FM/ATV front end, RF/mixer, diplexer, IF amp, demodulator, L.O synthesiser, 12V DC: £100 ono. Trio/Kenwood dual trace 30MHz scope, transistorised, 5mV sens, auto/manual/ext. trigger: £250. 11GHz feedhorn and polarswitcher: £30. Bird pwr meter 4430 with set of new plugs, no splits: POR. MCL double balanced mixer ZAD 1WH/3H, SRA 2H/3H: POR. SAE for more info - buyer inspects/collects. K. Barth G0KSW, 30 Bedhamton Way, Havant, PO9 3EY. (Portsmouth) 0705 674478 day.

• TS440S tcvr internal auto antenna tuner, 1.8kHz SSB and 500Hz CW filter options. Unmarked and fully functional cond: £975. FT290R 2m unmodified tcvr, HD nicads, charger, helical antenna and carrying case. Like new: £250. John QTHR. (Liskeard) 0579 43749.

• SCANNING rcvr JIL SX200 26-514MHz. Exc.cond. Save £200: £125. Varactor diodes BAY96: £2.50 inc PP. G3RNV QTHR. (Stockport) 061-477 0315.

• ICOM ICR7000 25M-2GHz rcvr, Weltz D130N discone ant, Kenwood TW4000A 70cm-2m FM tcvr, Trio RF sig.gen, Trio audio sig.gen. All with manuals and boxes. G4OWV. (Solihull) 0564 773652 eve.

• TRIO R5000 with VHF conversion: £700. GW0KZW. (N.Wales) 07456 88798.

• TRIO R600 rcvr 150kHz-30MHz AM/SSB/CW. As new cond: £200. GM3NIG QTHR. 041-639 7700.

• VALVES for HF linear 572B suitable for 30LI etc. New cond. Offers. J. Farlow, G3BXI QTHR. (Wilts) 0373 830804.

• COLLINS rcvr 75S3B with Collins spkr. Exc.cond: £400 ono. J. Farlow, G3BXI QTHR. (Wilts) 0373 830804.

• SOMMERKAMP FL200B FR100B. Layfayette HA230 needs attention. BC221. Codar AT5 T28, mains and 12V PU's, station and mobile controls. Remains of R1155. Aerials, switches, SW mags and RadComs, some bound. G3VNS QTHR. (Evesham) 0386 870227.

• ERA Microreader CW/RTTY decoder LCD display. 5-40wpm 45-50 baud rate. Narrow and wide shifts with int. filters. Operating inst. As new. Cost £120. Accept: £40 for quick sale. G3ISP QTHR. 091-483 7401 after 6pm.

• ICOM IC735: £650. Yaesu 757GX: £560. FC757AT: £240. All mint. Hardly used. All ono. Howard, G0HZH QTHR. (Suffolk) 0394 460474.

• KPC2 Packet Communicator II, boxed with manual. Absolutely as new: £125. Will split carr. G4PCV. 0858 65609.

• GETTING married. Shack clearance, BBC Micro, lots of bits, FT902DM plus tvtrs, Racal HF-portable, ATU, PSUs, 4CX250B's, tents, 40ft mast, portable mast, reel-to-reel tape recorder, or may swap for PC1640/1512. SAE for full price list. G4SOL QTHR. Norfolk/Suffolk, Yorkshire.

• AR900 handheld scanner, 6-bands 108-950MHz c/w charger VHF/UHF aerials. Boxed, used once. Charge cycle only. Bargain: £160. (Beds) 0525 222163.

• EDDYSTONE EA12 with plinth, spkr and manual: £150. S meter in diecast case, suit Eddystone 640 etc: £16. (Canworthy Water) 056681 493.

• TEN-TEC Paragon top of range tcvr. Boxed, new, latest model with all filters and FM if reguired. Save £300 on list price. Colin G4AZM. 04575 6114.

• ICOM 251E 2m multimode basestation. Plus desk mic. Ideal for contests: £350. Or may swap for FT707, FT107. G0IBG QTHR. 0302 875375.

• FT101ZD, FM, fan, mic, new spare valves, manual, transit case. Full output all 9-bands. Surplus to shack requirements. Exc.cond: £350 ono. G3BVW. (Moretonhampstead) 0647 40223.

• SCOPE, Heathkit model 1018U. Professionally built and in immac.cond with h/book, single trace, specified to 4.5MHz but good to 10MHz: £60 ono. MET 70cm 17ele crossed yagi, offers. Dave, G0CAD QTHR. (Oxford) 0865 341428.

• R210 RX, R109 RX, MK328 miniature spy RX, A510 jungle set, complete, mint. All sensible offers or would prefer swap for MK119, MK121, MK122, MK123 or any B2 ancillaries, spares box, key, phones, etc or other clandestine set accessories WHY? Major Kemp, 4 Armd Wksp, BFPO 41 or 01049 5231 35266 after 8pm or w/e.

• ICOM 271E 2m all-mode basestation c/w Icom preamp and Icom SM8 base mic. Boxed as new: £575. G0BEE. 01-958 6400 anytime.

• BRYANS X-Y plotter: £30. Variable supply 90-110V DC: £40. Solartron data transfer unit with 3310 cold junction compensation unit: £30. 721 linear photometer: £10. Philips luminance meter: £10. 3006 U-V recorder: £15. Kode teleprinter: £35. (Bracknell) 0344 425890.

• SILENT key. FT101ZD complete rig FC902ATU, FC901 spkr, filter, desk mic, spare valves: £650. 0799 22150 eve.

• 4CX250B, 3 by GEC, one by RCA, unused. Also one used, one Eimar SK600A socket and chimney: £100 the lot. Datong D70 morse tutor: £25. 2m RF, switched preamp type MMA144V: £12. All plus post. G2BUP QTHR. 037387 432.

• IC2E 2m FM portable 2xBP2, 1xBP4 chgr: £120. Matching 12W PA: £20. Moscow 1 satellite system 3.7-4.2GHz 5ft HB dish, 90deg LNA horn downconvertor and rcvr. C-band: £230. (Surrey) 0932 247699.

• BBC Micro system, inc. Acorn Speech, dual 80-track disk drives, Microvitec medium resolution monitor, Acorn teletext, Prestel, 6502 second processor, inc all manuals: £450. No splits. Also software, computer bench. Offers? G3WZR QTHR. 0483 575870.

• DIAMOND half wave whip ant. for 2m handheld, BNC fitting: £5. 35ft H100 coax, N-type plugs fitted both ends: £5. Hi-mound HK709 morse key with sounder: £5. All items plus post. Martin. 01-590 5490.

• SERVICE manual for TS430S: £10. 0453 833411.

• KENWOOD TS430S filters FM, auto ATU AT250, 1yr old, used for transverting: £800 ono. MMT144/28R tvtr: £200, MMT432/285 tvtr: £100. Tvtr switching box for use with above gear: £50. G4GIR QTHR. 0525 403431 x3226 day, 02303 8813 eve.

• FDK multi 700EX 2m FM tcvr, mobile mount, mic, desk stand, h/book, orig.packing, VGC: £130. GM3KCY QTHR. 0389 73563.

• KW2000B Shure mic, PSU, spkr, manual. Good cond: £160. G4JKJ QTHR. (Harwich, Essex) 0255 507894.

• FT707S HF 10W tcvr, mint cond. with mic, in orig.packing: £350. FL110 HF linear amp 10W input 100W output, 160-10m: £100. Heathkit Tower 32ft galvanised, good cond, dismantled: £150. G4ERO QTHR. (Cambs) 0353 665869 eve-w/e.

• IC720A tcvr ICAT100 auto ATU, ICSP3SP matching units: £650. FT480R all-mode: £250. All exc.cond. No offers. Buyer collects. G0HXX. (Sheffield) 0742 320008.

• TRIO R2000 rcvr, 100kHz-30MHz. VGC. Orig.packing, manual etc. Also MM 2m cvtr: £400 ono. Ian, G1HLT QTHR. (Mansfield) 0623 25651.

• TRIO TR9130 2m multimode 5/25W mint cond. Rarely ever used mobile. Inc B09A system, base plinth and all orig. boxes: £360 no offers. 10FM Spectrum converted Uniace 100: £30, bargain. Graham. (Dorking,Surrey) 0306 740195.

• ROBOT 450C SSTV colour cvtr: £625. Dressler 2m masthead preamp with interface: £30. 0689 75496.

• TWO Gould 10A PSU's for sale. Brand new, never used: £40 each or £70 the pair. G1GWW. 0865 820553.

• CELLULAR phone rcvr. Exc. performance. Guaranteed to receive all phones anywhere. Cheap for quick sale. 0504 265675.

• COMMS rcvrs Racal RA17L rack version. AR88LF, both VGC: £100, £50 respectively. Realistic direct drive turntable, Shure cartridge, mint: £45. GW0FPY, 4 Bryn Deiniol, Valley Rd, Llanfairfechan, Gwynedd, LL33 0SR.

• FTDX400 plus FV400S: £150. Datong RF clipper: £35. H/B 160m TX plus PSU: £5. G4BKE QTHR. 0962 61133.

• R1000: £200. VCR97: £5. Grundig TK35 7in reel-to-reel with sundry tapes: £25. 4in portable reel-to-reel: £5, needs attention. Pre-war Siemens and Halske Galvonometer calibrated 200mV in good cond and orig.box. Offers? G4UWS QTHR. 0272 772550.

• TELEPRINTER technical manuals for ITT/Creed models, Seventyfive, Envoy dataprinter and models 6S/6 and 6S/6M auto transmitters. Free if you pay package, post and advert costs. G4ZAO QTHR. Tel: (Taunton) 0823 253904.

• PSU 240V in, 13.8V out, 20A: £50. 2m 30W linear 2.5W in Alinco: £25. Buyers collect. G3WRO QTHR. (Harlow) 0279 30609.

• ICOMS'S 745 and 251. 745 with FM board. Good cond: £600 ono. 251 immac: £375. £850 the pair. Buyer pays carr. Andy, GM6UHC QTHR. 0343 48557.

• COLOUR TV 20in monitor style. Full remote control. In current use: £85. Buyer arranges collection. Gordon, G1PUH QTHR. (Oxford) 0865 775412 after 6pm.

• KR500 elevation rotator: £80 ono. 70cm 8 slot yagi: £15. 70cm 8 crossed yagi: £5. G0FMD QTHR. 0246 239033.

• 35MM single lens reflex camera. Rollei SL35E, mint. Offers or swap 2m or 70cm handheld. Microwave Modules 2m amp, MML 144/25, 25W out for 3W in, old but OK: £25. G3HCM QTHR. (E.Yorks) 0759 318408.

• TRIO 1000 rcvr with inst. manual. Ideal SWL beginner: £120. G6RYT QTHR. 0743 231306.

• TRIO TR2300, nicads, chgr, case: £120. G1DXN not QTHR. (Lancs) 0524 420239.

• STORNO CQM714 FM/HB boot mount: £30. Dymar modulation meter 1785 AM/FM 30/240MHz: £60. Advance 0S250 dB scope: £100. STC Novatel Prestel TV: £25. IEEE RS232 interface SSEL type B: £30. G-whip coils: £3 each. GEC serial keyboard: £10. G8AYN. (Lutterworth) 04555 57790.

• INTERNATIONAL reply coupons (IRC's) for sale: 35p each, 10 for £3, 100 for £25. Cheque or PO plus SAE please to S.R.Gregory, 55 Waterloo Road, Mablethorpe, Lincs, LN12 1JU.

• TRIBANDER TB3Mk2: £180 ovno. 2yrs old. Buyer inspects/collects. G4SKS QTHR. 0723 367658.

• R1155F, ext AC PSU spkr, working order. Also DC PSU, no split: £40. Tripod dolly, Slik 6050, unused, boxed: £25. Ferguson B/W TV, 12in, model 38030, manual tuning, mint: £30. Prefer buyer collects. G6AQC. (Oxford) 0865 243634 after 7pm.

• YAESU FT726R, 2m/70cm MD1 mic. Orig.packing: £775. Matching SP102 spkr: £40. Tono MR150 2m linear: £90. KR400RC rotator: £110. Altron tiltover mast: £200. Cue-Dee 16ele 2m beam, 19ele tonna 70cm beam: £30 each. Weltz dual meter: £60. G6MFT. 01-449 7754 day.

• MORSETALKER MMS2 with PSU: £95. KW two super silent morse keys, new, unused: £59 each. Grundig Satellit International 400, boxed, unsued: £95. G1HPJ QTHR. (Stevenage) 0438 354857.

• C500 standard dual-band handheld: £265. As new. Sinclair Z88 portable computer plus c-port software: £195. Atari VIP professional softare: £60. David Cole. 01-594 3495 day.

• DRAKE R4C, 500Hz filter, Sherwood audio and product detector mods, some extra xtals: £195. T4XC plus AC4 PSU: £125. G4BMH. (Kettering) 0536 712273.

• FT707, FC707, FV707DM, MMB2, 100W 9-band. Not used mobile. Exc.cond: £600 ono. New ant? Acrylic aerosol, 16oz spray protects and prevents corrosion, dries quickly. £3 per tin. Mark G4RGB. (Kent) 0634 30822.

• VERSATOWER W40, head unit, top bearing, with HamIV heavy duty rotator and KR500 elevation rotor, all in good cond. Ideal satellite setup: £475. Buyer collects. Microwave Modules MM432/50 linear: £90. BNOS 12/25A PSU: £120. G8PRF QTHR. 0484 651374.

• EVERYTHING must go! Linear amps, ATU's parts to build powerful amps, equip. racks, trolleys. Large collection LP records, guaranteed mint. Copy sale lists from Mike. 03306 613 after 7.30pm.

• ORKNEY. Superb VHF/HF QTH 7acres, hilltop, sea-path all directions, 2 double bedrooms, stone cottage fully modernised whilst retaining charm. Large lounge, dining room, large fully fitted kitchen inc. Aga, ceramic hob, double oven. Full CH, bathroom, shower room 35ft boarded loft with windows, leaded light double glazing throughout, 80ft long stone/slate roof outbuilding. 10 miles Kirkwall, 6 miles airport. Offers in region of £45,000. Clive Penna, G3POI QTHR. 0959 75992.

• SPECTRUM system, RTTY, CW, Prestel, Micronet and much more. Computer, all scarab hardware and software microdrive, prism modem, Seishoka dot matrix printer, multifacet etc. Books and programs on Basic, M/C and other utilities plus games: £175. GW3GRY QTHR. 0633 400836.

• TILT-DOWN mast, 8m when erected, winch operated, sturdy construction: £60. Buyer collects. G6LAY QTHR. (Penn) 049481 2172.

