Volume 71 No 1 January 1995

RadCom

Radio Communication

The Journal of the Radio Society of Great Britain

THE VOICE OF AMATEUR RADIO FOR 81 YEARS

100 YEARS OF RADIO 1995

Going Underground with Very Low Frequencies

SO MANY FEATURES, IT NEEDS A MANUAL. SO WE BUILT ONE IN.

Kenwood's TH-79E marks a new high in user-friendly handheld tranceivers. This slim-line FM dual-bander features a dot matrix LCD menu, which helps you to access the many class-leading features of this stylish unit.

Features that include an FET power module for longer battery life, 82 memory channels with ID, DTSS and pager functions, Automatic Band Change and DTMF memory function for auto-dial operation. Confused? You won't be. Just call up the menu. Or ring 0923 816444 for a full information pack.

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RadCom

COVER PICTURE:
Chris Trayner, G40KW, experimenting with collapsible loop antennas in Goyden Pot, North Yorkshire. Feature page 16. Photograph: G4AEE.

NEWS AND REPORTS

TECHNICAL FEATURES

REGULARS

REVIEWS

Lowe Electronics

TH79E - Small wonder!

The new Kenwood TH79E has been with us for a month or so now and what a winner it is proving to be. Just how do they fit so much into such a small space! I'm sure my first mobile radio had a bigger microphone!

Many of the features of the TH79E are hidden away, not even revealed in the manual but trust Lowe to take care of that for you. Everyone buying a TH79E from any branch of Lowe Electronics or by mail will get absolutely free of charge our wonderful booklet The secret life of the TH79E, detailing all the modifications and hidden functions in this marvellous little transceiver.

We have the power

The Manson is back! We've increased our orders once again for these superb power supplies but you just keep on buying them! Sorry to keep so many of you waiting. If you don't yet know what all the fuss is about check this out! The EP925 is a variable voltage PSU that gives a continuous 25A current, peaking on 30A, Twin meters give you current and voltage readout and the thermostatically controlled fan keeps things cool, ideal for powering any of todays HF transceivers. When you check out the price of a matching power supply for your rig, you'll see just what great value it is at just £99.95.

If you don't need all that power then the EP815 may be the one for you. Case size and style is the same as the EP925 but without the metering. Output is 13.8V at up to 15A, just right if you use your mobile radio at home. Ideal too for running all your shack accessories, like your Packet or GTOR equipment, backlighting your Diamond SWR meters or even a stand alone transverter or VHF linear amplifier. Like its big brother it is superb value for money and you get change from seventy quid!

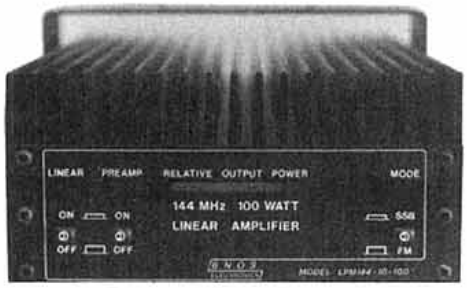
New!

Half catalogue, half price list - why not get your copy of our new CataList! Just send us four first class stamps and we'll send you one by return. Crammed full of interesting new products and some good old favourites as well.

BNOS VHF and UHF linears - for the serious Dxer

What's the difference between a power amplifier and a linear? Try a BNOS and compare it with some of the other products that call themselves linear and you'll soon find out! If you are going to work that DX you need to be loud and clear and BNOS linears will give you both. Models available with or without pre-amps and all can be RF switched or hard switched depending on how you like to work. Full specs available on request.

CLP14410100	2m Linear with pre-amp; 10W drive; 100W output	***£255.00***
CLP14410180	2m Linear with pre-amp; 10W drive; 180W output	***£439.00***
CLP1441050	2m Linear with pre-amp; 10W drive; 50W output	***£169.95***
CLP1443100	2m Linear with pre-amp; 3W drive; 100W output	***£289.00***
CLP144350	2m Linear with pre-amp; 3W drive; 50W output	***£289.00***
CLP43210100	70cm Linear with pre-amp; 10W drive; 100W output	***£439.00***
CLP4321050	70cm Linear with pre-amp; 10W drive; 50W output	***£255.00***
CLP432150	70cm Linear with pre-amp; 1W drive; 50W output	***£289.00***
CLP43225100	70cm Linear with pre-amp; 25W drive; 100W output	***£375.00***
CLP5010100	6m Linear with pre-amp; 10W drive; 100W output	***£289.00***
CLP501050	6m Linear with pre-amp; 10W drive; 50W output	***£169.95***
CLP50350	6m Linear with pre-amp; 3W drive; 50W output	***£169.95***
CLP7010100	4m Linear with pre-amp; 10W drive; 100W output	***£289.00***
CLX14410100	2m Linear; 10W drive; 100W output	***£219.00***
CLX14425180	2m Linear; 25W drive; 180W output	***£345.00***
CLX1443100	2m Linear; 3W drive; 100W output	***£255.00***
CLX43210100	70cm Linear; 10W drive; 100W output	***£399.00***
CLX4321050	70cm Linear; 10W drive; 50W output	***£219.00***
CLX432150	70cm Linear; 1W drive; 50W output	***£255.00***
CLX43225100	70cm Linear; 25W drive; 100W output	***£345.00***



If you'd like all the secrets of the top Dxers, we've a great book written by the experts themselves. It's called the VHF UHF DX Book and contains chapters on propagation, antennas, transceivers, transverters, linears, pre-amps, accessories and most importantly, the techniques you should use to get the most out of VHF and UHF operating.
Its bang up to date.

SPEED THRILLS

If you haven't yet upgraded to 9600 baud packet, now's the time. Its been a long time coming but now you can get to 9600 of the shelf - complete radio and TNC packages with no mods to do and no extra boards to add in - just plug in and go - at high speed!

The radio end...

Check out Kenwood's twin FM transceivers - The TM251E puts you straight on to 2m or the TM451E for 70cms. Both run more than enough power to get you right into the network and feature dedicated data ports tailored to the needs of high speed packet.

The TNC end...

The new Kantronics KPC9612 is fast becoming the new standard in TNCs and when you see what it can do you'll know why! This is the only dual speed, dual port TNC on the market. It will let you connect two transceivers to it for working on two bands, or two frequencies on the same band if you prefer. One port is 1200 baud and the other can be configured to 4800, 9600 or 19k2 as standard! If you are already on Packet, imagine doing what you are doing already but eight times faster! With many new 9600 baud user ports fast becoming available on many BBS's this is the way forward! The new KPC9612 is available direct from Lowe Electronics, the Kantronics distributor - who better to buy from!

If you want a complete package, we can supply you with everything from the power supply to the antenna and all the bits in between, including all the interconnecting leads. We canít supply the computer but we've got some great software we can offer! Ask now if you are considering upgrading, we're doing super deals on trade-ins and some great package deals on complete 9600 baud stations. Donít miss out!

Why not send us four first-class stamps and request our DataComms information pack and we will also give you a free copy of the Lowe Packet Radio ideal for beginners to get going or a useful reminder to those with more experience.

Don't forget our Second Hand List FaxBack service.

Dial 01629 580008 from your fax machine and follow the voice instructions.

We've also launched a great new service for customers equipped with computers and modems. You can now reach us via the Internet. We've got separate e-mail addresses for orders and enquiries. Leave the appropriate message at orders@lowe.demon.co.uk or info@lowe.demon.co.uk. Please make sure you leave your full postal address and daytime phone number as replies by e-mail may not always be practical!

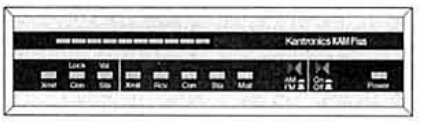
New V7.1 upgrades for KAMPLUS and KAM Expansion Boards

That's right the new V7.1 upgrades are available at last, promising new, easy functionality of all TOR modes, including AMTOR, PACTOR and the ever growing GTOR. The upgrade allows identical changeover commands for all three modes and uses the same mark and space tones and introduces TOR Standby.

TOR standby allows access to your mailbox in any of the three modes and allows other stations to link to you in AMTOR, PACTOR or GTOR automatically. The mode in which you are linked is displayed in the linked message on your screen.

The KAMPLUS is available now with all the new features but if you have an older KAM you can still upgrade via the KAM Expansion board.

Finally, you may be interested to know that there is now a book about GTOR. Called GTOR: The New Mode, it is nearly 100 pages of collected published articles and a full description of the GTOR protocol - just the thing for the more inquisitive who likes to know what is going on in the background or those that really like to know their subject!



KAMPLUS £399.00 KAM Expansion Board £95.00 V7.1 Upgrade £35.00 GTOR: The New Mode £15.95

Lowe takes away the pain of mobile operating!

These days so many cars are just not conducive to operating mobile! Fewer and fewer places to mount a radio and when you do find someplace, someone breaks in and nicks it! Many people today are using handhelds in their vehicles which presents two problems - how do you operate it safely and where do you put it? Trust Lowe to solve the problem!

The QS200 is a superb little gizmo that everyone will want to buy for two reasons - it is so good and it is also so inexpensive! Just look at the picture. The QS200 holds the radio in a convenient place on the dash where you can still see the display and operate the major controls be it a handheld transceiver or a scanner. The QS200 mounts into the vents of your car dashboard with no drilling or cutting and your handheld just slots into it using its belt clip - fits in seconds and you can remove your handheld just as fast when you want to take it from the car - beats any quick release mount ! Get one now while stocks last!

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RADIO SOCIETY OF GREAT BRITAIN

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

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

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

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Corporate Members: UK and Overseas (*Radio Communication* sent by surface post): **£32.00.** Airmail rates on request.
UK associate member under 18: £16.00. Family member: £14.00
Corporate (Concessionary): £27.00 over 65 or full time student under 25. (Applications should provide proof of age at last renewal date and/or include evidence of student status.)
Affiliated club or society/registered group (UK): £16.00 (including *Radio Commmunication*). (Subscriptions include VAT where applicable.)

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

Membership application forms are available from RSGB HQ

RSGB Main Switchboard:
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The RadCom Leader

Towards the 21st Century

It seems a little strange sitting at my desk in early December writing the *Leader* for the January edition, the Christmas Festivities are still to come yet here we are thinking of the New Year!

As the dawn of 1995 approaches one's mind drifts back to 1894, the year in which Marconi carried out his first experiments in Radio Communication which, in effect, led to the birth of the Amateur Radio Service we know today. From those humble beginnings amateur radio has developed into a diverse range of interests, so much so that it is now extremely difficult to cater for all those interests in the house magazine.

Some eighteen months ago the Council approved the setting up of the RadCom Advisory Panel whose brief was to meet periodically to discuss the format of the magazine. The objective of this group was to keep the publication fresh and, from time to time, introduce new columns and articles to cater for all our members' interests.

Starting from this edition you will see some changes: a new front cover, a new regular feature and some design changes to the presentation, all aimed at keeping RadCom in its position as the best amateur radio magazine available in the United Kingdom. I sincerely hope you will approve.

1995 is important in another respect. For the first time for a number of years the membership of the National Society is increasing. Amateur Radio licences are also on the increase after a fall last year.

It is important that we grasp the initiative and ensure that this growth continues so that the Amateur Radio Service enters the 21st Century as vibrant as it entered this Century. All licensed amateurs have a role to play. We have all derived much pleasure from our involvement in amateur radio and it is our duty to encourage new blood into our hobby.

Throughout the year the Society will be introducing new initiatives designed to increase the interest in the Amateur Radio Service. If we are to be successful in our aims we will need your full support. I am sure that we can rely on it.

Peter A Kirby, G0TWW
General Manager

NEWS & REPORTS

- BBC Local Radio Three Counties visited Sandy Scouts HQ during Jamboree On The Air. Paul Costello, 2E1BFD, was interviewed for The Breakfast Programme, transmitted on Monday, 17 October.
- GUERNSEY ARS will operate from Castle Cornet in St Peter Port, 7 - 13 May, to commemorate the 50th Anniversary of the island's liberation.
- STOLEN in Oxford. Kenwood TH-215E S/N 10500655. Information to Charles Towns, G0OZW, tel 01865 515323.
- The RA is to move its headquarters from Waterloo Bridge House to a new site in Docklands during 1995.

Changes to *RadCom*

A FEW CHANGES have been made to your magazine with effect from this month. Most are minor and concern logos, design philosophy and pagination. The most noticeable is the front cover which has been changed to allow for more flexibility of presentation.

We have frequently been requested to change the banner colour each year (as was the case in the 70s) so that a particular year's *RadComs* can easily be identified on the shelf. This has been resisted because the banner colours - red, white and blue - are chosen as part of the Society's corporate image. However, we have now introduced a colour code at the top left of the cover - read it like a resistor - which not only shows the year but the month as well. Please let us know if this works.

Also new from this month is the *IOTA* column which will appear alternately with the *IARU* column. This is in recognition of the vast increase in interest in the RSGB's Islands on the Air Awards Programme, both in the UK and worldwide.

Members Call for a Complete Overhaul of the Society's Articles

Annual Meeting Changes Constitution

THE *ARTICLES OF ASSOCIATION*, the Society's Constitutional rules, were amended at an Extraordinary General Meeting held in central London on 3 December. Six Special Resolutions were each agreed by the meeting on a show of hands. Members can find the resolutions in the *Annual Report and Accounts* which was posted to all members with the November *RadCom*.

The amended *Articles* have the following important effects:

- Allows the Council to reappoint a President so that he/she may serve for up to five consecutive years.
- Allows flexibility of choice as to whether the President is also the Chairman of the Council, though the President will continue to be the Chairman of the AGM.
- Allows An Executive Vice-President to Chair the Council.
- Enables the appointment of Executive Vice-Presidents to take charge of important areas of the Society's work.
- Allows the Council to co-opt a member to sit on Council when no Immediate Past-President is in office.
- Updates the wording to cater for the President being a woman.

There was general agreement that the *Articles* were in need of a complete redraft but this would be a major, costly exercise.

The formal Minutes of the Extraordinary General Meeting will be published with those of the Annual General Meeting in a future edition of *RadCom*. Copies of the revised *Articles of Association* will be made available to members when the document has been re-printed.

Project YEAR Co-ordinator

THE NEW CO-ORDINATOR of the Society's Project YEAR (Youth into Electronics via Amateur Radio) is Phil Mayer, G0KKL. He takes over from Hilary Claytonsmith, G4JKS.

Project YEAR is an ongoing recruitment initiative, supported by the RA, involving the Novice Licence, Young Amateur of the Year, *D-i-Y Radio* magazine, a video and training books.

RSGB Council Retirements

TWO MEMBERS of the Council retired at the end of 1994: George Benbow, G3HB, and Hilary Claytonsmith, G4JKS. Both retire under Article 26 which limits Council members to two consecutive terms of office.

George Benbow has been closely associated with the Society's book publishing programme for many years, and is the author of several best-selling training books, including the *RAE Manual*.

Hilary Claytonsmith will continue as a member of many RSGB committees, including EMC, Training and Education, Licensing Advisory. She is standing down as Project YEAR Co-ordinator but will continue with C&G / RSGB liaison and other training and education work.

Council Election Result

THE VOTES cast in the election for the 1995 - 97 RSGB Council were as follows:

Ordinary Members

N Roberts, G4IJF 1629
G R Morris, GW1ATZ ... 721
R Horton, G3XWH 1532
M G Shread, GM6TAN 1098
D B Glover, G1VJP 881
E J Allaway, G3FKM 1626

N Roberts, G4IJF; E J Allaway, G3FKM; M G Shread, GM6TAN and R Horton, G3XWH are elected.

Zone E

E P Essery, GW3KFE 93
M J Adcock, GW8CMU .. 48

E P Essery, GW3KFE is elected.

Zones A and F

P R Sheppard, G4EJP, is elected unopposed for Zone A.

I J Kyle, GI8AYZ, is unopposed for Zone F.

The number of votes which could not be allowed totalled 110. These were late (14), unidentified (65), subscription in arrears (16), invalid category (10) or spoilt (5).

RSGB 1994 International HF & IOTA Convention

Neville Cheadle, G3NUG, Chairman of the Convention Organising Committee

AFTER MONTHS OF planning which started in early January, Friday 7 October had finally arrived. This was the opening day of the RSGB 1994 International HF and IOTA Convention, sponsored by Trio-Kenwood and Martin Lynch.

On Friday morning we were off to the Beaumont Conference Centre, Windsor, to make sure everything was being set up properly and that there were no more last-minute hitches. Some overseas visitors had already arrived and some were helping Tony Canning, G0OPB, and his team to set up the special event station GB301OTA. The mast and TH6 loaned by the Verulam Radio Club had arrived, as had the station equipment which was loaned by Yaesu UK Ltd. It comprised an FT-1000 transceiver and FL7000 linear. PacketCluster links had been established and SHACKLOG [see review on page 52 - *Ed*] was ready to go. By early Friday evening the station was on the air. It was very busy all weekend and some 20 operators participated.

Birthday Party

THE OFFICIAL programme started at 7pm on the Friday evening with IOTA's 30th Birthday Party. The 200 guests filled the Beaumont Lounge to capacity and immediately one could sense that the evening was going to be a very enjoyable one because of the hubbub of conversation; many old friendships were being renewed and new ones were being made. After an excellent buffet supper I called the party to order and announced the sponsorship of IOTA by Yaesu which is reported on page 27.

PHOTOGRAPH: G3RVM

What on earth is K7JA sitting on? Turn to page 13 to find out.

Barry Cooper, G4RKO, Sales and Marketing Director of Yaesu UK Ltd presented the cheque for the sponsorship monies to Roger Balister, G3KMA, RSGB IOTA Director. Both said a few words and Roger then made a number of presentations to some of the IOTA gang. The birthday cake was cut, the group photo taken (see December's *HF News*) and the entertainment began; first, the Morris dancers, then the band. Some games were organised by Martin Atherton, G3ZAY, and Chip Margelli, K7JA, of Yaesu US.

We played the SSB pile up game, then a number of teams made up 20m antennas from bamboo, string and wire, an SWR meter being used to check the resonance of the winning set-up.

RSGB HF Convention location: The Beaumont Conference Centre, Windsor.

The evening's raffle of an HF hand held transceiver, donated by Yaesu, raised over £500 for IOTA funds. And so to the highlight of the evening, a game called ASCII. This involved sending GB301OTA in CW on a modified loo seat. Great efforts were made by all the participants, and it was great fun for the observers too! Don Gavish, 4X4DX, won the prize.

A total of 100 bottles of wine were consumed during the evening and the bar eventually closed at 2am.

Saturday

THERE WAS ONE last-minute hiccup [after 100 bottles of wine, I'm not surprised - *Ed*] with the visual aids, but apart from that everything seemed to be running smoothly. There were three lecture streams, each starting at 9.30am with four lectures in each stream. The day visitors came flooding in at a rate of 100 a day and Saturday was 200% up on last year. Almost without exception each of the lecture rooms was packed out - in fact there was standing room only in some rooms. The 3Y0PI DXpedition story by Peter Casier, ON6TT, was run on both Saturday and Sunday and proved extremely popular.

Just about every aspect of HF radio was covered in one way or another: Computers; LF antennas and phased arrays; antenna models; transceivers; PacketCluster and LF propagation; DXpeditions to Tristan da Cunha, Mellish and Peter First Island and various IOTA operations; how to develop the international goodwill possibilities of our hobby, IOTA developments and policy; how to work the first 100 countries for the newcomer; Contest College; RSGB and other awards; and a clinic on antenna planning matters.

PHOTOGRAPH: G3RVM

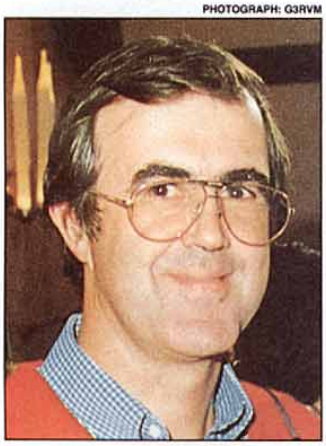
Roger Balister, G3KMA, thanks Barry Cooper, Sales and Marketing Director of Yaesu UK for their IOTA sponsorship. In the centre is Neville Cheadle, G3NUG.

PHOTOGRAPH: G3RVM

W4BAA spoke for the DX guests.

Lecturer G3SXW / ZD9SXW.

PHOTOGRAPH: G3RVM



From Portugal - CT4NH . . .

PHOTOGRAPH: G3RVM

. . . and from Oman - A4IKG.

This year a 45 minute gap was planned between each lecture to allow for overruns, questions, discussions and socialising and this seemed a popular idea. It also provided time for visitors to look at the various special displays and clinics.

DX Dinner

WE THEN CAME TO the Saturday evening DX Dinner, always a popular event. Bob Whelan, G3PJT, was the MC. We knew we might have a problem - the Beaumont dining room has capacity for 250 and we had issued exactly 250 tickets so it was going to be a squeeze. In the event we kicked off on schedule - this was probably the biggest-ever gathering of DXers in the UK. The service and food were excellent, as was the speech by RSGB President Ian Suart, GM4AUP, who toasted the guests. Dewitt Jones, W4BAA, graciously replied. This was followed by presentations and more games. The whistle game was particularly popular with the guests trying to identify the call signs being piped on whistles set to different frequencies but all being played at the same time. We all adjourned to the bar which again closed around 2am.

Sunday

The lecture programme continued. The ladies did an excellent job selling raffle tickets to all those hopefuls who wanted to win the main prize, the TS-50S transceiver, donated by Trio-Kenwood, the Convention sponsors.

The magnificent selection of trophies presented at the HF Convention.

The DX Quiz was also well under way. The Belgians looked the likely winners. Mats VanCampenhout, ON5KL, and Ghis Penny,ON5NT, were fighting it out. There were two silver salvers to be won.

We were almost there! Clive Trotman, GW4YKL, drew the raffle. The ticket for the major prize was drawn first and put safely away. This way every ticket had an equal chance of winning the TS-50S. Forty or so prizes were given away and Mike Wadsworth, G3UOF, won the TS-50S which was presented to him by David Wilkins, G5HY, of Kenwood.

The winner of the DX Quiz was announced: Ghis, ON5NT, won the large silver salver. Runners up Pam Ott, ON4QP, and Matt, ON5KL, also won a salver.

Better Each Year

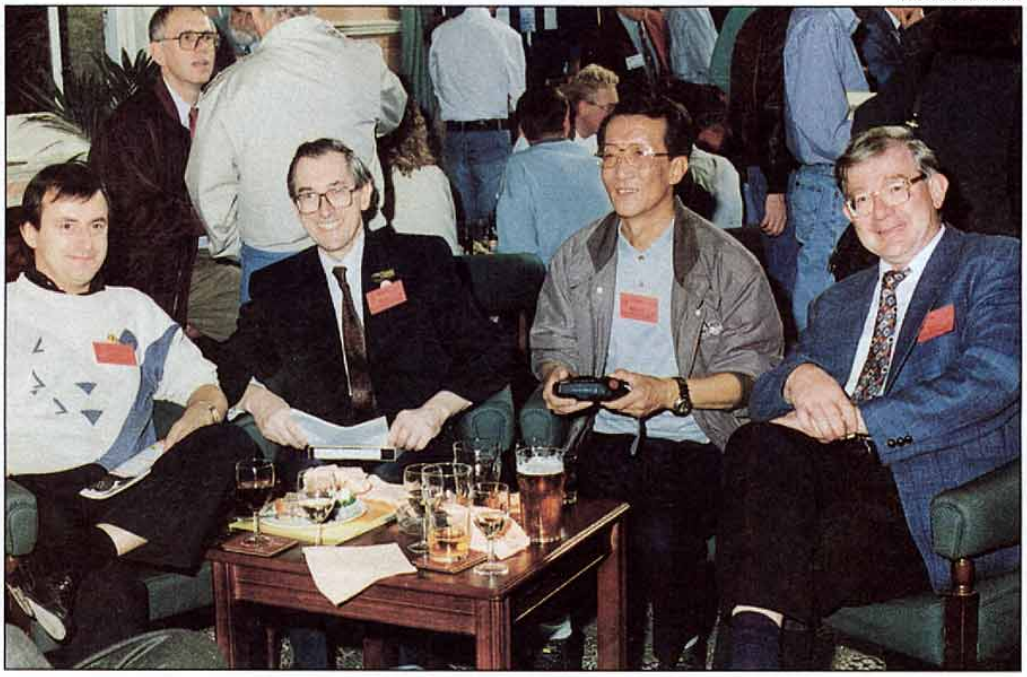
WE FILLED THE Beaumont to capacity: 160 rooms were booked, there were 210 residential visitors, 200 came to the IOTA Birthday Party, 250 attended the DX Dinner, 100 day visitors came each day, 90 licensed overseas visitors represented 30 DXCC countries.

The Ladies' Programme was well organised by Gill Balister with 40 guests visiting Windsor on the Saturday and cruising on the Thames on Sunday. The weather was delightful.

I believe everyone enjoyed the event. I certainly did. Roger Brown, G3LQP, summed it up very nicely: "I don't know how you make it better year after year, but you do. Thanks and see you all again next year!" We had many similar comments which make organising an event like this so worthwhile.

So, why not put a date in your diaries *now*. 8 - 10 September 1995 is the weekend of the RSGB 1995 HF Convention to be held again at the Beaumont. If anyone feels they can contribute to the organisation of next year's Convention please do get in touch with me. My thanks to all the lecturers, our lady helpers, the Organising Committee and to the many members of the Chiltern DX Club who bore the brunt of the work. Thank you all for your support.

PHOTOGRAPH: G3RVM



Good food, good drink and international friendship: (L to R) ON5NT, G3KMA, BV4AS and DJ2YA.

RA Re-Appoints SSL

A LETTER TO ALL licensees from the Radiocommunications Agency has announced the re-appointment of Subscription Services Limited (SSL) as the distributor of amateur licences. The contract, which was issued following a careful examination of all of the proposals received, is "initially for a three year period". SSL has also been given the contract for CB licensing. Ships radio licensing, which was included in the RA's specification, is to be dealt with by Wray Castle, a training centre known to RSGB members in connection with the Young Amateur of the Year Award.

The world's most unusual Morse key - see HF Convention Report, p10.

RA May Publish Revocations

THE RADIOCOMMUNICATIONS Agency has announced a change in its policy regarding the publication of details of those who have had their licences revoked following prosecution.

Until now, the RA has not made this information available as licence details were regarded as confidential between the Agency and the licensee. The Agency stated: "The decision to publish will be based on the consideration that it is important to make other amateur radio... licensees aware of the revocation of a licence, and the ensuing ban on radio use for the person concerned."

New GB2RS Broadcast

A GB2RS NEWS transmission takes place on 433.525MHz, channel SU21, FM, every Sunday commencing 2000 UTC from G4OBE in Enfield, north London.

STELAR Seeks Teachers

THE STELAR Group - Science and Technology through Educational Links with Amateur Radio - is again running a crash course for the RAE. The course is aimed at teachers who want to start up an amateur radio club in school, or use amateur radio as a cross-curriculum link.

The group is looking for teachers who are working in schools where there are no licensed amateurs. If members know of any teachers who have expressed an interest in becoming involved with amateur radio, and who want a quick way in, please ask them to contact STELAR Chairman, Richard Horton, G3XWH, on 01423 871027.

The course, which is sponsored by Trio-Kenwood UK Ltd, runs from 17 to 21 April at Kenwood's HQ in Watford. Accommodation and meals are free but the course is not for the faint hearted and students must look forward to some really hard work as well as many laughs.

Courses

HIGHBURY COLLEGE, **Portsmouth** is running a Refresher Workshop for the **Radio Amateurs Examination** for one term from 9 January. The course is for those with some knowledge of radio who wish to bring their knowledge up to the standard to sit the RAE in May.

A 12WPM **Morse** course starts at the same venue on 10 Jan.

Enquiries should go to the Faculty of Technology office on 01705 283212, quoting course code ET1 RARW/767 for the RAE or ET1 MCWS for Morse.

1995 RSGB President Clive Trotman, GW4YKL, was guest of Liverpool and District Amateur Radio Society at which he spoke on the way forward with amateur radio and the RSGB. Clive is pictured presenting an RSGB shield to LADARS Chairman Jim Anderson, G0TDK. The club, which has over 90 members, has been active for more than 80 years.

DARC's Horkheimer Prize

Available to Selfless Radio Amateur

RUDOLPH HORKHEIMER was one of the first German radio amateurs. Each year a prize bearing his name is awarded by the DARC (Deutscher Amateur Radio Club) to someone who benefits amateur radio in a selfless manner. The prize is an etched glass plate, together with 'non-personal' prize money which must be spent for the advancement of amateur radio.

Proposals for the Horkheimer Prize, which will be presented at HAM-Radio 1995 in Friedrichshafen, must contain the name and address of the nominee, a short substantiation and any other relevant information. Self proposals are permitted. The nominee must be a member of an IARU national society (eg RSGB). Send to: Referat für Technologie des DARC, Prof Dr Hans-Hellmuth Cuno, DL2CH, Birkenstraße 11, D-93164 Laaber, Germany, before 31 January.

Past President's Call Lives On

MARGARET NEWNHAM, the widow of RSGB Past President Len Newnham has been issued with her husband's old callsign, G6NZ. Her call was formerly G4HSV.

President Ian Suart, GM4AUP, presented a £3000 cheque from the Society to AMSAT-UK at the RSGB Annual Meeting in December. See also *The Last Word* this month.

IARU Region 3 Conference Correction

IN LAST MONTH'S feature on the IARU Region 3 Conference, the wrong caption was inadvertently placed under one of the photographs. The photograph at the top of page 14 should be captioned 'Tim Hughes, G3GVV, with Jamie Pye, ZL1AIZ, operating the conference station S61ARU'. Apologies to all concerned.

IARU's QRQ Call

ALTHOUGH THE date and venue have yet to be decided, the IARU hopes to hold the World and European High Speed Morse Championships in 1995. The overriding criterion for the event is an ability to send and receive Morse at speeds in excess of 50WPM.

Anyone interested in taking part can obtain further details from: Klara Lendvai, HA5BA, IARU Region 1, HST Co-ordinator, c/o MRASZ, Radio Amator Ugyintezes, Budapest PF75, B-1525, Hungary.

Tom Douglas, G3BA, who passed away in September 1994. He was a GB2RS News reader for many years until his death, and had previously been a member of RSGB Council and many Society committees. A top VHF operator, he went on VHF expeditions and contests, and became VHF Manager in the late 70s.

COUNCIL ATTENDANCE

1 Jan to 31 Dec 1994

I D Suart	GM4AUP	100%
J Allaway*	G3FKM	43%
J Bazley	G3HCT	72%
G L Benbow	G3HB	57%
P E Chadwick	G3RZP (Resigned Sept 1994)	66%
M H Claytonsmith	G4JKS	86%
D A Evans	G3OUF	86%
J N Gannaway	G3YGF	100%
D Gourley	G0MJY (Resigned Oct 1994)	83%
J E Greenwell	G3AEZ	86%
F D Hall	GM8BZX	100%
I J Kyle	GI8AYZ	100%
N Lasher	G6HIU	100%
T I Lundegard	G3GJW	86%
N Roberts	G4IJF	100%
P R Sheppard	G4EJP	100%
C N Trotman	GW4YKL	100%
R P Horton	G4AOJ	86%
J C Hall	G3KVA	100%

*Absences mainly caused by attendance at IARU meetings.

Historical Year

1995 IS A YEAR OF significance for amateur radio. A number of important anniversaries will be celebrated during the next twelve months, but the most important is the centenary of radio itself.

It was one hundred years ago that Guglielmo Marconi first demonstrated the practical application of radio over a one-mile path near Bologna, following the earlier experimental work of RSGB Past President Sir Oliver Lodge.

IEE Conference

The Institution of Electrical Engineers will be holding an International Conference on '100 Years of Radio' at Savoy Place, London WC2, from 5 to 7 September. The conference will consider the development of radio from the 1890s to the present day. It is to cover topics such as: Marine Radio (spark to satcom), broadcasting, HF communications, Datacomms, telecommunications satellites, microwaves, mobile, amateur radio, LF and VLF, receivers and transmitters, antennas and propagation, and radio components.

Contributions are sought by the IEE and a synopsis on no more than one side of A4 paper should be submitted **before 23 January** to: HYR95 Secretariat, Conference Services, IEE, Savoy Place, London WC2R 0BL; tel 0171 344 5477; fax 0171 497 3633.

RSGB officers and members may consider putting in a paper. Possible subjects could be: The Amateur as Pioneer (from the very early days to future developments), Propagation Measurements on the HF Bands, Amateur Radio Construction Techniques for the 90s, the Amateur Satellite Scene and Digital Amateur Radio. Contributors will be expected to provide slides or viewfoils and will need to spend at least one day at the Conference, but attendance is free. The Society's IEE Liaison Officer Prof Peter Saul, G8EUX, is happy to advise anyone thinking of submitting a paper. He is QTHR.

CQ Blind NRAE Students

LAST MONTH we reported that the RSGB *Novice Student's Notebook* and the RA's *BR68a/N* licence conditions booklet were available on tape. But owing to a misunderstanding, we understated the number of tapes involved.

If you would like to take advantage of the offer, send 2 x C60 *and* 3 x C90, or *5* x C90 cassettes, plus £1.60 to cover post and packing to: Julian Mayfield, 9 Middlefell Way, Clifton Estate, Nottingham NG11 9JN.

Rose Not by Any Other Name

THE WHITE ROSE ARS Rally, scheduled for 9 April, has *not* been cancelled. There appears to be some confusion with the December 1994 Rally, run by the Leeds and District ARS, which *was* cancelled.

The events are quite separate and anyone wanting details of the White Rose Rally should contact Allen Bartram, G7ELS, PO Box 73, Leeds LS1 5AR; tel 0973 189276.

RSGB Call Book Correction

THE 1995 *RSGB Call Book and Information Directory* contains an advertisement for Radio Amateur Supplies of Nottingham. Unfortunately their phone number is incorrect. The correct number is 0115 928 0267. We apologies for this error.

RSGB Attendance at Rallies

The RSGB will have a book shop and information stand at the following rallies and events during 1995:

19 Feb	VHF Convention, Sandown Park	**23 - 25 Jun**	Friedrichshafen, Germany
25 Feb	South Shields, Tyneside	**25 Jun**	Longleat, Wiltshire
11 - 12 Mar	London Amateur Radio Show Picketts Lock	**06 Aug**	Woburn
		19 - 20 Aug	Stafford
		27 Aug	Torbay, Devon
19 Mar	Norbreck, Blackpool	**03 Sep**	Telford, Salop
		10 Sep	Southend on Sea, Essex
28 - 30 Apr	Dayton, USA		
22 Apr	RSGB HQ Open Day, Potters Bar	**16 Sep**	Scottish Convention
		7 - 8 Oct	HF Convention, Windsor
28 May	Trafford, Manchester		
		20 - 21 Oct	Leicester
11 Jun	HMS Collingwood, Fareham	**4 - 5 Nov**	Llandudno
		19 Nov	Durham
17 - 18 Jun	Bletchley Park	**02 Dec**	AGM

Requests for the Society to attend rallies in 1996 should be sent as early as possible to the General Manager at RSGB HQ.

PHOTOGRAPH: G4HCL

Martin Lynch and his team entertained around a thousand regular customers and visitors at their Annual Open Day in November. The event was strongly supported by all of the principal manufacturers and, in particular, Barry Cooper of Yaesu seen here receiving a cake to celebrate the first birthday of Yaesu's UK office. The Open Day also raised over £200 for the Children in Need Appeal.

THIS MONTH'S LEADING FEATURE

Venturing Underground with VLF Radio

VLF Induction Radio Investigated by Mike Bedford, G4AEE*

THE RSGB HAS BEEN discussing the possibility of an LF/VLF allocation with the RA for some years. In the last year, encouraging responses have been obtained from the RA and there is now a very real possibility of obtaining a narrow experimental LF Amateur allocation.

As well as long distance communications, VLF is uniquely appropriate to communications underground and through rock, something which is of potential interest to miners and potholers alike, particularly in rescue situations. There is a considerable area of common interest between amateur LF/VLF operation and those experimenting with underground communications, and it seems appropriate to have an introductory article on this subject from them. This article is intended as an introduction to the topic of underground radio, and to encourage anyone who is interested in LF/VLF to consider this as a suitable avenue for their experimentation.

J Gannaway, G3YGF, Vice Chairman, Licensing Advisory Committee

IT IS 2.00 AM, AND A PARTY of six laden cavers grunt their way through the dark recesses of Dowber Gill passage beneath the flanks of Great Whernside in the Yorkshire Dales. For those who know it well, the trip between Providence Pot and Dow Cave, through the connecting mile long Dowber Gill Passage, is a pleasant and unthreatening experience. For inexperienced cavers, it can turn into a spiralling nightmare of route finding, exhaustion, and light failure, which inevitably results in members of the local rescue association being called out.

The missing party are found half way through the system - two hours journey from either end. Despite having been sitting in the cold, damp, and draughty conditions for over eight hours, most of the party are in reasonably good condition, and are rapidly revived by the hot soup and chocolate bought in by the rescue team. But one of the party, who is somewhat overweight, is very tired and gives some cause for concern.

It is rapidly agreed to take the casualties out of the Dow Cave entrance, and that an ambulance should be placed on standby near the entrance. The 87KHz Molefone [1] is taken out of its protective ammunition box, the antenna spread out over the floor of the cave, and two wake-up bleeps sent to the surface support person, standing on the moor 300 feet above their heads. He rapidly responds, and the underground party give full details of the situation, and their requirements. Surface support relays the information by radio to the surface controller, who passes it back to Base, who in turn pass the requirements through to the police.

By the time the underground party are out, everything is ready for them at the cave entrance. A surface party is ready to take the casualties; an ambulance and doctor are there to look at the patient; and most importantly, the dry clothes of the underground rescue team have been brought round the five miles by road from the Providence Pot entrance.

The above description of a typical cave rescue was provided by John Gardner of the Upper Wharfedale Fell Rescue Association, and illustrates the importance of radio communication links. The use of radio in emergency and rescue situations is a familiar concept to radio amateurs. What is somewhat out of the ordinary, however, is the use of the Molefone to transmit through 300 feet of solid rock.

*4, Holme House, Oakworth, Keighley, W Yorks BD22 0QY

RADIO THROUGH ROCK

I GUESS THAT MOST people would be inclined to state that radio waves are quite effectively absorbed by rock, pre-stressed concrete, and most other solid conducting materials. On the evidence of car radios fading out under motorway bridges, it seems reasonable to assume that the attenuation is in the order of a few decibels per metre. For the frequency bands currently used by British radio amateurs, this would be a correct assumption. However, it is not a universal property of all radio waves. Let me introduce a bit of technical jargon which is frequently used in the realm of underground radio. The *skin depth* is a measure of how far a radio signal will pass into a conductive medium. To be more precise, it is the distance, in metres, at which the field strength is attenuated by 8.7dB (ie 63%).

The following formula shows how the skin depth, δ, varies with frequency, f, and the properties of the medium, specifically its magnetic permeability, μ, and its conductivity, σ:

$$\delta = \sqrt{\frac{1}{\pi f \mu \sigma}}$$

For most rocks, the magnetic permeability is reasonably constant. We are therefore left with the frequency and the conductivity as the major influences on a radio signal's passage through rock. In qualitative terms, it is clear that attenuation increases with both the frequency of the signal and the conductivity of the rock. We would therefore expect that the more conductive the medium, the lower the frequency which would be required to achieve effective communication. Let's look at some actual values. **Fig 1** shows a family of curves for various conductivities, each showing the variation of skin depth against frequency. The curves for 10^{-1}, 10^{-2} and 10^{-3} S/m correspond to low, average and high rock conductivities, 10^{-3} being reasonably typical of dry limestone, the rock in which caves and potholes are formed. Note, however, that with a significant cover of conductive material (eg soil), or the pres-

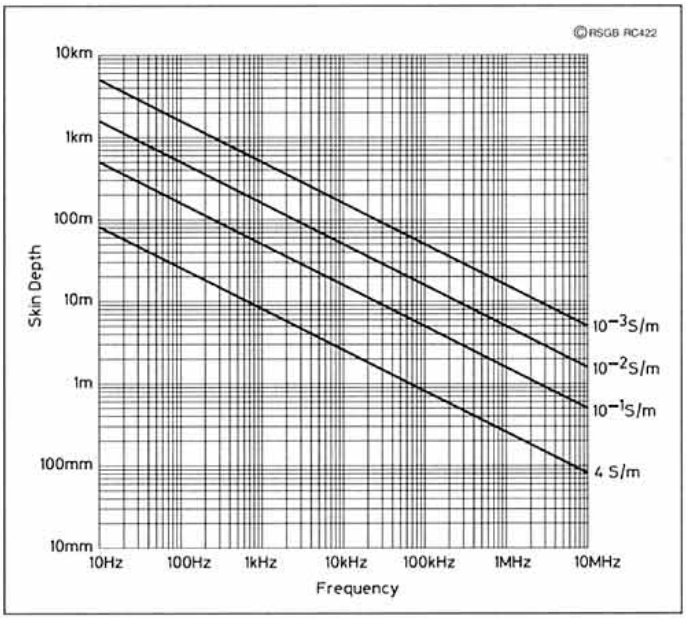


Fig 1: Skin depth vs frequency for various conductivities (in Siemens per metre).

The underground end of the cave-to-surface radio link on 87KHz.

ence of metal bearing minerals, this figure could be much higher. 4S/m is the conductivity of sea water. Although this is somewhat removed from our topic of underground radio, it has been provided to illustrate the similar, but more severe problems associated with submarine communication. It is not easy to translate skin depth into maximum range since radio signals also suffer attenuation in free space. Furthermore, as we shall see shortly, for the types of signals generated by cave radios, the signal drops off very rapidly with distance in free space, so this other term in the equation is quite significant. Nevertheless, it is clear that after quite a modest number of skin depths, very little of the transmitted signal will remain. In practice, most cave radios operate somewhere in the frequency range 800Hz to 200kHz. The US Navy's *Project Sanguine*, for submarine communication, operates on 75Hz.

FAR & NEAR FIELD

THOSE OF YOU WHO - due to space limitations - have struggled to erect an efficient Top Band antenna will immediately recognise the problems associated with communication at even 200kHz, let alone the figure of 800Hz mentioned earlier. Converting these figures to wavelengths, we get a range of 1500m to 375 km - a half wave dipole at 800Hz would reach from London to Birmingham!

It should also be borne in mind that impractical as VLF antennas may be on the surface, in a cramped cave passage, we're talking of something which is totally impossible. Certainly it's possible to make do with antennas shorter than a half-wave, but at the sort of fractional wavelengths we'd be talking about here, any antenna would be grossly inefficient, and very little power would actually be radiated.

Something which probably goes unnoticed to most radio amateurs, operating as they do comparatively high frequencies, is that if we look at fields much closer than half a wavelength from the aerial, the behaviour is very different from that which we find at greater distances. **Fig 2** shows the magnetic field pattern produced by a magnetic dipole in free space at various distances from this antenna. A magnetic dipole is approximated to by a small (compared to the wavelength) loop so long as we observe at a distance significantly greater than the loop diameter. In this diagram, the axis of the loop is pointing out of the paper. Exactly why I have chosen this antenna rather than the sort of thing encountered in ordinary radio will become clear shortly. In passing, I should make it clear that this diagram shows field patterns; it is not to be confused with an antenna gain polar diagram with which we are all familiar. At a few wavelengths from the antenna we see a circular pattern of field lines which are detached from the loop. As we get closer to the antenna, however, the pattern gradually changes until we eventually get the sort of field pattern normally associated with bar magnets. We are now in the vicinity of what is referred to as the *near field*, which has quite different properties from the *far field* which is normally considered as radio. The far field is true electromagnetic radiation, which means that a magnetic and an electric field co-exist in a fixed ratio. In the near field there is also a magnetic field and an electric field, but the ratio between them varies with distance, and different types of antenna favour the propagation of one type of field over the other. The near electric field is called the *electrostatic field* and the near magnetic field is normally referred to as the *induction field*. The good news about the induction field is that it can be generated effectively using loop antennas with dimensions far shorter than a wavelength. This is the technique employed for cave radio.

Before we jump to the conclusion that the use of small loop antennas and magnetic induction is the universal panacea, I should just point out one important feature of the induction field. With ordinary radio, both the electric and magnetic components of the field are attenuated in free space at a rate proportional to the distance travelled. In terms of power, therefore, we have an inverse square relationship. As alluded to earlier, however, the near magnetic field decays much more rapidly. It actually decays with the cube of distance, and there is a sixth power relationship between the distance and the power required to generate the field. So, for example, if a 10W transmitter achieves a range of 1000m, to increase the range to 2000m the power would need to rise to 640W. To get communication over a 20 mile path would require the output of five large power stations. Clearly this places a severe distance limitation on the range of magnetic induction, and for global communication, magnetic induction just isn't a viable proposition. However, if we remember that the purpose of cave radio is simply to communicate from a cave passage to the closest point on the surface, and since the deepest cave in the world is in the region of 1000m (and in the UK, 200m is about the limit), we can see that inductive communication is eminently suitable.

HARDWARE REQUIREMENTS

Having now covered the theory of magnetic induction, albeit in somewhat simplistic terms, we can now turn our attention to the hardware

Above: Stuart France doing a radiolocation with his 874Hz rig. He is finding 'ground zero' by using triangulation.

Right: An angle of measurement is being taken by Stuart in order to determine depth.

required. A good analogy of an induction radio system is a transformer with a very wide separation between its primary and secondary windings.

The field strength, H, on the loop axis and at a given distance, d, from the transmitter loop (ie the primary of the 'transformer') is given by:

$$H = \frac{M}{2\pi d^3}$$

where M, the *magnetic moment*, is given by:

$$M = I N A$$

where I is the current flowing in the loop, N is the number of turns in the loop, and A is the loop's cross-sectional area. The loops are normally tuned in order to present a purely resistive load and thereby maximise the current. A number of interesting conclusions follow from this formula. Although it would seem to suggest a large number of turns is beneficial, this is only true if all other factors remain constant. So, for example, if the number of turns is doubled, but the same gauge wire is used, the resistance doubles, the current halves, and so the magnetic moment remains the same. To achieve the intended gain, the cross sectional area of the wire would also have to be doubled. In other words, to get the two-fold increase in the magnetic field strength, a four-fold increase in weight is required. Since, as we've already seen, doubling the range involves producing an eight-fold increase in the field strength, to double the distance by adding more turns involves a 64-fold weight increase. In fact, it can be shown that the number of turns has no effect on the distance covered for a given power consumption.

All that really matters is the mass of copper in the wire, and for a given loop diameter, a lot of turns of thin wire and a few turns of thick wire give the same result. There are other reasons why a given number of turns may be favoured, but the strength of the resultant magnetic field is not one of them. If number of turns is not particularly significant, the same cannot be said of loop area. To maximise the magnetic moment, having decided on the maximum mass of copper you can tolerate, the loop should be made as large as possible. Clearly the size constraint of a typical cave passage doesn't lend itself to large diameter loops, so in the interests of portability, a 1m diameter is typical. Much larger loops have been used for the surface station, however.

Turning to the receiver loop (ie the secondary in our transformer analogy), the formula for the voltage induced, V, is:

$$V = 2\,\pi\, f\, N\, A \cos(\theta)\, \mu\, H$$

where f is the frequency, A is the loop's cross sectional area, N is the number of turns, θ is the angle of the loop to the lines of flux, μ is the magnetic permeability, and H is the magnetic field strength. This formula may suggest that, in contrast to the transmitting loop, the number of turns is significant. However more detailed analysis, taking into account the signal to noise ratio, atmospheric noise, and the thermal noise of the loop, indicates that once again, efficiency does not depend on the number of turns. One interesting aspect of this formula is the presence of frequency - the higher the frequency, the greater the induced voltage. This is at odds with the skin depth consideration which indicates that the higher the frequency the smaller the skin depth and hence the greater the attenuation. The implication is that for a given depth and rock conductivity there is an optimum frequency.

Space limitations preclude a discussion of the transmitter and receiver hardware. Suffice to say that although modulation and

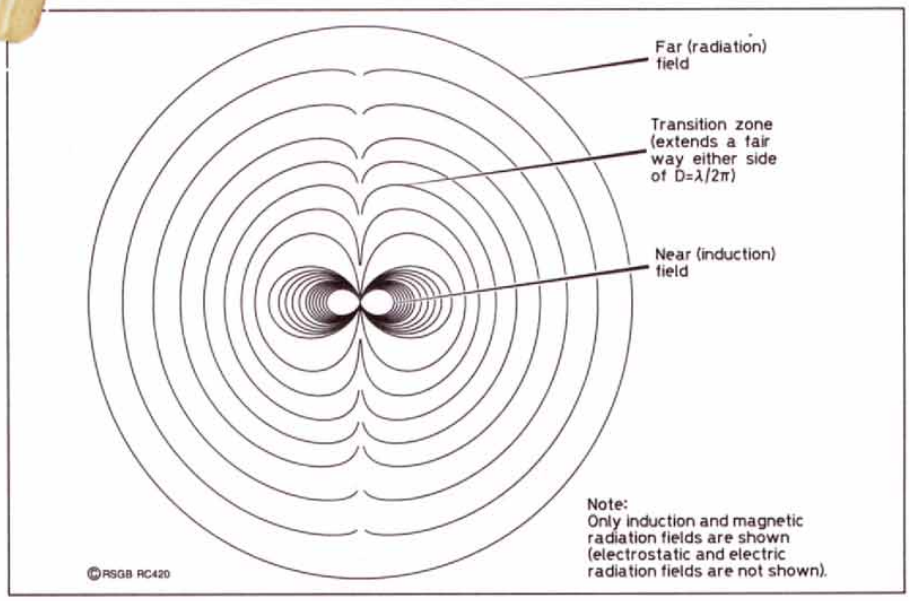


Fig 2: Magnetic field pattern of a magnetic dipole.

demodulation techniques are similar to those employed in conventional amateur radio equipment, aspects such as the transmitter PA have more in common with audio than with RF design techniques.

RADIO LOCATION

THE WORLD OF THE POTHOLER doesn't normally hit the big time, yet on Saturday 28th May 1983, two cave divers, Geoff Yeadon and Geoff Crossley, emerged from Ingleborough Cave in North Yorkshire to a barrage of cameras, reporters and TV crews. The cause of the excitement was that eleven hours earlier they had abseiled down the 360ft shaft of Gaping Gill, one mile distant, and had become the first people to make this through trip - receiving the ultimate accolade in British caving. Although their skill, stamina and perseverance cannot be underestimated, the contribution of technology to this achievement must not be forgotten either. Had it not been for the vast improvements made to the surveys of both caves using radio location, the search for the elusive link could have taken years. To put this in amateur radio terms, radio location is DF in three dimensions, and is another application of inductive radio communications. Using this technique, an underground transmitter can be located on the surface to within a few metres, to provide fixed survey points within caves.

Since radio location in caves operates on the near magnetic field, the principles are somewhat different from those which appertain to normal radio direction finding. **Fig 3** shows how the magnetic lines of flux emanate from a horizontal loop in a cave. You will notice in (Fig 3(b)), that immediately above the transmitter, the lines of force have infinite curvature - ie they are straight vertical lines. Since small magnetic loops are highly directional, producing a sharp null, we have a suitable means of finding *ground zero*. The following is the procedure normally used.

One party of cavers is sent underground with a transceiver and loop, and an arrangement to contact a similarly equipped surface party is made. On reaching the point of interest, voice contact is made to ensure that the surface party is ready, and the underground transmitter loop is then accurately set up in the horizontal plane. A continuous carrier, or more usually - in the interests of power conservancy and ease of signal recognition - an on/off modulated carrier is then transmitted. The surface party now holds the receiving loop vertically, and rotates it around the vertical axis for a null. It is clear from Fig 3a, that once a null is detected, the plane of the loop will point towards ground zero. If this procedure is then carried out from one or more other positions, ground zero can be determined by triangulation. Frequently a more accurate result is obtained by taking further readings close to the calculated position. Having found ground zero, so long as the loop remains in the vertical plane, it can be rotated through any horizontal angle and no signal will be detected. This obviously provides a check on the position.

Having located the position in two dimensions, we now need to consider the depth of the transmitter. At any position other than ground zero, even with the face of the antenna pointing towards ground zero, a null can be achieved by rotating the loop from the vertical. This is clear from Fig 3b. The angle at which a null is obtained depends on both the distance from this point horizontally, and the depth of the transmitter. This, therefore, gives a means of determining the depth. However, since the lines of force are not straight lines, simple triangulation cannot be used. It wouldn't be appropriate to derive the equation here, suffice to say, that depth, d, is given by the following formula:

$$d = \frac{2x}{\sqrt{9\tan^2(\theta)+8} - 3\tan(\theta)}$$

where θ is the angle to the horizontal, and x is the distance from ground zero.

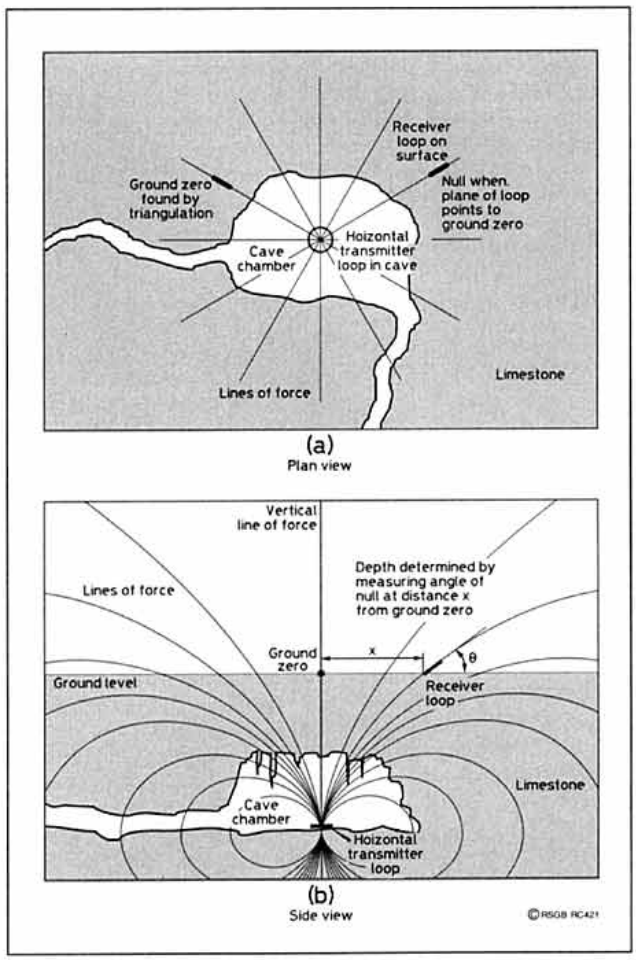


Fig 3: Plan view (a) and side elevation (b) of cave and magnetic lines of force.

A TYPICAL CIRCUIT

FOR THOSE WHO HAVE BEEN inspired to get their hands dirty (literally) with cave VLF or cave radio, I am presenting a circuit which was developed by Stuart France and Bob Mackin (the designer of the Molefone), and is reproduced with their permission. This design is for an 874Hz transmitter and receiver which could be used for radio location at depths to about 120m. With minor modifica-

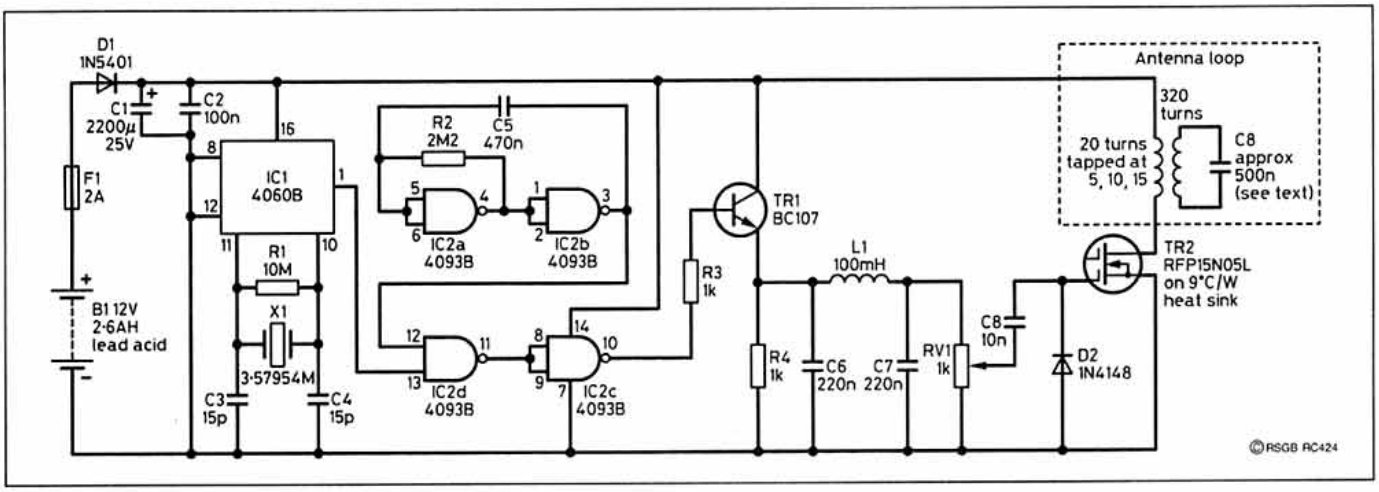


Fig 5: 874Hz radio-location receiver.

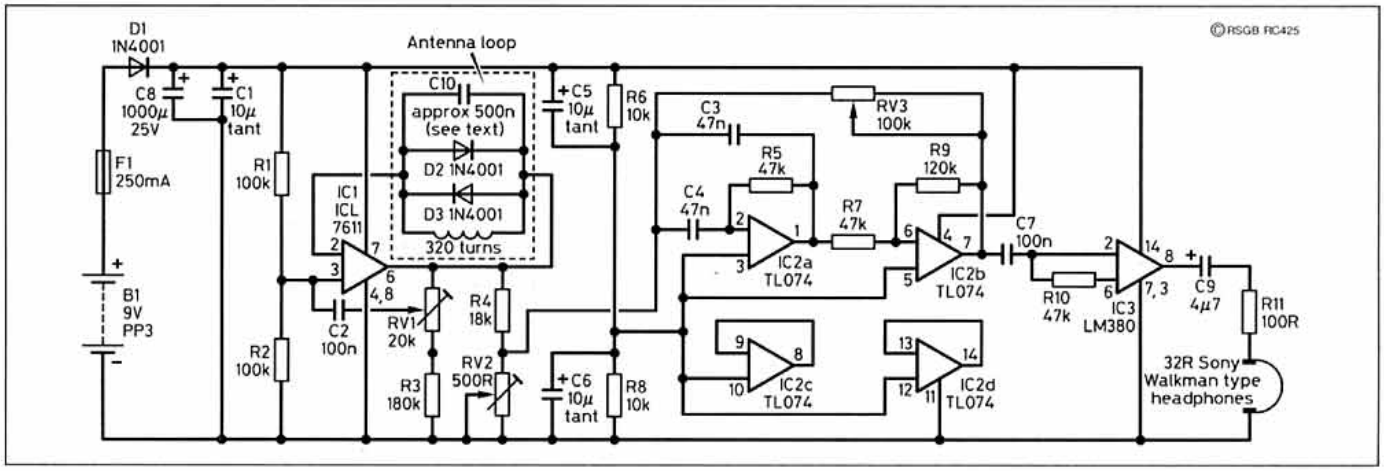


Fig 6: 874Hz radio-location transmitter.

tions it could also be used for CW or data transmission by on/off keying. It gives an idea of the techniques that might be used in equipment for an amateur VLF/LF allocation. First a few brief notes about the circuit.

The transmitter (**Fig 4**) consists of a 3.57954MHz crystal oscillator divided down by the 4060 to give the 874Hz signal frequency. A 1Hz square wave, generated by the 4093, is used to key the signal in a 50% duty cycle. The resultant signal is filtered to produce a pure sine wave which is amplified to drive the loop using a MOSFET. The transmitter antenna is tuned to resonance, and is linked to the PA via a primary link winding. The power output is set by RV1.

The receiver circuit (**Fig 5**) consists of three stages, a Q-multiplier, a bandpass filter and an audio amplifier. These are based around the 7611 CMOS opamp, TL074 FET quad-opamp, and LM380 integrated audio amplifier respectively. The receiver antenna is a multi-turn loop, tuned to resonance and with diode protection for strong signal conditions. RV1 is the Q multiplier control, and should be adjusted until ringing occurs, and then wound back slightly until stability returns. RV2 sets the filter's centre frequency, and should be adjusted for maximum signal at pin 3 of the TL074. RV3 sets the Q factor of the filter, and should be set in the same way as RV1.

With the exception of ensuring that all the components in the receiver's bandpass filter are as close to the IC as possible, the construction of the transmitter and the receiver is not critical. However, the winding of the antennas does require further explanation.

Both antennas are wound on a square former with 450mm sides. The former is constructed from four lengths of plastic conduit (the square type intended for surface mounting) with the top cover removed. The 'U' channel faces outwards and acts as a guide for the windings. During the winding process, a couple of struts are attached to one face in a cross. A hole is drilled in the middle of these struts and the whole assembly placed on a spindle to allow rotation whilst winding. A 500m drum of wire is placed on another spindle to allow free rotation. The wire is then wound from the drum onto the former in neat, ordered layers. For the transmitter loop, the link coil goes on first and consists of 20 turns of 16/0.2mm PVC-covered equipment wire tapped at 5, 10, and 15 turns. The main coil goes straight on top of this and consists of approximately 320 turns (ie a whole 500m reel) of 7/0.2mm PVC-covered equipment wire. The ends of the coils terminate in a small box attached to the inside of the former. This houses the tuning capacitors, diodes (for the receiver loop) and a socket. The receiver loop is identical to the transmitter loop with the exception of the link coil which is omitted, and the back-to-back diodes which are added.

The 500nF loop tuning capacitors should be built up from smaller (1000V, polypropylene type) capacitors in a series/parallel arrangement and adjusted for resonance by trial and error. Variable capacitors are impractical at these values.

PRACTICALITIES

WHEN TAKING ANY ELECTRONIC equipment underground, it is essential to make sure that everything is well waterproofed, as caves are wet places, and your comfort and safety could depend on the waterproofing. Waterproof ammo boxes are rugged, and can be used to protect electronics such as the transmitter, receiver or batteries, but the loop antennas would be more exposed to the elements. Potting the boxes and well varnishing the windings is strongly recommended.

LICENSING

THE CIRCUITS PRESENTED should give those interested in cave radio or VLF a feel for the issues which relate to VLF, underground radio and 'Cave Proofing' without going to the complexity of a full SSB design. Until an amateur VLF allocation is obtained, equipment such as that described here can only really be used under a Technical and Development Licence. However, these licences are expensive, and the usage must be strictly test and development - it precludes the operational use of the equipment, but it might be used to develop equipment to meet MPT1337.

The RA specification MPT1337 covers type approved equipment for inductive communications, and equipment which complies with this specification does not need a licence, as it is licence exempt. This is obviously the ideal solution for non technically minded cavers and rescue groups, but the cost of obtaining type approval for a new design is very significant to non-commercial organisations, being measured in thousands of pounds.

There is a variety of type approved equipment available commercially for more conventional applications, and some of this could be used to gain experience with short range VLF propagation; however, it is part of the type approval requirements that this equipment must not be modified in any way, and so this allows relatively little scope for experimentation.

Underground communication is clearly an interesting area, and is the only way of proving that VLF signals can be transmitted through solid rock. It also offers some interesting challenges in making equipment waterproof and rugged. I hope this article has encouraged some of you to consider this aspect of VLF propagation if an allocation becomes available.