• YAESU FT726: £525. Sat unit: £25. 70cm module: £200. 50MHz module: £225. Kenwood YK88A AM filter: £25. FT290R with mic: £225. All items as new and boxed. G4GWZ. (Stroud) 04536 2429 after 6pm.

• TRIO TR751E 2m multimode boxed, as new, c/w mobile brkt, voice synth, DCL modem, 5/8 whip, gutter mount and 12ele ZL special yagi: £500. G1ZUP QTHR. 0278 455896.

• JIL scanner SX400 freq range 26-520MHz continuous: £300. Ted, G3ETA QTHR. 0305 813293.

• HRO with power pack and spkr. Working but needs some attention: £12. G2DW QTHR. 01-660 6722.

• COMPLETE HF station for sale. Going QRT. Vicious neighbours. Yaesu FT757GX, FP757HD heavy duty PSU, hand mic MH1BB, linear amps Ameritron AL80A cover 1.8-28MHz 1000W PEP SSB and 850W CW RF output. Antenna tuner Daiwa CNW518 2.5kW PEP. All in mio Olivetti computer Prodest PC1, expansion to 640k RAM, twin disk built in, colour monitor, mouse, software. Amstrad printer DMP3160, as new and c/w manuals for: £700. Buy the complete station and FRB757, FL1000 low pass filter, phones free. Prefer interested party to inspect and collect. Jan G0DSI. 091-482 0593 eve.

• SONY ICF2001 rcvr 150kHz-30MHz SSB/CW/AM plus FM band. 8 memories. Push-button digital tuning, 2 scanning modes. Ant. tuning and SSB fine tune. Very stable and sensitive set.: £150. G4EAQ QTHR. 0925 65813 after 6pm.

• TRIO TM201A 25W 2m FM. Basestation use only. VGC and c/w box and books: £200 ono. G4RUS QTHR. 085885 343.

• FT690 Mk2 amp FL6020. Battery case, nicads, carrying strap, chrgr, mic, inst. book, boxed and in mint cond: £350 or offer. G0KXI. (Highcliffe, Dorset) 0425 278359.

• CAMCORDER JVC GRC11 VHS(C) autofocus, zoom, CCD etc. Nearly new. Cost £690. Superb pictures. Exch for FT101ZD or similar TRX, or FL2100 linear, cash adjustment either way. G3WIF. (Bristol) 0272 293738.

• CREED 444 printer. Brand new, untouched by screwdriver! Offers or swap. G4LSA QTHR. (Staffs) 0785 74388.

• YAESU FRG7 gen.cov. rcvr. Filter fitted with manual and ATU. VGC. Jack, G0FTW QTHR. (Barnstable) 0271 830619.

• YAESU FRG7700 RX: £200. Code Master CW/RTTY CWR610E: £100 ono. LAR omni match ATU: £15. G1CIA QTHR. (Oldham) 061-626 5597 eve.

• KATSUMI electronic keyer EK150, (list price £133): £40 plus PP. J. Sanderson, 5 Babbacombe Dr, Rudhill Est, Ferryhill, Co.Durham, DL17 8DA.

• COMPLETE fixed or mobile station comprising Yaesu FT75 TRX, 50W PEP, FV50C VFO, mobile PSU, mains PSU, and Mizuho DX008 programmable offset DDU providing digital readout on all bands VXO or VFO operation: £210. G3WIF. (Bristol) 0272 293738.

• SOMMERKAMP TS800 2m tcvr 5W/50W 140-150MHz with Yaesu Pbert QTHR. 061-366 0927.

• RTTY ST5MC unused. Also has clock board. Buyer also can take 444 machine. Wayne Kerr B701 admittance bridge. Scopex 4010B scope. G4PIP QTHR. 05642 3200.

• APRICOT F1 PC MSDOS 256k with 10in VDU and 3.5in disk. Lots of software, Wordstar, DB2, GWBasic, Turbo, Pascal etc. Would make good packet computer: £260. Also CB master multi-mode mute, good IUM rig: £50. Phill. 0978 352086.

• KENWOOD TS430S with FM. Never used on TX. As new: £650. Kenwood TR751E 2m multimode tcvr 25W. Never used on TX. As new: £450. (Devon) 0392 877819.

• TET HB15M2SP 2ele 15m beam, new: £50. 2ele Gem Quad spares, wires, clamps, tension tubes, toroid kit, stub kit, tyraps, genuine factory parts, all brand new: £25. G4UGQ QTHR. 0223 65541.

• KW swr meter: £20. Welz AC35M ATU: £25. Reace RC1000 swr/pwr meter 1kW 3.5-150MHz: £25. All good cond. Stan, G0EBS QTHR. (Tonbridge, Kent) 0732 351313.

• FT102 tcvr with matching ATU and spkr unit, exc.cond, all cabinets like new, truly hardly used: £850. Jack. 061-370 4226.

• DRAKE TR7 tcvr, 3 filters, aux board, desk mic, MS7 spkr, heavy duty PS7 supply: £825. Telequipment S51A scope: £44. TRS80 computer: £25. Belcom AMR217B VHF/FM monitor, marine channels: £46. Old c1900 brass morse key with Wells Fargo pony sounder: £60. Ken, G3RQY QTHR. (Norwich) 0603 419967.

• COMMODORE printer 1526/MPS802. As new, perfect working cond: £120 ovno. Bell and Howell 16mm optic sound projector, TQ1 auto-load. Gone video, so surplus to requirements: £50 ovno. Hammond 5V-0-5V 50A transformer with 12-0-12,20-0-20 at 2A: £5. Tony G4KDZ. (Grays) 0375 378783.

• FT290R nicads, chrgr, case, helical: £275. Raycom 35W linear FM/SSB/CW: £45. Heatherlite mobile mic: £20. Raycom 12A PSU: £45. HB9CV 2m beam: £4. Sun 7/8 whip ant: £13. Gutter mount PL259/coax: £6. Complete station: £370. Marek, G0GUQ not QTHR. 0823 336670.

• FT101E: £300. Yaesu FRB757 relay box: £8. Jaybeam 10ele yagi: £10. Trio TS940S official workshop manual: £20. Wide spaced cap. twin 300pf approx reduction drive, insulated feet, weighs 3.25lb. Electrotest car diagnostic tune up analyser: £20. G3IDW. (Swindon) 0793 822055.

• 70cm standard C78 FM portable tcvr, 1W with int. nicads, chrgr, scanning mic, whip, carrying case. With snap-in cradle mobile mount and matching 10W amp with preamp. All in good cond, boxed: £195. G4DGM QTHR. (Wolverhampton) 0902 340211.

• WESTMINSTER Pye FM 10ch dash mount. 2 working 70.425: £25 each. 1 unmodified: £15. 2 Pye PF2 xtals SU20, 2 c/w vehicle chrgr 12/24V: £40 complete. G4YMP. (E.Sussex) 0424 51795.

• PYE Westminster boot mount converted 70MHz xtalled 70.260 FM. Complete cable, brackets, spkr etc: £45. Spectrum 144/70 tvtr TRX421 with 30W amp TA4S1: £110. 4/6m dual-band ant: £30. 6m 3ele ant: £15. G1GQL QTHR. 0425 54946.

• TEST GEAR. Noise figure meter, Magnetic AB, tube, manuals: £95. RF oscillators, 0.5-900MHz: £55. Bird pwr meter/dummy load, 500W fan cooled, 30MHz/900MHz: £95. Panoramic rcvr plug in for Tek 500 series. 2-18GHz: £120. Tel 4 trace(M): £45. Telonic sweeper 10-1500MHZ: £145. Radios. Drake SSR1 HF gen.cov: £180. Yaesu FRDX400: £125. Bearcat 50XL: £65. Icom 240: £95. Storno on 4m: £30. WPO 2m TX/RX boards: £35. Would PX for 23cm tcvr, 2m/70cm dual bander. G8EUX QTHR. 0327 53522.

• MONITORS, green screen composite: £30. Microvitec colour standard: £95. Hitachi EGA colour: £120. HP 125Mb disk drives, large. Offers? Various other computing O and S to

callers. Loft full of electronic bits, ribbon cable etc etc. Bob, G4TTZ QTHR. (Yateley) 0252 871077.

• BARLOW Wadley XCR30's x2. Both need attention. Offers. Jaybeam 14ele parabeam 2m. New cond: £25. Stolle rotator, needs attention to control unit: £20. LCL 10m FM rig, hardly used. VGC: £35. G4GNU QTHR. 0268 774947.

• HQI minibeam: £90 ono. HF5 vertical: £35 ono. Both in exc.cond. Tony, G4IMZ QTHR. 0372 275784.

• QUME letter-pro high quality daisy-wheel printer. Inc tractor feed, serial/parallel interface, spare daisy wheels and ribbons. A heavy duty, office quality printer. Boxed as new: £195. Tony Cadwell, G8TDL QTHR. 0734 788110.

• RTTY station, Tono 550 comm. terminal, CW/RTTY/BAUDOT, ASCII, plus Tono CRT1200G, 12in green monitor, plus manuals, books. Exc.cond: £135. Buyer collects or pays Securicor carr. G0GMU. (Sussex) 0403 864625.

• BBC Master Computer's 512k processor. Hardly used. Internally mounted. Plugs into main board. c/w mouse, software and h/book. Cost over £200. A snip for £100 plus PP for quick sale. G3KUF QTHR. 027581 3648 anytime.

• TRIO 9R59DS comm. RX: £45. Matsui MR4099 portable synthesised RX: £65. Kenwood TH25E handheld 2m rig, c/w SMC30 mic, case, and empty battery box: £230. G4YJO QTHR. (Medway) 0634 43875.

• SWAN 350 PSU. New spare matched finals: £210. Yaesu 290Mk1, case, nicads, chrgr, slightly tatty hence: £220 ovno. Drake TR4C, complete set spare valves MS4 PSU spkr. Codar preselector: £12.50. G0HZE QTHR. 0733 42439.

• TRIO 9130 multimode, mint cond. Little use mobile: £350. Drae 12A PSU: £40. G8YVW QTHR. 0742 375790 anytime.

• YAESU FT480R tcvr, 4A Drae PSU in exc.cond plus 1/4 wave magnetic mount mobile aerial: £300 the lot. G8YGD QTHR. (Aldershot) 0252 29842.

• FT727R dual-band handheld. 5W spkr mic, quick chrgr, PSU. Complete Yaesu package: £325 ono. Carl. (Camberley) 0276 29219.

• YAESU MD1B8 desk mic, new: £55. Trio MC405 hand mic, new: £16. Timestep weather satellite frame store, perfect: £365. Black Star Meteor 600 freq. counter: £90. BBC-B ATPC ROM board/RAM: £20. Assorted BBC rome, enquire. Paul G4XHF. 0293 515201.

• TEN-TEC Argosy, CW filter calibrator, desk mic, manual. VGC, orig.packing: £325. Portable tcvr, Raytheon, 1.9-11MHz, xtal controlled, VFO on 80m, SSB/CW, battery pack, whip, chrgr, mic, manual, 15W PEP. VGC: £95. G4JXK. (Fareham,Hants) 0329 230737.

• SONY CCDV8AF Camcorder, VGC, c/w 3 batts, 5 tapes, case, leads, 12V adaptor, chrgr, 240V supply etc. Bargain at £600. Cost over £1200 when new. Ideal ATV. K. Graham, GM0AVB QTHR.

• TRANSTEC business computer, dual disk drives, Kaga green monitor, Microline 80 printer with CP/M system disk, manuals, Basic, Pascal, Cobol, BStam, Wordstar software and desk: £400. G4ZQC QTHR. (Norfolk) 048522 385.

• LINEAR Homebrew for sale. 2x4-250 valves: £350. Altron wind-up tiltover with head unit: £275. Datong processor wired Yaesu 8-pin: £75. All in perdect cond. John G0EWI. 0246 206918 eve.

• TRIO 2400 handheld 2m, new batt, chrgr: £79. Trio 1000 RX: £269. Trio multimode 2m TX 9000, mount, up/down mic: £295. Icom-TR IC4E, 70cm, chrgr, case: £195. Sony RX, ICF76cs plotter: £500. Yaesu RSG8600DX scanner, 0.30MH adaptor: £460. All boxed as new. 0925 64075.

• ICOM IC290D immac.cond. All accessories: £325 ono. Sony IC7600D exc.cond: £90. Jaybeam 4ele quad: £10. 0923 50673.

• YAESU FRT7700 ant tuning unit: £30. R.Smith, 6 Breach Lane, Shaftesbury, Dorset, SP7 8LE.

• ICOM 740 160-10m 100W tcvr. CW/SB/FM, narrow CW filter, electronic keyer and marker fitted. Passband and IF shift, twin VFO's. VGC. Plus Trio LF30A LPF transmitting filter: £600. Dave, G4XHN QTHR. (Sittingbourne) 0795 22950.

• ICOM 271E basestation 10MHz coverage, 30W variable output. Built-in Icom preamp, SM8 base scanning mic. Mint cond, c/w orig.packing: £495. G0BEE not QTHR. 01-958 6400.

• HEATHERLITE 2m Explorer amp. ACX240B valve. Boxed: £400. Mike G1UAX. (Herts) 07072 65025.

• TRIO 3600E 70cm handheld as new, c/w base charger (stand), spare nicads, mobile mount etc. Sensible offers. 0473 311665 after 7.30pm.

• PYE SSB130 100W HF tcvr (see HRT), xtalled on 14.103 inc. manual, mains PSU: £125. MFJ1270 TNC HF/VHF: £75. SX200 VHF/UHF scanner: £120. G0BSX TNC kit contains PCB, connectors, semi's, IC's add C's and R's: £40. RLC200 TNC2 clone TNC: £65. Spectrum Plus 48k with GW3RRI RTTY terminal: £80. Canon A1 SLR plus lenses plus case: £300. Will exch for AR gear. All prices ono! G4FAT. 0684 564854.

• G2DYM's 2 trap 108fc mode: £35. Z-match ATU Eazitune dummy load SEM: £85. New unused. Brother electronic typewriter AX10, new unused with extras: £85. G1HPJ QTHR. (Stevenage) 0438 354857.

• SELLING up. MML 432/100 70cm 100W linear: £200. Also complete 23cm station consisting of LMW tvtr, 50W valve linear c/w PSU and quad loop ent: £500. Will split or offer to G6BKX. 021-526 6850.

• EDDYSTONE and Raymart 6-pin coils offered for equivalent 4-pin coils. Also needed BTS and Colvern plug-in coils. Bernard Litherland, G4IMT QTHR. 0225 891254.