SAFETY WARNING

MANY PEOPLE also find that transmitting through rock for the first time is a great thrill. However, I must stress in the strongest possible terms, that if you're not an experienced caver, you should not wander into caves unescorted. I'm sure I don't have to labour the point, but caves and potholes are potentially very dangerous places. However, all the risks can be virtually eliminated by taking sensible precautions. First and foremost, you should seek out a caving club and make your first trips underground in the company of people who can guide you into good caving practice. To find out details of a caving club in your area, contact the National Caving Association at Monomark House, 27 Old Gloucester St., London WC1N 3XX.

CONTACT

YOU MIGHT ALSO LIKE to consider joining the Cave Radio & Electronics Group (CREG) of the British Cave Research Association (BCRA). The CREG publishes a quarterly *Journal* which includes a good deal of coverage on induction radio, arranges regular field meetings, and can - of course - put you in contact with like minded people in your area. For information, send a 9" x 4" SAE to the author.

REFERENCES

[1] 'VLF Link for Cave Station', *RadCom*, October '94, p7. ♦

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HF NEWS

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham B17 8QB

TO BEGIN MY first *HF News* column of 1995 - a very happy New Year to all readers! Let us hope that it is a DX-filled twelve months.

DX NEWS

THE DXCC DESK states that the number of unprocessed applications at the end of October was 378 (representing 48,640 QSLs). 385 applications (39,546 QSLs) were received during the month. The total application activity for 1994 at that time was slightly down compared to 1993 although more cards had been submitted.

As usual Roger, G3SXW, and Nigel, G3TXF, did a fine job of making 10,115 CW QSOs from **Macao** during their October visit. They used an FT900 and Alpha amplifier for both stations. Send QSLs for XX9TSX and XX9TXF to the addresses in *QTH Corner*. *RSGB DX News Sheet* reported that messages had been received from Jim Smith, VK9NS, who was in Thimpu, **Bhutan**. These stated a successful demonstration of amateur radio had been carried out in the presence of the Deputy Minister of Communications and his staff. Twenty seven contacts being made with Japan, several by two Bhutanese operators. A51MOC is now the official callsign of the Ministry of Communications. DL7FCQ is expected to be in **Qatar** between 14 and 27 January concentrating on CW on 14, 21, and 28 MHz. His callsign was not known at the time of writing. HS0/DL2VK will be in **Thailand** for a little longer using CW and digital modes.

KK6H will be in **Tonga** until 7 February as A35RK from Tongatapu Is (OC-049). DF6FK and wife DL2ZAD were scheduled to be in **Central Kiribati** for a two-week operation as T31BB and T31BA concentrating on 7 and 14 MHz. Exact dates of their stay were not known at the time of writing.

RSGB DX News Sheet states TL8NG (WA7NPP) returned to the USA on 1 November. The same news source says that Ed, TU5BA, is at the US Embassy in Ouagadougou and will be in **Burkina Faso** for two years as TU5BA/XT. Likewise DL8AAI and wife will be appearing as 5X4B and 5X4A from Kitgum in **Uganda** and should be there for a year or so. TJ1JR, in **Cameroon,** keeps a schedule with his QSL manager N7VEW on Wednesdays at 2230 near 14.165 MHz, usually taking a few callers after he has finished. The same procedure is followed with 5V7MD, in **Togo** who also keeps a schedule with N7VEW but his is on Thursdays at 2200 on 14.165 MHz. Paul, F6EXV, will be active as 9Q5EXV in **Zaire** until the end of January. If you still need a card for a contact with ZD8TC send it to the address given in *QTH Corner. (not to Ascension Is)*.

In mid-November KB8CTD and KB8CTC were reported by *DXPRESS* to be in **Haiti** as HH1T and HH1D. They were located at Thomonde. They had a TS-450 and quad loop on 14 MHz and a vertical antenna on 7 MHz. Their favourite times of operating seemed to be around 2200 between 14.260 and 14.350 MHz. It was unknown how long they would be there.

CALLSIGNS IN CHINA & TAIWAN

THE CHINA RADIO Sports Association at the recent IARU Region 3 Conference produced a list of prefixes. These are used as follows: B (=VHF/UHF stations and contest stations in mainland China), BA (= Class 1 home stations), BD (= Class 2 home stations), BG (= Class 3 home stations), BG (with SWL numbers = listeners in mainland China), BO (= the Quemoy area of Taiwan), BR (= mainland repeaters), BS0H (= Huang Yan Dao = Scarborough Reef), BT (= special event stations on mainland), BV (= Taiwan), BV9P (= Dong Sha Dao = Pratas Is), BY (= club stations on mainland), BZ (personal calls of club station operators when operating from a club station only). 33 old-timers are allowed to operate from home with a BA prefix. 28 cities held examinations on 17 July for the Class 3 individual home station licence. About 1400 took the test with about 1000 being expected to pass ! 99 club stations and around 200 individuals held BZ calls in June 1994 allowing them to use their personal call when operating from a club station. Chinese amateurs are allowed to use 1.8 - 2.0 MHz (shared), 3.5 - 3.9 MHz (shared), 7.0 - 7.1 MHz (exclusive), 10.1 - 10.15 MHz (secondary), 14.0 - 14.25 MHz (exclusive), 14.25 - 14.35 MHz (shared), 18.068 -

18.168 MHz (shared), 21.0 - 21.45 MHz (exclusive), 24.89 - 24.99 MHz (shared), and 28 - 29.7 MHz (shared).

Also present were the Chinese Taipei Amateur Radio League who produced a similar list accompanied by a detailed map. As of 31 August 1994 there were 1,584 licensed stations in Taiwan with only one licence class everyone are allowed to operate on HF. CTARL's club call is BV5Y. Regional branches are BV2YA, BV4YA, BV7YA, and BV8YA. BO is a prefix used for some islands. The two permanent residents on Kinmen Is being BO2AA and BO2AB. The Peng-Hu Is are now BV9A and BV9AA (ex-BV7ER) and BV9AB (ex-BV7BQ) live there. Other islands in the area are BV9C (Chi-Lung Yu), BV9G (Lu-Dao), BV9H (Hua-Ping Yu), BV9K (Kuei-Shan Dao), BV9L (Liu-Chiu Yu), BV9M (Mien-Hua Yu), BV9O (Lan-Yu), BV9P (Pratas Is), BV9S (Spratly), BV9U (U-Chiu Dao), and BV9W (Peng-Chia Yu).

VIETNAM

ROLF SALME, SM5MX, reported from the Region 3 Conference that the Deputy Director General of the Directorate General for Posts and Telecommunications seem to have a very positive attitude toward amateur radio. A group has been working on new rules for amateur radio in Vietnam. Rolf believes that standard regulations like those which exist in many countries already will be adopted. Three licence classes - I, II, and III and a maximum power of 300W are being considered, and provision for visitors licenses will be made. Their report should have been presented to the government before the end of 1994. Meanwhile Rolf has been given a temporary licence with the callsign XV7MX.

CONTESTS

HUNGARIAN DX CW CONTEST

0000 - 2400 15 January

1.8 to 28 MHz - no WARC bands. Single operator single and multi-band, multi-operator single and multi-transmitter, and listener classes. Exchange RST and progressive number (from 001). Hungarians will give two letters indicating their county. Members of HADXC will give their membership number after the report. Counties are: HA1 - GY, VA, ZA, HA2 - KO, VE, HA3 - BA, SO, TO, HA4 - FE, HA5 - BP, HA6 - HE, NO, HA7 - PE, SZ, HA8 - BE, BN, CS, HA9 - BO, and HA0 - HA, SA. QSOs with Hungary count six points, with stations outside own continent three, with own continent one. Multipliers are the total of different counties and club members per band. Separate logs per band and signed summary sheet with the usual declaration should be posted within six weeks to : HA DX Club, PO Box 79, Paks, H-7031 Hungary. I can supply copies of the rules- SASE please.

28 MHZ COUNTRIES TABLE

G0DNV	83
G0AEV	60
G0MCT	52
G4OBK	40
G3XBM	32
G0NQC	18
G2FQR	14

ARRL RTTY ROUNDUP

1800 7 January - 2400 8 January

All bands 1.8 to 28 MHz (no WARC) using Baudot, RTTY, ASCII, AMTOR, and Packet (attended operation only). Exchange signal report and serial number from 001. Ws and VEs will give their state/province. One point per QSO (with anyone) with a station on each band. Multiplier is each US state (not KH or KL), each VE province, and each DXCC country. W and VE do not count for country credit. Packet QSOs via digipeaters or gateways are not allowed. Entries must be postmarked no more than 30 days after the contest and sent to ARRL. Logs may be submitted on disk. Copies of rules available- SASE please.

CQ WW 160M CONTEST

2200 27 January - 1600 29 January (CW)

2200 24 February - 1600 26 February.

Single and multi-operator sections. Single operator is split into three categories - H = over 150W, L = less than 150W and Q = less than 5W. Exchange RS/T and state/province for W and VE and "either prefix or country abbreviation for DX." QSOs with stations in own country count two points, in own continent five, and with other continents ten. Multipliers are each US state and VE province plus DXCC countries (excluding W and VE). Logs with 200 or more contacts must be accompanied by a "dupe" sheet. Indicate on the envelope "CW" or "SSB" and send logs to reach David L Thompson, K4JRB, 4166 Mill Stone Court, Norcross, GA 30092, USA, no later than 28 February or 31 March respectively. I can supply photocopies of the rules -SASE please.

In the **1994 Holyland Contest** G4IQM scored 2016 points and G0KWJ/M 1120. In the **1994 Helvetia Contest** (multiband section) UK scores were: G4IQM (42,585 points), G3ESF (24,990), GW4HBK (9,648), G3RSD (2,997), GM0GNT (1,080), and G2DUP (768). GM3ITN scored 396 points on 1.8 MHz.

JAPAN INTERNATIONAL DX CW CONTEST

2200 13 January - 2200 15 January

This is the Low Bands section - the High Bands section takes place in April. 1.8, 3.5, and 7 MHz. Only 30h operation allowed and breaks must be at least 60m long and marked in the log. Exchange RST and *CQ* zone number (UK is 14). Japanese stations will give their JARL Prefecture number. QSOs with Japan on 1.8 MHz count four points, on 3.5 MHz two points and on 7 MHz one. Multiplier is the number of prefectures (plus Ogasawara)

BAND REPORTS

Conditions seem to have been rather better and even 28MHz has had its days ! I have to thank the following for input for this part of the column: G2HKU, G3GVV, GW4KGR, G0s AEV, MHC, NQC and the UK DX Packet Cluster via G4PDQ. Loggings covered mid-October to mid-November and as usual stations whose callsigns are printed in italics were using CW:

1.8MHz
0000 *JW0I, KP2A, S92SS, V26B, VQ9SS, ZB2FK.*
0100 *ZA/OK1TN, ZS5LB, 5T5CJ.*
0600 *HL0E, G4DBN/VP9, ZL4SQ, ZL4WA.*
1700 *VQ9SS, 9M2AX.*
2100 *A71CW, VK6HD, VQ9QM, 9K2MU.*

7MHz
0000 *J6/DL3KDV, YI9CW,* ZS7ANT.
0100 A45ZZ, C6AFT, *V26Y, ZA/OK1CF, ZS6QU, 9G5VT.*
0600 *A35ZB, JW0I, KL7Y, TR8XX, VP8CQO, YJ0AAY,* ZL.
0700 HC8A, *JA,* PJ9U, TI9JJP, *VK9NL, VY1JA, XF4M, ZL1MH.*
1600 *A71CW, BV2TA, BZ4SBA, K7QQ, KC6OK, R1FJL.*
1800 *SU2MT, XX9TXF, UY0QY, VU2XTO, 3DA0Z, 5X1XT.*
1900 *HL9DC, JY5DL, PA3CXC/ST0.*
2200 *FG5FR, FH/JA1ADY,*FR5DX, HV4NAC, JR5JAQ, *XX9TXF,*9M8R, 9N1KY.

10MHz
0700 *FK8GJ, JA, TA7/KU0J, VK3, VK9NS, YJ0AAY, ZL.*
0900 *FS/DJ2BW, N3KEG/KH6.*
1700 *D68TA, XX9TXF, ZA/PA0GAM.*
1900 *FR5HG/E, KL7U, R1FJL, T5AR, 5X1DF, 9Q5EXV.*

14MHz
0700 A35ZB, JT1FAA, KH0AC, VK9ND, ZD8Z, 5X1C, 9G1SB.
0800 A35SS, BV8BC, BY5QW, *KC6OK,* KH2/VP9PB, SV2ASP/A, 3X0DEX.
0900 *A71EZ,* AH8AF, BY4RN, BZ5HAE, FK8FA, H44BC, S92YL, V73Y.
1600 *ET3YU, FH/JL1UXH,* HS1NGR, VE6/7, W6/7, *9M8BL.*
1700 *J28CI, JT1CO,* TI9JJP, VE6/7, W6/7.
1800 KH6FKG, KL7GU, TZ6VV, V26B, 6O0A.
1900 ET3BT, HS1NGR/8, KL7FO, S83H, ZD7CTO.
2100 D3X, FS5PL, HC8A, EA2KL/HK0, PJ8Z, PY0FM, S0RASD.

18MHz
0900 *XX9TXF, 9Q5EXV.*
1000 *KC6OK.*
1600 *PJ7/DJ2BW, TR8CA, 9U/F5FHI.*
1700 D44BS, *D68TA,* D68SY, *7Q7RM.*
2000 *FG5FZ,* TI4CF, *VP2EY.*

21MHz
0700 *BZ4REB,* HL5FUA, JA, KH8FB.
0800 A22EX, *S79ASM,* XX9TZ, 3DA0Z.
0900 BV0D, BV3BW, FH5CB, 9M8R, 9N1WT.
1000 *D2XX, ET3BN, HS0ZAA, HS7XK,* KC6SS, *XX9TSX,* 9U/F5THI.
1100 A71EM, *C91BW,* J6DX, P29VR, PJ1B, SU2MT, XV7VK, VE3MJQ/9X5.
1200 C94BA, FS/KH8AL, J52AK, HK0TCN, XX9GD, ZA9A, 5R8ED, 6O0A.
1500 D68LC, ET3YU, FJ/AA2SZ, FS5PL, S92SS, VP8BKT, ZD7JP, 8R1Z.
1700 KG4CO, S83H, VP8CPC, XF4M, XO9SF, 3G1X, *5U7Y.*

28MHz
0800 OH0XX/DU1, HS0AC, TZ6VV, 5R8DM, 5X1C.
0900 YB0ASI, V59T, *VK6HD,* 4U9U (=9U).
1000 HV4NAC, SU2MT, VU2DNL, V5/N9NS, 5Z4FM, 7Q7SB
1100 A22MN, C56DX, FR5BT, EA9DB, TZ6TIC, V85BG, 5R8ED, VK3AMK.
1300 FR5DX, S92YL, VP2MBA, XV7VK, *3B8FQ, 9I30ZIN,* VE3MJD/9X5.
1400 D3X, HC8A, HC0E, PJ8Z, VP2E, ZD7BJ, 7P8EZ, 8R1K.
1600 D2EGH, D68HS, FJ5AB, KG4JO, NP2EF, S92SS, VP8CQG, 9G1NS.

1994 WARC BANDS TABLE

	10MHz	18MHz	24MHz	Total
G4OBK	**136**	**204**	**127**	**467**
G4YVV	50	132	64	246
EA5GQI	-	137	77	214
G0MHC	59	90	45	194 (CW)
GJ4GG	42	70	45	157
EA5DQE	-	92	49	141
G2AFV	57	56	12	125
G3ING	62	46	15	123
G4CMZ	53	61	9	123
G3KKJ	17	53	39	109
G0TMZ	25	32	11	68
G4FVK	20	26	12	58
G3IAR	33	16	2	51

worked on each band. Logs have to be sent before 30 April to Five-Nine Magazine, PO Box 59, Kamata, Tokyo 144, Japan. Copies of the (1993) rules available SASE please.

AGCW-STRAIGHT-KEY-PARTY

1600 - 1900 4 February

3.510 - 3.560 MHz CW *using hand keys only*. Call "CQ HTP". Four Classes - A = maximum output 5W, B = maximum output 50W, C = maximum output 150W, and D = listener. Exchange serial number (from 001), class, name, and age (YLs = XX). Class A entrants earn nine points for a QSO with another A, seven with a B and five with a C. Class Bs earn four for working another B and three with a C. Class C with Class C counts two points. I can supply copies of rules on receipt of an SASE please.

AGCW QRP WINTER CONTEST

1500 7 January - 1500 8 January

3.5 - 28 MHz (no WARC) CW only following IARU recommended contest preferred segments where appropriate. Nine hours obligatory rest time to be taken in one or two blocks. Categories : very low power (2W input), QRP (10W input), MP (50W input), QRO (above 50W input). QSOs between QRO stations are not allowed. QSOs with own continent count one point with others two. Multipliers are DXCC countries per band. Logs must reach Dr Hartmut Weber, DJ7ST, Schlesierweg 13, D-38228 Salzgitter, Germany, by 1 March. I have copies of rules-SASE.

Please note that the address to send entries in the **AGCW Happy New Year Contest** is: Antonius Recker, DL1YEX, Hegerskamp 33, D-48155 Munster, Germany, and not that given with the rules in last month's column.

In the **1993 European DX Contest (CW section) G5LP** scored 153,966 points, **GM4SID** 55,296, GM3CFS 52,490, G3ESF 79,212, and G5MY 13,689. In the **SSB Section GM0ECO** scored 329,148, **G6QQ** 10,478, and G0NIF 342. In the **Multi-operator single transmitter** class **G0SDX** scored 286,272 points.

The results of the **1994 ARRL International DX Contest** are now available. In the **CW Section** (all band) G0TDX scored 73,476 points and GW0KZW 10,530 in the less than 5W class. In the under 150W class G3ESF scored 117,612, G3KNU 63,450, G4ZME 42,624, G5MY 40,635, GM3ZAS 26,010, G3RSD 12,600, and G6QQ 9,936. In the over 150W category G4BUO scored 1,392,600, GD0SLY 809,784, G3UFY 437,304, G2QT 358,323, G3XMZ 147,015, G3NKS 83,160, and G3TXF 52,611. Single band entries by G0LII on 7 MHz (2,805), G4CNY on 14 MHz (146,328), and GM3CFS (9,024). On 21 MHz the UK was represented by G4IQM (24,054), and G0MBQ (6,723). In the **Multi-operator single transmitter** class **GJ3ULT** gained 1,328,959 points and was third in Europe, GB5DX with 1,062,393 was fifth. **G4CNY** was world thirteenth on the 14 MHz band.

In the **Phone section** (all band) less than 5W category G0NYD scored 12,321 points and in the up to 150W section G6QQ 3,612. In the QRO section G4OJH scored 697,698, GM3BCL 167,256, G2QT 101,430, G4UIF 79,596, G4XKR 31,785, and G0NYL 22,896. Single band entries were G3NLY 48,006 on 3.5 MHz, GI0SAP 94,392 on 14 MHz, and G4BUO 232,560, G4IQM 24,816, and GW0PUP 9,660 on 21 MHz. **Multi-operator** scores were G0SDX 1,133,070 who was European ninth. The winner of the Society's **Braaten Trophy** is therefore **G4BUO** and the **Milne Trophy** goes to GD0SLY. Sincere congratulations to both.

AWARDS

THE VERON GOLDEN JUBILEE AWARD

The Netherlands amateur radio society VERON celebrates its 50th anniversary this year. Requirements for the award are to contact (or receive) at least 100 Netherlands stations during the calendar year. All bands/modes can be used. Some Dutch stations may use special callsigns during the period and in this case only one credit can be claimed whatever callsign the particular station was using. Send log extracts (no QSLs necessary) to Award Manager: Sytse Wybenga, Certificatemanager VERON, Pr. Bernardlaan 60, 8501 JG Joure, The Netherlands. Application should be made before March 1996.

WORKED REPUBLIC OF INDIA

Issued by the Amateur Radio Society of India for those who have contacted stations in India, the Laccadive Is, and the Andaman and Nicobar Is on bands 1.8 to 28 MHz (including WARC) on CW, AM, SSB, or RTTY since 26 January 1950. A minimum of 100 points is needed - QSOs with mainland India on 1.8 MHz count three, on 3.5 and 7 MHz two, and on 14 to 28 MHz one. Contacts with stations using special prefixes attract an additional point. With Laccadive and Andaman the points value is five on 1.8 MHz, four on 3.5 and 7 MHz, and three on other bands. Send QSLs or log extracts certified by a national society Award Manager (in the case of RSGB this is G4BWP) together with five IRCs to: Awards Manager, Amateur Radio Society of India, 40 Ghalib Apts, Parwana Rd, Pitamoura, Delhi - 110034, India. (If QSLs are sent please enclose IRCs for their return).

PHOTOGRAPH: DJ9ZB

Left to right 9E2A (JH1AJT), Mr Ghethuet (Ethiopian PTT), Mr Adamse (ex ET3AZ, ET3MA, ET3AR), and Sid, G4CTR, now ET3SID.

QTH CORNER

A35ZB	Lothar Grotehusmann, DJ4ZB, Quaekerstr 35, D-13403 Berlin, Germany.
J28CI	Box 1891, Djibouti.
TJ1JR	Adam Boettiger, N7VEW, 6911 Naches Heights Rd, Yakima, WA 98908, USA.
XX9TSK	Roger Western, G3SXW, 7 Field Close, Chessington, Surrey, KT9 2QD.
XX9TXF	Nigel Cawthorne, G3TXF, Falcons, St George's Avenue, Weybridge, Surrey, KT13 0BS
ZD8TC	via Ted Collins, G4UPS, 27 Parklands, Hemyock, Devon, EX15 3RY.

PROPAGATION REPORT

THIS MONTH Smithy's report goes as follows: "Often the unpred-ictability of conditions on the HF bands is a source of annoyance if not frustration at the loss of a choice DX contact but there are also occasions on which things turn out to be better than could be reasonably expected.

Such was the case during the weekend of the *CQ* Worldwide SSB Contest at the end of October. As reported last month, mean solar activity had shown signs of rising by the middle of October. The second half of the month saw eleven days with sunspot numbers above 50 (daily solar flux values in the 90s) while the 27-day average solar flux crept up towards the 90 sfu mark. As a result the contest weekend saw even 28 MHz open to all continents although the North Atlantic path was severely affected by the high level of geomagnetic activity.

By the middle of November the trend in average solar activity was again downwards though it will not be clear until late in the month whether this is likely to continue into the new year."

THANK YOU

TO ALL WHO provided information for this month's column and to the authors of the following publications:

The *Lynx DX Bulletin* (EA2KL), the *EA DX Boletin* (EA1QF), the *Long Island DX Bulletin* (VP2ML), the *RSGB DX News Sheet* (G4DYO), and *DXPRESS* (PA3FQA).

DEADLINE

PLEASE SEND everything for the **March** column to reach me no later than **19 January.** ♦

HF F-LAYER PROPAGATION PREDICTIONS FOR JANUARY 1995

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

Time / / GMT	28MHz 000001111122 024680246802	24MHz 000001111122 024680246802	21MHz 000001111122 024680246802	18MHz .....1111122 .2468.2468.2	14MHz .....1111122 .2468.2468.2	10MHz .....1111122 .2468.2468.2	7MHz .....1111122 .2468.2468.2	3.5MHz .....1111122 .2468.2468.2
** EUROPE								
MOSCOW	....11....	....331....	....2664....	....5886....	....88884...	32.476668 2.1	88564334 6768	++53....3+++
MALTA	....11....	....1322....	....36651...	....68874...	....88881..	4525765 68643	99874334 6898	+++4....3+++
GIBRALTAR	....	....111....	.....4431...	....26764...	....68882..	132.866677 31	89866433 5887	++++3...25++
ICELAND	....	....	......22....	....1552...	.....5886...	....377785..	453.654567 53	++++42.245++
** ASIA								
OSAKA	....	....	....	....1.....	....51.....	....63123...	1...311243 33	.........4+.
HONGKONG	....	....1.....	....32.....	....55.....	....663.....	1...343 21...	2...111234 44	.........4+4
BANGKOK	....12.....	....251....	....573.....	....686.....	...1466 32...	2...133 46..1	3...111 4566	.........4++
SINGAPORE	....132....	....3541...	....5774....	....6876....	...1366 72...	2...133 46113	2...111 4566	.........4+4
NEW DELHI	....12.....	....342....	....565.....	....6762....	...2456 5....	41.112343113	831...11 4568	5.........4++
TEHERAN	....232....	....4542...	....6774....	...17777...	...4556 73...	6423223 46224	9731...11 4678	+5........4++
COLOMBO	....232....	....4542...	....5775....	...1567 71...	...1236 74...	.2...134 6224	42....11 4678	4.........4++
BAHRAIN	....232....	....4542...	....6675....	...2667 7....	1..433 674...	7323113 46334	973....14 778	+5........4++
CYPRUS	....3432...	....5664...	....88872...	...2888 85...	22.676 7882 11	8856434 57766	9973111 35798	++4....25++
ADEN	....3322...	....5544...	....6677 1...	...2556 83...	2..422 4671..	8.22..14 6655	953....14 788	+5........4++
** OCEANIA								
SUVA/S	....	....	.....1.....	.....21....	.....3551...	....14344 1..	....32124 3..	....
SUVA/L	....1.....	....21.....	....531.....	....8531.2..	.11.865 43621	..126333 52.	...231.13 2..	....
WELLINGTON/S	....	....	.....12....	....341.....	....1564....	....5434 3...	....3112 41..	....
WELLINGTON/L	....	....	.....1.....	....32...1..	.11.752 11421	..116332 442.	...131.13 2..	....
SYDNEY/S	....1.....	....131....	....4642....	....6764....	...1666 61...	...144345...	....1112 441.	.........3..
SYDNEY/L	....	....	.....2.....	.....51....	....2642.32.	....4433 3641	....2111 351.	.........2..
PERTH	....232....	....4542...	....6875....	...1687 71...	...2366 74...	2...133 46222	....1114 663	.........44.
HONOLULU	....	....	....	....	.........1..	.....2124..	..2.2111 32..	...5......
** AFRICA								
SEYCHELLES	....122....	....1244...	....3477 1...	...1446 83...	1..222467 1..	7.1...14 6655	921....14 788	+2........4++
MAURITIUS	....1322...	....3554...	....5667 2...	...1556 84...	21.222467 11.	741...14 6766	83.....13 788	+.........4++
NAIROBI	....3232...	....5454...	....6667 3...	...1555 76...	2..322268 211	8222...36 776	973.....3 788	+5........4++
HARARE	....133....	....1355 1...	....3567 4...	....4557 7...	22.222247 421	8722...15 887	973.....2 688	+5........4++
CAPETOWN	....1441...	....1266 3...	....3467 6...	....4456 71..	31.132236 542	8732...13 688	873.....1 478	+5........5+
LAGOS	....15442...	....3666 4...	....6767 7...	....7656 72..	34..632366 42	8934 3...3 798	8884.....4 88	5++.......++
ASCENSION Is	....3223...	....1543 5...	....4755 61...	....6655 63..	243.742236 42	8982 41...4 78	8885 1....1 69	+++3......3+
DAKAR	....4433...	....6655...	....2876 71..	....5765 74..	233.753256 42	7~82 52..25 88	8787 3....2 69	+5+5.....4+
LAS PALMAS	....3322...	....5554...	....2887 71..	....5888 83..	122.876677 31	7884 7544 5787	9898 5211 2589	++++2....2++
** S. AMERICA								
Sth SHETLAND	.......11..	....1123...	....2345 51..	....4665 53..	133.765434 21	4561 5321.123	2343 21.....1	....
FALKLAND Is	.....122...	....1244...	....4566 1..	....2665 53..	123.664223 21	5782 631...23	4675 31.....1	.343.......
R DE JANEIRO	....	....21.1...	....5323 1..	....6534 3..	123.263223 21	7782 53....35	8897 31.....15	+++5.......2
BUENOS AIRES	.......1..	....113....	....2424 1..	....5534 3..	113.464222 11	5782 641...13	6897 41.....2	3++5.......
LIMA	.....222...	....443....	.....7652..	.....7653..	..1...6322 1.	2361 1231...1	5896 311.....1	2++5.......
BOGOTA	.....121...	....343....	.....6652..	.....7653..	....1642 21.	2254 331...12	6885 411.....2	4++5.......
** N. AMERICA				.....2763..	....5632 31.	3363 43...133	8876 411....15	++55.......2
BARBADOS	.....221...	....443....	....16652..	.....5753..	.....6533 1.	1133 232...21	6774 411.....2	4+55.......
JAMAICA	.....11....	....133....	.....3651..	.....6764..	....2654 51.	1134 321232	7784 411....15	+++5.......2
BERMUDA	.....11....	....133....	.....3652..	.....2763..	.....5655 1.	.12..234 2231	6672 3111...14	+++5.......
NEW YORK	.....1.....	.....22....	.....1551..	.....2762..	.....1652..	.12.1224 2...	2672 3211.....	.5+5.......
MEXICO	.....1.....	.....22....	.....551..	.....2763..	.....5665 1.	.11..234 3331	6672 3211 1124	+++5.......2
MONTREAL	.....1.....	.....22....	.....1541..	.....1761..	.....464..	.11....4421.	3661 3111 1..1	2++5.......
DENVER	....	.....1....	.....3.....	.....41....	.....63..	.1...1.3421.	1561 21.11....	.3+5.......
LOS ANGELES	....	....	.....2.....	....	.....33..	.1.....1641.	255.21.13211	.3+5.......
VANCOUVER	....	....	....	....	....	.1...111351.	242.2111 4532	.235....2..
FAIRBANKS	....	....	....	....	....	.1...111351.	242.2111 4532	.235....2..

The provisional mean sunspot number for November 1994 issued by the Sunspot Data Centre, Brussels was 18.0. The maximum daily sunspot number was 48 on 2 November and the minimum was 7 on 21 November. The predicted smoothed sunspot numbers for December, January and February, are respectively: (classical method) 23, 22, 21 (±5); (SIDC adjusted values) 16, 14, 13 (±3).

NEVILLE CHEADLE, G3NUG
Further Felden, Longcroft Lane, Felden, Hemel Hempstead HP3 0BN

THE PURPOSE OF this new column is to introduce the RSGB IOTA (Islands On The Air) Programme to all RSGB members with the objective of attracting further participants. It is not my intention to duplicate the 'IOTA News' column in the *RSGB DX News Sheet* which will remain the recommended source of information on current IOTA activities.

The IOTA Programme, which has just celebrated its 30th Anniversary, was created by the late Geoff Watts, a leading British short wave listener. When it was taken over by the RSGB in 1985 it had already become for some a favourite award. Its popularity grows each year, not only among ever-increasing numbers of island chasers but also among a growing band of amateurs attracted by the possibilities for operating portable from islands.

The Programme comprises 18 separate awards which may be claimed by any licensed amateur (or SWL on a heard basis) who has had contacts with the required number of islands or groups listed in the *IOTA Directory*. Many of the islands are DXCC countries in their own right; others are not, but by meeting particular eligibility criteria they also count for credit. Part of the fun of IOTA is that it is an evolving programme and new islands and groups are frequently activated for the first time (see 'Friendly Islands for IOTA Award', *RadCom*, Dec 94, for example). Currently, over 850 of the 1,175 listed island groups have seen activity and therefore have reference numbers in the form 'EU-005'.

The basic award is for working stations located on 100 islands / groups. Higher achievement awards are given for working 200, 300, 400, 500, 600 and 700 island / groups. In addition, there are seven continental awards (including Antarctica) and three regional awards - Arctic Islands, British Islands and West Indies - for contacting a specified number of islands in each area. A Plaque of Excellence is available for confirmed contacts with at least 750 islands / groups.