• DATONG morse tutor, barely used and exc.cond. Heavy commitments force sale: £40. G8VDE. (Nr.Huntingdon) 0487 813468 after 6pm-w/e.

• AOR 2002 scanner: £385 ono. FT780R 70cm multimode: £225. Welz SP45M swr/pwr meter 140/470MHz: £45. 28ele 70cm multibeam: £20. FP80A PSU: £40. SEM Tranzmatch 160/10: £75. KW103 swr/pwr meter 1kW. Offers. If the lot bought: £800. 0266 45527.

• SCOPE Telequipment type D31R. Manual, working and calibrated. Rack mount, d/beam, 6MHz: £25. Buyer collects. Rd, Liverpool, L25 8TN.

• FT726R 2m/70cm/6m satellite board. HF module. MHIBH mic. All mint, boxed, practically unused. Complete VHF/UHF/HF all-mode tcvrs. New from SMC Feb last. Cost £1495. Offers not less than: £1100. No splits considered. G2FZU QTHR. (Notts) 0636 813847.

• TS530SP fitted CW filter. Mic and h/book. As new cond. Sensible offers. Neil G4RQN. (Kings Lynn) 0553 675676 after 8pm.

• STANDARD C8800 1W/10W mobile 2m FM: £125. Standard C7800 1W/10W mobile 70cm FM: £150. Microwave Modules 2m linear 1W or 3W in, 30W out. Mint MML 144/30LS: £60. Kenda DFS for BBC-B: £25. Peter, G3UDV not QTHR. (W.London) 01-998 6225 before 9.30pm.

• DATONG RF Clipper processor. Very little used: £30. Heathkit DX 100U 80 timcu 10m 100W TX. Recent professional overhaul. New driver and PAs. Receipt available: £45. GW0FXA QTHR. 0981 240632 anytime.

• 70CM H/H FT708R with leather case and strap. Hkr mic. Boxed with inst.manual: £120. Plus £2.50 towards insured carr. G8LPY QTHR. 0903 32880.

• ALINCO ALR22E 25W 2m FM mobile. Hardly used. Genuine reason for sale. Boxed: £190. G0IXP. 0452 21287.

• ICOM 251E base 2m all-mode with Mutek F/E and Icom SM5 desk mic: £475 ono. Datong speech processor: £35. G1KKF QTHR. 0273 566455.

• EDDYSTONE EA12 amateur bands RX with spkr, plinth and manual: £185. Katsumi electronic keyer model EK150 mains or 13V DC: £80. Bartg ST5C RTTY terminal unit: £60. Bartg Toni Tuna: POA. G3UQZ QTHR. (Birmingham) 021-373 8806.

• FT101E tcvr, VGC. Spare PA valves with mic: £270. G2DTQ QTHR. (Wolverhampton area) 0922 415048.

• BC312 RX: £25. 52 set RX: £25. Both working but require titivating. Class D wavemeter: £5. Wartime civilian rcvr: £10. Ham Int'l FM/AM/USB/LSB partly xtalled for 10m, up to 28.30MHz. Work the DX for: £55. G4EHT QTHR. 0543 251133.

• ICOM IC211E 2m multimode tcvr. A1 cond, no mods. Recent service by Icom. With all orig.packing, leads, manual etc: £350. G4GGE QTHR. (Bristol) 027582 3212.

• DSB80 digital readout QRP tcvr. Inc. stable ext. Howes VFO, HB mic. preamp with AGC, electret mic insert. Very capable CW/DSB tcvr. Bargain: £55. Mainly new components, trays, tools: £19.50. Going QRT. Prefer buyer collects or post extra. G4GIG QTHR.

• MMT144/28 2m tvtr: £65. MML144/100 2m amp: £75. MML 432/100 70cm amp: £175. MMT435 TV 70cm TV TX/RX: £75. Drae SSTV slow/fast cvtr: £75. G4UFU. (Northants). 0327 843694.

• SONY Air 7 rcvr plus discone, latter used indoors only: £100. Plus carr. for both. G7BNP. 0538 753545 eve.

• ICOM IC735 tcvr. Less than 1yr old. As new, orig.packing, little used: £790 ono. Jaybeam 8ele x2m beam plus rotator: £50. G4ZMG not QTHR. (Lincoln) 0522 680872.

• EPSON FX80 printer as new, little used: £105. Toshiba P351SX dot matrix printer, new, unused: £550. Sord PT351 dot matrix printer 24-pin wide carr: £40. Sord SWP20 daisy wheel printer, wide carr: £40. New mono monitor c/w Nascom 1 computer with S100 BUS, ROM board, RAM boards, PSU, xtal clock for RTTY reception,: £27. 8in IBM floppy disk drive with manual: £10. Trend 800 ESR telex, with keyboard, dot matrix print, LCD display etc: £37. Icom IC22A mobile 2m rig with VFO on RX and mag mount with 5/8 whip: £95. Microwave Modules cvtrs 432-144MHz and 144-28MHz: £12 each. Microwave Modules 144-432MHz tripler: £10. Cambridge potentiometer 44288: £5. Motorola cassette interface for 6800 development system: £10. Burr Brown analoque to digital input card for 6800 system: £15. G8EII. RCA senior valve voltmeter: £22. Philips PM2517X 4.5 digit DVM, as new: £42. Avo model 8 Mk4: £42. Philips model 9145 stereo cassette tape deck: £12. Realistic TRC-422A 27MHz tcvr: £15. Wollensak 3M model 9588 professional cassette deck with slide projector synchronisation: £27. Texas TI programmer calculator, decimal, hex, octal: £10. 8 Denco coils ranges 3,4,5T: £10. Westminster low-band PA board: £5. Westminster hi-band driver board: £5. G8EII. (Camberley) 0276 35228.

• BandW 2Q4 audio phase shift networks as specified for phasing type SSB exciters: £10. Muirhead D118AV slow motion drive: £5. Admiralty pattern 1257 SMD: £5. Pye HP1FM bantam 1ch hi-band with info: £20. Another 3ch with mic, carrying strap, aligned 2m: £35. EF Johnson heavy duty rotary inductor 37ft: £15. QQV06/40, new, boxed: £15. Pair ex-eqpt 4CX250B: £5. Racal RA17 front panel. Resprayed, new legend: £5. All items plus post. (Glos) 0242 524217 eve.

• BNOS 100W 6m linear LPM 50-10-100. Mint with inst. Switchable preamp. List £235. Sale: £150. TL922 linear mint, boxed with inst. Practically unused. List £1495. Sale: £1100. No offers please. G2FZU QTHR. (Southwell, Notts) 0636 813847.

• FT290R immac.cond, nicads, chrgr, soft case, orig. packing and manual: £220. Ham Major multimode modified for 10m AM/FM/SSB/CW plus 80W linear: £110. 0424 64723.

• KW2000A with PSU and ATU. All orig. inc manual and circuit diagram: £250 firm. Also 18ele parabeam 70cm: £15. G0EIK. 0952 57670.

• STRUMECH P40. 2 mast sections with winch and cable: £100. Prefer buyer to collect from Derbyshire. G4WBR. (Redditch) 0527 45998.

• DNT M40 10fm inc. rpt shift mic, brackets: £40. WandD ATV 1 on 435.185, mic: £50. 2 KR500 elevation rotators plus control units: £80 each. Channel master 9502A rotator, alignment bearing, stub mast and control unit: £30. Hirschmann rotator, control unit: £15. Hygain rotator, control unit: £15. Marconi TF995B FM/AM 0.2-220MHz sig.gen: £80. Advance B2 sig.gen 0.1-30MHz: £5. Bremi BRL40 linear mod for 6m, 3W drive 15W out: £10. Zetagi p27.1 10m preamp: £10. Zetagi p27m 10m preamp: £10. Ferguson Videostar VHS portable, TT unit, 4 nicads faulty pause and counter: £90. ITT Star mod for 70.260 AM 10W out nicads, portable case: £20. Pye Bantam mod for 70.260 AM nicads, chrge, case: £20. RandS Polyscop 1 0.5-400MHz heavy: £90. Philips G22 t.text col TV, remote: £70. HB9 CV 2m: £8. 4m: £6. 6m: £8. 70cm: £3. Disconne: £25. GPO morse key on marble base, lead and plug: £10. Vibroplex lightning bug standard, lead and plug: £30. Mini key ex. Spitfire: £10. CW practice osc. TRX3: £3. Telex hy-gain 18 AVT/WB: £60. 1/2 size G5 RV: £8. Apelco marine 6ch hh: £90. Tektronics 549 dual storage scope 30MHz: £60. Telequipment D52 dual scope: £50. Cushcraft 3ele A3 tribander: £120. G3BXI galvanised steel lattice telescopic tower, tiltover, crank-up, 2 23ft sections, groundpost, winches, emotator 103 LBX control unit, rotator, head unit, stub mast 2in. Complete: £300. Dressler D200: £500. Dressler D70: £650. Yaesu FT757GX, FC757AT, FP707: £650. Icom IC25LE, Mutek, HM7 mic: £350. Adonis API mic adaptor: £8. Adonis AM802 compressor mic: £25. ZX Spectrum, 48k, PSU plus Scarab RTTY CW T/U and interface. Software inc Oscar tracking, slow scan, QRA locators and data recorder: £100. Datong ASP 8-pin mic i/p with through scanning: £30. ZX Spectrum, 48k, prism VTX 5000 Micronet/Prestel phone modem, joystick, games software (lots) and data recorder: £60. Yaesu FT790RMk1, Alinco ELH710 linear, nicads, soft carry case, stubby duck, flexi-whip, mobile mount bracket, listen i/p, pip toneswitchable, YM49 spkr mic, no chrgr: £300. Yaesu FT290RMk1, Mutek, Alinco, ELH230E linear, nicads, soft carry case, mobile mount bracket, listen i/p, pip toneswitchable, YM49 mic: £290. 2m/70cm mobile whip and gutter mount: £15. 2m 7/8 whip: £5. 2x 9XY tonna 2m yagis: £20 each. 2-way 2m power splitter N conns: £15. 2-way 70cm PS N conns: £15. 4-way 70cm PS N conns: £20. 4 old-type 48ele MBM's, new balun, boxes: £18 each. 2x 19 tonna old-type 70cm yagis: £18 each. New and used UR67, H100, coax and rotator cable, at least 50m: £50. 2x Bremi BRS35 PSU's with moving iron ammeters: £30 each. Drae 12A PSU: £40. Rama 250MHz frequency counter 5 digit, swr/pwr FM modulation meter: £40. Murphy CBH1500 basestation and mic: £30. Midland 4001, chatback, mic and brackets: £40. Midland 4001 10 FM inc rpt shift, brackets, no mic: £50. No offers, no time wasters, cash only, buyers collect, all sold as seen, no refunds, and please no violence this time. Alvin, G6DTW QTHR. 0372 277945 9.30-3pm w/days.

• KENWOOD TS520SE c/w 500Hz CW filter, SP520, spkr, AT200 ATU, MC50 desk mic and HS5 phones: £400. Yaesu FL2100Z 10-160m linear: £500. Trio AG202A oscillator sine/square generator 20Hz-200kHz: £80. DL1000 dummy load 1kW: £30. Prism modem 2000 Prestel, Micronet c/w software BBC-B: £45. AR2001 25-550MHz: £200. Bencher paddle key, chrome: £25. All exc.cond, manuals and orig.packing. Paul, G4KHX QTHR. (Northampton) 0604 858999.

• HEATHKIT HW100 HP23 PS SB600 spkr. Recent complete overhaul to new spec. All manuals etc. 80-10m: £150 or exch for good 2m basestation. G3OUQ QTHR. (Nuneaton) 0203 384582.

• PIONEER car radio/cassette system KEX33, 20W/20W GM4 amp, pair of TS1614 35W spkrs. Complete: £100. Kenwood TR2400 2m handheld: £80. AOR AR240 2m handheld: £65. Peter, G3UDV not QTHR. (W.London) 01-998 6225 before 9.30pm.

• TS530SP, MF941D tuner, Katsumi EK108A electronic keyer, mic and phones. Tcvr purchased Nov 87. Used approx 60hrs. Filters fitted and in exc.cond. Not used since July 88. Complete station: £650 ono. G3MEY QTHR. 024975 700.

• G3LIV AMTOR/RTTY cvtr for BBC. As new, never used, with cable for user port. Not home built. Software for RTTY. Needs G3WHO ROM for AMTOR. Cost £135. Will take: £80. G3NAO QTHR. (Dewsbury) 0924 465065.

• YAESU LCD world clock. Unwanted gift. Cost £30. Will accept: £20. G3YNC QTHR. (Romford) 0708 49175.

• KENWOOD R2000 and VC10 cvtr as new: £550 ono. Aerials, headset. Not QTHR. 0372 54819.

• 6M gear for sale. MMT 50/144 tvtr only 6mths old: £230. BNOS 50MHz 100W linear amp, very recently serviced: £180. For both items: £400. Peter G3ZSS. (Cobham) 0932 63552 eve.

• TEN-TEC Century 22 with xtal calibrator, matching PSU and circuit breaker for battery operation. Also Altai dip meter and MFJ 901B ATU. All items as new: £300 the lot. (Walton-on-Thames) 0932 221586..

• DRAKE R7 comm rcvr. Yaesu FRG7700 comm rcvr. Yaesu FRV7700 cvtr. All units little used, in pristine cond. 0633 253949.

• SHACK clearance: must be sold! CR100 RX: £10. KW Valiant TX, AM/CW, PSU: £15. Grundig TK120 mono tape recorder: £20. Garrard SP25 record deck, plinth, cartridge: £5. Also many radio mags 1965 on: free. Buyer collects, Hants. G4BIX. (Betchworth) 073784 2894.

• HF tcvr TS510 with PS510 PSU and remote VFO. Totally restored to orig.cond and aligned. This radio is in top cond. mechanically and cosmetically. Buy this super rig at: £275. Steve G4HXD. 0785 818634.

• TRIO TS780 2m/70cm multimode tcvr and matching spkr. H/book, workshop manual: £750. Trio TS180 HF bands tcvr fitted with new bands by Lowe's, unused: £525 inc h/book. Olympus VX301 colour video camera with built-in character generator. Auto-focus, power zoom: £250 inc h/book. Wood and Douglas 70cm TV tcvr 10W PSP: £100. Pye 4m tcvr xtal on 70.260 and Jaybeam 4m beam: £35. All items VGC. Open to offers. Will haggle within reason. Carr. arranged if necessary. 0773 604429 after 5pm.

• FT101ZD Mk3 FM, mic, fan, narrow CW filter, WARC, FC902 ATU and SP901 spkr. All exc.cond with manuals. No splits: £650. Brand new unused front panel for FT101ZD Mk3: £20. G0KPH. 0926 429719.