Contacts may be made on any or all of the 1.8 to 28MHz bands (inc all three WARC bands), single mode or mixed mode. The rules require that, in order for credit to be given, QSL cards need to be submitted to nominated IOTA checkpoints for checking. A feature of the IOTA Programme is the annual Honour Roll which encourages the continual updating of scores. This is published in *RadCom* and *DXNS*.

IOTA DIRECTORY

THE *IOTA DIRECTORY* is an invaluable aid to the island hunter. Not only does it show island listings by continent, region and country group, it also answers many of those basic questions. For example: How do I apply? How do I know if an island counts? Who is my authorised checkpoint? All these types of question are answered and the rules are clearly set out. There is, in addition, a very interesting section which gives more information about the Directory list including the definitions and criteria for islands which qualify.

If 'island chasing' appeals to you (and it can become compulsive), turn to pages 90-91 for how to get hold of the new 60-page *1995 IOTA Directory* which is the result of a major revision.

SPONSORSHIP FROM YAESU

A SPONSORSHIP agreement with Yaesu which came intoeffect on 1 October 1994 was described in *HF News*, December 94. Many benefits will follow which will enhance the programme, in the UK and worldwide, in a way which would otherwise not have been possible. The agreement signals the beginning of a new era for IOTA and offers great potential for future growth and stability.

PORTABLE IOTA STATION

AS PART OF THE sponsorship agreement, Yaesu will be making available on loan to the IOTA Committee a portable station for the use of IOTA DXpeditions, together with QSL cards.

A unique feature of the IOTA Programme is the ease with which an island DXpedition can be mounted. Many islands lie within easy reach and during a summer weekend some twenty or thirty IOTA stations may be heard. Activating fairly rare islands is generally much easier than activating a fairly rare DXCC country. The portable IOTA station is shown below.

This station can be made available to anyone wishing to activate an island. There are a few very straightforward conditions on its use such as returning the rig promptly in good condition, providing insurance cover and replying to QSL cards sent via the bureau. Both the IOTA Committee and Yaesu are keen to introduce younger amateurs to DXpeditioning so younger teams, particularly those from radio clubs, will get preference. Please contact me at the address above if you wish to borrow this station.

An obvious question to ask is: "Which European islands need activating?" The 'most wanted' Island list is printed in the new IOTA publication *IOTA - 30 Years On*. DXpeditioners do not have to go far to find a rare IOTA island. Included in the European top 20 listing are:

EU - 148 F Languedoc-Roussillon Region
EU - 118 GM Flannan Is
EU - 112 GM Shiant Is
EU - 122 GI N Irish Islands.

A week-end of great fun can be guaranteed to anyone activating any of the rarer island groups and it should be possible to make about 2000 contacts during a two to three day period.

The portable IOTA station, comprising a Yaesu FT-900 transceiver, a lightweight power supply, mic, keyer and wire antenna, all in a splash-proof case.

30 YEARS ON

THE 60-PAGE booklet *IOTA - 30 Years On* has been published to celebrate IOTA's 30th Anniversary. It contains many features which have never before been published, such as the most wanted islands list, stories of IOTA island DXpeditions, the complete Honour Roll and Annual Listing and over 50 photographs. There is a full listing of all certificate holders and many other interesting articles, together with a comprehensive kit checklist which should be invaluable to anyone taking their rig on holiday.

The DXpedition stories include descriptions of operations to several very rare islands including: Ducie Island in the Pitcairns by Brian Young, VR6BX, Plover Islands in Alaska by Larry McKay, K5MK, Anuta Island in the Solomons by Bernhard Stefan, DL2GAC, and the Pangutaran Group in the Philippines by Giuseppe De Gasperin, I2YDX.

IOTA - 30 Years On is proving to be of interest, not only to Island hunters, but also to all DXers and HF operators generally because of its emphasis on island operations and mini DXpeditions. Why not take advantage of the current special offer and purchase both the Directory and the Anniversary Booklet from G3KMA QTHR? The price for the two together, including postage, is £11 or US$18 or 27 IRCs within Europe or £13 or US$22 or 33 IRCs outside Europe.

UPDATES

NOW A REMINDER that updates for the 1995 listings must be mailed to checkpoints on or before 1 February 1995. The new *Directory* shows revised charges introduced with effect from 1 January 1995 (see also this month's *HF News*). ♦

VHF/UHF NEWS

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

A VERY HAPPY New Year to all readers and contributors. The Leonids meteor shower produced a higher than expected peak according to preliminary reports. An explanation for a 50MHz propagation puzzle has been suggested. Some auroral activity has been reported.

REPEATERS

LEICESTER Repeater Group (LRG) produced an issue of its newsletter *LENS* for the Leicester show. The lead story describes how interference to VHF relay GB3CF on R0 from the West Midlands was alleviated by altering the receiver coverage. UHF repeater GB3LE on RB4 ". . . is showing signs of its age." It was hoped to have sorted out all the problems - drying up electrolytics and resistors going high - by Christmas. LRG's address is PO Box 180, Leicester.

On 5 November, the new mid-Wales VHF repeater GB3RA (IO82GG) came on stream. Located northwest of Llandrindod Wells, it is on R5. Reports should be sent to its keeper, Mr W A Cook, GW0KQX (QTHR). On 7 November, the Yorkshire coast 'in-fill' VHF repeater GB3YC on R0 became operational. It is located northwest of Scarborough (YSN) and reports should be sent to keeper Mr RA Pullen, G0OII (QTHR).

Jack Hum, G5UM (LEC), mentions that the big lift in mid-October enabled many operators to converse with continental amateurs via their repeaters. Many were heard to promise to confirm such contacts by QSL card. He points out that such cards are not valid for RSGB awards as they do not relate to 'real' QSOs. He concludes: "To originate them for assisted contacts and not direct ones is so much waste paste-board and, of course, clutters up the QSL Bureau unnecessarily."

SOFTWARE

THE PUBLIC Domain and Shareware Library (PDSL) publishes regular *PC Shareware Reference Guides* and supplements to the main issues. *Issue 18, Supplement 4* runs to 48 pages and is in a new format which includes a synopsis list of the full library in catalogue order. It has five pages of CD-ROM titles, several devoted to amateur radio. See the advertisement pages for the PDSL's address.

For PC users, the VK3UM EME Planner and Autotrak, and OH5IY MS suites of programs are proving very popular. See page 20 in the December *RadCom* for details. Andy Talbot, G4JNT, has placed some of his excellent software in the public domain. This includes a very comprehensive contest collection, complete with site database and maps, and assorted geographical type programs. If you would like a copy of G4JNT's software, send me an IBM formatted 1.2Mb 5.25in or 1.44Mb 3.5in disk in a Jiffy bag with return postage and address label. Before sending any disks, please run CHKDSK to ensure there are no bad sectors on them.

CONTESTS

A REMINDER that the Christmas Fun sessions are on 26 - 29 December - see page 78, November *RadCom* for the rules. On 15 January there is the 144MHz CW contest, 1000 - 1600UTC. The first two legs of the 70MHz Cumulatives are on 22 and 29 January, 1000 - 1200UTC. There are Single operator fixed, All other and SWL sections in all these events. The 432MHz Fixed/AFS/SWL contest is on 5 February, 0900 - 1500UTC. The 1995 VHF/UHF/SHF contests and rules are listed in the *1995 RSGB Call Book and Information Directory* but check in the latest *RadCom* for any late changes, such as the adjudicator's particulars.

The 12th BYLARA (British Young Ladies Amateur Radio Association) Contest is in two sessions: 9 February 1900 - 2200 and 11 February 1000 - 1300UTC. There are 2m and 70cm sections but no operation in the 144.750 - 145.175, 145.600 - 146.000, 432.800 - 433.375 or 434.000 - 434.975MHz slots is permitted. There are Phone and Mixed sections. For full rules, send an SASE to Ella Tugwell, G0FIP (QTHR), to whom entries should be sent to arrive by 4 April.

PROPAGATION

A PUZZLE

The monthly *Reports* published by the Six and Ten Reporting Club always make interesting

reading. In the September issue, editor Ray Cracknell, G2AHU (HWR), wrote a piece entitled 'Propagation Puzzle.' This was prompted by his observations of the daily, morning skeds on 50MHz between Arne Nilsson, SM7AED (JO66), and Ted Collins, G4UPS (DVN). These 1200km contacts are mostly completed via random meteor reflections with a near-100% success rate.

With his beam on SM7, Ray finds he can copy both stations at a steady low level, but with his beam on Devon, he can only copy the weak signal from Ted and nothing from Arne. John Stace, G3CCH (HBS), started weekly MS tests with SM7AED in 1989 and they also noticed these very weak signals. Arne concludes that tropo can be ruled out as the signals are there whatever the barometric pressure, rain or storm, and even if they would have to cross ducts at 90°.

This phenomenon occurs principally in the May to September period, suggesting that enhanced E-layer ionization in summer has something to do with it. There are further observations from G3CCH in the October *Report* and John has also noted these weak background signals in MS skeds with SM3BIU (JP73).

THE SOLUTION

I copied this correspondence to Emil Pocock, W3EP, editor of the monthly 'World above 50MHz' column in the ARRL's journal *QST*. He wrote: "From the description, it does not sound mysterious at all, but is a nearly perfect description of ionospheric forward scatter. This is a textbook case phenomenon, so there should be no real surprises. I use it often enough, especially during contests, but it is generally overlooked because the signals are generally very weak.

"The rule of thumb over here, anyway, is that consistent results are possible only with 100 watts or more (better) and a several element Yagi - five elements or more is better. Signals are in and out of the noise, but persistent. CW is almost always needed.

"This is scattering in the upper D and lower E layers. It peaks at noon local time, and is totally dependent on solar radiation. As you point out, meteor scatter can suddenly enhance the path for brief moments. The typical distances are 600 - 2000km (theoretical maximum); most of my contacts are in the 1500km range."

On 144MHz, ionospheric forward scatter contacts are regularly made by EME-class stations - eg 1kW output and four or more Yagis. But on 50MHz, it seems they can be achieved with far less ERP. On the face of it this sounds unlikely, but many operators have completed auroral contacts with very modest ERP, so why not?

Some useful daily experiments could be set up around local noon for this summer by stations around 1000 - 1500km apart. Reliability and average signal strengths in dB-over-noise could be recorded and the results correlated with E-layer activity. It would seem best to arrange such tests well away from the usual 'Sporadic-E shouting frequencies' since any weak ionoscatter signals would be buried.

AURORAL EXPERIMENT

In his December *QST* column, W3EP invites US 2m operators to participate in an auroral propagation experiment.

Auroral propagation is a field-aligned mode. Free electrons are ordered in long, thin columns along Earth's magnetic field lines. During auroras, energetic electrons form tight spirals around magnetic field lines, thus creating innumerable vertically orientated columns of ionization. These columns form a curtain at 90 - 120km altitude off which stations to the south can scatter back signals to others. Michael Owen, W9IP, has set up a beacon with circular polarization for their experiment; the callsign is W9IP/2.

We invariably use horizontal polarization for all weak signal, DX work, but the scientific literature suggests that vertically polarized signals may scatter more efficiently from these vertical columns of ionization. The difference could be as much as 20dB, about 3 - 4 S-points. So Emil suggests those with choice of horizontal or vertical polarization, such as the satellite operators, could monitor distant beacons during auroras, switching antennas and noting the difference in received signal strength.

From the IARU Region 1 beacon list, it is not clear if any of the northern European 2m beacons use other than horizontal polarization. With sufficient participating stations and SWLs we could reach some meaningful conclusions over a period.

METEOR SCATTER

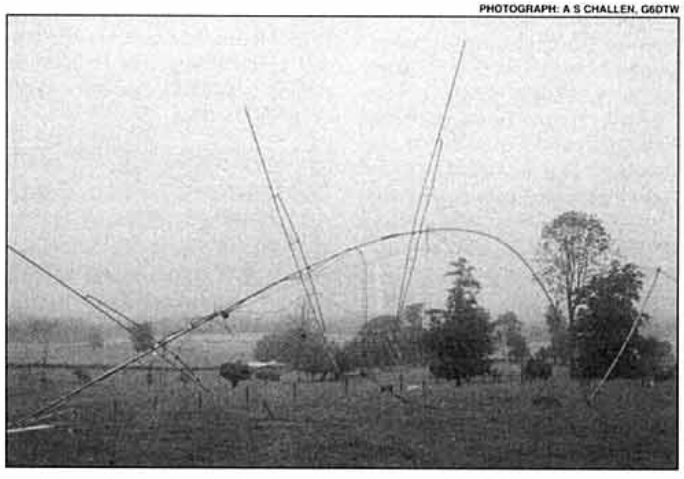
THE LEONIDS

Preliminary reports reveal that the 1994 Leonids stream produced significantly higher ZHRs (Zenithal Hourly Rates) than expected. Alastair McBeath of the IMO (International Meteor Organization) telephoned on 18 November to report that Spanish observers had recorded an unexpected peak that morning.

Jukka Sirvio, OH6DD, reports that OH5IY's 87MHz recordings revealed a peak at 0700 which: ". . . was slightly better than the 1994 Perseids peak." Subsequently, I downloaded a seven-page report via CompuServe from Rainer Arlt, the Vision Commission Director of the IMO. This comprised input from observers in Spain, The Netherlands and California.

Up to 21 November, raw data were coming in but it seems the peak ZHR was about nine times the normal for this stream, probably over 100. The maximum could have occurred around 1400 on the 18th, according to Peter Jenniskens of the NASA/Ames Research Center in California. At that time the radiant would just have been setting for British observers. We must await more data before definitive results as to the time and ZHR of the maximum can be confirmed.

PHOTOGRAPH: A S CHALLEN, G6DTW



The result of using too short a gin pole when trying to raise a long mast. Taken before the 1994 144MHz Trophy Contest, the picture shows G6DTW's four stacked 23-element two metre antennas.

THE QUADRANTIDS

The IMO's *1995 Meteor Shower Calendar* predicts the visual peak of the Quadrantids at solar longitude (LS) 283.16° referred to equinox 2000.0; this equates to 2300UTC on 3 January. OH5IY's program predicts the same time. However, projecting Ilkka's gradient graph of measured 87MHz 1994 activity in a NE/SW direction forward to 1995 suggests peaks around 1700 on the 3rd and 0500 and 0900 on the 4th.

For observers in our latitudes, the radiant never sets, ie it is circumpolar. Reflection efficiencies exceed 50% as follows: NE/SW around 0600 and 1100 - 1830; E/W 1430 - 1800 and 2300 - 0300; NW/SE around 1130 and 2300 - 0600: N/S 0100 - 0700 and 1000 - 1630, all times UTC.

MOONBOUNCE

JOHN HOBAN, G0EVT (YSW), has built four DJ9BV 10-ele Yagis for 2m from data published in *DUBUS Magazine*. He planned to use them in the ARRL EME Contest on the 26/27 November weekend. Conrad Farlow, G0RUZ (YSW), was hoping to be QRV on 70cm in the contest. He has an array of four 8.5 λ DJ9BV Opt70 Yagis with open-wire feed, elevated by a satellite TV dish screwjack. The PA uses a 3CX800 triode and the Rx preamp is a dual-stage MGF1302 and CF300 design with cavity input, 0.4dB noise figure.

John Hunter, G3IMV (BUX), was QRV on 2m in the first leg of the contest on 29/30 October but rain static was a problem for a while. The aurora on the Saturday afternoon messed things up further. He completed 30 QSOs with 17 multipliers and KL7FB was a new square and country. He found five new initials.

John Regnault, G4SWX (SFK), found conditions awful on 29/30 October. He completed with 11 stations on the Saturday, including KL7FB for initial number 256, and heard 16 others. Nothing was heard in skeds from NC7K, EI4DQ and K1FJM. Three were worked next day with another six heard.

In his *432 and Above EME News* for November, Al Katz, K2UYH, commented: "Virtually all reports give high marks to conditions on both 70 and 23cm during the first contest weekend." Activity was intense, but QRM was less because stations spread out. EA8/ON5FF, OM1TL, PY5BZU and 9M2BW were QRV on 70cm and CX9BT showed up on 23cm

with a much-improved signal giving South America to many for their WAC (Worked All Continents).

ANNUAL VHF/UHF TABLE
JANUARY TO DECEMBER 1994

	50MHz		70MHz		144MHz		430MHz		1.3GHz		Total
Callsign	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Points
G0TRB	51	43	36	5	45	13	40	12	-	-	245
G6HKM	29	52	-	-	68	23	25	11	18	12	238
G3FIJ	20	17	37	5	56	13	31	9	5	4	197
G1SWH	2	24	22	4	61	18	29	10	2	2	174
G0FIG	-	-	-	-	70	28	43	13	8	6	168
G3FDW	30	17	22	3	46	7	24	3	-	-	152
G1AWF	16	12	-	-	77	21	13	4	-	-	143
GW6VZW	55	60	-	-	-	-	-	-	-	-	115
G0HIK	1	1	2	1	71	14	16	8	-	-	114
G4MUT	16	9	15	2	27	7	19	5	4	5	109
G8XTJ	15	17	-	-	52	15	-	-	-	-	99
G4OUT	-	-	30	6	47	13	-	-	-	-	96
G0EVT	5	41	-	-	3	22	10	9	-	-	90
G3UOL	18	4	-	-	53	15	-	-	-	-	90
GW0PZT	-	-	-	-	59	24	-	-	-	-	83
G4DEZ	3	16	-	-	29	13	5	5	2	2	75
G1UGH	11	16	-	-	21	10	-	-	-	-	58
GI4OWA	1	15	-	-	26	12	-	-	-	-	54
G4OBK	17	30	-	-	1	1	-	-	-	-	49
GU4HUY	-	-	-	-	38	11	-	-	-	-	49
G3FPK	-	-	-	-	37	11	-	-	-	-	48
G3YHF	-	-	-	-	-	-	39	7	-	-	46
G7CLY	9	16	-	-	10	6	-	-	-	-	41
G6ODT	-	-	-	-	2	2	17	10	-	-	31

British counties are those listed on page 81 in the January 1994 *RadCom*; 77 in all. Up to three different stations allowed in each of the 12 GM regions. Do not include EI counties. Countries are the current DXCC ones plus IT9. Deadline for the final 1994 scores is 26 January.

50MHZ

NEIL CARR, G0JHC (LNH), completed a few MS contacts with DL, OZ and PA stations during November. G5UM is in favour of repeaters on 6m which, he suggests, would encourage more mobile activity and increase occupancy of the top half of the band. The VHF Committee has discussed this topic and entirely supports the Repeater Management Group's (RMG) guidelines. Eight repeater proposals seem to be current.

G4UPS had auroral QSOs with G, GD, GI and GM stations and heard others in OZ, PA and SM on 29 October, 1445 - 1620. From 1753 there was an E-layer opening to ES, I3, 4 and 7, IS0, OE5, SP5 and 6, YU and 9A until fade-out at 2050. There was a little morning Es to OE2 and I1 next day and Ted copied beacon CT0WW at 1025. November was unproductive apart from the regular skeds with G3CCH on tropo and SM7AED on MS. On the 18th he lists QSOs with SM7AED and OZ7DX as Es propagation. This was the day when the Leonids were so active, so were these actually MS?

Nick Shaxted, GM0OGI (CTR), recently returned from two years in Jordan in time to catch the 29 October aurora. From 1345 he worked stations all over England, plus OZ1KSN (JO57), OZ5AGJ (JO56) and SM6EHY (JO67) all on SSB. He reports strong Es to OE, YU and 4N later from 1900 for a couple of hours. He runs 20W to a 4-ele Yagi at 9m AGL, the QTH being 150m ASL.

70MHZ

JOHN PERCIVAL, G7DDU (NHM), made 105 QSOs in October with 36 stations including mobiles. Half the contacts were outside the county - Suffolk, Sussex, Derbyshire and the Malvern Hills. All G prefixes, 0 to 8, were worked with 22W and a half-wave collinear antenna. GM0OGI is QRV on the band with 10W and a 2-ele Yagi at 7.6m AGL. Nick is building a 150W PA and plans to upgrade his antenna system very soon.

144MHZ

G0EVT FILLED IN three 'holes' in his squares map in the 12 - 14 October tropo lift; running 400W to a 10-ele DJ9BV Yagi, John added SP2NJI (JO92), DL9USA (JO71) and SP3EPX (JO83). Andy Wyspianski, G1AWF (LDN), did well in the October lift; his tally included 35 Scandinavians and 20 SPs, furthest DX being to JO59, 75, 93, 95 and KO02.

G4OUT operated in the Marconi Memorial CW Contest on 5/6 November making 54 QSOs for a claimed score of 16,714 points. Ian's best DX were F6KIM/P (JN38), DK0BN/P (JN39) and F5KOJ (JN28), all over 700km. He missed out on HB9WW/P.

In the 29 October aurora, GM0OGI worked many DL, G and PA stations on SSB. Nick highlights SP3MFI (JO91), F6GGF (JN18), GU3EJL (IN89) and F/DG6UAJ (JN37) between 1425 and 1604. He runs 100W to a 17-ele Yagi 10.7m AGL.

Joe Ludlow, GW3ZTH (GNM), is amazed how few people bother to send in activity reports considering how useful they are for later analysis. He sent a comprehensive report of his September and October activity, mostly from his portable site at IO81FP. He was -/P on 6-9 and 13-15 October and completed 333 QSOs to 16 countries and 71 squares.

On the 13th, in one and a half hours, he made 66 contacts in eight countries and 27 squares, best being JO60 - 63, 65, 67, 70, 72, 75 and 76. Activity was low the next afternoon so only 24 QSOs were completed in three hours, best DX being OZ5ACG (JO75).

The JOTA weekend started on 15 October so what started as an easy DX session rapidly became difficult with very strong Dutch Jamboree stations operating on Joe's frequency. Repeated requests for them to QSY fell on deaf ears. Fortunately he was using his Timewave DSP-9+ digital signal processor without which DXing would have been much more difficult. Best DX of the day was RZ2FWA (KO04), first heard on SSB in an MS burst; the QSO was completed on weak tropo CW. He recorded many MS bursts that afternoon from SP6.

From home on the 16th he worked LX2DF (JN29) using 3W to a 5-ele Yagi. He caught the 29 October aurora and worked a couple of GMs on the key. GM7NVA on SSB and EI4DQ on CW were heard. Joe comments: "The DSP filter was remarkable with the tone A signals giving near T9 results and the SSB being virtually Q5. He noticed a 600Hz upwards Doppler shift on G4ASR's signal.

430MHZ

ROGER PIPER, G3MEH (HFD), runs 10W to a 48-ele Jaybeam Multibeam 18m AGL, the site being 217m ASL. He sent a contest-style log showing 59 completed contacts on 12 October, the first day of the good lift. Best DX over 900km were OZ6OL (JO65) and DG0EK (JO60); 700+km QSOs were with DK1PZ (JO41), DG7LAZ (JO43), DC2XG, DC3XH and DK5HQ (JO53), HB9MIN/P (JN37), DF6LO (JO52) and DL8CME (JO52). Using 25W and a 17-ele MET Yagi, G0EVT added DF0RB (JO51), DG0CZE (JO61) and F6FLE (JO00) for three new squares.

On 13 October, Bob Reeves, G8VOI was out -/P on Butser Hill (HPH) running 50W to a 19-ele Yagi. Best DX were DL3LAB and DD7LO (JO44), OZ6CE (JO55), SM6s CEN, CMU and FHZ (JO57) and SM7SCJ (JO65). GW3ZTH/P was QRV in the October lift period and completed 21 QSOs with stations in seven countries and 13 squares. Joe's best DX was EA1DKV (IN53).

1.3GHZ

USING 30W to a G3JVL 50-over-50 Quad Loop Yagi array, G3MEH completed 74 QSOs with 68 different stations in the 11-15 October period. Roger's best DX was SK7QJ (JO76) at 1146km. Other contacts over 1000km were SM6GXV (JO58), SM6EAN and SM6FHZ (JO57), SM7UHF (JO65) and DL6NVC/P (JO73).

DEADLINES

THE **MARCH** deadline is **26 January**, an important one for your final 1994 Annual Table claims. The **April** date is **23 February**. My CompuServe mailbox ID is 70630,603. Via the Internet use 70630.603@compuserve.com. The tel/fax machine is on 0181 763 9457 and the BT Gold mailbox is 87:CQQ083. Have a nice year. ♦

RSGB NATIONAL VHF CONVENTION

Sandown Exhibition Centre, Esher, Surrey

SUNDAY 19 FEBRUARY 1995

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

PROGRAMME

1030	Convention opens. Enter through main entrance.
1100	Refreshments. Snack bar in the hall will be open from 1100 to 1800 and the licensed bar will be open throughout the convention.
1130	AGM 6m Group
1130 -1230	Lecture: Getting Started on the Microwave Bands by Lehane Kellet, G8KMH (Stream C Lecture Room)
1330	Convention address and presentation of trophies by RSGB President Clive Trotman, GW4YKL.

AFTERNOON LECTURE PROGRAMME

Detailed arrangements for lectures will be notified on arrival

	A	B	C
1400	VHF Contesting in the 1990's *by the VHF Contests Committee*	Single & Dual Band Log Periodic Yagis *Mike Gibbings, G3FDW*	The Middle Microwave Bands *Andy Talbot, G4JNT*
1500	A 50MHz DXpedition to Jordan	The Sun and Aurora *Ron Livesey of the British Astronomical Association*	A Year on 10GHz *G4KNZ, G4CBW, G8VZT and G3WDG*
1600	VHF Contest Committee Forum	VHF Committee Forum	

1700	Lecture Sessions End
1730	Trade Exhibition Closes. Convention Ends.

ADMISSION

Admission will be by payment on entry as follows:

Convention and Exhibition £3.00	(over 65)	£1.50
	(under 18)	£1.00
	(under 14)	Free

ACCESS MAP TO SANDOWN PARK

RAIL TRAVEL:
British Rail
WATERLOO TO ESHER

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GB2VHF:
Channels S22 SU22

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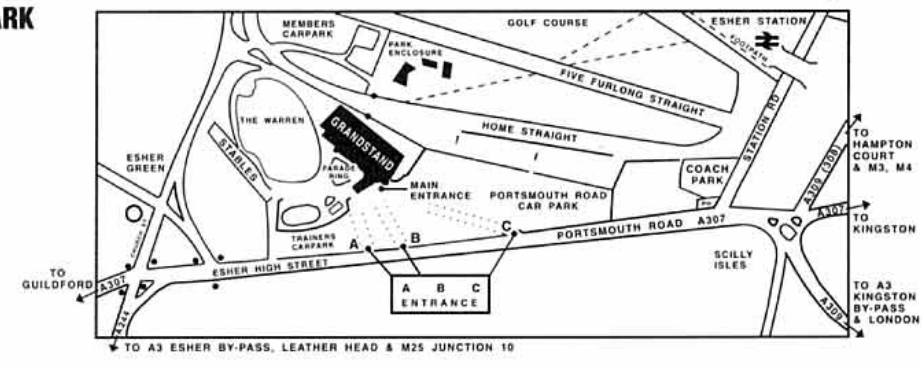
Les Hawkyard G5HD
Tel: 0409-281342



Map by courtesy of United Racecourses

SWL NEWS

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

G3VLX IS AMONG the many amateurs receiving a fair number of QSL cards from SWLs. Most, however, are from locations 'just around the corner' from the station being worked, or, even, from SWLs in the same country. Although they are not terribly useful, each receives a QSL card in reply.

However last month, G3VLX received a QSL through the bureau from Siberia, north of Mongolia reporting 5x9 signals on 21MHz while he was in QSO with a stations in Europe. Therefore this SWL usefully showed G3VLX that his signals were travelling much further than the stations that he was working on that occasion.

I am sure that most SWLs are guilty, at some time or other, of sending a QSL card simply hoping for one in return, rather than preparing the report on the basis that it might be useful to the recipient.

The instances that an SWL report comes into the "useful" category will differ from listener to listener but some examples are: i) reporting on a QSO involving stations in different locations from the listener eg a VK working W6s, a ZS working JAs, or even a W2 working an EA on 3.5MHz or a YB working a UR station on 7MHz; ii) someone calling CQ continually without receiving a reply; iii) someone testing new equipment or a new antenna system and who is seeking reports on the quality or strength of their signal; iv) in reporting a DX QSO at VHF or UHF, on the LF bands (7, 3.5 or 1.8MHz, especially 'Grey line' propagation), or v) on the WARC bands (24, 18 and 10MHz). SWL reports on CW QSOs are seen favourably (because there are too few CW SWLs.

If an SWL prepares a QSL for, say, a CT3 on 14MHz because it is a new country, state that "You are my 1st CT3 on 20m" on your report and, if the amateur has the policy of responding to SWLs, there is a good chance that you will get the desired card. It is worth adding that QSLing direct with IRCs, a $ bill or return postage - rather than through the bureau - does tend to result in a higher QSL return, the disadvantage of this, of course, being the cost!

CATCHING UP. . .

BEING THE SWL QSL Manager for C56DX and C56/G0MRF I have received requests for cards, however at the time of penning this, QSL cards were still being printed. If you require a card from C56 and you heard either of these calls, please send me your QSL with return postage and I will reply as soon as I can ; cards with no return postage being replied to via the bureau.

Many logs have been received for my October SWL Challenge. It seems to have coincided with some fairly good conditions, and has already exceeded last year's total of 42 logs. More news of this later.

In the November issue, a reader asked about the QSL route for some stations active in the 80s. Bill, GM3AWW considers that most, if not all, the addresses for the stations will not be valid as so much time has elapsed. However, he suggests that WD4HMG might be able to help with a card for G3MUV/CE0.

WHITE ROSE SWL CONTEST

DAVID WHITAKER, BRS25429 has once again organised this very popular contest the rules of which are published in full this year. David is hoping for an even better entry than 1993, when 31 SSB and 6 CW logs were received.

LF BANDS AT TURN OF THE YEAR

WE WILL EXPERIENCE more hours of darkness in late December and early January bringing better DX conditions on the low bands. 7, 3.5 and 1.8MHz can all be expected to produce some exceptional DX during this period.

Looking at 7MHz first, the band can be expected to be open for DX at any time from 1400 through to 1000. Early afternoon can provide signals from the West Coast of the USA (above 7.150kHz) and Canada, and the near and far East. In the mornings, after sunrise, signals from VK can be strong and on some days listeners can hear a long path opening to JA. 100 countries on 7MHz is a common occurance during January, so let me know how you fare. Many listeners consider 7MHz to be 'hard work', but for those with a good receiver which can give 10 or even 20dB of attenuation (to reduce the strength of the Europeans) and a low angle antenna eg a sloping dipole, the band can produce surprising results.

DXing on 3.5MHz has been a favourite winter pastime of mine for many years although new countries have been few and far between in the last two years. I currently have 277 'current' countries on the band, although several listeners who have been DXing on the band longer have heard 300 'All time' countries. The most interesting time of day is at the grey line to the West Coast of the USA. Last season actually produced the best conditions for a number of years and N7UA was 57 on the meter just before 1600 on several occasions. On a good day, the Grey line will provide some VE7s, normally just after 1600.

Later in the evening, Africa, the near and Far East will be possible. Last season, 9V1XQ was a regular on 3.789MHz - it is easier to QSL this station now that G4PKP is handling his cards. Stations from Eastern USA can be extremely strong from as early as 2000, and, of course, all SWLs will be trying to log the DXpedition to South Georgia on both 7 and 3.5MHz which should be active at the turn of the year.

Conditions on 1.8MHz will probably prove more of a challenge to SWLs. The band can be noisy, and to get the best from 160m listeners will need a long Long Wire or a 1.8MHz dipole. For those who have the space to experiment with 'big' antennas, the best time will probably be around our sunrise when signals from the west should be at their best. Choice DX from the east can be heard from around 2100 but these stations tend to mainly appear on CW.

SOFTWARE

LAST MONTH I said that G7DHM was the author of PKTMON. This is not the case although he is happy to help users of this software. To avoid being out of pocket, he would appreciate an SASE with any queries.

FINALE

THE NEXT DEADLINE dates for your diaries are **13 January** and **10 February**. ♦

14TH INTERNATIONAL WHITE ROSE AMATEUR RADIO SOCIETY SWL CONTEST

LOWER FREQUENCY BANDS

RULES

1 From 1200UTC on 14 January to 1200UTC on 15 January 1995. The contest is over 24 hours but only 18 hours may be operational during the 24. A continuous 6-hour rest period must be clearly shown in the log.
2 The contest is open to all SWLs in the world. There will be two sections - Phone and CW. Transmitting amateurs holding VHF licences and Novice licensees are very welcome to participate. Multi-op and mixed-mode entries are not allowed.
3 The 1.8, 3.5 and 7.0MHz bands are to be used.
4 The object of the contest is to log a maximum of five stations on each band in as many countries as possible. Scores shall be compiled as follows:- Countries outside one's own continent score five points. All other countries score one point. Total points on each band to be multiplied by the total number of countries heard on that band. The final score is the total of the three bands.
5 The call areas of Canada, Japan, Australia and New Zealand will all count as separate countries, ie: VO1, VO2, VY, VE1-VE8, JA1-JA0, VK1-VK8, ZL1-ZL4. All other countries will be determined by the ARRL Countries List.
6 No CQ, QRZ or similar calls will be allowed to count for points. Aeronautical and Maritime Mobile stations are not to be included in the entries.
7 Log sheets to show the following columns:- Date, Time (UTC), Station Heard, Station being Worked, RS(T) at SWL QTH. If both sides of a QSO are heard they may be claimed as separate countries, 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. Logs should be submitted with each band on separate sheets. A separate sheet listing all multipliers for each band should also be included.
8 Entries should be sent to the Contest Manager, Mr David A Whitaker, c/o The White Rose Amateur Radio Society, 57 green Lane, Harrogate, North Yorkshire HG2 9LP. Entrants should ensure their entries are postmarked no later than 14 February 1995.
9 A plaque, suitably engraved with the winner's name, will be presented to the overall contest winner. Certificates of Merit will be awarded to the leading SWL Station from each country.

Contest Exchange

ANDY COOK, G4PIQ
Fishers Farm, Colchester Road,
Tendring, Essex, CO16 9AA.
G4PIQ @ GB7MXM.#36.GBR.EU

WELL, I HOPE you all had a good Christmas, and that you got all the presents you wanted (like an FT1000 and 150ft Christmas Tree tower with stacked monobanders for 40m through 10m complete with planning permission wasn't it?).

CQ WW

I'M WRITING THIS month's column before Christmas, and with the sounds of the SSB leg of *CQ*WW still ringing in my ears.

As seems to happen just all too often, Murphy's law came into play with the propagation during both the CW and the SSB leg of *CQ*WW this year - perhaps it's a little foolish having the two contests separated in time by about 1 rotation of the sun!

In the week and a little more previous to the contests the bands had been in excellent shape for this stage in the sunspot cycle - before the SSB leg, I dropped into our club shack one evening at 2000 and heard ZL coming in over a polar path on 15m, in addition to many loud stateside stations that late in the evening.

However, as the contests approached, the sun did its worst, and conditions took a big nosedive. The lousy conditions had a particularly marked effect on the path to the USA from where we normally expect to get the bulk of our high band QSOs. You might expect under these conditions that the amount of DX to be worked would be well down, and indeed on a 'peace-time' band things would seem very sparse. However, a contest is quite different and the fact that there are so many people on the bands just plugging away at it, means that all sorts of unusual (and sometimes short) openings come to light, and there is still a tremendous amount of DX to work.

For instance, during the SSB event, while it undoubtedly depressed the F-layer east-west path, the aurora did bring quite a number of genuine auroral contacts on 10m and a few on 15m, but more to the point, there was a good auroral-E opening between the phases allowing good QSOs inside Europe which would not otherwise have been possible.

Sunday brought a sidescatter opening to the USA on 10m, and the path to Africa, South America and the Caribbean was very good throughout on all the high bands. Indeed the expeditions who went to the Caribbean reported having a great time - one of them even made the 'Last 10 QSO' rate meter on CT hit 900 QSO/hour - all I can say is he must have had a shorter callsign than us! ZD8Z in the thick of it down on Ascension Island broke the single band 15m record, with 5600 QSOs and 178 countries! To show the difference in conditions between there and here - we [G0KPW-see this month's *News & Reports - Ed*] made about 4,000 QSOs less than him on 15m! So - just remember - next time you think conditions are just going to be so poor it's not worth going on - think again - some remarkable things can be done in a contest.

COMPUTER AIDS

THE START OF a new year is always an interesting opportunity to look ahead to future developments in any area, including contesting. Recently, I've been giving a few talks to radio clubs, and as part of this I've shown some of the features of the latest software in order to show how computers can ease the pain of contesting.

I have a voice keyer card installed in my PC (although I have yet to use it in anger - I had a dreadful earth loop in *CQ*WW which made my speech only about 6dB above the background hum!) One of the interesting (though frankly not very useful) features of this card is that, when used in conjunction with CT, it can send the complete contest exchange on SSB using digitally recorded samples of your own voice stored on the hard disk.

This concept seems to strike fear into the hearts of some people who assume that the point is almost upon us where you can just turn the computer and radio on at the start of the contest, and return 48 hours later to find a winning score. The technology is a long way from making this viable yet, particularly for SSB, in spite of a couple of people who claim to have made an automatic CW contest QSO machine.

In fact, I believe that, for a very long time to come and even when technology has made some huge strides, winning scores will still require a human brain in the loop to add that level of judgement and intuition that a computer cannot bring. I guess it all depends how powerful you expect artificial intelligence to become in the near to medium term future. Also, before this technology becomes anywhere near viable, I'm sure that the rules of many contests will be changed to outlaw such devices. Over the past few months, people on the Internet contest reflector have been discussing what would make a robust definition of single operator, and the best suggestion which I saw in this debate was along the lines of 'Only one human brain to contribute to the entire operating of the station for the duration of the contest'. You can easily see something similar being devised to bar the 'robots' from normal competition. Of course, the development of the hardware and software associated with the robots is a challenging and perfectly valid exercise, and I guess it is very likely that we will see true robot contests where people's fully automated stations compete against one another rather than against 'normal human' stations!

Another view developing among some is that a computer is absolutely essential to contesting and that if you don't have one you really are bashing your head against a brick wall. Now, while I would be the first to sing the praises of computers in contests, they are by no means essential and the sort of edge which they give to a score is probably 10% or less league for most events.

Anything which reduces fatigue and the requirement to keep accurate multiple paper records for dupe sheets, multiplier sheets etc must help, but the big improvements in people's scores come from getting the 'real' hardware (antennas, radios, operators etc) right. It is much easier to add 50% to your score by going from a dipole to a 3-el tri-bander or improving your operating technique, than to do so by going from manual logging to computer logging. So, if you're not into computing, don't despair of your ability to do well in the contests, and put your time into building up the real pat of the station!

1995 VHF CONTESTS

THIS TIME OF year is also a good point to think about what contests you and/or your club may want to do during 1995, and a good time for me to mention what changes have been made to the RSGB VHF Contests calendar for 1995. The calendar remains in much the same form as last year, except for two new series of contests.

Following the success of the 2m Backpackers events during 1994 which brought many low power portable stations onto the band, two 50MHz Backpackers events will be run along very similar lines during the summer. The other set of additions to the calendar are three 144MHz SSB Cumulatives for single operator fixed stations during April, which have two sections - one for people with big systems, and another where people are limited to 25W and one antenna. Please note that the dates for the 6m Trophy and the associated IARU event and Backpackers contest are the 3rd/4th June - not as shown in the *RSGB Call Book*.

That's it for this month - don't forget the 80m and 70cm AFS contests - why not work off the post-Christmas apathy by getting a few of the club members on to put the club's name up in lights - or at least in the tables! ♦

RSGB President Ian Suart, GM4AUP, presents Bob Whelan, G3PJT, with the BERU Trophy for winning the 1994 RSGB Commonwealth Contest from VP9.

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CH600MX	2/70/23CM Whip BNC	£25.00
CA-50HR	6M MOBILE Whip	£38.00
CA2X4KG	2M/70CM Mobile Whip	£45.00
Z4	2m/70cm M. whip w/locking collar	£33.00
B-10	2M/70CM Mobile Whip	£18.50
CHL21J	2M/70CM Mobile Whip	£15.00
CA-350dB	6M/10M Base Colinear	£140.00
ABC23	3 x ½ Base Colinear	£55.00
GP9N	2M/70CM Base Colinear	£123.00
GP15	6M/2M/70CM Base Colinear	£85.00
CX-902	2M/70CM/23CM Base Colinear	£84.50

COMET DUPLEXERS

CF-305	HF/VHF Duplexer	£25.00
CF-306A	HF/VHF/UHF Duplexer	£34.00
CFX-514	6M/2M/70CM Triplexer	£39.50
CFX-431	2M/70CM/23CM Triplexer	£42.50
CF-520	2M/6M Duplexer	£24.50

COMET ANTENNA ACCESSORIES

RS-9	Mini Boot Mount	£6.75
RS20	Mini Gutter Clip	£15.00
CK-3MB	Mini Cable Assembly	£19.50
WS-1M	Window Mount & Cable	£36.50

COMET STATION ACCESSORIES

CBL-30	HF 1:1 Balun 1KW PEP	£20.00
CBL-2000	HF 1:1 Balun 2KW PEP	£25.50
CSW-20N	Switch 2 WAY 'N'	£39.00
CF-30MR	HF Low Pass Filter 1KW PEP	£34.00
CF-50MR	6M Low Pass Filter 1KW PEP	£35.00
CF-30H	HF Low Pass Filter 2KW PEP	£69.00
CF-30S	HF Low Pass Filter 150W PEP	£19.00
CF-50S	6M Low Pass Filter 150W PEP	£19.50
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HL63U	70cms Linear, 10/25W in 50W out GaAs FET Preamp	259	C
HL180V	2M Linear, 3/10/25W i/p auto select 170W out Rx Preamp	389	C
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B5016G	2m, 50W input, 160W output preamp	269.00	C
D1010N	70cm, 10W input, 100W output	349.00	C
D3010N	70cm, 25W input, 100W output	329.00	C
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QSL

JOHN HALL, G3KVA
Corfe Lodge, Ipswich Road, Long Stratton, Norfolk NR15 2TA.

THE NEW QSL Sub Manager for the **G6AAA - ZZZ series** is Mr C R J Healey, G0NCS, 22 Stirling Rd, Plymouth, Devon PL5 1PD. Our thanks to G4IAQ and G4IAR who did this task previously.

A couple of errors crept into the list of Sub-Managers in the November *At Your Service*. Firstly, for the **G0MAA - MZZ** series the Sub Manager lives at 23 Ghyllroyd Drive, *not* Chyllroyd Drive. Secondly, and more seriously, the **G4OAA - OZZ** Sub Manager is Mr W Dykes, G1UKE, 9 Severnmead, Hemel Hempstead, Herts HP2 6DX, and not as stated.

The Sub Manager for the **G0TAA - TZZ** series, Mr J Taylor, has a new address: 121 Garesfield Gardens, Burnopfield, Newcastle Upon Tyne NE16 6LQ.

Ted Allen, G3DRN, has dropped me a line to moan about the number of uncollected cards and I agree with him. The sub-managers go to all sorts of lengths to make sure they give a good service to their customers and it's a bit of a let-down to find that about 30% of cards go uncollected. So please do let your sub-manager have envelopes for those cards. Mind you, I guess the worst offenders are too idle to read this column.

CIS BUREAU

ALEX RK3DT writes to let me know now that the IARU has voted in favour of admitting SRR (Union of Radioamateurs of Russia) they are the only 'official' bureau, whatever that means. He says things are a bit difficult on the QSL front out there with three people sorting cards as and when they can find the time.

Also, the postal service is a bit 'iffy' and the postal truck sometimes doesn't call for as long as three weeks. In addition, they have to pay a premium of about 50p for each parcel received and they have just been informed by the Post Office that the rates will go up threefold!

Alex says they appreciate the stout boxes in which we send out our cards because they recycle them. He says they are sorting the 1, 4, 6 and 9 regions' incoming cards to sub bureaux in those regions and the 3 and 0 calls by oblasts.

What I am not sure about is the position regarding PO Box 88 now that Alex says PO Box 49 is the 'official' bureau. I have written him for clarification because I suspect this is a rather delicate area and I don't want to ruffle any feathers!

Another letter from the SRR says they can only handle cards for Russian hams with the following IARU prefixes: RA - RZ, UA, UW, UV and UZ up to March 94 and RA - RZ and UA - UI currently. They say that about 40% of all QSL mail they get is for other bureaux and they cannot forward it. The HQ Bureau girls tell me that's all very well but what about the 4Ks and the 4Ls? To confuse matters even further, we have just had a package returned to us from Uzbekistan with no explanation as to why. We posted it in June and although I know it's a difficult area, I wouldn't have thought they would take exception to a few QSL cards - looks like they did!

OVERSEAS

THE HQ BUREAU girls tell me that it is possible for QSL cards destined for Serbia to be sent via the Bulgarian bureau because the Serbian border is not far from Sofia. So we will try a few test parcels, asking for confirmation of receipt, in order to see whether the experiment is successful.

I had a letter from Jan Hallenberg, SM0DJZ, telling me that the Swedish QSL Bureau receives a lot of cards for SH and SF prefixed callsigns. Jan says Sweden has not issued such prefixes but they could possibly be corruptions of S5. Therefore, he says, try the new S5 Slovenia Bureau but not Sweden!

I have said it once recently but I will say it again - there is no QSL Bureau on Sao Tome. If you send a card then enclose postage or you will not get one back.

Roger Western, G3SXW, and Nigel Cawthorne, G3TXF, en route from their recent DXpedition to Macao, sent me a postcard from Hong Kong. They reckon they made 10,000 QSOs and hope the girls in the Bureau have got their fingers oiled ready for the deluge of QSL cards! I heard them but couldn't beat the bedlam to actually work them so I won't be getting a card!

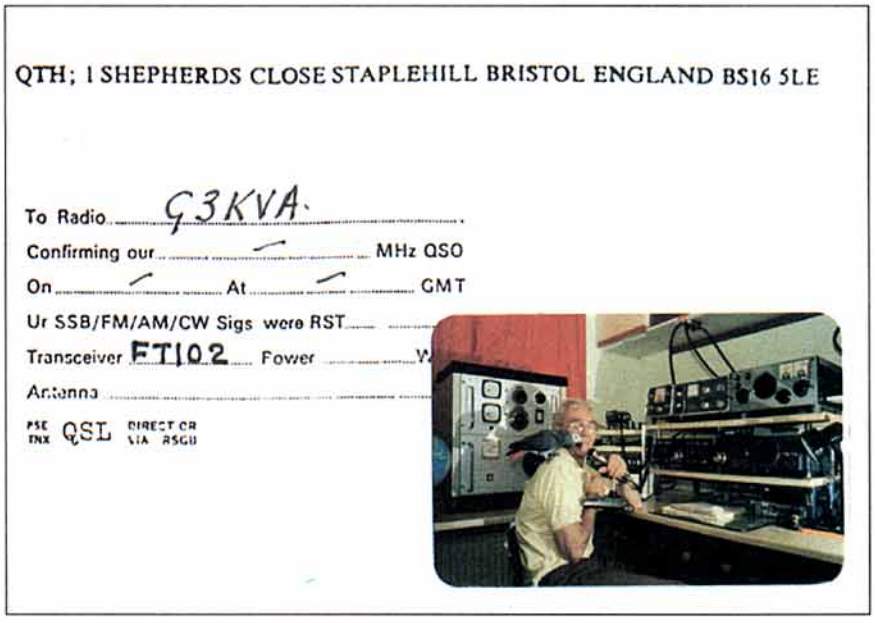
The first 160m G-ZL contact confirmed.

The humorous front of G3IZM's card . . .

ON THE CARDS

JOHN WIGHTMAN, ZL1AH, wrote me to say that he sees from September *RadCom* that there is a revived interest in UK/New Zealand contacts on 160m: 'To New Zealand on Top Band Phone'. He sent me the QSL card for the first ever confirmed contact on 160m between himself and G6GM in October 1953. It is reproduced here. John says the contact was the result of over two years work. When he returned to 160m in 1983 it was much easier because, he says, modern receivers are immeasurably superior to those he was using some 30 years earlier.

John Harper-Bill, G3IZM, sent me the card pictured here and told me of the interesting way it was produced. Apparently, John utilises the services of a company that produces rolls of photographs with self adhesive backs from 35mm negatives supplied by the customer. The possibilities for producing unique and artistic designs are unlimited as you can see from John's efforts. Further details of the photograph can be obtained from Colab Ltd, Herald Way, Coventry CV3 1BB.



. . . and the back showing the self-adhesive shack photo.

NOVICE NEWS

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

DETERMINATION

THAT WAS THE heading of an item in November's *Novice News* which told the story of the path Jack and Justin took to their present callsigns - G0SRX and G0VBV respectively. The story continues:

Justin followed the best traditions of the hobby when he returned to the classroom to help Chuck, G0MDK (ex WA6TIR) instruct the latest Novice class. He could then have 'retired' and followed his own interests, but he decided against that and decided instead to become a registered Instructor.

I hope more readers follow Justin's example. He is offering the chance to others to gain the pleasure that he has found through amateur radio. Any worthwhile hobby is worth sharing, and Justin is doing just that. I wish him well - I am sure that each successful candidate will be a personal triumph.

Daniel, 2E1AAH, and Kevin, G0TOG, helped to man GB2CHA when three radio societies (Bury, Manchester and District, and Oldham) combined to support the Children's' Hospital Appeal last August Bank Holiday. Despite poor weather the appeal raised a very creditable £111,072.

DXCC

THE ACHIEVEMENTS OF EMMA, 2E0AAX, have featured in this column before. She has never found that the Novice power limitation has stopped her from enjoying herself and now her DXploits have gone further.

To gain the DX Century Club Award (DXCC for short), you not only have to make one hundred contacts, you have to prove it. To apply for the award, confirmation of contacts is needed and QSLs have to be submitted. Sometimes promised QSL cards are very slow to arrive or, even worse, do not arrive at all. Emma's patience must have been stretched to the limit although she had a good working margin, with 72 countries on 10 metres and 40 on 6 metres. She was not wasting her time off the air either - as eight excellent GCSE grades prove.

Thanks to her Dad, Mike G3OIL for sending the information and photograph. Emma is reluctant to boast of her achievements but the expression on her face shows her pleasure. Well done!

Emma Wills, 2E0AAX, proudly showing her DXCC certificate marking her first 100 countries confirmed using only three watts on 28 and 50MHz.

MORE DX

AT THIS STAGE of the sunspot cycle it is often assumed that the 10m band is dead for most of the time. John, 2E0AHU, knows better. In the last four months he has worked 34 countries from home and nineteen when he was mobile. He described his working conditions.

From his West Sussex home John uses three watts into a home-made dipole set as an inverted-V at 9m (30ft). The mobile contacts were made using a base loaded CB antenna. He intends to follow Emma's example and is working towards his DXCC Award. As a 10m addict, all his contacts could be on that band.

In spite of his own success, John feels that a little more power and a small phone allocation on 20m would be welcome as many Novices are not dedicated Morse lovers - indeed many full Class A licensees come round to this mode after a period on phone as they feel they are ready for something more challenging.

This success story comes from a more mature Novice who is quietly regretting the years before he took up amateur radio. With a full licence in his sights, as soon as he can find the time to study for it between other commitments, he says he will be loth to give up his 2E callsign as it attracts the DX contacts.

There is no doubt about it, amateur radio opens new horizons - and the extra effort needed to get that Class A licence is effort well spent - ask John and Emma.

NOVICES-IN-WAITING

RESULTS OF THE December NRAE are eagerly awaited in Bristol at this moment by the eleven students who took the exam there. The course, at the John Cabot City Technology College, was conducted by John, G4WOD. The mixed-age class included four adults, and all are looking forward to meeting again on the air when they receive their well-earned licences. A second course is under way at the present time - again with students of mixed ages. Thanks to David, G4ZBT for this information

There was no mention of any help that John received, but I should imagine that with eleven students in one Novice class, some was needed. May I remind Instructors that as long as they are in overall charge, they may have as much supervisory help as they need. Often, fellow club members are willing to lend a hand although they do not want the full Instructor status. Assisting like this is a good way to find out that the demands on them are not too onerous and that the experience is enjoyable. Some then become Instructors in their own right.

If you live in the Bristol area, listen for the new callsigns and welcome the holders. Do you remember the welcome you received when you were first licensed?

UPDATE

FOLLOWING THE story about Leroy in August *Novice News*, he has written to me to say that he could not find a Novice instructor, so he waited and took the RAE as soon as he could – and passed. He is now fifteen and holds the callsign G0ULC. Thank you Leroy for this news. Congratulations – I hope you have many, many years of enjoyment.

RADCOM TECHNICAL FEATURE

The Magic of Keys and Code

by Dave Ingram, K4TWJ*

YOUR RESPONSE to my April 1993 *RadCom* article 'The World of Telegraphy and Keys' proved most encouraging, and requests to 'do it again' have been overwhelming. I am thus honoured to delve further into this ever popular area with more views of unique keys and Morse instruments from various eras and all corners of the globe. The previous article was an introduction to CW and key appreciation, so this time I will focus on special treats in various categories of keys. Some of these gems are significant in their design or nameplate, some in their historical background, some are genuine classics, and all are absolute heartthrobs. Enjoy the photographic tour!

In today's world of high tech rigs and advanced communications modes, one might casually assume keys and Morse are lagging in popularity. Indeed not! Operating CW is still unsurpassed in personal enjoyment of an internationally-recognized skill. It is also the least expensive and most reliable means of communication for radio amateurs and maritime services alike. Briefly listening to any recent DX contest or monitoring coastal marine stations will quickly confirm that fact! Yes, friends, CW is alive, well, and a pursuit everyone can enjoy. Start collecting your own group of keys today and join the fun!

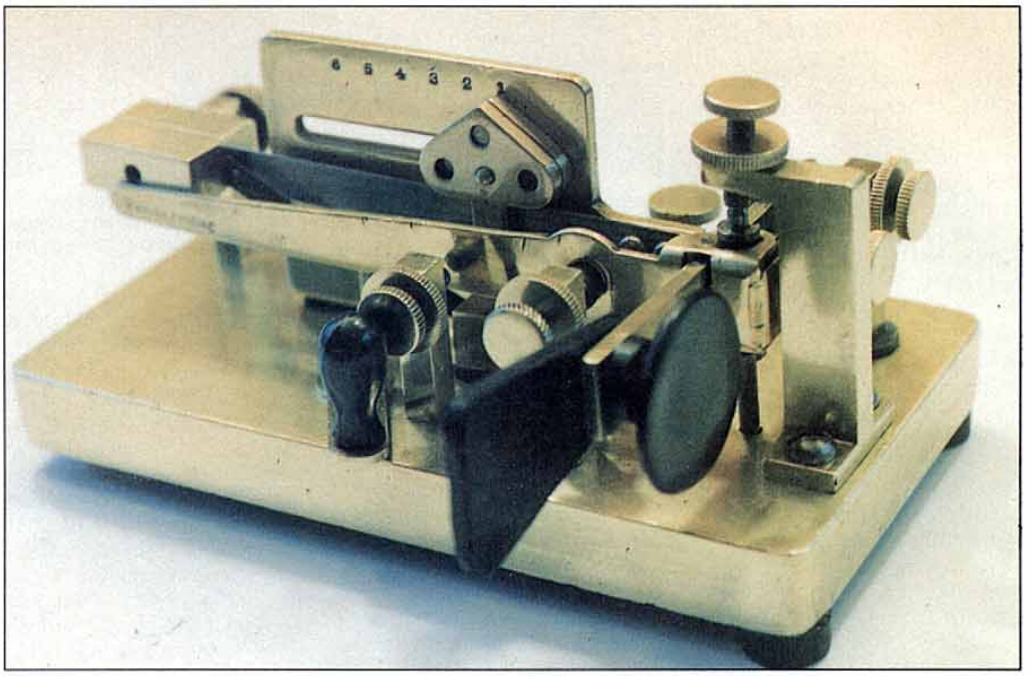


Photo 2: Classic right angle Mecograph semi-automatic key. It was made in all-brass version (shown) and a painted version with diagonal pinstripes.

SPECTACULAR SEMIS

OUR SHOWCASE OF highly esteemed keys begins with the rare and almost priceless Martin Vibroplex 'Midget ' shown in **Photo 1**. This semi-automatic wonder was produced between 1919 and 1922, and advertised only a few times in commercial telegraph magazines of that era. Only a handful of Midgets were sold, most of them going to travelling telegraphers. Three Midgets are known left in existence today.

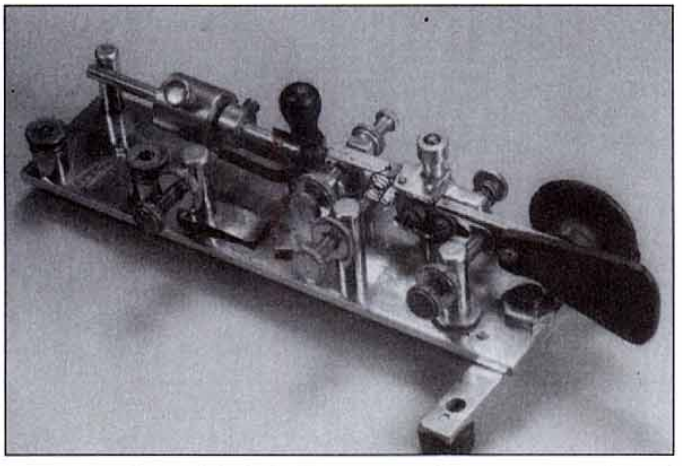


Photo 1: The priceless little Martin Midget bug. It weighs only 15 ounces(425gm) and fits in a coat pocket.

The Midget's base is 5.5in (140mm) long by 2in (51mm) wide, and has an extension foot that swings out for stable use on a desk. The upper mechanism utilizes a single pivot post rather than a regular yoke to support its main/movable arm. The arm has a rectangular pendulum and a short vibrating mainspring, indicating it handles best at high speeds.

The early days of semi-automatic key production in the United States was somewhat restricted by bug patents filed by HG Martin, inventor of the 'Vibroplex'.

One of the first semi-automatic keys different enough in design to beat Martin's patents was produced by The Mecograph Company (**Photo 2**). This right angle item works on the principle of releasing rather than applying pressure to its vibrating (dot producing) pendulum. The flat blade pendulum is mechanically linked to the dot contactor arm in front of it which, in turn, taps against the left adjusting screw's end/contact to make dots automatically. Weights are fitted on each side of the pendulum, and speed is set by the metal pointer on the calibrated scale.

The all-brass Mecograph shown was made during 1911 and 1912. A similar version with nickled upper parts and a painted base with diagonal pinstripes was also made during the same period. Mecographs were produced only for a short time, as Vibroplex (a typewriter company that changed direction and began

*4941 Scenic View Drive, Birmingham, AL 35210, USA.

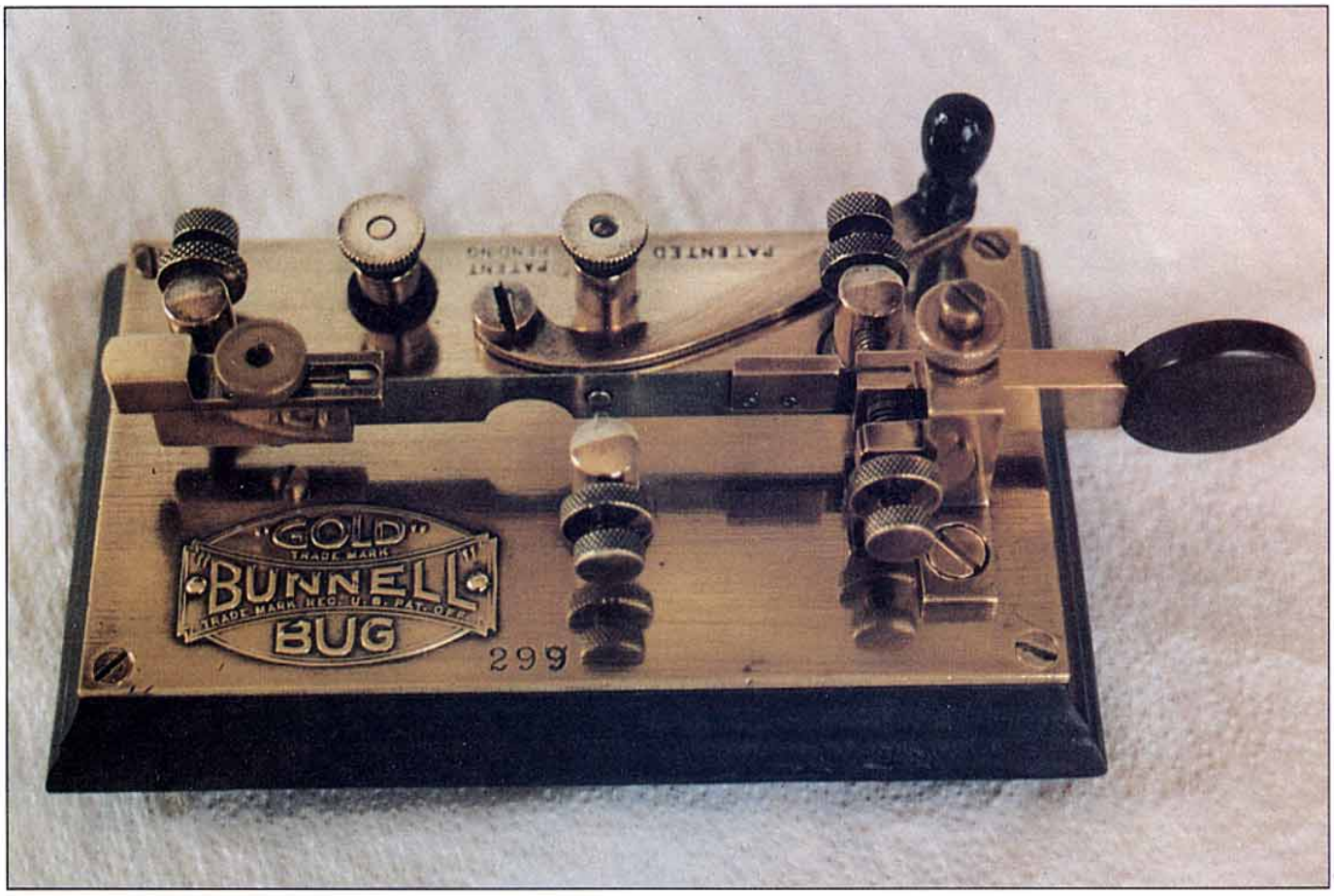


Photo 4: J H Bunnell's Gold Bug is a rare find, but this one is even more unusual: it is all brass!

making the bugs Martin designed) bought out the competitive company in 1913. Mecographs are obviously genuine collectables today.

Martin eventually separated from Vibroplex, but he continued designing neat little bugs like the Rotoplex featured in my last *RadCom* article and the Flash Key shown in **Photo 3**. There is no noticeable difference between this item and an 'Original' model Vibroplex bug, and the term 'Flash Key' may simply have been marketing hype. The nameplate is especially significant, however, as it combines two world-famous names in keys. Martin's arrangement with J H Bunnell to make Flash keys generated substantial tension between both parties and Vibroplex, thus these bugs were produced for only a short time and are fairly rare today.