• 10M FM Maxicom Super E spectrum DID conversion with mic. 13.4V 3A Woden protected PSU and CO/85 ant. mobile matcher: £40 the

lot. No splits. Collected. (Reading) 0734 588503.
• YAESU 757GX, auto-tuner, PSU and base mic. All boxed, immac.cond with manuals: £850 ono. 60ft tower plus 3ele tribander, Ham rotator inc: £400. Includes cable and coax. G0DLY QTHR. 061-437 9620.
• ICOM R70 FM fitted, mint cond: £425. Trio 120V: £300. DNT M40 10FM: £30. Scope 2.5in ex W/D: £25. Video camera with UHF modulator model CC5E photo-scan: £40. G2CKI. (Evesham) 0386 881155.
• SILENT key sale (G4TBB). Trio R1000 HF RX: £200. Trio TR9000 2m multimode: £300. Microwave Modules 144MHz RF switched preamp: £15. RX80 ATU QRP 1.5-30MHz: £15. Realistic desk mic amplified: £10. PSU 13.8V 5A: £8.50. All ono. John, G1TSL QTHR. (Lincoln) 0522 750757.
• HP8410A network analyser. Complete: £2700. HP180A scope with 100MHz plug-in: £290. HP8620 plug-in 5.9-12.4GHz. Henry G1GMM. 0376 62108.
• GP144W vertical ant: £10. Jaybeam 5ele yagi: £10. Hi-mound MK706 squeeze key: £15. SMC T3170L pwr/swr meter 3.5-170MHz: £10. Archer rotator with controller and cable: £20. 1/2 size G5RV: £5. 2m mobile ant oscar 2NE: £5. G0ELH QTHR.
• YAESU FT747GX tcvr c/w mobile mounting bracket. Mint cond. Only 4mths old. Genuine reason for sale: £575 ono. Marconi TF801B/1 sig.gen 12-470MHz: £30. Creed 444 printer and H/Brew RTTY terminal: £40. G3ZDG. 0264 88768 after 7pm.
• KW Viceroy Mk4. SSB TX with inst.book. GWO on 80 and 40. Low drive on other bands: £40. KW 160 TX AM/CW. GWO: £10. BC342 RX. GWO with 240-110V trans, US army service, manual. Offers. G3EBG QTHR. (Ely) 0353 740434.

• PACKET terminal c/w keyboard, 12in screen mono. RS232 interface. 25-way Dee printer port, manual. All units fully tested. VGC. Hurry, last few left. Bargain: £25. Steve, G4YJP QTHR. 0604 583872 or Ron G0stment. QTHR. 0579 63192.
• PRINTER Copal model SC5500 from ICS. Wide carr. 136/233 col. 12 character sets and NLQ 180cps. Parallel/Centronics interface, Epson compatible. c/w nearly 2000 fanfold sheets, 3 spare ribbons and manual: £150 plus carr. G3RDG QTHR. 01-455 8831.
• YAESU FT101ZD, fan model. Immac cond. Must be seen. Travel if necessary: £450 ovno. (Burton) 0283 218562.
• 2M high power amp mounted in free standing floor cabinet. Inc. pair 4CX250B's control unit, heavy duty PSU: £275. 2m MMT tvtr 144-28MHz used to drive above amp: £85. 2m 17ele tonna aerial: £15. Martyn, G0GMB QTHR. 0908 560026.
• 2M medium power station Kenwood TS700 all-mode tcvr. Fitted Mutek preamp, driving QQOV6 40A valve linear amp 80W O/P. Combined: £275. 70cm MMT tvtr 432-144MHz used with above TS700: £85. 70cm 21ele tonna aerial: £15. BC221: £25. Martyn, G0GMB QTHR. 0908 560026.
• HF linear amp 80-10m 400W O/P. Uses 6HF5 valves. Requires 100W drive. Beautifully made in compact desk top cabinet inc. PSU: £275. Dual beam valve scope c/w h/books: £50. Martyn, G0GMB QTHR. 0908 560026.
• RADCOM, P.W, P.E, and various other magazines. Offers. Lots of electronic components on PCBs and loose. Cheap. Buyer collects. G6IUD. 01-421 1970.
• VALE of Belvoir. Grantham 6 miles, easy access A1. Detached 2yr old FGCH house. F/f kitchen/diner. Coloured bathroom with shower. Detached garage. Lawned gardens, open views: £74,950. G3CDC QTHR. 0949 43346.
• FRG7700 plus matching ATU: £200 or swap for Sony Pro80 or Realistic Pro2004. Also matching FRV7700 cvtr, but has small fault: £10. Buyer collects or pays post. Phillip G0JXR. (Hoddesden) 0992 468522 eve.
• 2M 100W linear with preamp MM100: £80. G0IOR. (Grimsby) 0472 358449.
• YAESU FT227RB 2m/FM 144-148MHz. Many mods 10W out, good cond: £120. Scarab RTTY terminal RX/TX: £20. 2m 9ele cross yagi: £10. B/W monitor 12in: £10. Akai GXC704D stereo cassette deck: £35. Yaesu YM40 mic: £10. Chris, G6XZM QTHR. 0737 350421 w/e only.
• MORSE key HK704: £10. Xtal filter 9MHz type YF90F with carrier xtals: £10. 70cm xtals for Pocketfone etc. RBO 6,11,15, SU8: £3. Pair 807's: £1 each. Carr. extra. G0EBQ QTHR. (Ipswich) 0473 270335.
• SIG.GEN Marconi TF8010/15 with h/book. Frequency 10-485MHz. Output 1V with attenuator, -130dBW 50ohms. AM. Low output at high frequency, requires oscillator valve: £50 ono. B/W monitor, green, video input, ideal ATV, computer games: £15 ono. Stephen G6NUT. 0732 865429.
• DATONG FL2 filter: £60. KW dummy load: £20. SML swr-25 twin meters 3.5-150MHz, G4HMD QTHR. 09274 22776.
• PORTABLE colour camera, VHS VCR tuner/timer: £250. Length heliax 50ohm coax 1/2in diam with N-types. Approx 25m: £35. Pye F460 UHF base: £30. Ex-Govt sig.gen. .1-32MHz AM/FM: £20. G8EXS QTHR. (Notts) 0623 792887.
• PHYSICS lab equip. Mostly new, electroscope, ripple tank, insulators, pulleys, Lectron kit spares, cases for 38mm meters, laser, filter pump, bimetallic strips. KWL meters, optical bench, Bourdon gauges, tuning forks. SAE for list. No reasonable offers refused. G8APX. (Ribchester) 0254 878215.
• SAGANT EL40X 3.5/7MHz dipole mint cond: £50. Yaesu 690Mk1, Benos 50W amp: £285 ono. G4UNM QTHR. 0983 402273.
• HAMEG HM203 dual trace scope, plus 2 X1x10 probes. 20MHz bandwidth 5mV/cm-20V/cm deflection. With operating manual/circuit diagrams: £200 plus carr. Teletext decoder inc interface. Offers. Ex-Govt Geiger counter, presumed working. Offers. 0270 624248 before 8pm.
• G-WHIP multi mobile ant. 10-80m: £50. 0782 395017.
• B40D HF RX made by Murphy for the Royal Navy. 0.650-30MHz. CW/AM/SSB. All valve mains operated. Ideal for RX/DX. Because of weight, 114lbs, buyer must collect: £40 ono. Tom, G0FPJ QTHR. (Blackpool) 0253 865395.
• TRIO 9000 2m multimode CW BO9 plinth. PS20 supply unit used basestation. Boxed with manuals: £350 ono. Buyer collects. G2DWZ QTHR. 0773 606375.
• STRUCTURAL aluminium c/w plans and article for telescopic mast. 6m/2m 4in box section plus 3in diameter 5m/4m lengths. Any reasonable offer accepted. (Essex) 0621 892755.

• UNIDEN 2830 10m multi-band mobile TX/RX upgradable to 10/2m. Brand new and boxed. Never on air: £219. 70W 10m linear, new: £45. Allan King, G4BKM not QTHR. 41 Curzon St, London, W1Y 7RF. 01-493 9070.
• MICROWAVE Modules MML432/50 70cm 50W linear with RX preamp. Good cond, boxed: £100. G3CAG QTHR. (Bletchley) 0908 76707.
• AVO CT38 97 range electronic voltmeter: £15. Buyer collects. G4WWX QTHR.
• YAESU FT290R, FT790R, both with nicads, case, strap, mic, mount etc: £250 each. Sat.ant. system 8ele 2m, 19ele 70cm AZ, ele rotators mast cables, coax etc: £100. No offers, no time wasters. Nigel, G0IRW QTHR. 0732 846416.
• FDK750 multimode 10W tcvr. Homebrew 10W PSU. 9ele crossed tonna. 5/8 whip gutter mount. HB9CV portable beam. Yards of coax Daiwa 2-way ant switch. Vswr meter: £200. Datong morse tutor: £35. G6CAJ QTHR. (Clacton-on-Sea) 0255 812170.
• SONY ICF7600D rcvr 150k-30MHz, plus 88-108MHz: £100. As new. SEM HF preamp RF sensing: £15. Bartg ST5MC RTTY TU machine/computer: £50. Kenwood TS530S as new: £500. No offers. Gordon. 091-581 9989 after 6pm.
• YAESU FT290R Mutek F/E. Modified to listen on input, auto tone burst on minus FM, CW, nicads, chrgr, case, good cond: £875 ono. Mic.Mod. MML144/100LS linear with preamp. Immac, boxed: £130 ono. G0JEG. (Merseyside) 051-639 9520.
• STANDARD C58 multimode. 144-147MHz, memories, scan, mic control freq, mobile slide unit, carry case, rubber duck, chrgr unit, 2 set nicads, 25W linear amp, preamp, boxed, exc.cond: £265. Ken G1XTT. (Watford area) 0923 670475.
• 1930's radio components. Various in box. SAE for list. AN/PRM10 test set GDO, osc, wavemeter, all in one instrument, 2-400MHz: £55. AR300XL rotator, new unused: £25. Electronic megger, new: £50 ono. G4DVH QTHR. 0229 54466.
• KENWOOD TS940S with ant. tuning. New: £1600. GM0BCI QTHR.
• FOR linear amp builders I offer PSU components. Inc toroidal HT transformer 240V primary 1100V 1A secondary. 700MFD 400V electrolytics 10 off. Slow start module. Rectifier bank for 2.8kV DC out plus 4-250 with holder etc: £100. G3DPR. 0425 615676.
• TRIO TS120V tcvr. 25W PEP mic and manual. Good cond: £275. (Somerset) 0278 652139.
• TELESCOPIC mast pneumatically extended using car footpump. Extends to approx 30ft c/w mounting brackets: £125. G1UEV. (Southampton) 0703 897216.
• FT290R with chrgr, rubber duck, Mutek F/E, carrying case, phones: £275. Tektronix scope DC-50MHz, type 581A with type 82 dual trace plug-in, type L adaptor, calibration and differential plug-ins, probe and manuals: £175 ono. Marconi sig.gen, 10-460MHz with calibrated attenuator: £40 ono. (Southampton) 0703 695144.
• QSL manager has quantity of IRC's for sale: £4 for 10. Present PO price 60p each. SAE please. K.Frankcom G3OCA. 1 Chesterton Rd, Spondon, Derby, DE2 7EN.
• TRIO R1000 rcvr. Exc.cond: £250. Also Global ant coupler 1000. Exc.cond: £45. 0823 284478.
• YAESU FT200 with PSU, mic, manual: £200 ono. 0942 672657.
• YAESU FT203R 2m handheld, chrgr, mains eliminator, hand mic, headset, gutter and mag mount. 3 whips: £150. Also Datong morse tutor and key: £37. John G7DOX. 061-338 8731.
• SONY video system HVC2000P camera SLF1UB recorder TTFIUB tuner, carrycase, battery, boxed, manuals: £600. MML144/100S linear: £60. MMT432/144R tvtr: £50. G3GLL, 6 Woodrolfe Rd, Tollesbury, Maldon, CM9 8SB.
• TRIO 2300 chrgr, nicads: £85. Catronics RTTY terminal: £30. HQ1 minibeam 10-15-20: £25. G4ERS. 0708 763551/45733.
• FM 2m handheld. Alinco ALX2E. 3.5W output. In perfect cond. Scan and memory, battery save function, very small rig, c/w extra long-life battery and mains chrgr. Cost £225. Accept: £120. GM0IZC. (Aberdeen) 0224 638647.
• HEATHKIT HW17 2m tcvr, built-in PSU, mic, squelch, noise-limiter. FM board, circuit diagram. Good appearance and working but sensitivity rather low, hence give-away price: £20 plus carr. G3AEP QTHR. 0253 720756.
• 150W HF transistors. SRF1397, MRF428A, MRF422: £20 each. 120kHz-500MHz sig.gen: £30. Kenpro keyer, KP100: £40. MMT28/144: £38. MMT144/432: £45. Phil. 0270 761978 after 6.30pm
• FRG7, digital, GWO, h/book: £125. CR100, nice appearance GWO, manual, no baseplate: £45. G2DAF RX separate PSU, RSGB books: £65. All ono, buyers collect. G4MNB QTHR. (Swindon) 0793 826325 after 7pm or w/e.