My own Bunnell-Martin Flash key has a fascinating history. It was purchased as a discontinued item in 1940 and 'broken in' aboard a destroyer ship during World War II. It then became the main key for a secret '5 digit numbers' station operating from Guadalcanal (honest!). The key was then stored for many years

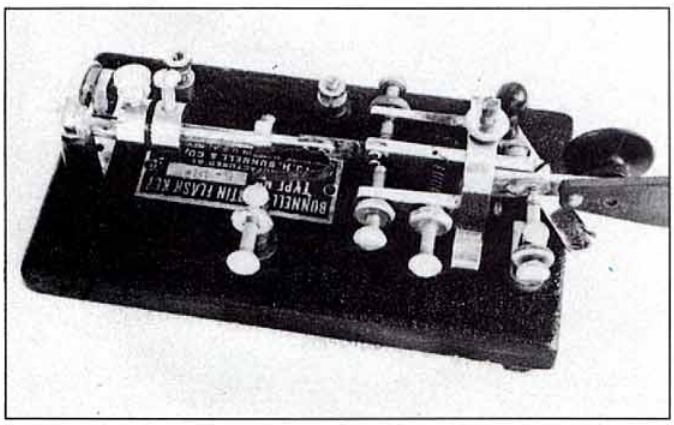


Photo 3: Famous Bunnell-Martin Flash Key. This particular bug was used several years in a mysterious 'spy numbers station' then restored to new condition by the author K4TWJ.

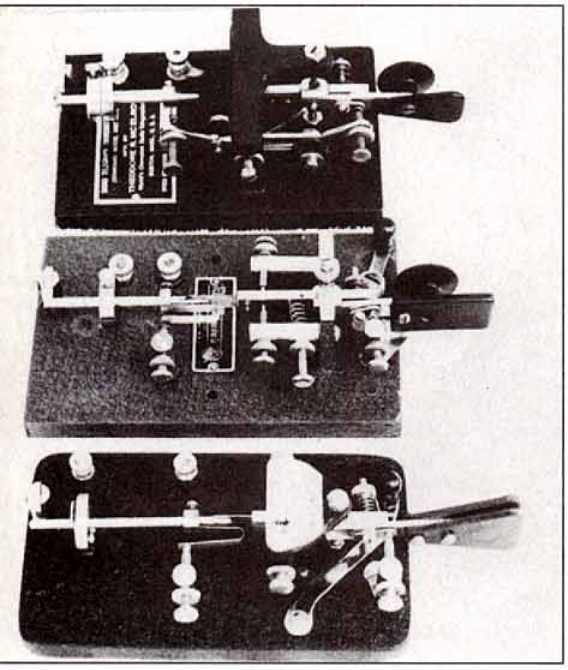


Photo 5: Three decades of bugs in one photo. Top item is 1930s Mac Key, middle item is 1940s TAC bug, bottom is 1950s E F Johnson bug.

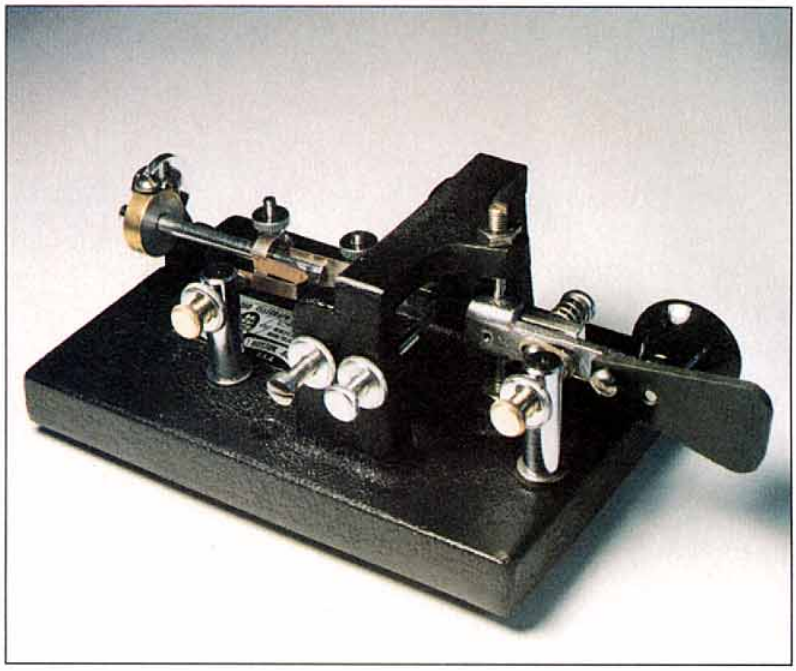


Photo 6: Another of the Morse keys from Dave Ingram's historic collection. This early 1940's Mac Key features a square frame yoke and the distinctive nameplate 'World's Champion Radio Telegrapher'.

and donated to my collection a couple of months ago.

After Martin and Bunnell parted company and time limits on Martin's patents expired, Bunnell jumped right into the game with his self-designed Gold Bug (**Photo 4**). This 14 Carat gold showpiece is semi-rare, but it is fairly well known among key collectors. The one shown in Photo 4 is very special, however; this Bunnell Gold Bug is actually brass! No explanation known!

Three classic semi-automatic keys representing the 1930s, 1940s, and 1950s are shown in **Photo 5**. The top item is a standard model Mac Key produced by World Champion Radio Telegrapher Ted R McElroy in 1937. It has a wide black wrinkle finish base which Ted preferred to nickel or chrome because it minimized operator fatigue due to reflections from overhead lights. Notice the distinctive top tee bar. A telegraph operator can curl two fingers around the bar for easy carrying to assignments. The bug can also be placed on its left side (propped on bar and pendulum locked in place), and used as a pump key.

McElroy's incredible background in telegraphy made his keys famous right from their first day of production. Ted learned to type over 150WPM before graduating from elementary school, and began working as a professional telegrapher at age 15. Ted's 1937 established world record of copying Morse at 77WPM still stands proud today, and his keys are still highly sought after items.

The middle key in Photo 5 was made by the Telegraph Apparatus Company of Chicago, Illinois during the 1940s, and it still works great today. This bug sports a low slung mechanism mounted on a very wide base, and it sits quite firmly on a desk during even heavy-fisted use. The main support yoke has a round centre hole through which the arm passes. Chrome tubes bolted to each side have adjustment screws for dot and dash travel. A very impressive item!

The lower key in Photo 5 was made by the EF Johnson Company during the 1950s, and it is quite popular among collectors today. This is the same Johnson Viking Company that made amateur radio equipment like the 'Ranger' and the 'Adventurer' etc during eras past. Keys are truly a piece of history you can hold in your hand.

Since the uppermost key in photo 5 illustrated McElroy's distinctive tee bar yoke, we are sure you will enjoy viewing a rare exception to that rule. The Mac Key shown in **Photo 6** was made during the early 1940s, is also inscribed with 'World's Champion Radio Telegrapher' on its nameplate, but has a square frame yoke. No 'tilt on side and use as a pump key' action here, but a superb bug nonetheless.

MORSE IN MINIATURE

NEXT IN THE SPOTLIGHT are three tiny and terrific 'pump keys' compared to a writing pen in **Photo 7**. The left item is an Australian lifeboat key that was packed with a small battery powered transceiver for emergency use at sea (a concept still widely endorsed today!). The key's mechanism and adjustments are fully enclosed but accessible by removing the top screws and waterproof gasket. A rubber gasket was also included below the mushroom knob: I removed it to give the key a better 'feel'.

The middle/upper item was originally described to me as an 'India spy key', but I recently learned that it is a British-made test key. That explanation seems more accurate, as arm contacts for both 'make' and 'break' are included (like a lineman's key), and the knob has a top hat style.

Photo 7: Miniature keys add real fun to portable and/or QRP operations. Shown here are an Australian lifeboat key (L), British lineman/test key (M), and G4ZPY's available-right-now 'Baby' (R). Details in text.

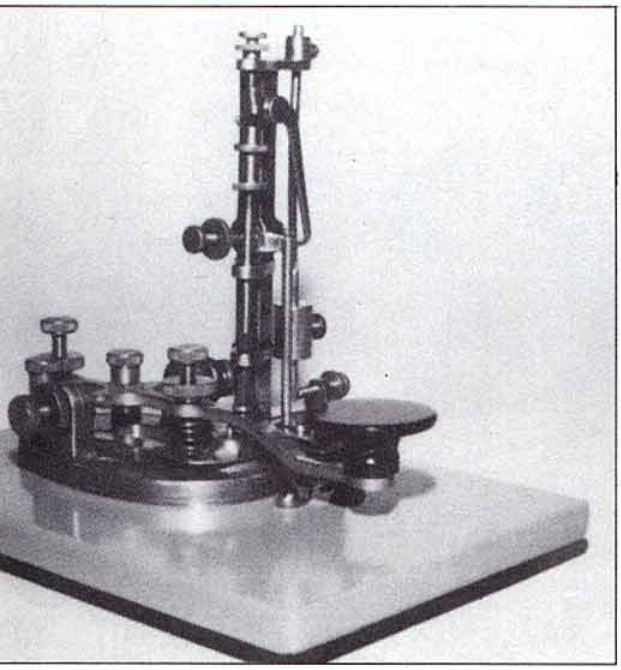


Photo 8: The Vailograph add-on bug adapter. It is shown fitted to an oval-based key, and produces a string of dots when the key's arm is raised from its (new-set) centre resting point.

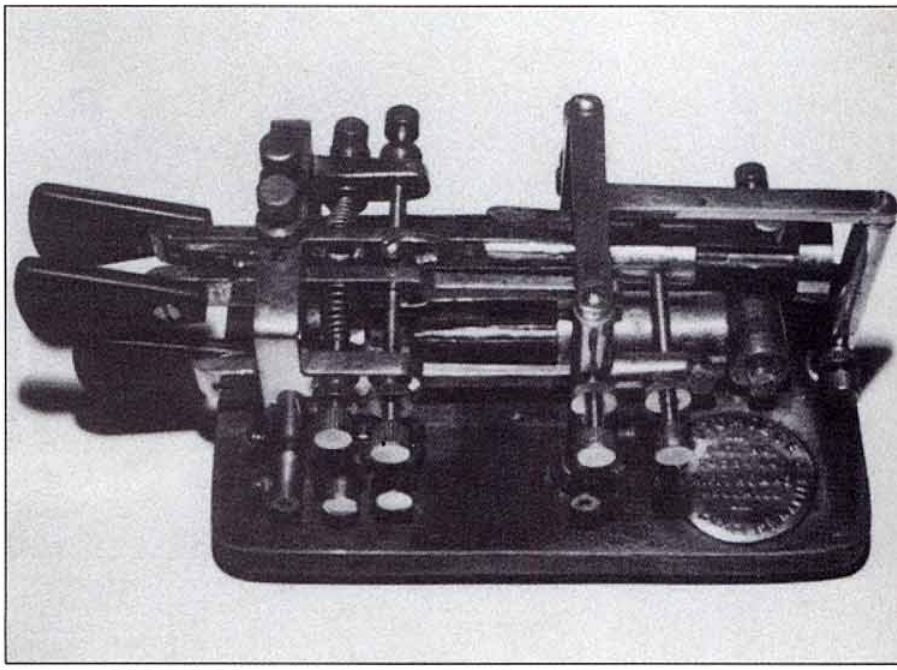
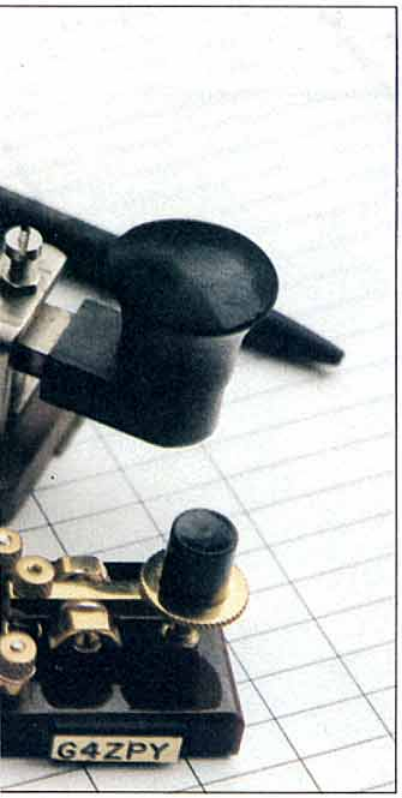


Photo 9: An unique three lever Automorse made in Australia during the 1920s. It uses top two levers for semi-automatic operation and the left top and bottom middle levers for fully automatic operation.

The right/lower item is my favourite miniature: G4ZPY's handmade and one inch-square 'Baby' key. Miniature keys are very popular among collectors and CW devotees, but finding them is quite difficult. Ah - but the good news here is you can presently order a handmade 'Baby' at a reasonable charge directly from Gordon Crowhurst, G4ZPY (41 Mill Dam Lane, Burscough, Ormskirk, Lancs, L40 7TG,). Since this is the world's smallest presently available key, I 'christened' the gem by using it with my HF rig to work the longest DX path possible (VK via longpath). That is a hearty record for such a small CW instrument!



EXOTIC KEYS

UNBELIEVABLE but true is the only way to describe the Vailograph add-on bug adapter shown in **Photo 8**. This combination of vertically-standing rods converts an oval-framed pump key to send dots automatically when the key's knob/arm is raised, and send dashes manually when the knob/arm is pressed down. No, this is not a gag! The Vailograph fits onto a key as follows.

First, the key's circuit closing lever is removed and a support bracket is bolted to the resultant screw hole. A stabilizer arm is then added, an additional brace fitted in one of the key's mounting holes, and the Vailograph's contacts are wired in parallel with those on the key. Finally, the key's arm and the Vailograph's mechanism are adjusted for a wider gap with a centre resting position produced by the Vailograph pressing down and the key's tension spring pushing up on the arm.

When the key's arm is raised from its new 'centre rest' position, the Vailograph's movable rod (which rides on the arm) moves up. Its attached pawl (black piece between dot adjusting screw and vertical rod's top in photo) then moves diagonally and relieves pressure on the top-swung pendulum. The pendulum, in turn, swings free and taps against a contact on the end of the dot adjusting screw to make a string of dots. The previously mentioned pendulum is the long shiny rod on the Vailograph's far right side. It has a single weight showing between the dot adjusting screw and the bottom end.

Another item in the 'beyond belief' category is the Australian-made Automorse shown in

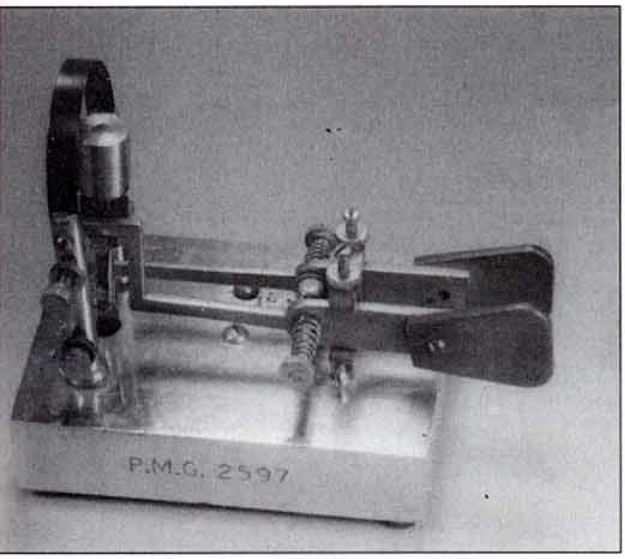


Photo 10: The captivating PMG vertical bug made in Australia: a dual lever delight!

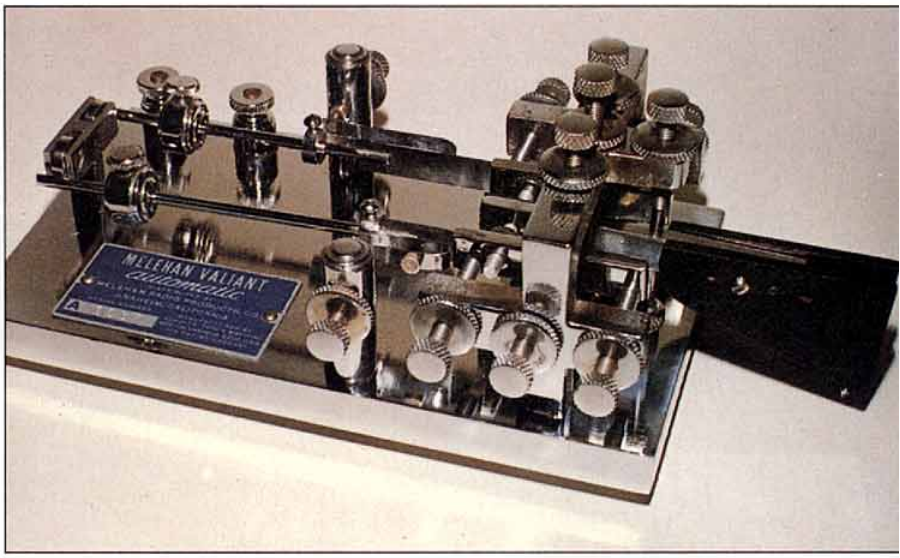


Photo 11: Dazzling all-chrome and fully automatic Melehand Valiant. Item achieves 3-to-1 keydown timing by use of different length mainsprings.

Photo 9. This three-lever key works like a regular bug when its top two levers are used. Switching around and using its top left (dot) lever and bottom middle lever, however, gives fully automatic operation (dashes result from use of a very large weight on the bottom pendulum). If mastering that 'over and under' action seems easy, I might point out that all three levers also operate independently and there is no iambic operation. Failure to release one lever before moving the other produces a solid key-down signal. Dexterity and good wrist action are vital to using an Automorse. No problem: only a few are known left in existence!

Australia's indulgence in unique style keys is also apparent in their vertical pendulum PMG bug shown in **Photo 10**. Once again, independently operating levers are employed: the right one making dashes manually and the left one releasing the pendulum to make dots automatically. The large metal arch at the key's rear protects the moving mechanism and supports dot and dash contact screws. The full arch sits on an insulated mount. Although simple in design this key is a real heart throb!

A slightly more conservative, fully automatic key made in the US in 1945 was the Melehan Valiant shown in **Photo 11**. This eight pound treat has dual vibrating pendulums, and 17 adjustments. Unlike our previously featured Automorse, the Valiant has same size weights on its pendulums. A short mainspring on the left pendulum and a long mainspring on the right pendulum are used to produce the desired 3:1 dot/dash ratio. Levers from both mainsprings mate with a single main arm with twin fingerpieces, thus simplifying use.

Our final highlighted item is a small Camelback related pump key permanently mounted at a 45° angle on its base (**Photo 12**). The key has a very stiff and non-adjustable spring that looks like it was adopted from an old Flintlock pistol. The logic behind this key's design is unknown - possibly it was made for a lazy telegrapher hanging one leg over the side of a bed. Tally Ho!

Just as the adrenalin really gets pumping we run out of space! Ah - but the fun of collecting and using keys continues indefinitely! Yes, it is now your turn to seek out and fine-tune that perfect-for-you key, then hit the airwaves in style. I will be looking forward to working you on 30m CW 0145 - 0215 UTC week-nights or on 20m SSB 2145 - 2215 Sundays. ♦

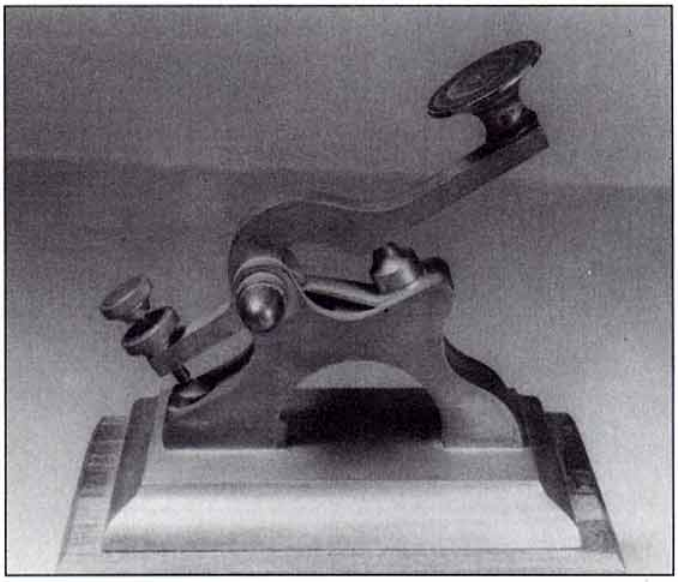


Photo 12: A small Camelback key permanently mounted at a 45 degree angle: ideal for contortionists.

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73 from Dave G4KQH, Technical Manager.

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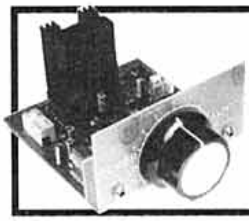

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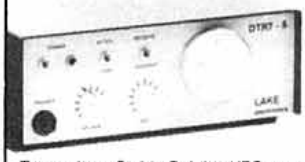

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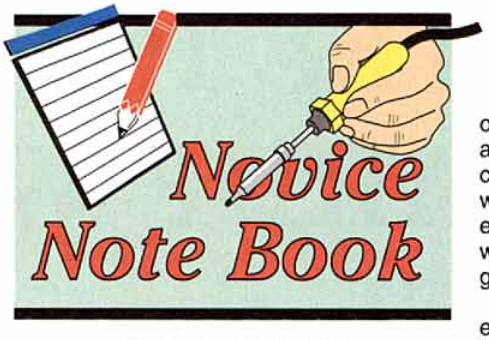

IAN KEYSER, G3ROO
Rosemount, Church Whitfield, Dover,
Kent CT16 3HZ

IN THE PAST WE have concentrated on simple constructional articles; items of equipment that you can make and use in your station. After some deliberation I decided that it might be useful to have this interspersed with information of a more general interest.

I will start this new format with a submission from David Pink, G6EGO, who wrote the following to assist his wife with her RAE course.

VARIABLE FREQUENCY OSCILLATORS.

WHEN YOU CONSTRUCT a piece of radio equipment, be it a receiver or transmitter, one of the most important circuits is the oscillator to generate a radio frequency signal.

This oscillator must have frequency stability; it should move away from the set frequency while the radio is being operated. If the frequency inadvertently varies, due to such things as changes of temperature, then the oscillator is said to 'drift'. It is also important that the oscillator covers the whole range of frequencies called for by the design of the radio equipment. For example a receiver that covers from 1MHz to 30MHz must have an oscillator that covers a frequency range of 29MHz. However these two requirements for an oscillator can conflict.

The simplest way to obtain a wide frequency coverage is to use a Variable Frequency Oscillator (VFO) using a coil, a capacitor and something with some gain, a transistor, Integrated Circuit or valve. The capacitor can be a Varicap Diode, a diode which changes capacitance when the voltage across it changes. This makes the circuit into a VCO (Voltage Controlled Oscillator). Unfortunately this design of circuit tends to drift.

For example, if you build a VFO for 30MHz and it has a drift even as low as 0.1% then the frequency can change by as much as 30kHz. This amount of drift is unacceptable for most communication equipment purposes. A VFO for 3MHz, with 0.1% drift would cause a frequency change of 3kHz, an improvement but still the drift is quite high. This does illustrate that higher frequency stability is obtainable with lower frequency VFOs.

CRYSTAL OSCILLATORS

TO OVERCOME THE 'drift' problem you could use a crystal oscillator. This gives a very good frequency stability but only oscillates on one frequency. You could use several crystals at different frequencies, with a switch to select the required crystal. The problem with this approach is that you may need a large number of crystals to cover a range of frequencies - and crystals can be expensive.

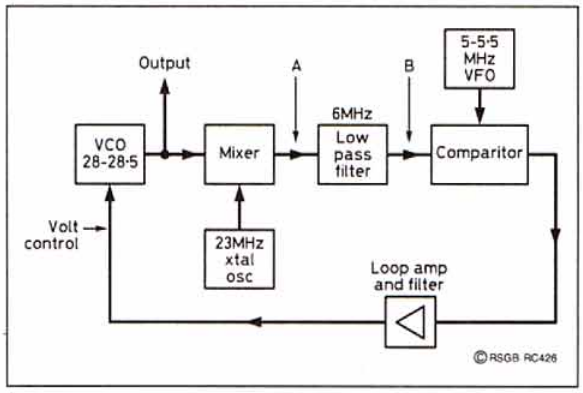

Fig 1: 28MHz Frequency synthesizer, block diagram.

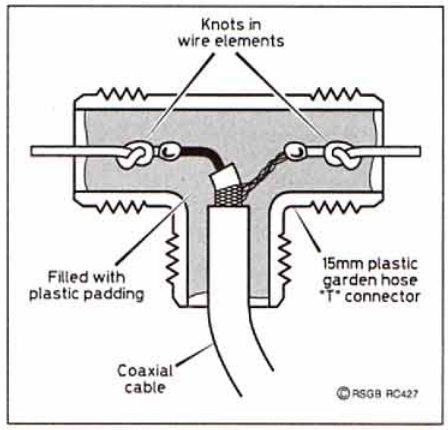

Fig 2: Plastic pipe T-section dipole centre insulator.

You can combine the properties of a crystal oscillator and a low frequency VFO to generate the high frequencies with low drift. This can be done by mixing the output of the VFO with the output from a crystal oscillator, for example mixing the output of a 5MHz VFO with the output of a 32MHz crystal oscillator to get 28Hz.

Unfortunately lots of other frequencies emerge from a mixing arrangements like this; for example 5,18, 23MHz. A mixing system can be used but a lot of filtering is required to remove the unwanted signals.

THE FREQUENCY SYNTHESIZER

THERE IS A BETTER WAY. It uses a VCO based around 28MHz and a VFO of 5 to 5.5MHz and a crystal oscillator of about 23MHz. The arrangement is shown in **Fig 1**.

The output of the 28MHz VCO is mixed with the output from the crystal oscillator. This gives 5, 18, 51 and 28MHz at point [A]. A low pass filter is used to remove all the signals except for the 5MHz one. This is known as the reference signal which is at point [B].

The resultant 5MHz signal is compared with the 5MHz from the VFO (which has low drift) using a frequency comparator. This comparator compares the two input frequencies and generates an 'error voltage' based on the difference between them. The error voltage is fed back into the 28MHz VCO and adjusts it to the correct frequency. This results in a signal at 28MHz with the frequency stability of a low frequency VFO.

When the frequency of the VFO is increased the voltage from the comparator will change and it will increase the frequency of the 28MHz VCO by the same amount. For example, increasing the VFO to 5.5MHz will cause the 28MHz VCO frequency to change to 28.5MHz.

HINT OF THE MONTH

FOR HF DIPOLES it is difficult to get a strong, watertight connection to the coax feeder. A method I have used in the past uses a standard 15mm plastic 'T' piece for connecting garden hoses. The coax is fed up through the vertical of the T and out of one of the arms. Connections are then made to the elements and one element threaded through the T to come out of the other arm. Having carefully made the connections within the housing of the T it is then packed with Plastic Padding.

The two knots in the element wires shown in **Fig 2** are there to act as strain relief to stop the wires from being pulled out of the padding. I have used this method over the years with very little trouble of water ingress into the cable. ♦

RADCOM NEWS FEATURE

The 1994 ARDF World Championships

A report by Geoffrey Foster, G8UKT

Top: Competitors by country. The RSGB team is (L to R): Back row - Graham Taylor, G3MDC and Phil Smith, GW1XBG. Front Row - Geoffrey Foster, G8UKT and Robert Vickers, G3ORI.

Left: The equipment compound. All competitors' equipment is impounded before the start to stop cheating.

Below: G8UKT in action.

THE SEVENTH IARU World Amateur Radio Direction Finding Championships were based in the barracks of the Swedish 1st Royal Engineers, a few kilometres from Sodertalje, 40km south-west of Stockholm. Teams were entered by 25 national societies, including the RSGB.

Team leader was Graham Taylor, G3MDC, who attended the numerous meetings that take place during the event and generally looked after the three competitors. These were Robert Vickers, G3ORI, an experienced orienteer and Top Band DF contestant who had taken part in the previous World Championships in Hungary; Phil Smith, GW1XBG, a top 144MHz DF expert from Swansea; and myself, also a competitor in the Hungarian World Championships, Top Band DF contests and a few 144MHz DFs (to try to get to grips with the different technique necessary).

Previous reports of the 5th World Championships held in Czechoslovakia [1] where I competed using borrowed equipment, and the 6th in Hungary [2], where a British team took part for the first time, have described the events.

As the Championships approached, I mused over the possibilities and problems. Foremost was our lack of expertise on 144MHz DF. What was needed was a competitor who had taken part in 144MHz events in the way that Robert and I had on Top Band. I needed to be much fitter - the level of fitness I had had 10 years earlier when playing squash three or four times a week - and to improve my forest navigation through regular orienteering. Regular jogging seemed to be taking me in the right direction until mid-January when I awoke with severe back pain unable to do much more than shuffle. A month later I was walking but had put on weight which was to stay with me throughout the year until all the DF contests were over!

Practice Run

My qualifying for the British Top Band final meant that I could afford to miss some UK events to go to the German National Championships to see how effective I could be as a walking DFer. Phil Smith, GW1XBG, would compete in the senior class, while Robert and I would be in the old-timer class. This meant that we needed two more receivers and the German suppliers agreed to post the kits to me and accept payment at their championships. Time was short, but after working all through the night the sets were finished just before we left at 0630.

In the German Championships, Phil demonstrated his prowess on 144MHz and Robert his

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PRODUCT NEWS

Note: Product news is compiled from press releases sent in by the manufacturers and distributors concerned. Details are published in good faith but *Radio Communication* cannot be held responsible for false or exaggerated claims made in the source material.

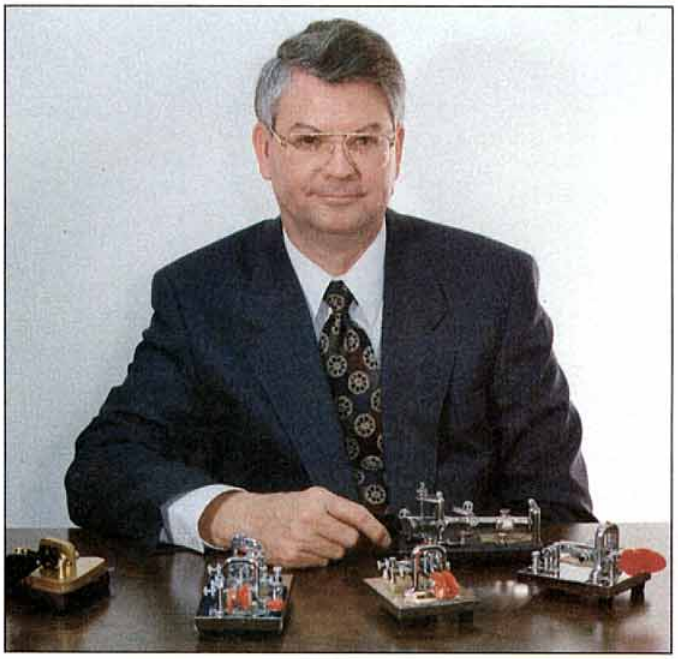
THE VIBROPLEX® Co Inc has been acquired by S Felton 'Mitch' Mitchell Jr, WA4OSR, of Mobile Alabama. Mitch is a member of the RSGB and has been licensed since 1963. He holds a US Extra Class licence.

All current Vibroplex products, including the Original bug, the Iambic and the Brass Racer, will continue to be produced. Production is to be moved to the south where the company began.

"The Vibroplex name is older than amateur radio itself and I intend to continue the unmatched Vibroplex quality, feel, simplicity and performance" says Mitch, adding that we should "watch for some new and exciting products in the near future."

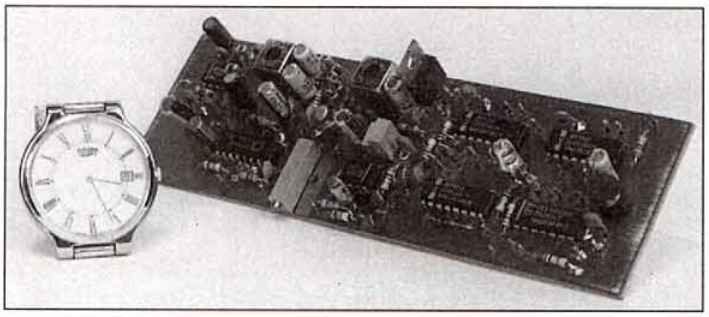
Tim Thirst, G4CTT, of Eastern Communications, the principal European stockists for Vibroplex, welcomes the news of this takeover by an active amateur and anticipates that the future of this famous marque is assured for many years to come. For details of Vibroplex products contact:

Eastern Communications, Cavendish House, Happisburgh, Norfolk NR12 0RU. Tel 01692 650077; fax 01692 650925.