WANTED

•HELP. Do any old-timers remember owning or still own an Autoplex bug key? British made c1927/28, all brass construction. Can anyone help me trace one? C. Waters G3TSS, 1 Chantry Est, Corbridge, Northumberland, NE45 5JH. 043471 3125.
•SERVICES textbook of radio. Vol 5 Transmission and Propogation. Vol 7 Radio Location Techniques. R.Wilson, G3TBS QTHR.
•HELP wanted. Need circuit diagram Emoto rotator control unit model 1103 MSAX. Name, address any company/individual home overseas providing assistance appreciated. All expenses reimbursed. G4CHP QTHR. 0508 470365.
•TUNING condensers from surplus TU5/6/7B tuning units (BC610). Help to repair ex-WD aircraft altimeter, 100,1000,10000ft. Alan, G3MBL QTHR. (Bury St.Edmonds) 0284 60984.
•NIKON camera outfit wanted. Have for exch,. Kenwood TR9000 multimode. Ten-Tec Argonaut 509, 2W QRP rig SSB/CW. Ten-Tec 50W linear amp. CB radio converted 10m FM. Precision 3kg electronic balance, RS cataloque C3001 boxed as new. G3NQU QTHR. 0935 815616.
•FRG7000 up to £225 for unmodified mint specimen. Buyer inspects and pays cash. Within 50 miles Manchester preferred. 061-678 7370 eve.
•ROTATOR unused HamIV or G600RC also unused S2001 and 6146B. TS130S service manual. Cabinet for HF linear SB220 size. Sensible offers please. WW 1949-83, 35yrs, 25yrs bound or exch for above or 2m tcvr. G3GYE QTHR.
•TCVR HF bands WHY? c/w literature. Must be in 1st rate cond. Also other equip. necessary for starting new station. QTHR. 0792 816473 after 8pm.
•ORIGINAL packing boxes and associated packing materials for Trio/Kenwood TS940S and Trio/Kenwood SP940 spkr. Price and delivery or collect negotiable (needed for transportation). 021-730 2001.
•SUITCASE radio B2 and A Mk3 wanted. Also any clandestine type radios, manuals in any cond. for spares or restoration. (For small collection). G4OFO. 01-949 2317.
•EARLY wireless/crystal sets, horn speakers, valves, old books, catalogues, bound volumes Wireless World wanted. Also interested in American Comm. RX's. Jim Taylor, G4ERU, 5 Luther Road, Winton, Bournemouth. 0202 510400.
•BUTTERNUT vertical add-on kits TBR160S for 160m band and 10R A1824 for 17/12m bands for use with Butternut HF6V or HF2V antennas. Also noise bridge for HF and Betamax hi-fi video recorder. G4IRD not QTHR. (Northampton) 0604 44341.
•EBL31 valve. Info on ultrasonic cleaner for brass (clock parts) or complete machine. G4LSA QTHR. (Staffs) 0785 74388.
•XTAL filters for CW and SSB eg 9MHz IF KVG-XL-10-M or XF9B, XF9NB. SE1-QC1246AX, IQD-90E0.5, IQD-90H2.4B or WHY? Book, Zverev, Handbook of Filter Synthesis, Wiley, New York 1970 to buy or to borrow. Rod, GW4SLK QTHR. 0745 560165.
•TRIO TS 130V or similar mobile HF tcvr wanted. (Blackpool) 0253 791699.
•WORD processor, CPC464 or similar with disk. Exch Canon A1 50mm STD 35-150 zoom, 500mm drainpipe, Vivitar 3500 zoom flash, plus3x teleconv, steel box and tripod. (London) 01-607 4333.
•TRIO dip meter DM801, must be mint, FWO all parts present. Drake RV75 remote VFO model 1545. Drake tcvr cable to cconnect TR7A and R7A model 1548. Des G0JCF. (Ruislip) 0895 633118.
•COMMAND rcvrs R24,R25,R26,R27,R28,BC946,BC454,BC455. Any cond and parts. Also BC348, BC342. GW3UMD QTHR. 0222 761813.
•A122, rcvr type 301 B2, A16, A123 generator, A123, spares, valves etc. Any similar type equip WHY? G4YMP. (E.Sussex) 0424 51795.
•R1155 RX plus T1154 TX. Also R1155 RX for spares. Info on MN26X aircraft RX. Other ex WD RX's and TX's wanted ie No.19 set etc WHY? G0DRT QTHR. (Kent) 0795 876277.
•MORSE keys Marconi GPO etc, Old service types from any country. Also semi-auto's any cond. SP930/940. Hi-impedance hand mic T4X only. Also pre 1950's Buls. G4WJB. 0733 43021 eve.
•SG Brown phones type A. G3JVC QTHR. 01-398 0939.
•4-TRACK reel-to-reel tape recorder in working order, 3.75 and 7.5 speeds, 7in reel size, or larger. Also Megger insulation resistance tester in good cond. Roberts, 26 Beech Ave, Brentwood, Essex, CM13 2DX.
•BOOKS for African student "Electronic Devices and Circuits" Bogart. Telecommunication Technician
•YAESU digital display YC601 for FT101 Mk1. G2CVO. 28 Elmwood Dr, W.Mersea, Essex, CO5 8RD. 0206 383363.
•VFO 230 must be in mint cond. GW3TMP. 0244 549563 day.
•KE Eze Match wanted or KW107 or similar. Steve G0KKI. (Bradford) 0274 817095.
•WANTED for R1155 please, suitable mains PSU giving 215V HT and 6.3V heaters approx. Ron Fray. (Colwyn Bay) 0492 49382.
•TUNING cap. for Eddystone 358X RX. G3LLZ QTHR. (Swindon) 0973 828188.
•ICOM IC700T, non-working for spares. Also manual for Wayne Kerr component bridge B521 or circuits. Also manual or circuits for Marconi Q-scan scope TF966A. All expenses refunded. G4FQW QTHR. 0254 391682 after 6pm.
•REQUIRED for premier NW Lancs Radio Society, large HF tri-band beam and heavy duty rotator. Both items must be in very good to mint cond. Please contact Secretary G4ZJL QTHR. 0524 52042 after 7pm.
•MARINE RX AOR AR22M. Lockwood, G3XLL QTHR. (Mellis) 037983 596.
•HANDBOOK/circuit diagram or manual for Dymar type 785 modulation meter, copy or purchase. All costs refunded. GW4WWE QTHR. (Swansea) 0792 884895.
•R1155, GWO, reasonable price. Roy G1UUT. 0926 56094 after 6pm.
•HELP. I need a circuit board for the Wood and Douglas 70SY25B synth or a complete unit working or dud. It doesn't matter which. Someone must have one. Dave, G1NSV QTHR. 0579 45740.
•F6GPA would like to buy and FT290 with Mutek F/E in GWO and not too expensive. De L'aistre, 12 Place de la Mairie, 41600 Chaon, France. 33 54884645. Fax: 33 54961800.
•TOP band tcvr AM/SSB. Have you got one you no longer use? Even if it's homebrewed as long as it's working OK. Phillip G0JXR. (Hoddesden) 0992 468522 eve.
•MINT (virtually) R217 or Eddystone 958/2/3 or 4. Have new (virtually) ultrasonic cleaner for exch, swap. Tank size 10in cube. Neale. (Wilts) 0672 870866.

TNX FOR QSTs

A few months ago the RSGB asked for a back issue of **QST** (November 1984). We'd like to thank those who sent copies to us, particularly for the one sent from the USA. While continuing to plough through our library in an attempt to bring it up to date, we were unable to locate any issues of **QST** for the period between 1967 and 1976. It may be that these have just been misfiled, but if it turns out that they were lost during the move from Doughty Street we'll be asking for your help again!

GETTING YOUR LICENCE RE-ISSUED

Do you have a copy of a callbook or list of callsigns, names and addresses of licensed amateurs, for the years 1946-1952? HQ gets many requests from OTs who took out licences at this time, let them lapse and now, in retirement, would like to take up the hobby again. When considering the re-issue of a lapsed licence, the DTI requires some documentary proof of having held the licence previously. If the applicant no longer has a copy of the original licence, the callbook is often the onl
y source of such proof. The Society is always keen to help anyone regain their licence but we do need copies of callbooks for those years in order to be of assistance. If you can help, please contact Jim Smith, G3HJF at RSGB HQ.

MORE HELP FOR HEADQUARTERS

And finally from us, we're looking for a copy of the circuit diagram of the LM14 frequency meter (ex-US Navy). Again, please contact Jim Smith if you can help.

EVEN MORE CHASSIS BASHING

Letters on the subject of where to get your chassis made are still arriving at HQ. Harvey Jackson, G0GGI, is able to offer a one-off custom-made service and anyone interested should send a dimensioned sketch and stamped addressed envelope to him QTHR. On another matter, Harvey is trying to locate a replacement mode switch for his Swan 500C. He says that just the wafers will do if you haven't got the complete switch. If you can help, please contact him QTHR.

NO TRACE OF THE MANUAL

Alan Wood, G0ENV was lucky enough to pick up a Tech TO3 oscilloscope at a car boot sale. Unfortunately there was no trace on the screen when he came to try it out. Several attempts at trying to trace (sorry!) the manual or circuit diagram have failed so he's giving 'Helplines' a try. If anyone has the manual or cct diagram for this model, or knows where Alan can obtain one, please contact him at:

262 Egmanton Road, Meden Vale, Mansfield, Notts NG20 9PY

NOT ME - HONEST!

G0AMT has written...

"May I, through 'Helplines' apologise to any station who thinks he/her has worked G0AMT/P on the HF bands (usually CW) and is waiting for a QSL card. On several occasions over the past three years I have received QSL cards from stations I have not worked, on bands and using modes which, at the time, I was unable to use. I must conclude that my callsign is being pirated, usually as G0AMT/P. I do NOT work the HF bands as portable and I would like to caution all stations that I rarely operate outside my local area (Tyne & Wear). If any operator has knowledge of, or has worked the bogus 'G0AMT/P' on HF, could they please let me know by writing to me:

S Weglarz, G0AMT, 4 Bosworth, Highfields, Killingworth, Tyne æ Wear"

WHERE'S THE DIN?

A few years ago Jon, G1OSP, bought some metal-bodied three-pin DIN plugs fitted with a collar allowing them to be locked on to the surface-mounted socket by turning the locking ring through 90 degrees. These useful plugs were purchased from an electronics shop in Mill Street, Cambridge but Jon has mislaid the address. So far, he has been unable to locate a supplier of the connectors and would like to know if any reader knows of a supplier. Jon can be contacted by telephoning 0723 584028 (doesn't Electromail do them? — Ed).

MR (OR MRS) FIXITS REQUIRED

The Radio Amateur Invalid æ Blind Club (RAIBC) is in need of people with the technical expertise necessary to cope with amateur radio equipment, in order to take the load off its Loan Equipment Manager and to save the necessity of returning faulty equipment to Harrow. If you feel you can help in fixing equipment, please contact Angus McKenzie, G3OSS, on 01-346 5372.

BOOK GONE WALKABOUT

Kev Greaves, G6KTZ, writes with a plea.. "has anyone got a spare copy of the paperback book 'Down to a Sunless Sea' by David Graham, which they no longer require. It's now out of print and my copy has gone AWOL".

If you can help Ken he can be contacted on tel: 0533 606494.

THANKS FOR YOUR MEMORIES

Jack Clegg, G3FQH, the West Yorkshire RAFARS Representative has written to say thanks to all those who responded to his request for information about the Yatesbury and Compton Bassett radio clubs. He also says thank you to the DTI's Radiocommunications Division at Waterloo Bridge House for its help and advice regarding the re-issue of the Yatesbury callsign, G3HWF, which is now held on behalf of the West Yorkshire RAFARS Group.

CORRECTION

Last month we provided you with a destination for your BP tokens - the "new Amateur Radio and Blind Club." Not so - the line should have read "Radio Amateur Invalid and Blind Club." Sorry.

LOOPSTICK ANTENNA UPDATE

Due to lack of space, we were unable to publish the components list and coil winding details for this article in the April edition. The relevant details appear below.

COMPONENTS LIST

1 2 x Terry clips
2 2 x Wood, 203 x 19 x 13mm
3 1 x Wood, 190 x 19 x 13mm
4 2 x Wood, 102 x 16 x 13mm
5 2 x single-sided PCB, copper 'up', 203 x 102mm
6 1 x single-sided PCB, copper 'in', 114 x 102mm
7 1 x single-sided PCB, copper 'in', 76 x 102mm
8 3 gang, 500pF per section, air-spaced variable
9 Rod and coil assembly
10 Reduction drive
11 RG58 coax cable
12 Spacers
13 Bracket

COIL WINDING DETAILS

L1 51 turns, imm o/d PVC covered hookup wire, close wound
L2 16 turns, close wound
L3 6 turns
L4 2 turns, spaced
Notes: All wire (except for Li) is 7/0.2mm, 1.2mm o/d PVC covered stranded wire. L3 and L4 are wound with one piece of wire (including link) over centres of L1 and L2.

CLUB NEWS

DEADLINE - Items for inclusion in the JUNE issue must be sent to HQ marked "Club News - DIARY" to be received by Tuesday 25 APRIL 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 ARC - 4, Special event station GB0XXV; 11, talk "Repairing Domestic Appliances"; 18, VHF field day preparations.
▶ Bristol RSGB Group - 22, talk "ATU's and Transmatches" by Peter Chadwick, G3RZP.
▶ South Bristol ARC - 3, video "Travels in South Africa"; 10, HF activity evening; 17; construction evening; 24, talk "Camden Works Museum" by J. Richardson; 31, video "Aerial Circus".
▶ Thornbury & DARC - 3, RAYNET; 17, HF activity evening.
▶ Weston-Super-Mare RS -

BEDFORDSHIRE

▶ Bedford & DARS - 2, visit to Stewartby Brick Works; 16, talk "Crime Prevention" by Bedfordshire Constabulary.
▶ Dunstable Downs RC - 1, DF/ treasure hunt; 6/7, Wolfsburg amateurs' departure; 12, talk "Interference on Radio Sites" by Nick Fenner, G1NMP.
▶ Shefford & DARS - 11, talk "DXing on the 2M Band" by Martin, G0GMB; 18, visit to Letchworth Power Station; 25, Field Day planning.

BERKSHIRE

▶ Reading ARC - 11, talk "Test Equipment" by Dean Cousins from Marconi; 25, alignment evening.

CLWYD

▶ Conwy Valley ARC - 4, talk by Norman Kendrick, G3CSG.
▶ Delyn RC - 9, joint evening with Alyn & Deeside ARS for demonstration by Lowe Electronics. To be held in Shotton Lane Social Club, Shotton, at 8pm; visit by RSGB Liaison Officer for Clwyd. Mr. Peter Higgs, GW4IGF.

DERBYSHIRE

▶ Buxton RAs - 16, talk "Underwater DX" by Geoff, G4SYC.
▶ Derby & DARS - 3, junk sale; 10, video show; 17, talk and demonstration "Satellite TV - the facts" by Paul, G8JGF; 24, visit by Birketts of Lincoln; 31, illustrated talk "Japanese Morse" by Norman Kendrick, G3CSG.

DEVON

▶ Exeter ARS - 8, talk "Transmitters and Simple Treatment" by Chuck G0/WA6TIR.

DORSET

▶ Flight Refuelling ARS - 7, talk "Six metres tropo" by Steve, G4JCC; 14, open forum; 21, talk "Packet Radio techniques" by John, G3WGV; 28, talk and slides "A visit to Russia" by Les, G1LHW.

Co.DURHAM

▶ Houghton-le-Spring ARC - Now meets on Thursdays at 8pm in Fencehouses Comrades Club, Eastfield House, behind Station Avenue North, Fencehouses, Houghton-le-Spring. Details Foster, G0ABF tel: 091-584 4673.

ESSEX

▶ Braintree & DARS - 15, AGM.
▶ Chelmsford ARS - 2, monthly club meeting - KW Communications.
▶ Loughton & DARS - 5, talk "Radio Navigation" by Tony Mothew; 19, planning night for Aylmer's Farm; 26-28, Aylmer's Farm weekend GB2LRS.

GLOUCESTERSHIRE

▶ Gloucester ARS - 3, talk "Introduction to Amateur Radio" by G5BM; 31, NFD briefing.

GREATER LONDON

▶ Acton, Brentford & Chiswick ARC - 16, talk "Antenna Projects" by G3IGM.
▶ Echelford ARS - 8, talk "Transpolar Ski Trek" by Mike Meiman, G0/PA3BHF.
▶ Harrow ARS - 5, activity night.
▶ Southgate ARC - 11, talk "Marconi and Microwaves" by Mr. Stan Woods, Marconi historian; 25, CW computer program "Dr QSO" demonstrated by G0ASA.
▶ Wimbledon & DARS - 12, general activity; 26, quiz with Coulsdon ATS.

GREATER MANCHESTER

▶ South Manchester RC - 5, talk "A 160mm DF Receiver with Frequency Synthesis" by D. Holland, G3WFT and I. Morrison, G0DMU; 12, talk by winner of Home Built Equipment Contest; 19, AGM; 26, talk "Confessions of a Safety Engineer" by C. Plummer, G8APB.
▶ Stockport RS - 10, talk "Capacitors" by Geoff Lomas, G4SYC; 24, discussion night/pre NFD.

GWENT

▶ Ebbw Vale CARS - **NEW** mets Mondays (during school term) 7pm at EV College of Further Education. Regular CW classes. New members & SWL welcome. Club station. Details GW1IKN tel: 0495-370286.

GWYNEDD

▶ Dragon ARC - 15, talk and demonstration on "Meteostat" by Peter Higgs, GW4IGF.

HAMPSHIRE

▶ Basingstoke ARC - 1, talk "More on ICs" by G1MDS.
▶ Fareham & DARC - 3, talk "Data Communications and the SEB" by Steve Frost, G4VNM; 17, talk "The R7000 and Scanners" by Rod Smith, G0ERS; 31, talk "PEP up your Power Meter" by Mick Curran, G- 10, public evening; 24, HF NFD preview.
▶ Horndean & DARS - 4, talk "Maritime Communications - yachts" by Mr. Clarke.
▶ Itchen Valley ARC - 12, talk "ATUs" by G3RZP; 26, talk "Basic 2M Foxhunting" by G4WIZ.
▶ Three Counties ARC - 10, talk "Police Photography" by Hampshire Constabulary; 24, junk sale.
▶ Winchester ARC - 19, talk "Nostalgia" by G6NZ.

HEREFORD & WORCESTER

▶ Bromsgrove ARS - 9, AGM; 23, night on the air.
▶ Bromsgrove & DARC - **NEW SECRETARY** Mr. Trevor Harper, G0KIN tel: Bromsgrove 33173. Continues to meet on Fridays at Avoncroft Arts Centre; own shack.
▶ Malvern Hills ARC - 9, DTI Radio Investigation Service.
▶ Redditch ARS - 11, talk "Thoughts on Aerials" by G3JFH.
▶ Vale of Evesham ARC - 4, visit to Club by Howes Communications, Kit manufacturers.
▶ Wythall RC - 9, night on the air; 16, surprise night; 30, night on the air.

HERTFORDSHIRE
▶ Cheshunt & DARC – 3, talk "Electronic Warfare" by John, G3WFM; 17, talk "Packet Radio" by Mike Dennison, G3XDV; 31, NFD briefing by Peter G0KLU.
▶ Verulam ARC – 23, talk "6 metre Equipment" by R.V. Ray, G8CUB.
▶ Welwyn-Hatfield ARC – 1, talk "The Black Art of Heat Sinking" 15, NFD preparation.

KENT
▶ Edenbridge ARS – 7, net night; 14, field day equipment check; 25, Fox hunt (pedestrian Ide Hill); 28, shack visit.
▶ Medway ARTS – **NEW VENUE** Tuesdays, 7.30pm at 5th Medway Scout Headquarters, Roseberry Avenue, Beresford Avenue, Rochester. Details G4VRI, QTHR.

LANCASHIRE
▶ Central Lancs ARC – 1, GB2GOD – HF/VHF activity day at Club HQ; 15, film night – "The S0RASD DXpedition" and "NZAA Multi-Multi Contesting".
▶ Eccles & DARS – 2, talk "Applications of Electrostatics" by G6FEI.
▶ Fylde ARS – 11, equipment sale; 25, preparation for Field Day.
▶ Rolls Royce ARC G3RR – 3, Extraordinary General Meeting.
▶ Southport & DARC – 15, talk "Aircraft Accident Investigation" by Viv Slight, G6SX, ex-Chief Inspector of Accidents, HM Overseas Civil Aviation Service.
▶ Thornton Cleveleys ARS – 8, talk "Getting Started on Microwave Bands" by Mike Dixon; 15, preparation for HF Field Day.

LEICESTERSHIRE
▶ Leicester RS – 1, HF/VHF activity night; 8, HF/VHF activity night; 15, talk "Packet Radio" by G4MTP/G4JTY; 22, HF NFD final arrangements; 29, HF/VHF night on the air.
▶ Melton Mowbray ARS – 19, Annual Fox Hunt.

LOTHIAN
▶ Lothians RS – 10, construction competition and DF tune up; 24, DF hunt.

MERSEYSIDE
▶ Kirkby ARS – **NEW** meets Wednesdays 7.30pm at Kirkby Sports Centre, 17 Valley Road, Westvale, Kirkby. Activities include Morse code tuition, electronic construction, computers and on air nights.
▶ Liverpool & DARS – 2, inter-club quiz; 9, activity – construction – club station on air; 16, G3IQD DF Foxhunt Cup event; 23, surplus equipment sale; 30, NFD preparations.
▶ Wirral ARS – 3, RSGB videos; 17, final NFD organisation.

NORFOLK
▶ Norfolk ARC – 3, talk "Pub Life – the "Inn-side" Story" by Derry Fuller, G0DAP; 10, talk "Polar Ski-Trek Expedition" by Mike Mearman, G0/PA3BHF; 17, first NFD briefing; 24, GB3NB repeater AGM; 31, final NFD briefing.

NORTHAMPTONSHIRE
▶ Northampton RC – 11, junk sale; 18, video "VHF" by Jack G5UM; 25, walking DF Foxhunt.

NOTTINGHAMSHIRE
▶ Mansfield ARS – 12, AGM.

OXFORDSHIRE
▶ Harwell ARS – 16, talk "HF Antennas for the Small Garden" by G3XTT.

SHROPSHIRE
▶ Salop ARS – 11, junk sale at Beauchamp Hotel, The Mount, Shrewsbury.
▶ Telford & DARS – 3, Morse class, station on air; 10, mini talks by G0CZD; 17, RSGB video; 24, talk "The Sun" by G3ENY; 31 May, electronic egg race, G6UDX.

SOUTH GLAMORGAN
▶ British Telecom ARS – 10, IBTE visit; AGM.

SOUTH YORKSHIRE
▶ Barnsley & DARC – 8, treasure hunt.

STAFFORDSHIRE
▶ Stafford & DARS – 9, night on the air; 16, talk "Wire Antennas" by Ken, G3EHM; 23, equipment construction.

STRATHCLYDE
▶ West of Scotland ARS – 19, AGM.

SUFFOLK
▶ Ipswich RC – 24, final planning for the East Suffolk Wireless Revival.
▶ Felixstowe & DARS – 3, Martlesham RS Open Meeting talk by Louis Varney, G5RV. British Telecom Research Labs, Martlesham Heath; 15, East Suffolk Wireless Revival Planning; 28, East Suffolk Wireless Revival – The Hollies, Straight Road, Bucklesham. Provision of Talk In and Bring & Buy.

SURREY
▶ Coulsdon ATS – 8, talk "Facts and Fallacies about Learning Morse" by Tom Mansfield, G3ESH.
▶ Dorking & DRS – 9, talk and demonstration "Microwave Modules Product Range" by Mick Senior, G4EFO.
▶ Reigate ATS – 16, talk and slides "Contests, The Competitive Edge" by Al Salter, G3FXB.

WARWICKSHIRE
▶ Rugby ATS – 2, annual construction competition judging; 16, talk "DXpedition to Lundy" by Lionel Parker, G5LP; 23, DF Hunt.
▶ Stratford-upon-Avon & DARC – **NEW SECRETARY** Alan Beasley, G0CXJ, 2 Ilmington Road, Blackwell, Shipston on Stour, Warks. CV36 4PE.
8, talk "The Heyday of Wireless"; 22, technical topics.

WEST MIDLANDS
▶ Coventry ARS – 5, 2M direction finding contest; 12, night on the air and Morse tuition; 19, the Indoor Direction Finding Contest; 26, night on the air and Morse tuition.

WEST SUSSEX
▶ Mid-Sussex ARS – 4, night on the air; 11, talk "Antenna Planning Applications" by Ray Hill, G4HLH; 18, G3ZMS calling...; 25, talk "Amateur Satellite Operations" by Fred Southwell, G6ZRU.

WEST YORKSHIRE
▶ Denby Dale ARS – 3, talk "Simple PCB Design" by G3SDY; 17, talk "Plastic Boxes" by G8BZY; 24, fox hunt.
▶ Keighley ARS – 2, night on the air; 16, foxhunt; 30, talk "Programmable Devices" by G3YEE.
▶ Spen Valley ARS – 18, fox hunt.
▶ Todmorden & DARS – 1, talk "Raynet" by Paul, G6FMP; 15, surplus equipment/junk sale.
▶ White Rose ARS – 10, AGM.

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'.

30 APRIL
▶ BATC Rally – The Crest Hotel, junction 2 of the M6 motorway. Small entrance fee must be charged to comply with local Sunday trading regulations. Opens 10am, trade stands, components stands, everything for the keen ATV enthusiast, lectures and construction displays. Details Trevor, G8CJS tel:0532 670115.
▶ 6th Anglo-Scottish Rally – *CHANGE OF DATE* Tait Hall, Kelso. Details Bruce GM4UIB.

1 MAY
▶ Mid-Cheshire ARS Rally – Civic Hall, Winsford. Opens 11am (10.30 for disabled). Full catering and ample car parking. Details David, G4XUV tel: 0606 77787.

7 MAY
▶ Southend & District Mobile Rally – Roachway Youth Centre, Rochford, Essex. Doors open 10am. Details Ted G4TUO tel: 0702-202129.
▶ Yeovil QRP Convention – Preston Centre, Monks Dale, Yeovil. Doors open 9am, traders, two lectures, refreshments. Details Dave, G1MNM.

14 MAY
▶ Drayton Manor Mobile Radio Rally – Drayton Manor Park, Tamworth, Staffs. On A4091, 1 mile from A5 junction. Opens 11am, usual traders, flea market, park facilities for family, refreshments, bars. Talk-in on S22 and 70cm. Details Norman G8BHE, tel: 021-422 9787.

21 MAY
▶ 32nd Northern Mobile Rally – Great Yorkshire Showground, Harrogate, North Yorkshire. Usual large number of traders, bring & buy stall, craft stalls, refreshments and bar. Entry via Railway Road, off Harrogate – Wetherby road, 2 miles from town centre. Details Harry, G3CQQ tel: 0943 602118.
▶ British Telecom ARS Rally – Now 4 June.
▶ Parkanaur Rally – Silverwood Hotel, Lurgan, Co.Armagh. Opens 12 noon. Usual trade stands, bring & buy, bookstall, QSL bureau. Talk-in on S22. Details Jim, GI1YGS tel: 0762 851179.

28 MAY
▶ 13th East Suffolk Wireless Revival – Civil Service Sportsground, Bucklesham, nr. Ipswich. Opens 10am, usual traders and attractions. Well suited for family day out. Free parking. Details Jack, G4IFF tel: 0473 464047.
▶ Maidstone (YMCA) Radio Rally – Sports Centre, Melrose Close, Maidstone. Usual traders and attractions, snack bar and beer tent. Details G6FZD tel:0622 50709.
▶ Plymouth RC Mobile Rally – Plymstock School, Church Road, Plymstock, Plymouth. Opens 10am, usual traders, demonstrations, refreshments and raffle. Large free car park, talk-in on S22. Details Joe, G1RXR tel: 0752 509855.

29 MAY
▶ Doncaster Radio Rally – Bircotes Sports Centre, near Bawtry, Doncaster. Details Audrey Wilson tel: 0302-721259 or 0302-857526. Write: 23 Florence Avenue, Balby, Doncaster.

MAY – The Swindon & DARC regrets that it will not be running the Swindon Rally this year.

4 JUNE
▶ British Telecom ARS Rally – BT HQ, Coryton, Cardiff. Opens 10.30am, traders, bring & buy, refreshments and bar. £1 admission (half-price children/OAPs). Ample parking and easy access 100 yards from M4 junc 32. Details Martyn Jenkins, tel: 0222 379634 (office).
▶ Spalding & DARS Mobile Rally – Springfields Arena, Spalding. Usual traders, free entry to gardens. Talk-in on S22 and 70cm. Details T Kettlewell, G4TWR.

11 JUNE
▶ Elvaston Castle Mobile Rally – Elvaston Country Park near Derby. In excess of 120 trade stands, bring & buy, flea market, craft marquee, full on-site catering, children's entertainment, arena attractions. House and gardens for family. Car parking 50p (levied by Elvaston Castle). Details John G4PZY tel: 0332 767994. Trade Peter G3WFU tel: 0332 700265 evenings.
▶ 29th RNARS Mobile Rally – HMS Mercury, Petersfield, Hants. Opens 10am, trade stands, special interest, repeater group and local club stands, bring & buy stall, local radio (County Sound) stand, craft exhibition, many other attractions for adults and children. Talk-in on 2m and 70cm. Details Cliff, G4UJR tel: 0703 557469.
▶ Norfolk Raynet Rally – Barford Village Hall (7 miles E of Norwich, NGR: TG 113 078). Opens 10.30am, trade stands, car-boot sale, refreshments etc. Details Tim, G4CTT.
▶ Mid-Lanark ARS Open Day – Community Education Centre, Newarthill, by Motherwell. Usual traders, bring & buy stall, demonstrations of packet radio, RTTY and QRP, lectures, presentation of EHI Trophy, refreshment facilities. Talk-in on S22. Venue is situated on A723, 1.5 miles south of M8/A73 interchange. Details David, GM1SSA tel: Holytown 732403.