The new owner of the Vibroplex Co, Mitch Mitchell, WA4OSR, with some of the company's keys.

THERE ARE NOW no excuses for not being able to measure time or frequency accurately. With the **off-air reference kit** from Walford Electronics you could have a range of useful outputs from 1kHz to 0.2Hz with a frequency accuracy comparable with the Droitwich BBC Radio 4 LW transmitter.



Optional extras provide all of the parts to make a two-channel 575MHz frequency counter for less than £120. For more information, get in touch with:

Walford Electronics, Upton Bridge Farm, Long Sutton, Langport, Somerset TA10 9NJ. Tel 01458 241224.

BEN SPENCER Consultants have announced three more kits. The first is **a receive audio breakout board** which takes the loudspeaker output from a receiver, and produces four low level outputs for TNCs, tape recorders etc, plus a high power speaker output.

Next are two **Morse side-tone or practice oscillators**: one for external mounting which drives a loudspeaker, the other for internal use without the AF power amplifier.

Like all Ben's kits, these are available ready-made for a few pounds extra, or (for those with good junk boxes) as PCB and instructions only.

Send an A5, self-addressed, stamped envelope for details and a free catalogue to:

Ben Spencer Consultants, Enterprise House, 33 New King Street, Bath BA1 2BL. Tel/fax 01225 482604.

WATCHING THE WEATHER will be even easier from 4 January, thanks to Steve Jelly, G6URJ. He is heading Skyview Communications (SKYCOM), which is a new division of Skyview Systems, famous for their Weatherfax software.

SKYCOM will provide a retail outlet specialising in amateur radio and short-wave data products as well as continuing to supply a large range of **amateur weather monitoring equipment**.

A number of 'own brand' products are planned for launch and the company is having a special promotion on their SYNOP synoptic weather charting software package.

SKYCOM, Skyview House, Alresford, near Colchester, Essex CO7 8BZ. Tel 01206 823185; fax 01206 825328.

● DEREK PEARSON, G3ZOM, known to many as the owner of Jandek, the **kit manufacturer**, has returned to university. This means that Jandek has ceased to exist, although Derek has offered to deal with queries about Jandek products by post (SASE please). Derek thanks all of his customers for their loyalty and support and mentions the many friends he has made at clubs and rallies, both amongst customers and the trade.

● ICS has won two government **SMART awards**. Their funding under the Small Firms Awards for Research and Technology scheme now totals £150,000.

HUNDREDS OF MEGABYTES of quality **software** is the boast of the CQ Centre BBS. This is a telephone bulletin board dedicated to all aspects of amateur radio and short-wave listening, and is available 24 hours a day at 'all popular modem speeds'. The system provides news, E-mail and conferencing plus 'the very latest amateur radio software' comprising 100Mb (compressed) of radio related software plus a further 500Mb of general interest programs.

To access the BBS, call 01753 595468 or 593524.

The CQ Centre BBS, Mike Gathergood, G4KFK. Tel 01753 582085; fax 01753 592726.

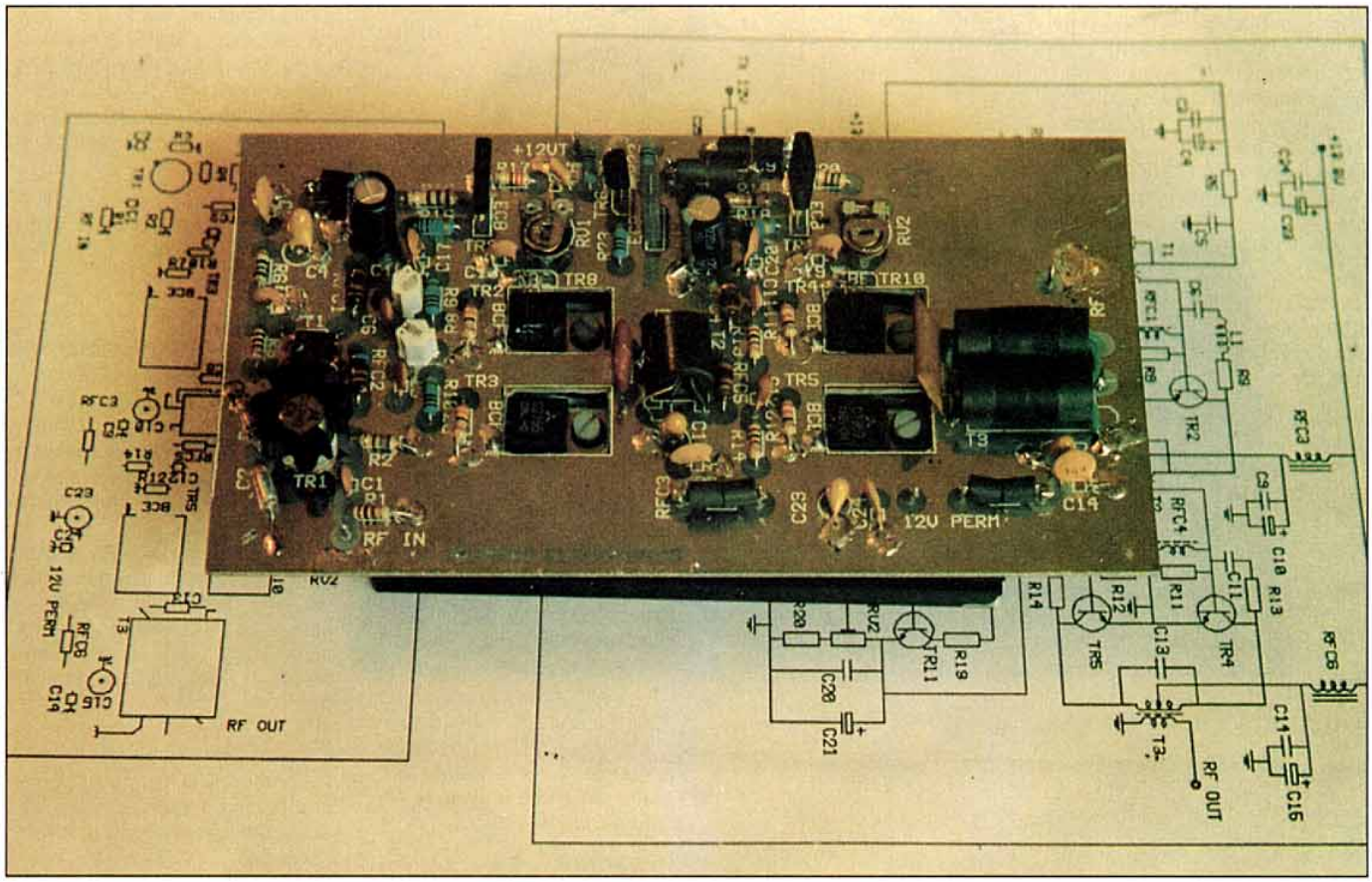
THE NEXT GENERATION of **digital signal processed audio filters** are now available. One such is the MFJ-784 which has many new features, such as tuneable low-pass, high-pass, notch and band-pass filters. Also there are programmable pre-set filters that can be user-adjusted, together with an automatic multiple notch filter. And a push-button by-passes the filter instantly. See what *RadCom's* reviewers said about the first DSP filters (Sept 94) - it looks like this one has addressed many of their criticisms, yet retained the unmatchable performance of DSP. Obtainable in the UK from:

Waters & Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS. Tel 01702 206835; fax 01702 205843.

RADCOM EQUIPMENT REVIEW

Hands HF Linear Amplifier Kit

By the Reverend George Dobbs, G3RJV*



The layout of the Hands RTX/AMP broadband linear amplifier kit. The heatsink can be seen below the board.

HF LINEAR AMPLIFIERS are not easy to build. I know. I have failed to achieve good results with several of my own efforts in the past so my ears pricked up when I heard that Hands Electronics had produced a kit for a broadband HF 18 watt amplifier.

The RTX/AMP kit is a three stage wideband linear amplifier covering 160m to 10m, designed to complement the Hands Electronics RTX Transceiver System. This is a complete system of modules for building a simple SSB transceiver for the HF bands.

The kit is, however, useful as a power amplifier in a whole range of transmitter and transceiver projects. It could be used with many of the popular transceiver designs such as the G4CLF Plessey IF system or derivatives like the G3TSO or G3TXQ transceivers described in *RadCom*.

* *St Aidan's Vicarage, 498 Manchester Road Rochdale, Lancs OL1 13HE.*

THE CIRCUIT

THE FIRST STAGE is a 2N3866 run as a class A amplifier. Negative feedback and simple capacitive filtering ensure a flat response from 1.8 to 30MHz. This drives a push-pull pair of 2SC2166 transistors run in class AB1. The biasing transistors for this stage include a measure of temperature compensation. The driver stage is transformer coupled to a pair of 2SC1969 transistors in pushpull. The final pair follow a similar configuration to the driver stage. This power amplifier includes some temperature and frequency compensation.

The 2SC1966 was originally designed for CB service and is rated at 18 watts. In this design a pair of them are run to 18 watts maximum output. To avoid large current surges when the amplifier is switched on, the first stage amplifier and the bias supply are switched separately. As the subsequent amplifier stages are effectively cut off when the bias voltage is at zero, the second and third stages may be left connected to the positive supply line. A low current level positive transmit line can be used to bring the amplifier into operation. This could be part of a sequential change-over arrangement.

THE KIT

HANDS ELECTRONICS supply a complete kit of the board components plus a PCB and full instruction manual. The board is a high quality epoxy double sided printed circuit board. All the component placements are screen printed on the top side of the board which is cut to accept the TO220 style driver and power amplifier transistors. A heat sink is not supplied but the mounting of the driver and power amplifier transistors render the board usable with almost any flat, finned, heatsink. The method of mounting may well depend upon the application. A common method would be to sandwich the back panel of a case between the transistors and the heatsink. I used a neat heatsink sold by Cirkit

and recommended by Hands. The kit does demand the winding of three transformers although it is very easy to do. Very clear drawings of how the windings are arranged are included in the instruction manual.

The manual also includes information on how much wire to cut for each winding; the kit contains the formers and wire. I found the kit very easy to build following the concise step-by-step instructions in the manual, the printed component placements were very clear and useful.

It took me about an hour and a half to build the whole board by following the manual directions. With one hiccup, which is explained below, it worked first time. The setting up procedure is very simple just requiring the use of a multimeter which can read up to 100mA.

THE RESULTS

THE AMPLIFIER WORKED first time although I found the gain of my amplifier kit a little under the claim made by Hands Electronics.

When I enquired about this, it seemed that the circuit had undergone a recent modification and one component change gave me the desired results.

On the oscilloscope the output waveform closely matched the input. Testing the amplifier over the full 1.8 to 30MHz spectrum showed that the claims about the broadband characteristics of the amplifier were true.

My example was about 3db down at 35MHz, but they do say 1.8 to 30MHz! There was a slight peak in the centre of the range.

SPECIFICATION

- Up to 18 watts output
- 37dB gain, flat within 2db from 1.8 - 30MHz
- 2nd harmonic 27dB down
- Central mounting of power transistors for standard heatsink slots
- Conventional double sided printed circuit board
- Silk screened component placement identification
- On board switching to facilitate sequence control
- Nominal 50Ω input and output impedance.

A SMALL NIGGLE AND SOME PRAISE!

THE SCREEN PRINTED component placement and the associated PCB layout drawing in the manual made the population of the board very clear.

Both the circuit diagram and the placement diagram use a sequential numbering of components for identification. This is linked to a parts list in the manual, standard practice in most kits and indeed most magazines. But I do find it tedious to keep having to look up the value of each part in the list before it can be placed. Thankfully the parts list and diagrams are on facing pages. I find it much more helpful if the circuit diagram includes both the component numbering and the component value. I like an easy life!

My building of the kit did include a sad saga. When it was completed I came to set up the bias on the driver stages only to find that my meter was giving a very high current reading; greater than full scale deflection on the 100mA scale. Furthermore the current could not be brought down to a reasonable level when the bias setting control was adjusted. Hands Electronics run a telephone Help Line - so I rang it. Sheldon Hands and I spent a half hour on the telephone, trying to trace the fault, until we realised I had a defective multimeter! I was using my spare meter which I sometimes lend out to other people and I suspect that one of the borrowers had used current ranges to check voltage. I can only praise Sheldon Hands for his willing patience before we sorted it out. A good back-up to any kit.

CONCLUSION & GOOD NEWS

IN CONJUNCTION WITH a suitable low pass filter, or set of switched low pass filters, the RTX/AMP offers an easy to build and reliable small HF power amplifier suitable for a whole range of projects. I like it and decided to buy the one I built. The good news is that the RTX/AMP is also to form part of a multiband transceiver in kit form, something the amateur market is lacking at the moment. This is in the late stages of development and I have been promised an evaluation kit as soon as it is ready for release. So - watch this space.

The RTX/AMP Kit costs £35 (plus £1.50 in the UK) from Hands Electronics, Tegryn, Llanfyrnach, Dyfed SA35 0BL. Telephone 023 - 977 - 427.

The 1994 ARDF World Championships

CONTINUED FROM PAGE 46

skill on 3.5MHz, but I realised that my participating in Sweden would be an embarrassment to everyone. When I mentioned this to my team-mates over dinner they disagreed, but I returned home determined to find someone to replace me in the team. This turned out to be easier decided than done and eventually there was no alternative but to go, or forfeit the cost of the airline ticket.

One extra piece of equipment was needed: a collapsible 144MHz aerial which was finished by 0220, and tested and in my flight bag by 0230. Then I squeezed in a few hours sleep before Robert and Phil called for me once again at 0630! We collected Graham on our way to Gatwick from where our flight took us to Sweden by 2.30pm local time. The organisers' coach took us the rest of the way to the army camp which was to be our home for the next few days.

Sweden

THERE WAS AN International Jury meeting at 2000 to decide the country start sequence for the 144MHz event on Wednesday.

Graham had another meeting at 0900 to state the starting sequence for his team members. Around 1000 Robert, Phil and myself went to the training area to test our receivers. There were signals on 3.5 and 144MHz for us to use. I was confident about 3.5MHz so I concentrated on checking the new aerial for the 144MHz set I would be using. It worked well but did not have the sort of polar diagram that the textbooks suggest for an HB9CV - it would require a slightly different technique. An aerial identical to those used on the other sets was unobtainable.

At 1600 came the opening ceremony. Speeches were made, the IARU flag raised and the band of the 1st Royal Engineers played their bagpipes (yes, bagpipes) for us.

On Wednesday, the 144MHz day, we were up at 0500, into breakfast for 0545 and onto the coach which was to take us to the competition area. At 0730 we were in the competition area and deposited our receivers before finding a place in one of the tents out of the drizzle.

I collected my Rx, the organisers gave me a map and I quickly waterproofed it and tried to orient myself on it. Then in was time to go and I jogged down the start corridor. Once out of it I took bearings on the transmitters and then set off at a fast walk and jogged down the hills to my first Tx. It took me a long time to find it but the next two came faster. After the third I set out for the finish but found the last mile or so through marshy ground heavy going.

A Result

ROBERT DID WELL, finding four out of four transmitters in 132 minutes and was classified 32nd out of approximately 55. Phil had a difficult time and found three out of five transmitters in 151 minutes, so was 53rd. He was, however, over the 140 minute time limit so was not classified. I found three out of four transmitters also in 151 minutes and came 43rd, but was also out of time so not classified.

Thursday came and it was a 'late' breakfast at 0700, a meeting for Graham at 0800 and then a rest day.

Friday and it was up at 0500 again! Breakfast, and off to the competition area. Though the weather was warm, it rained again soon after I started, and my back started to complain but I managed to cross the line with 12 minutes to spare.

Phil was top of the list in his class with a time of 88 minutes and was placed 46th; Robert had found three in 122 minutes and was 41st and I was just behind, also with three in 127 minutes in 43rd place.

After watching the awards ceremony we were off to the banquet, with wine - which made the pain in my back seem more distant. We all talked into the morning with our fellow competitors from all round the world.

It had been an enjoyable week. Phil had done well in only his second event, Robert was moving up the results and had done especially well on 144MHz, an event we both lack experience in.

REFERENCES

[1] *RadCom*, July 1992 p6

[2] Report to RSGB Council, August 1992.

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RADCOM USER REVIEW

G3PMR's SHACKLOG Log Program

by Bob Whelan, G3PJT*

YOU COULD MAKE a lot of new friends with the logging program SHACKLOG. Why? Read on and see! With the increasing use of computers in the shack and an increasing number of amateur radio program becoming available its now clear that you are likely to use quite a number of software programs, some of a general purpose nature, others more specialised. You may have a general purpose logging program, special contest programs like CT and Super Duper, a DXCluster program and ones for propagation, circuit design, antennas, operating practice etc. All of these programs usually have to coexist on the same PC. Some of them need to operate concurrently, such as logging and DXCluster, and some have to be able to swap data amongst themselves like contest to logging etc. Inter-operability is fast becoming a big issue. This applies to the human interface as well as between programs and PCs.

SHACKLOG is a general purpose logging program which includes DXCluster software as an integral feature. The basic system requirements are shown above. But the program has some interesting features which have been developed by active amateurs to meet actual operating needs.

SYSTEM REQUIREMENTS

IBM PC or compatible
Hard disk drive
DOS v2.1 or later
Any display type (logging only)
EGA or better display (logging + packet)
512K RAM (640K preferred)
SHACKLOG will run under Windows 3.1
SHACKLOG is available from : Alan Jubb, G3PMR, 30 West Street, Great Gransden, Sandy, Beds SG19 3AU. Tel: 01767 677913

SET UP

AFTER INSTALLATION on your hard disk, the various screens and interfaces have to be configured for your printer and packet terminal if you have them. If packet operation is not needed the full screen is dedicated to logging. If packet is to be used the screen splits into two parts, an upper one for logging, a lower one for packet, each with its own function key set. F10 toggles between the two parts. Screen colours can be set to suit and if you are using a monochrome LCD display you might want to experiment with setting the screen for 'colour' and adjusting the contrasts. I found you could get a very readable mono screen this way- better than the mono setting in fact.

QSO LOGGING

THERE ARE TWO parts to the QSO screen (see Fig 1): A set of fields for QSO entry on the left and a summary of the 15 most recent QSOs on the right. The order of the QSO fields is in the order mostly commonly used, bearing in mind that SHACKLOG fills in such details as times and date from the computer clock.

To log a call, and SHACKLOG allows for CQs etc, then you type in the call on the top line and enter it by pressing <return>. This is where friends are made. SHACKLOG immediately searches the database for past QSOs with the station and if you have worked before it fills in the name, QTH and any general comments. You can then go back to the station by name. I have found this the single most important way to make new friends on the air and get away from rubber stamp QSOs. The speed of this search through an 8000 QSO log was virtually instantaneous (on a 286 laptop). When you get your copy of course, SHACKLOG is empty of such data, but it soon builds up.

At the time you enter the callsign, SHACKLOG notes the start time (Time On). When you finish the QSO you log it with F1 which writes the QSO to disk with the finish time (Time Off).

SHACKLOG handles DXCC Country data rather differently to other programs. It does not use a preloaded database of countries but instead builds one up as logging proceeds. This is a bit tedious at first because you have to enter country names each time SHACKLOG cannot recognise a prefix. But it at least guarantees you can keep pace with all the many prefixes these days, which seem to change with the weather, day of the month or which side of the bed the operator got out of!

Mode and Band information defaults to the last QSO, so avoiding repeated entry. There are fields to log QSL status, IOTA, Zone, Region etc to help track award programs. The IOTA database is available on line as an option. On entering the IOTA island number details of the island group appear in a small panel.

All QSOs can be updated at will. Access to many of the routines is via the function key set. Taken overall these keys were used reasonably consistently throughout.

* 36 Green End, Comberton, Cambridge CB3 7DY

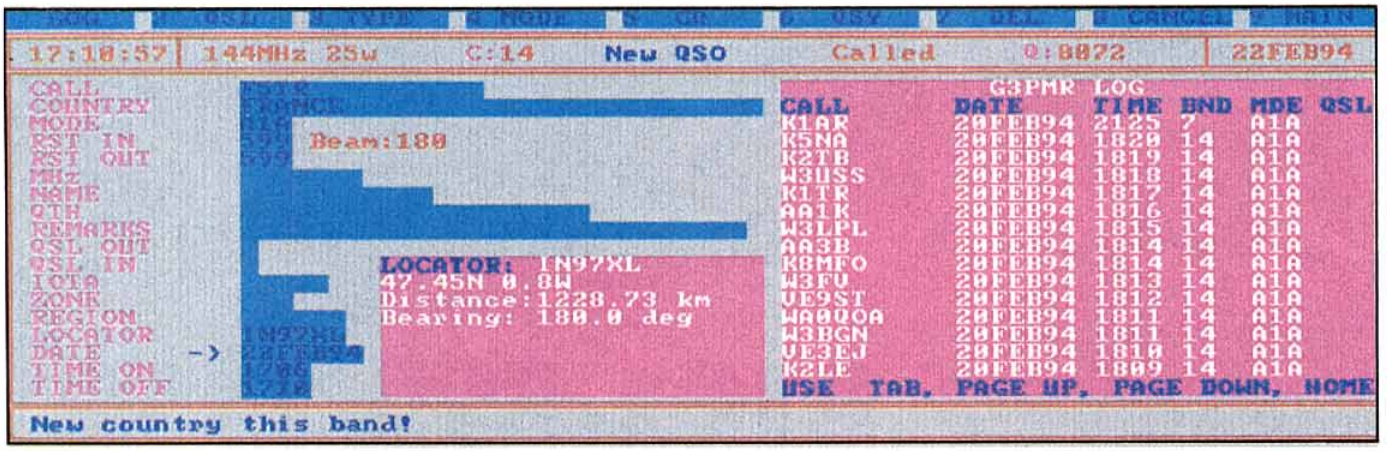

Fig 1: The logging screen.

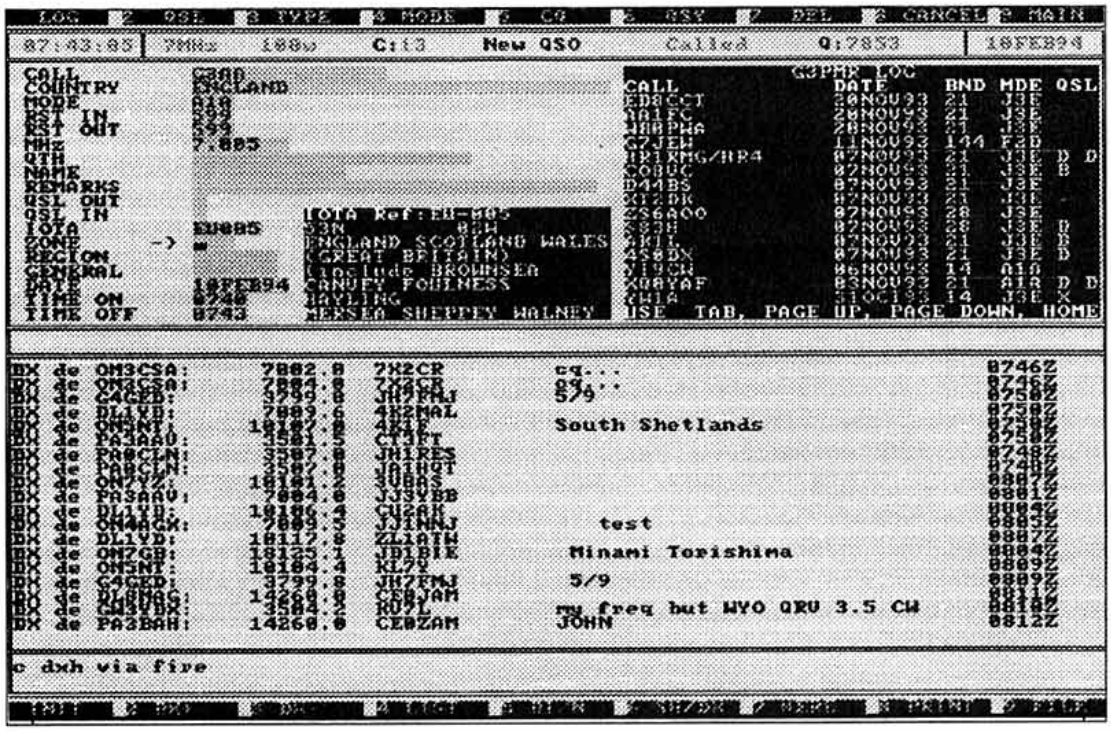

Fig 2: Screen printout showing the DX cluster information.

BACKUP

AS ANYONE WHO uses a computer knows they have a habit of going wrong from time to time so it is essential to backup your log to a separate floppy disk. SHACKLOG has two backup routines built in. Unfortunately Backup is not listed as a topic in the manual so you might not spot the routines. However from the Print Standard Reports screen it is possible to print a report to either printer or disk. These are ideal for Backup purposes. The third method, discussed very late in the Manual, is by the use of a batch file. I think this topic is so important it should be part of the installation procedure.

REPORTS

REPORT GENERATION is accessed by selecting 'Stats' (Statistics) at the main menu. It is important to understand the principle of operation of the report generator. Report formats are first defined and QSO records are extracted to defined criteria (Band, Date, Country etc) from the main log database. The QSOs extracted are sorted as necessary and printed on the pre-specified printer or disk file. You can either set up the report format you want or select from a standard set. Formats you design can be saved for future use.

If you direct the output to a file you can print the report later, or export it into another program. All of this process worked well once I had understood the principles, which could have been better explained in the manual.

QSLING

SHACKLOG HAS A powerful QSL label feature, one of the best I have seen. It allows a range of label sizes, which can be laid out to suit. Font sizes can be changed if your printer allows it.

SHACKLOG allows only one label per web width, sheet labels cannot be used. The basic process is the same as for reports, except that you make use of the status of the QSL field in the QSO extraction process.

After you have extracted the QSOs to be QSLed, the sort routine comes into its own since you can sort the QSOs into callsign order. Why is this a real bonus ? Because as you stick the labels onto your QSLs in the order they are pre-sorted for the bureau. Did I hear a cheer from Potters Bar?

SHACKLOG also helps with direct QSLs in that there is a feature to print a return address label with each QSL label. Someone had been doing serious QSLing when they wrote this program!

PACKET

ALTHOUGH THE PACKET features are designed for DXCluster use they can be used for general purpose packet operation too. A second set of function keys based on the ALT key are used for the packet screen (Fig 2). The features are somewhere between a fully fledged cluster program and a dumb terminal. Connection is a manual process which is just right for those of us who have a tortuous route to the nearest cluster. Commonly used commands like DIR/N and SH/DX are included of course, as is a facility to log cluster information to disk. Indeed this can be filtered in the same way as reports so keeping down the junk in the files. Extended use of the cluster can build up some very large log files so such filters are essential. DX spots can be listed for selection and insertion into the call field, band etc in the main log. You can QSY your rig if it's one of the CAT supported types.

WORKING WITH OTHER PROGRAMS

THERE IS AN increasing need to move log data between different databases. Some tests were therefore performed to see how easy this was with SHACK-LOG. Two contest programs were available, Super Duper (SD) and CT (V8.xx). For both of these SHACKLOG has dedicated import routines. SD worked easily and accurately, as did a single-op CT file. SHACKLOG does not support multi-op CT files at present.

The other logging program TURBOLOG can export to SHACK-LOG via its ASCII report generator. An ASCII file of part of the main G3PJT log was prepared using the report generator in TURBOLOG. After carefully cleaning out any headings, spaces and blank lines from the file, this was successfully imported into SHACKLOG. The format of the file was entered into SHACKLOG (101 bytes/QSO) the import of 94 QSOs took about 2 minutes. Clearly entering a typical contest file of a 1000 QSOs will take a little time.

I successfully exported a log from SHACKLOG to TURBOLOG using the ASCII file routines described earlier. Log transfer could be much improved if there was an agreed ASCII standard file. Perhaps the RSGB or ARRL contest format could be used as a basis.

OTHER FEATURES

SHACKLOG SUPPORTS a limited number of CAT transceivers notably Kenwood and Yaesu. Other rigs can be supported on request. It also contains a limited contest number generator for casual contesting. SHACKLOG does not contain a CW generator, neither does it support a mouse. However, it does have a special station close down feature, not found in any other program. A close down log entry is needed to comply strictly with UK licence terms.

MANUAL AND SUPPORT

SHACKLOG COMES with a 90-page, comprehensive manual which covers all of the features of the program. However, its structure does not follow a very logical process. For example Installation is described in Appendix 6 rather than in the first chapter and Packet is discussed in Chapter 8, Chapter 11 and finally, and most completely, in Chapter 13! The manual lacks short summary type information of the 'getting started' type. This would greatly reduce the amount of page turning when using some of the more complex features.

Users speak very highly of the support they get from Alan Jubb, G3PMR. Support which has been effective, timely and friendly.

SUMMARY

SHACKLOG CAN BE recommended as a excellent general purpose logging program. It has clearly been developed

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by active HF amateurs as many of the features evoke the thought "that's really useful".

SHACKLOG would work well with Super Duper and the pair would cover all of the logging needs of an amateur HF station.

SHACKLOG costs £27.50 and the optional IOTA database is £7.00. At that price it represents good value. ♦

COMMENT/UPDATE

WE SENT A COPY of the review to Alan Jubb who commented as follows:

"The review was carried out on SHACKLOG 3; the current version is SHACKLOG 4. SHACKLOG 4 extends the capability of SHACKLOG to VHF/UHF, handling all bands up to 2400MHz. Support for locators, automatic distance and bearing calculations, aurora and moonbounce reporting and other VHF features have been added. In response to the criticisms from Bob, I would make the following points.

"**Installation:** this is something one only does once, so it makes sense to have it as an Appendix. The floppy disk label now refers directly to the appendix.

"**Documentation:** SHACKLOG 4 now comes with a 'getting started' file which explains how to carry out the basic functions of logging, searching and reporting.

"**Transceiver Support:** SHACKLOG 4 supports a wide range of Kenwood and Yaesu transceivers (much extended since Bob's review), and I am currently working on adding the ICOM range.

"**QSL Labels:** sheet labels can, in fact, be used. I use ink jet printers and sheet labels. One simply uses one column of labels, and turns the sheet around to use the second column, once the first is exhausted.

"**Pricing:** The price of £27.50 is unchanged. However, the cost of the IOTA database is now £7.50. This is to offset part of the increased royalty charge levied by the IOTA Committee for each database I sell.

"**System Requirements:** 640k is now required, not 512k as stated in the review.

"**Backups:**- backups has always been covered in the manual, in the section of tips. However (and this may be what Bob meant), backup is not specifically listed as a subject in the Contents pages. The entry starts (and always has) 'Backups- a most important subject'."

This Month's Book Choice

Reviewed by John Bazley, G3HCT

THE QUAD ANTENNA

By Bob Haviland, W4MB

Published by CQ Communications Inc, 1993. 159 pages (278 x 216mm) soft covers. Price $15.95 (plus $4 shipping and handling) from CQ Communications Inc, 76 North Broadway, Hicksville, New York 11801-9962.

ISBN 0-943016-05-3

W4MB HAS, FOR THE first time, gathered together in one volume much of the published data on loop antennas. For those wishing to delve deeper into the subject an appendix provides a complete list of references.

In the preface, the author states that the idea for the book began when, having upgraded his two-element to a three-element quad, he obtained the expected gain but at the expense of a loss in front-to-back ratio (F/B). A frustrating experience (in which he is not alone!) which led to collecting available material on quad and loop antennas, further experimentation and finally computer analysis.

The author begins with a relatively short introduction to the shape of loops, covering diamond, triangular, delta, circular and square quads, together with methods of loading elements to reduce antenna size.