18 JUNE
▶ Denby Dale ARS Rally – Shelley High School, 5 miles SE of Huddersfield, W.Yorks. Details Gerald Edinburgh tel: 0484 602905.
▶ Newbury Radio Boot Sale and Rally – Acland Hall, Cold Ash, Newbury, Berks. 10am to 3pm, admission free. Talk-in with GB4NBS. Details and advance bookings from Mike, G3VOW tel:0635 43048.

25 JUNE
▶ 32nd Longleat Mobile Rally – Longleat Park, nr. Warminster, Wilts. RSGB stand, large bring & buy, extensive trade display, specialist clubs and societies, beer tent, several food stands, family entertainment. On-site camping available for weekend. Details Shaun, G8VPG tel: 0225-873098.

2 JULY
▶ Newport ARS Grand surplus equipment and junk sale – Brynglas House, Newport, Gwent. 11am (10.30am for disabled visitors), surplus equipment and junk stalls, auction, refreshments. Talk-in on S22 by GW1NRS. Details from Newport ARS, PO Box 33, Newport, Gwent.

9 JULY
▶ Worcester & DARC Droitwich Strawberry Rally – High School, Droitwich. Trade stands, bring and buy, family entertainment and strawberry fields (weather permitting). Free admission and car parking. Details Derek Batchelor tel: 0905 641733.

15 JULY
▶ Cornish RAC Rally – Richard Lander School, Truro. Trade stands, bring and buy, computer display and demo, refreshment, free car parking, attractions for XYLs and children. Details Rolf Little tel: 0872 72554.

16 JULY
▶ Sussex Amateur Radio & Computer Fair – Brighton Racecourse, Sussex. 10.30am. Usual trade stands and large bring and buy, refreshments, easy access and free parking. Details Bob,

G1IOS tel: 0798-43841.
▶ Pontefract Racecourse Rally & Fair - All the usual attractions plus boating, fishing, adventure play ground, pitch and putt. Details Colin G0AAO tel: 0977-43101.

23 JULY
▶ Anglian Mobile Rally - Highwoods Sports & Leisure Centre, Severalls Lane, Colchester. Details Jeremy, G0KEH tel: 0206-384829 (evenings/weekends).
▶ McMichael '89 Rally - Haymill Centre, Burnham, Slough. 10.30am (10.15 disabled visitors), radio controlled cars, ATV group, packet station, HF station, GB4MR, car boot sale,CAMRA bar, refreshments. Admission £1 and £5 for car boot area for car and driver for the day. Details Bob, G0BTY tel: 0494-29868.

28/29/30 JULY
▶ DATASPACE '89 (incorporating the 4th AMSAT-UK Colloquium and the 2nd RSGB Data Symposium) - University of Surrey, Guildford. Details Ron Broadbent, G3AAJ tel: 01-989 6741.

30 JULY
▶ Rugby ATS Amateur Radio Car Boot Sale - Lodge farm, Walcote, nr Lutterworth, Leics, about 2 miles east from junction 20 of the M1. 10am, admission 50p for non stall holders, pitches available for £5 the whole day. Talk-in on S22. Details from Kevin, G8TWH tel: 0203 441590.
▶ Scarborough ARS Rally - The Spa, Scarborough. 11am, trade stands, bring and buy, refreshments and bar. Talk-in on S22. Details Ian, G4UQP tel: 0723-376847.
▶ Hilderstone Radio Rally - Hilderstone College, St.Peters, Broadstairs, Kent. Details Ron, G3TAJ tel: 0304 812723.

6 AUGUST
▶ RSGB NATIONAL MOBILE RALLY - Woburn Abbey, Bedfordshire. Details Norman Miller, G3MVV tel: 0277-225563 daytime.

13 AUGUST
▶ Flight Refuelling Hamfest '89 - Flight Refuelling Sports Ground, Wimborne, Dorset. Details John G0API tel: 0202 691649 or Rob G6DUN tel: 0202 479038.
▶ Derby Radio Rally - Lower Bemrose School, St.Albans Road, Derby. Details Martin, G3SZJ tel: 0332-556875.

20 AUGUST
▶ Red Rose Summer Rally - Bolton Sports & Exhibition Centre. Details Dave, G1IOO tel: 0204-24104 evenings.

27 AUGUST
▶ Torbay Mobile Rally - STC Social Club, Brixham Road, Paignton, Devon. Details G3KZJ (QTHR). NO APPLICATIONS UNTIL AFTER MAY 1989 PLEASE
▶ Galashiels & DARS Open Day - Focus Centre, Galashiels. Details John, GM0AMB.
▶ BARTG Rally - Sandown Park Racecourse, Esher, Surrey. Details Peter, G8VXY tel: 021-453 2676.

28 AUGUST
▶ Huntingdonshire ARS JUNK 89 - The Medway Centre, Coneygeare Road, Huntingdon, Cambs. Details Chris, G1YVS tel: 0487 839212

OTHER EVENTS

14 MAY
▶ RSGB HF-DF Qualifying Event (Banbury ARS). Competitors require OS Sheet 151, 1:50,000 series Stratford-upon-Avon. Assemble at 1300 BST for 1320 start. Location, Drayton School, A422, Banbury, Oxon. Anyone requiring teas should contact Graham Nicholls, G4DLB tel: 0295 65492 before 7 May.

GB CALLS

The list below shows ALL special event stations licensed for operation during this month and early next month (as at press date).

It is taken direct from the GB Calls file on the HQ computer. These callsigns are valid for use from the date given but the period of operation may vary from 1 to 28 days.

1 MAY
GB0CDN - GRID: SZ 295 849
GB0RRG - MANCHESTER
GB1CDN - NEEDLES BATTERY
GB2YSC - MAIDSTONE, KENT
GB4BTS - BRITISH TELECOM STONE, STAFFS
GB4HVP - DARTMOUTH PARK, W.MIDS
GB4KS - HARROW, MIDDX
GB4PPA - PINDAR SCHOOL, SCARBOROUGH
GB4RRG - BOLTON
GB6BH - BARLBOROUGH HALL

3 MAY
GB1CDA - FORT BLOCKHOUSE, GOSPORT
GB4JWC - JAMES WATT COLLEGE, RENFREWSHIRE

4 MAY
GB0CDX - GRID: SZ 339 879
GB0XXV - 25TH ANNIVERSARY BRISTOL ARC

5 MAY
GB0BGS - AYLESBURY, BUCKS
GB4CSS - CARDIGAN SEA SCOUTS HQ, DYFED

6 MAY
GB1GGA - THE GUIDE/SCOUT HUT, NURBURY, LONDON SW16
GB2BHS - BALSHAW'S HIGH SCHOOL, PRESTON
GB2LOW - QRP CONVENTION, THE PRESTON CENTRE, SOMERSET
GB2PYG - PEN-Y-GHENT IN RIBBLESDALE
GB4CDS - NETLEY CASTLE
GB4DHS - DUFFRYN HIGH SCHOOL, NEWPORT, GWENT

7 MAY
GB4HMS - HMS WARRIOR 1860, PORTSMOUTH

8 MAY
GB0CDS - GRID: SU 628 069
GB1CDS - GRID: SU 628 069

10 MAY
GB1CDJ - ROUND TOWER PORTSMOUTH
GB1CDQ - SQUARE TOWER PORTSMOUTH
GB1CDS - FORT SOUTHWICK, HANTS
GB1CDW - FORT WIDLEY, HANTS
GB2SEM - SOUTHERN ELECTRICITY MUSEUM, DORSET

12 MAY
GB0CLC - BOWLEY SCOUTS CAMP SITE, LANCS
GB8GS - GRID: SE 95 4074

13 MAY
GB0CC - CANFORD PARK, BRISTOL
GB0FCS - FALKLAND COUNTRY SCHOOL, NEWBURY
GB0MT - DRAYTON MANOR PARK, STAFFORDSHIRE
GB4HSC - HIMLEY HOUSE PARK, W.MIDS
GB6CDS - NETLEY CASTLE

14 MAY
GB4YCS - YORK SCOUT COUNCIL HQ CAMP

18 MAY
GB0SAL - ORMO PARK RECREATION CENTRE, BELFAST
GB2GCR - GRID: TA 277 068

19 MAY
GB0BRC - BELL PUBLIC HOUSE, KENT
GB0HIC - BIRKDALE SCHOOL, SOUTHPORT
GB0TW - RICHMOND ADULT COMM. COLLEGE, TWICKENHAM
GB8FC - SCIENCE MUSEUM, WROUGHTON, SWINDON

20 MAY
GB0MSS - GRID: NR 860 690
GB0OAS - THE AMBULANCE STATION, OXFORDSHIRE
GB2PF - PAISLEY FESTIVAL, BARSHAW PARK
GB4NLS - AMERICAN ADVENTURE THEME PARK, DERBYS

22 MAY
GB0MC - MADRAS COLLEGE, ST. ANDREWS, FIFE
GB4BCY - BIRMINGHAM CENTENARY YEAR

23 MAY
GB2CAT - WILMSLOW, CHESHIRE

24 MAY
GB2FOI - PRIORY SCHOOL, WESTON-SUPER-MARE
GB4EWD - GRID: SJ 927 537
GB4XRT - 41 CLUB CARAVAN SITE, W.YORKS

26 MAY
GB0SC - SHREWSBURY CASTLE
GB1SI - SHETLAND ISLANDS (WAB)
GB2MAS - RAF MILDENHALL, GRID: TL 685 773
GB2WCF - FRANKBY, WIRRAL
GB4GWR - DIDCOT RAILWAY CENTRE, OXON
GB4SI - SHETLAND ISLANDS (WAB)
GB4SRS - STEEPHOLME ISLAND, GRID: ST 229 607
GB4SVR - SANDWELL VALLEY RESERVE, BIRMINGHAM

27 MAY
GB4DX - "SANDHOLM" HEATH FARM RD, SUFFOLK
GB4FNM - KILDALE, N.YORKS

28 MAY
GB0HCA - MERCHESTON HALL, HANTS
GB4SWR - CIVIL SERVICE SPORTSGROUND, SUFFOLK
GB5DX - HARROGATE LADIES COLLEGE, N.YORKS

29 MAY
GB1CDN - NEEDLES BATTERY
GB2PPC - PRIOR PARK COLLEGE, AVON

1 JUNE
GB0CDV - SPIT BANK FORT IN THE SOLENT
GB0MGS - MARSTON GREEN, BIRMINGHAM
GB0RRA - LEIGH, LANCS
GB0RRR - RED ROSE RALLY, WIGAN
GB2JLS - JOSEPH LECKIE SCHOOL, W.MIDS
GB2OTR - OLD TIME RALLY, GRID: TL 915 273
GB4BCO - GALA BATHS, W.MIDS
GB4CS - SAUCHIE TOWER, CLACKMANNANSHIRE
GB4MCF - MEIR YOUTH & COMM. CENTRE, STAFFS
GB4RE - 38 ENGINEER REGIMENT, N.YORKS
GB4RRA - BOLTON
GB4RRS - GTR MANCHESTER
GB6RRA - GTR MANCHESTER
GB6RRG - WIGAN
GB8RRS - BOLTON

2 JUNE
GB0GHG - GLASGOW CITY CHAMBERS
GB8FC - SCIENCE MUSEUM, WROUGHTON, SWINDON

3 JUNE
GB0BLR - BRENTWOOD, ESSEX
GB5DC - DRUMMONDS CENTRE, COLCHESTER, ESSEX

4 JUNE
GB2WST - WHITWORTH CIVIC HALL, NR ROCHDALE

5 JUNE
GB0CDS - GRID: SU 628 069
GB1CDS - GRID: SU 628 069
GB4CHF - CHURCHILL SCHOOL, AVON

6 JUNE
GB4RE - RIPON ACF ROYAL ENGINEERS, N.YORKS

8 JUNE
GB8XXV - 25TH ANNIVERSARY BRISTOL ARC

9 JUNE
GB0RAF - RAF STAFFORD
GB0SD - ASTLEY PARK

10 JUNE
GB2HLF - YEOVIL DISTRICT HOSPITAL, SOMERSET
GB2HSF - HOWLEY GRANGE PRIMARY SCHOOL, HALESOWEN
GB8SD - SCOTTISH AIR SHOW

12 JUNE
GB2WAB - WORKED ALL BRITAIN, GRID: SD 339 451

14 JUNE
GB1CDJ - ROUND TOWER PORTSMOUTH
GB1CDQ - SQUARE TOWER PORTSMOUTH
GB1CDS - FORT SOUTHWICK
GB1CDW - FORT WIDLEY
GB2HC - HARROGATE COLLEGE

15 JUNE
GB2MSG - ST GEORGES HOTEL, DARLINGTON

16 JUNE
GB0DJS - DINGLEWELL JUNIOR SCHOOL, GLOUCESTER
GB0KHS - KINGS HIGH SCHOOL, WARKS
GB0RAF - RAF CONINGSBY, LINCS
GB4NED - NORWICH EAST DISTRICT COUNTY CAMP SITE

17 JUNE
GB0SRS - SHIELD ROAD SCHOOL, FILTON, BRISTOL
GB1SSR - LOWER BIRCH FARM, WORCS
GB2MHF - BIRKDALE, SOUTHPORT, MERSEYSIDE
GB4GPT - GEC-PLESSEY, NOTTS. GRID: SK 535 355
GB4RAF - RAF HALTON, NR AYLESBURY, BUCKS
GB4SSR - LOWER BIRCH BANK, WORCS
GB4SYT - HILLSBOROUGH, SHEFFIELD

18 JUNE
GB4HSF - MARGATE, KENT
GB4NBS - NEWBURY BOOT SALE, COLD ASH, BERKS

19 JUNE
GB0UOD - OXFORD UNIVERSITY OPEN DAYS

22 JUNE
GB2SSF - SANDWELL SPORTS FESTIVAL, W.MIDS

23 JUNE
GB2RB - BURNS HOUSE MUSEUM, AYRSHIRE
GB2RBC - ROYAL BALMORAL CASTLE, ABERDEENSHIRE
GB8FC - SCIENCE MUSEUM, WROUGHTON, SWINDON

24 JUNE
GB2WMP - WEST MIDLANDS POLICE, EDGBASTON, BIRMINGHAM
GB4AIR - AIR FAIR, SHOREHAM-BY-SEA
GB4GGA - JACKSONS FIELD, NUNEATON, WARKS
GB4HAF - MILTON KEYNES, BUCKS

26 JUNE
GB4CHA - CASTLE HIGH SCHOOL, KENT

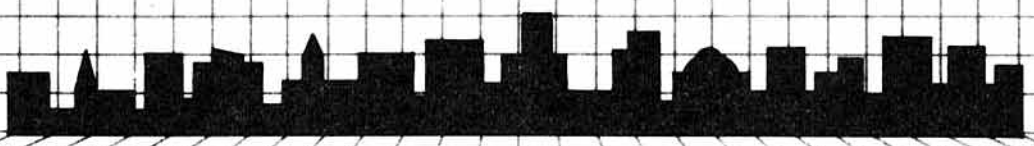
29 JUNE
GB2BSF - BICNACRE PRIORY COUNTY PRIMARY, ESSEX

30 JUNE
GB0BCS - BROCKWORTH COMPREHENSIVE, GLOUCESTER
GB0CDJ - ROUND TOWER, HANTS
GB0RAF - RAF STAXTON WOLD, N.YORKS
GB0SSF - STANCHESTER COMPREHENSIVE, SOMERSET
GB4TSR - TRAINING SHIP RESOLUTE, NEWPORT, GWENT

L.A.Moxon, G6XN

hf antennas

for all locations



HF ANTENNAS FOR ALL LOCATIONS by Les Moxon, G6XN, is renowned worldwide as probably the most in depth look at practical amateur radio hf antennas available. Sometimes controversial, but always helpful and encouraging to the experimenter, the author guides the reader through the theory of hf antennas with the minimum of headaches. The book is not just theory however. Many practical designs are given, a large proportion of which are completely unique to this book. Whether you throw a piece of wire out of an upstairs window, or have four elements on 7MHz you cannot fail to be fascinated by this book.

HF Antennas for All Locations costs £6.15 to RSGB members by post.

the last ...

PERSONAL DELIVERY

I had just packed the bags for our holiday in the sun (I'm now retired) when the postman dropped my February 89 *RadCom* through the letterbox. It was half and hour before we were due to leave for the train, so I took it with me to read in Spain.

A few days later after we had recovered from the travelling I read in 'Helplines' page 26, about the London postal strike of Sept 88 and an overseas member who did not receive his September 88 copy of *RadCom*, Senor R Martin Giral, E A7AMW, PO Box 2019, Malaga. As that address was only about an hour's journey away, I decided to write to Rodrigo, E A7AMW, offering whatever help I could both while I was in Spain and also when I returned to England. Eventually, E A7AMW replied, invited us to his little shop in the old port of Malaga city, and off we went. The meeting was very pleasant, despite my poor Spanish. Rodrigo was delighted that fellow amateurs in England had already sent him the missing September issue, and as he had received more than one copy he has distributed them to other eager Malaga 'EAs'.

He is most grateful to the people who have both written and sent the missing issue. So now I must get that 'A' licence so we can 'sked' direct. *J B Greenall, G7CBX*

DON'T GIVE UP ON LEARNING MORSE

We feel this information will be of some interest to your readers who are learning morse code, and to those who are finding it a disheartening and difficult task to master.

Joanne, our eleven year old daughter, started Senior School in September. After a long day at school travelling to and from by bus, out of school activities, ballet classes, tap and stage classes, Guides to name a few, and homework every night and weekend, she decided to learn morse code as well. Her father is a radio ham.

Only with self discipline and determination did she pass the RSGB morse examination within ten weeks of starting to learn it. She took her exam at Dover, and one of the adjudicators, G3ROO, commented on it being the best morse he had heard in a long time, from any candidate.

Hopefully this will provide encouragement to some of those who are ready to give up. Joanne proving that all it takes is self motivation and hard work to get results. *Mrs M Bedford*

SCOUTS AND GUIDES ON THE AIR

Guides on the Air (weekend of 18/19 February) slipped by quietly this year; This was very disappointing after the build-up of enthusiasm over the last two years.

To me I feel we all lost out on an excellent opportunity to promote all the good things of Amateur Radio, especially in this 'Project Y.E.A.R'.

To anyone who has not run or worked on a special event station for Scout Jamboree or Guides on the Air I can thoroughly recommend it.

This year I was an operator on GB2WGC (Woodlands Guide Camp) and spent two enjoyable days being well looked after by a Guide company. All of the Guides took and passed the Guide's Radio Communication badge. This involves such things as logging contacts, knowledge of callsign prefixes, Q codes, phonetic alphabet and many other compulsory and optional choice topics all very much related to amateur radio.

The Scout Communication Badge has three alternative themes, only one being chosen to pass the badge. A is devoted entirely to sending and receiving messages in morse or semaphore using correct procedures. B is totally related to amateur radio and similar to the Guide badge; although not covering quite so many topics it includes logging amateur contacts and basic rules. C is devoted to CB.

As you see for any Guide or Scout to pass these badges their leader could certainly do with help from the Amateur Radio fraternity. The ideal way is to provide some instruction in the weeks before Scout Jamboree on the Air in October or Guides on the Air in February, finishing up with the special event station.

So come on chaps and YLs, contact your local Guide or Scout leader and before you know it you could be involved in a lot of very rewarding enjoyment and pleasure with your amateur radio. Remember these Guides and Scouts could well be tomorrow's licensed Radio Amateurs. *J Brett, G6EBR*

A BALANCED MAGAZINE PLEASE

Please don't let the members spoil RadCom! I have been increasingly disturbed by the stream of letters on the lines of "stop wasting space on what I'm not interested in".

The RSGB is the voice of amateur radio in this country and as its journal RadCom should try to cover all aspects of the subject. Few of us have the time or mental capacity to develop a detailed knowledge of all of this material, but we can't expect the whole magazine to be devoted to our own little bit.

As for the alleged OTT technical articles again, the RSGB is the nearest thing we amateurs have to a learned society (I know you think that a bit pompous, but it's true) and as such where else should or can we find articles representing the most advanced technical achievements in amateur radio? We don't all see 'RF Design' etc or the proceedings of learned societies. Those articles in any case only represent a small part of your output. There have been many simple designs as well, and they all work, having been properly scrutinised by experts. In particular I find most useful the ones where the author 'talks the reader through the design' to some extent. I would single out the 3.5MHz CoPa of G3DXZ (Nov 1987) as being particularly good in this respect. More recently, the G3OGQ 14MHz Transceiver (Sept 1988).

Technical Topics is always good; also the articles on things everybody knows - except Muggins, like fitting a PL259 correctly!

Finally I was sad to read of G4LXN giving up. My own modest station here is almost entirely homebrew and mostly from *RadCom* articles. I have no engineering background but, like most people who pass the RAE, I can read instructions and use a soldering iron. That's all you need to start, so why not give it another go?

R E Craddock, GW4SLK

Many may grouse over space being taken up by, for example, G3TSO's Transceiver, Those who do quite miss the point of homebrew radio! Sure, very few, perhaps even only tens will make it. Most homebrewers wouldn't even want to try, because after a lot of work we'd end up not with our homebrew rig but a copy of someone else's homebrew rig. That's not the same thing at all!

However, literally thousands are going to refer to that article time and time again, and incorporate 'TSO's PA Stage, TSO's balanced mixer, TSO's VFO' in their own homebrews. I still use the original articles by G2DAF like this even NOW!! For goodness sake keep up the good work TSO and keep on publishing it, *RadCom*. Rest assured, for every grouser there are a hundred active radio amateurs (as distinct from Amateur Radio Telephone, Teletype and Telegraph Operators, which is quite a different hobby) who want articles like the TSO Transceiver... Bet I'll use a bit of it before 1989 is out as sure as the Lord made them there little apples!! *S Dyke, G3ROZ*

THE STAGE IS YOURS...

There have been many times I have sent in letters to be put in the *RadCom* magazine, but so far none have been printed. So Please Print THIS one. As I am a pensioner of 80 years I once needed help with a valve transceiver that I was building; this request was put into *RadCom* and shortly afterwards I received a letter from an amateur, Mr L Robinson, G0HTR. So please, Mr Editor, put in a vote of thanks concerning G0HTR, as I feel he deserves it, and to let others know that there are amateurs who will help some who need it. *RS Freeman, G0JCW*

HELP THEM VENTURE ONTO THE AIR - PROPERLY

I have been thinking about the problems that I personally encountered when I first obtained my 'B' class licence, as well as 'A' class. It would, however, be tedious as well as protracted to go through them, as most amateurs no doubt had similar experiences.

I've reached no concrete conclusions, but it does seem to me that, what with the vast experiences in amateur radio within the RSGB, the difficulties could be alleviated, if not entirely cancelled out, if the facts were given to each newly licensed amateur with his DTI certificate of licence and the regulations.

Surely the RSGB could draw up a proposal, plus a few A4 sheets covering the basic problems of setting up a home base, mobile mounting of rigs, TVI planning permission aid addresses, calling frequencies, basic contact procedures, etc. It wouldn't need to be a technical essay, just basics that would help newly licensed and relatively mike-shy amateurs to successfully, work the bands, without some heavy handed pompous twit slagging the new ham off.

Taking it a stage further, the above proposal, properly formulated, could surely be put forward for use by all IARU countries, provided the basic proposal was flexible enough to cover all nations and the differences in languages.

JD Bolton, G4XPP

WHAT IS THE POINT?

"Zulu Zulu Two Bravo, CONTEST.....Alpha Bravo, Five Nine, Number 1434. Good Luck! QRZ "Zulu Zulu Two Bravo, CONTEST....."

Yet again another weekend ruined by a CQ World Wide DX Contest and all the verbal pollution that goes with it. Every possible frequency and mode was wiped out by QRM. The ordinary weekend radio amateur is forced to turn off the rig in total frustration at the hopelessness of it all. What of the likelihood of a Raynet Emergency? NO chance!!

Any poor souls adrift in the South China Sea crying Mayday have picked a bad weekend. They must have all perished by now, for all we know.

The time has come for us to say...Pack it in guys!! Lets act like responsible Radio Amateurs and leave a few kilohertz in each band free from contest use!!

Now is the time to review this ludicrous situation and put all contest operating in its place. Operate within a specific band plan, otherwise....."What is the point?" *G Martin Russell, G0CAK*

YOUNG ENTHUSIASTS

I find that in the press, radio, TV, and even *RadCom* that amateur radio always seems to be Fred working Joe down the road on 144MHz via a repeater, with a display of a QSL on the wall. This can all be done on CB.

We should show them that we also have the LF and HF bands, ATV, slow scan, RTTY, satellites, Data Comms, EME. *John, G4BYV*

WHERE'S YOUR OPTIMISM?

The contents of most of the letters in 'The Last Word' have, of late, been a touch depressing. Correspondents seem devoid of both optimism and humour. However, the letter form CM Maceke, G4LXN, February *RadCom*, is something else. I had to go and read it to my wife who, if asked, would say that Amtor is a brand of suet. A couple of paragraphs from the letter had her giggling, and at the end we were both falling about laughing, and frightening the dog.

We think that the answer to the problem is that someone, it could be in the family, is intercepting this amateur's *RadCom* and substituting the inside pages with those from *"NAVAL ARCHITECT"*. *E A Balley, G4KLQ*

OOOPs... WRONG AUTHOR

In April's RadCom we published a letter from Paul Gaskin, G8AYY, about transceiving in data mode using an Amstrad PCW Computer. Alas, we credited the letter to R J Connell, G4JQY, who originally queried the subject in Last Word.

... word

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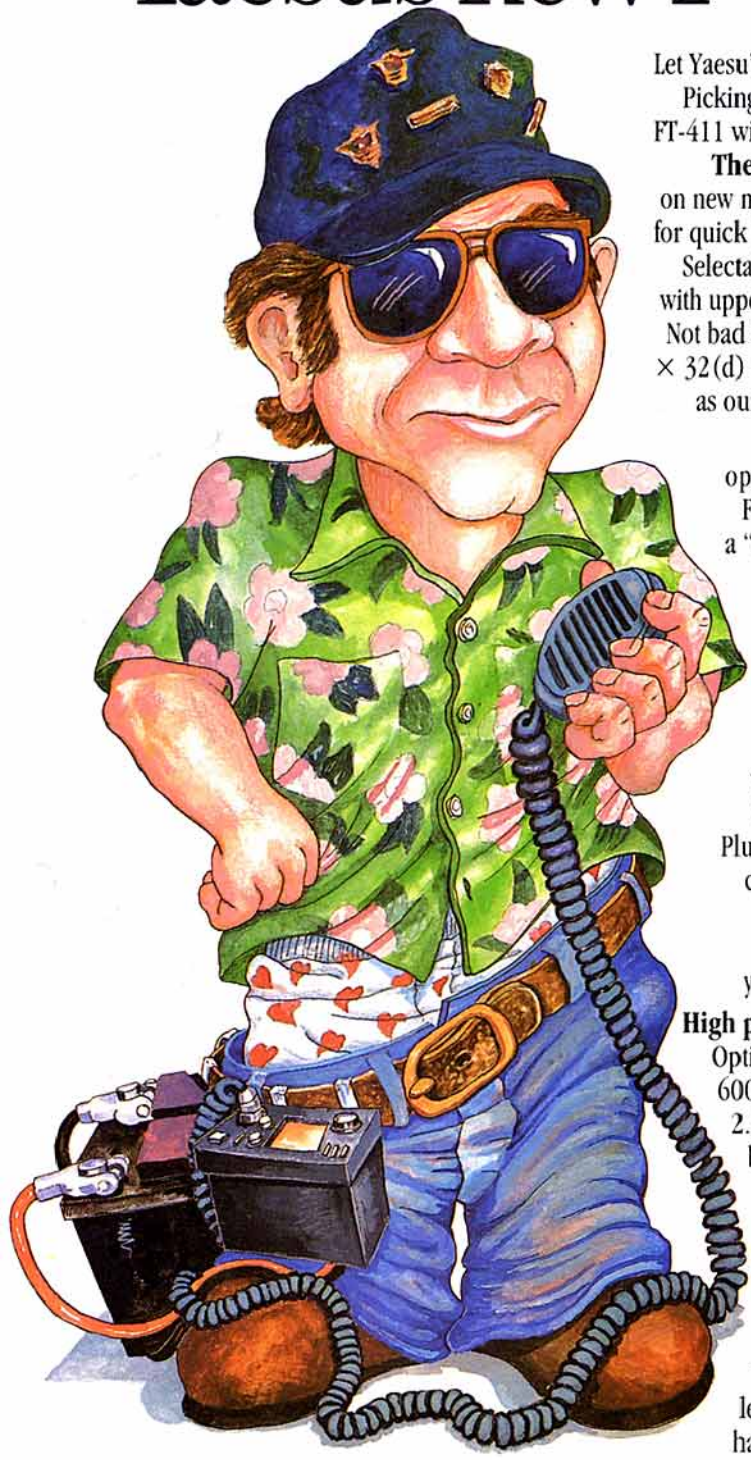

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