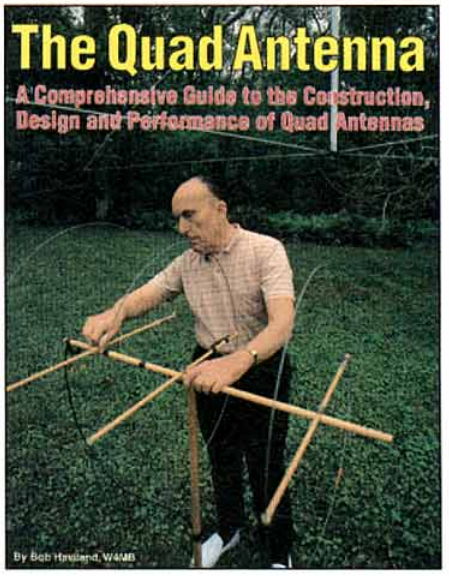
Three chapters deal with design criteria for multi-element arrays using some of the above configurations for the elements. Extensive use is made of graphs and tables whilst mathematics are kept to a minimum. Attention is drawn to multi-band application within these sections. Of particular interest is a graph showing gain and F/B of a 2-element full size 14MHz quad over the frequency range of 8 to 22MHz! An interesting conclusion from the data in this section is that for a two-element array the ideal spacing is 0.15 wavelength, with driven and reflector element lengths 1.1 and 1.2 wavelength respectively.

There follows a presentation of design data for two, three, four and even five-element quad arrays. A similar presentation deals with delta loops. The reader can design the array he requires by first establishing the main performance criteria required from the array: maximum gain, best F/B ratio, best gain bandwidth or best F/B bandwidth.

The author explains how, having calculated the elements' sizes and spacing to meet the above requirement, you can calculate the drive impedance from the graphs provided. A number of tables give detailed figures on element length, spacing, gain, F/B and feed impedance for quads from 2-element to 5-element arrays.

The effect of ground and height on performance is covered in a separate chapter and, again, a lot of the data is illustrated by graphs and plots. Multi-band feed systems are discussed and illustrated together with results of tests to determine the interaction between elements of multi-band designs. The last three chapters cover mechanical design, suggestions for future experimentation and tips on optimising quad design.

If you are building a quad, or are not satisfied with the one you already have, this book provides a wealth of information. ♦



RADCOM TECHNICAL FEATURE

Voice Spectrum Optimising

George Brown, BSc, PhD, CEng, FIEE, G1VCY*

THIS ARTICLE PRESENTS an alternative approach to improving the voice spectrum prior to transmission. The idea of 'spectrum flattening' was proposed by G0ACA in *Eurotek* [1]. It is adjustable in situ, and should suit those people who suffer from a voice rich in lower frequencies.

INTRODUCTION

EVERYONE WHO READ Jan Kliffen's approach to improving the transmission of speech [1] could not fail to be attracted by the idea. My voice is also rich in frequencies around 400 - 500Hz and, from watching the ALC meter or the transmitted output on an oscilloscope, I can see that maximum RF power occurs for words like 'four', 'go', 'more', and very low power for 80% of conversation.

G0ACA's clever approach to this is to massage the frequency spectrum coming from the microphone in an attempt to 'flatten' it. His circuit is designed for his own voice and, as he says, "it would be coincidence if they [the component values] would be appropriate for your voice". He examines the spectrum of his own voice using a method that might not be practicable for many experimenters. It is this aspect of the idea which this article sets out to modify, enabling anyone to build this alternative circuit. It should suit anyone with an essentially 'bassy' voice.

This alternative method involves the use of a low-Q notch filter, the centre frequency of which is variable, as is the depth of the notch. This means that, by means of two potentiometers, the circuit can be matched to an individual voice. This can be done in conjunction with a local station giving critical reports of 'punch', or with an audio recorder, listening carefully to the recorded signals.

A LITTLE THEORY

IT IS A LITTLE KNOWN (or, perhaps, an often-forgotten) fact that if the signal *from* a filter of any type is subtracted from the signal fed *into* the filter, the overall circuit has a response equivalent to the *inverse* filter characteristic. In other words, a low-pass filter becomes a high-pass filter, and vice versa; more importantly, from the point of view of this circuit, a band-pass filter becomes a band-stop (or notch) filter. This change of characteristic is illustrated in **Fig 1**.

A signal with a flat spectrum is fed in to a band-pass filter, which produces, at its output, the characteristic spectrum of the filter. This signal is fed, together with the original input signal, to a circuit which subtracts the two, thus producing a band-stop, or notch, characteristic.

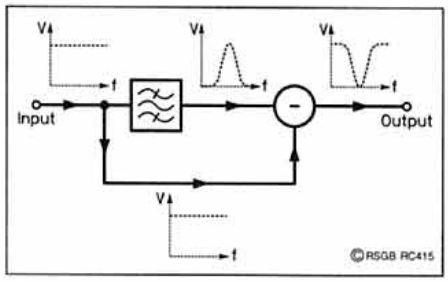


Fig 1: Deriving a notch filter from a band-pass filter.

CIRCUIT & ITS OPERATION

THE COMPLETE CIRCUIT DIAGRAM is shown in **Fig 2**. It can be split conveniently into three parts, as shown on the circuit.

The first part is a simple, variable-gain amplifier preceded by an RF filter (the RF choke and C1). The gain can be set, with RV1, to suit individual microphones having impedances around 600Ω.

The second part of the circuit is a second-order bandpass filter, adjustable between 250Hz and 1000Hz, approximately, by means of RV2. The mid-band gain of the filter is unity, within component tolerances. Equations for the determination of the component values in the filter circuit are given in the Appendix (opposite).

The final part of the circuit is a summing amplifier having two inputs. One is the original (amplified) signal from the output of IC1, and the other is from the output of the band-pass filter, IC2. Although it is a summing amplifier, it subtracts the two signals because the filter circuit uses the Op-Amp in an inverting configuration. This is illustrated by the mathematical representation:

Output = 1st input + (-2nd input)

= 1st input - 2nd input

At this point, you may be asking the question "Why build a notch filter by using a band-pass filter circuit, and not by using a simpler notch filter circuit?" The answer is quite simple: not only can the centre frequency of the novel notch filter circuit be changed, *so can the depth of the notch.*

The summing amplifier, IC3, has a gain of unity in the channel from the output of IC1, because R7 / R6 = 1. It will also have a gain of unity in the other channel when R7 / (RV3 + R5) = 1. Under these circumstances, the two signals nullify each other exactly, and the notch is infinitely deep. This does not happen in practice, and hence RV3 can be used to set the depth of the notch. This feature could not normally be incorporated into a basic notch filter circuit, but its implementation by the summing amplifier method is very simple. A suggested layout for the circuit on 0.1inch pitch Veroboard is shown in **Fig 3.**

MEASURED PERFORMANCE

THE PERFORMANCE OF the notch filter circuit is illustrated in **Fig 4.**

For the purposes of measurement only, a centre frequency of 300Hz was chosen, at which frequency the maximum attainable notch depth was -31.7dB. The width (Q-value) of the response is essentially constant, irrespective of notch depth.

ALIGNMENT

SETTING UP THE CIRCUIT is very simple. It can be operated from a balanced power supply in the normal way or, perhaps prefer-

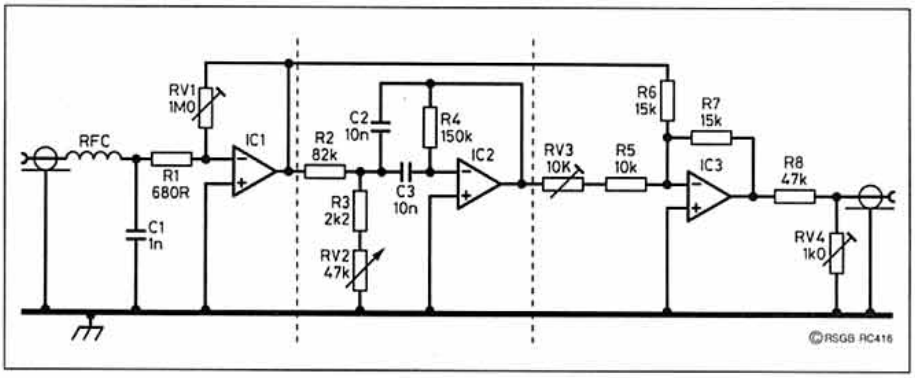


Fig 2: Voltage supplies are: +4.5V to pins 8, -4.5V to pins 4 of IC1, 2 & 3. Zero volts to earth.

* 1 Langford Cresent, BENFLEET, Essex SS7 3JP.

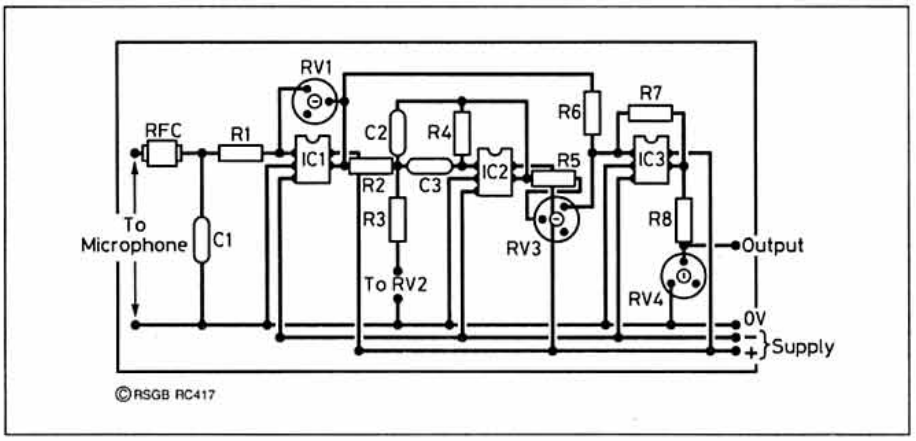


Fig 3: Layout diagram for the circuit.

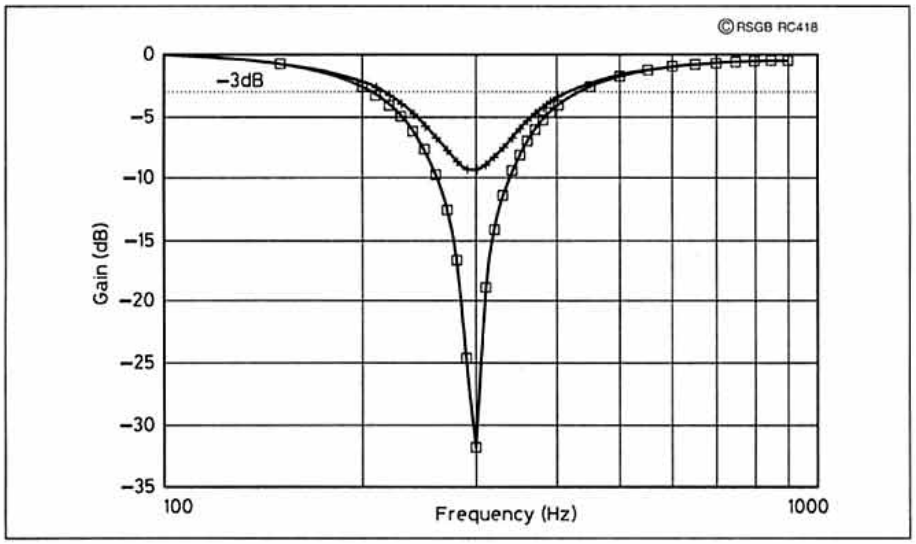


Fig 4: Notch depth at maximum and at an intermediate value.

ably, from a standard 9V PP3 battery with a resistive centre-tapped network **(Fig 5).**

The tuning range of the filter can be modified by changing the values of RV2 and its series resistor, R3, but the coverage should be more than enough for all requirements.

If a signal generator is to hand, it is worthwhile marking the position of RV3 corresponding to a maximum notch depth since, either side of that point, the notch depth will decrease. It has been suggested that RV2 could also be a preset potentiometer because, once set for a particular voice, it need not be adjusted again. RV4 is provided to step down the output signal to a level sufficient for the microphone input on the transceiver. On paper, a lower-noise opamp such as the TL071 may seem preferable; in practice the difference between the two types is imperceptible. Much depends upon the level of signal required at the microphone socket of the individual transceiver.

Tailoring the response for a particular voice is a case of trial and error; the author has found that initial tests with a tape recorder are valuable, particularly if it is fitted with a Peak Programme Meter or a VU Meter, since these exhibit the same behaviour (though often not so severe) as the ALC meter on the transceiver. It is important to use the same station microphone in all tests, of course.

Following this initial set-up, the circuit should be fitted into a screened box with a power switch; the switch is, surprisingly, academic, since the battery life on circuits such as these is of the same order as the shelf life. final tests can then be carried out with a willing friend having a good ear for differences in the intelligibility of the received signal.

REFERENCES

[1] *RadCom* April 1994, pp 68 - 69

[2] R P Sallen and E L Key, *A Practical Method of Designing RC Active Filters*, IRE Trans on Circuit Theory, CT-2, pp 74 - 85, March 1955.

[3] L P Huelsman, *Theory and Design of Active RC Filters*, McGraw-Hill Book Co, New York, 1968.

[4] G Brown, 'Design of Active Butterworth Filters', *Radio Communication* (RSGB), June 1993, pp 62-63, July 1993. pp 62 - 63. ♦

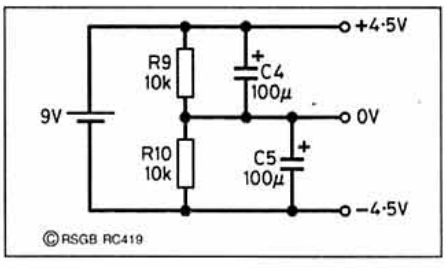


Fig 5: Power supply for the circuit of Fig 2.

COMPONENTS

Resistors

R1	680R
R2	82k
R3	2k2
R4	150k
R5, 9, 10	10k
R6, 7	15k
R8	47k
RV1	1M0 lin preset
RV2	47k lin
RV3	10k lin preset
RV4	1k0 lin preset

Capacitors

C1	1n Silver mica
C2, 3	10n metallised polyester
C4,5	100µ 10VDC tantalum

Semiconductors

IC1 - 3	741 or similar

Notes

All fixed resistors 0.25W metal film

Tantalum bead capacitors are justified only when the circuit is being powered from a dry battery.

Components are available from: JAB Electronics Components, 1180 Aldridge Road, Great Barr, Birmingham B44 8PB.

APPENDIX

Design equations for the band-pass filter

THERE IS MUCH PUBLISHED information on multiple feedback active filters, see for example [2 - 4], but the design equations are given here for the type implemented in Fig 2, to enable the reader to adapt the circuit for other purposes.

The three resistors involved are R2, the series combination of R3 and RV3, and R4. For the purpose of simplicity, (R3 + RV3) will be labelled as R3.

$$R2 = \frac{Q}{-\omega A C}, \qquad R4 = \frac{2Q}{\omega C},$$

$$R3 = \frac{R2\,r}{R2 - r}, \quad \text{where} \quad r = \frac{1}{2\omega C Q}$$

In these equations:

A is the mid-band gain of the filter. For the circuit used here, A = -1;

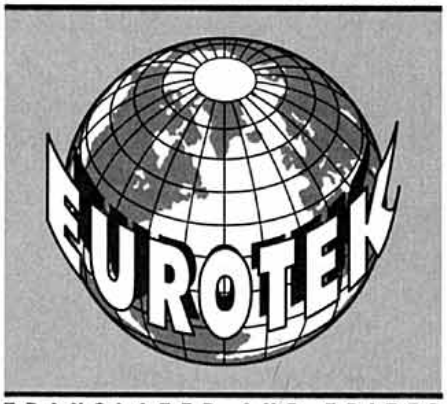
$\omega = 2\pi f$, where f is the mid-band frequency;

C = C2 = C3 (see parts list and Fig 2);

Q is the quality factor of the filter, ie

$$Q = \frac{\text{frequency at middle of passband}}{\text{width of filter response at 3dB points}}$$

IDEAS FROM ABROAD



TRANSLATED AND EDITED BY ERWIN DAVID, G4LQI

Portable packet radio is a burden no longer. Miniature components with built-in batteries are now available. **Marcel Henchoz, HB9XAK**, described his set-up in French and German in *old man* (CH) 9/94.

HB9XAK'S SOLUTION

MARCEL FOUND THE home packet station too bulky and awkward to power for portable operation and this was his simple, light-weight solution. Instead of a computer he uses an electronic organizer with a terminal emulator. The system comprises:

- Sharp model IQ-8300M organizer
- Sharp model CE-133T level converter-cum-cable
- Telereader model TNC-210 TNC with built in Ni-cads
- Hand-held transceiver

The Sharp organizer and level changer are not power misers; the addition of a battery pack, Sharp model CE-76BC is desirable to prevent rapid discharge of the organizer battery. A 12V car battery lasts even longer, of course.

MAKING IT WORK

The CE-133T level converter cable has a D25 RS232C connector while the TNC-210 requires a D9. Marcel replaced the D25 with a D9, and soldered the four colour-coded wires as shown in **Fig 1**. [An adapter could also be used - *G4LQI*]

The terminal program of the organizer was selected as per the manual and the English equivalent of following parameters keyed in:

NAME	:TNC 210
NUMBER	:
OUTPUT bps	:300 **1200** 2400 4800 9600
PARITY	:NONE ODD **EVEN**
DATA BITS	:8 **7**
STOP BITS	:**1** 2
XON/XOFF	:**ON** OFF
SHIFT IN/OUT	:ON **OFF**

CONVERSION CODE 7F	: ON **OFF**
SEND LF AFTER CR	: ON **OFF**
RECV LF AFTER CR	: ON **OFF**
LOCAL ECHO	: ON **OFF**
TIMING	: 0

When the installation was completed the organizer was switched on and the terminal emulator selected. The TNC was then switched on and the following display appeared on the screen:

TASCO data controller TNC-210

AX.25 Level 2 Version 2.0

message board Ver 1.28E

Release 15-Mar-1992

Checksum S32

cmd:

One TNC parameter had to be changed, as the usual <Ctrl-C> does not work on the IQ-8300M for return to the command mode. <COMMAND $26> was keyed in, which corresponds to the <&> in the ASCII alphabet. The other TNC parameters may be selected as usual. That did the job. To return to <Cmd:> one now only has to type <⊠@> and the job was done.

IN THE UK

HB9XAK USED an organizer and a TNC which were sold in Switzerland at the time of writing; strictly speaking, the above text and Fig 1, are valid for the named models only, but provide guidance to get 1994 UK models to work.

I made a few phone calls to UK suppliers and obtained the following information:

From *Sharp's* technical help line, 0161-204 2427: The UK equivalent of the IQ-8300M was the IQ-8200, superseded last year. The successor model is IQ-8920, £299 incl. VAT. The accessories CE-133T (£55) and CE-76BC (£21 w/o battery) fit all named models and are available here

Organizer specialists *Clove* Technology, Bournemouth, 01202-302 796, sell the Sharp products but also Psion models 3 and 3a, which may come out cheaper.

SMC, Southampton, 01703-251 549, are the importers of Telereader. They do not know a model TNC-210, but they do sell a model TNC-µ2/MkII (£175 w/o Ni-Cads) which looks like it is the same thing. It comes with radio cables to fit the 2.5mm mic/PTT jack and the 3.5mm loudspeaker jack of most handhelds.

Siskin, Southampton, 01703-207 155, sell a similar TNC, the Paccomm Handypacket, a miniature version of the popular Tiny-2 with built-in battery, (£195 incl. Ni-Cad, charger, cables and software.

Again, different models may require changes in the cables and the start-up routine. *[G4LQI]*. A bit of tinkering will be required to get the station going, but that is what our hobby is all about. ♦

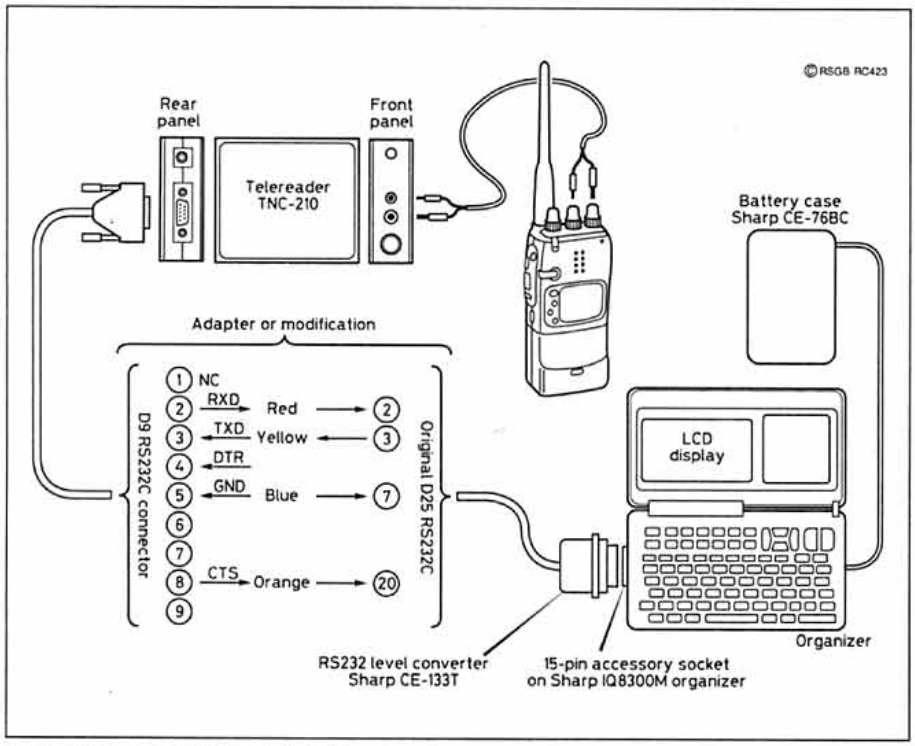


Fig 1: HB9XAK's portable packet station.

RADCOM TECHNICAL FEATURE

RMS and PEP Transmitter Power

by Bob Pearson G4FHU*

THIS ARTICLE OFFERS a more positive, and I hope more useful, extension of remarks made in a letter [1] about transmitter output power specifications. It deals only with what may interest most buyers and operators of amateur transmitters.

RMS

ELECTRICAL POWER WAS a commonly measured quantity, long before radio and electronics became important. In direct current systems it is simply the product of voltage and current. It measures the rate at which energy is being generated, transferred or consumed.

In an alternating current system, voltage and current vary repetitively as shown by their waveforms which are functions of time (as distinct from waves, which are functions of time and distance). Repetitive waveforms can have a number of different statistics chosen to describe and measure them, such as peak, average and root-mean-square values, form-factor, crest-factor etc. These statistics depend upon the shape of the waveform. Here, only the most common of all alternating waveforms, sinusoidal ones like Vsin ω t will be considered.

The power in an AC system is also a continually varying quantity and the way it is measured also needs to be specified to avoid confusion and misunderstandings. Instantaneous power is, literally, the power at an instant. It is voltage at an instant multiplied by the current at the same instant, quite irrespective of waveform shape.

In the design of electrical and electronic equipment, instantaneous peak levels of voltage or current are sometimes important. A peak voltage may determine the choice of a transistor or of a transformer core. A peak current may have to be limited by linearity requirements. Peak power just at an instant is not often a useful quantity (except for journalists writing headlines!).

For most practical purposes in industry and the home, the relevant measure of power is its *average*, taken over one or more complete cycles of the supply voltage waveform. Average power is always the default meaning when the word *power* is left unqualified. It satisfactorily specifies most power ratings for electric heaters, lamps, machinery etc.

The *effective* value of an alternating voltage or current also fits this convention. It is the magnitude of direct voltage or current that would produce the same average power in the same resistance. It was once common to use the simple adjective *effective* where the more technical looking RMS is now more fashionable.

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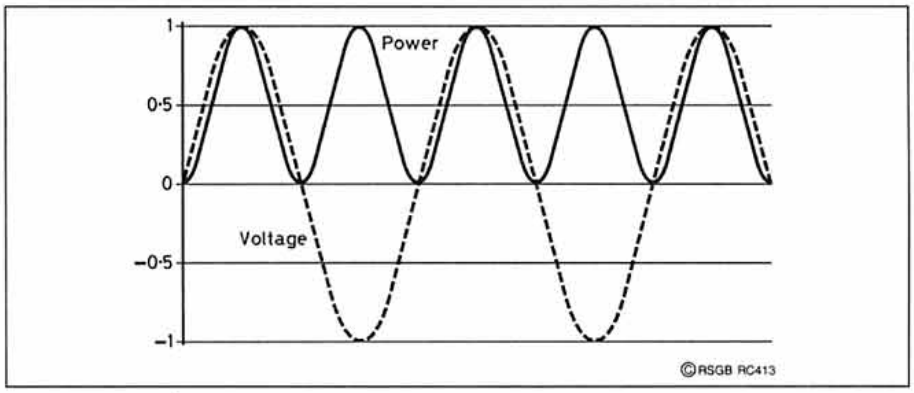

Fig 1: Instantaneous voltage and power waveforms when a 1 volt peak sinusoidal waveform is applied to a 1Ω resistor.

To see how the term RMS arises in the calculation of effective values, suppose that a sinusoidal waveform with a peak amplitude of 1 volt is applied to a 1Ω resistor. Voltage and power vary with time as shown in **Fig 1**. The instantaneous power reaches peaks of magnitude $(Vpk)^2/R$ twice per cycle. The peak power is one volt squared, divided by one ohm , ie 1 watt.

Fig 1 shows that everywhere else the power is less than this and, without any need for formal mathematics, it can be seen from the symmetry of the power waveform that its average is half the peak level, ie it is 1/2 W. What then is the equivalent direct voltage that would produce half a watt average power in a 1Ω resistor ?

$$\frac{(V_{effective})^2}{1} = \frac{1}{2}$$

so that

$$V_{effective} = \frac{1}{\sqrt{2}} = \frac{1}{1.414} = 0.7071$$

The power curve is identical in shape to the curve of voltage squared. In this simple example they also happen to be identical numerically. But whatever the actual figures involved the mathematical procedure is still the same, ie to take the average (or mean) of voltage squared and then divide by resistance to calculate the average power. Then the procedure 'root of the mean of the square of the instantaneous voltage' gives the effective voltage. That is why

$$V_{rms} = \frac{V_{pk}}{\sqrt{2}} = \frac{V_{pk}}{1.414} = 0.7071\,V_{pk}$$

is called the RMS value of a sinusoidal waveform voltage. An almost identical calculation gives the same result for alternating current.

Mean (ie average) power in a resistance is calculated from root-mean-square voltage and, or, root-mean-square current.

$$P = V_{rms}\,I_{rms} \quad \text{or} \quad P = \frac{(V_{rms})^2}{R}$$

$$\text{or} \quad P = (I_{rms})^2 R$$

In AC loads containing reactance, there is a phase difference between voltage and current and the power flow reverses direction for part of each cycle. The average power is still calculated using the product of RMS voltage and current but with an extra multiplying 'power factor' (less than 1.0) which is the cosine of the angle ϕ between voltage and current.

$$P = V_{rms}\,I_{rms}\cos\phi$$

TRANSMITTER POWER RATINGS

THE OUTPUT AMPLIFIER of a single sideband transmitter is usually a Class-B push-pull stage such as that studied in an earlier article [2]. The basic design fixes several factors. The peak voltage that can be supplied to the correct resistive load in normal operation is absolutely limited by the DC supply voltage and a transformer ratio. Also, as with all electronic amplifiers, no power at

all is *generated*, it is only *converted* from a DC supply to an AC output. Furthermore, even with perfect components, the highest power conversion efficiency is limited by the waveform mathematics to 78.5 % (or more precisely, $\pi/4$ times 100%). Consequently the instantaneous peak output voltage and therefore the instantaneous peak output power, cannot exceed what the design dictates.

Consider as an example, a push-pull pair of perfect transistors operating in Class-B and connected to a 50Ω load via a transformer with 2 turns centre tapped as primary, and with 8 turns as the output secondary.

Using a 12.5 V DC supply, the peak output voltage could not exceed 8x12.5=100V

and so the peak output power would be no more than $100^2/50$ = 200W.

The average power out would be half of this; 100W, and the corresponding effective (or RMS) load voltage and current would be 70.7V and 1.414A respectively.

The DC input power would be at least 100/0.785 =127W and the input DC current at least 10.2A.

In practice, such a design would probably achieve no better than 50% power efficiency rather than the theoretically ideal 78% owing to circuit losses, so that the highest average power output might be only about 60 W.

Such a figure would then be the highest output power rating for RTTY or FM operation though perhaps with a limitation on continuous transmit time depending upon cooling arrangements and ambient temperature.

For CW usage it would not run so hot (unless left 'key-down' accidentally) but could nevertheless not be rated for any higher power output.

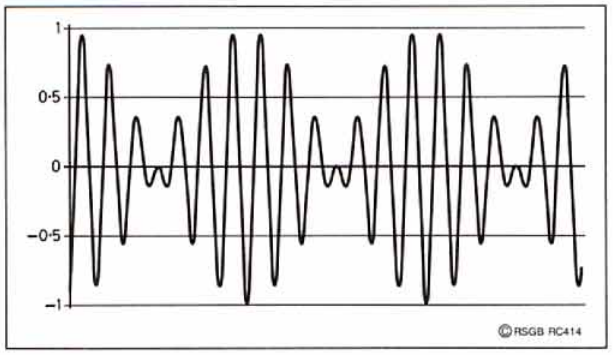

Fig 2: Voltage waveform of a Single Sideband Transmitter during a two-tone test. To reveal more detail, the (suppressed) carrier frequency has been set very much lower than normal.

PEP

WHEN THE OUTPUT VOLTAGE of a Single Sideband (SSB) transmitter, or indeed any amplitude modulated system, is viewed on an oscilloscope, especially when the RF cycles are not synchronised with the timebase or are too many to see, it *appears* as though the waveform is enclosed in an envelope. The envelope is of course a purely imaginary curve, but a useful concept nevertheless. In Fig 2 the number of RF cycles has been reduced by a factor of about a thousand relative to the imaginary envelope so that one can see more detail.

An SSB transmitter has to be operated so that it can accommodate the highest peaks of the modulated waveform without undue distortion. Therefore the power rating in the example above would have to refer to output when the envelope is at peaks. It would then be called the peak envelope power or PEP. By convention and convenience it is the *power averaged over the highest amplitude cycle* and therefore half the very highest instantaneous peak power. Some power meters can indicate PEP with a reasonable degree of accuracy although simpler ones average over a far longer period. A speech modulated waveform shown on a simpler power meter will therefore give a very much lower reading that can be virtually meaningless.

This may be why one often hears transmitters producing poor speech quality because they are being driven too hard due to the operator trying to increase the power.

As a rather academic point, no cycle of an amplitude modulated signal has *precisely* a constant amplitude sinusoidal shape. However, with the normally very high radio frequency of the suppressed carrier, relative to the modulating frequency, the error in measuring average power over several complete cycles around the peak is quite insignificant.

Plain vanilla AM with full carrier and both sidebands, which is now not very widely used in amateur radio, introduces other factors. These will not be pursued here, except to warn that old books on that topic are not the easiest way to approach SSB matters.

REFERENCES

[1] 'RMS Power UGH!', *RadCom*, November 1993 p93.

[2] 'How Big is a Bad SWR', *RadCom*, March 1993 p64, 65 and April 1993 p62,63.

Biggest UK Multi-Multi Station

FOR THE PAST four years, a huge contest station, G0KPW, has been put together to compete in the 'multi-multi' section of the *CQ* World-Wide Phone Contest from Martlesham, Suffolk.

In 1992 G0KPW was the top multi-multi (ie multi-operator, multi-station) in Europe and second in the world. Last year the group again won Europe but were down to fourth place in the world. Even a huge set-up like this can be beaten by a determined group in the Caribbean, with much less hardware. For the 1994 contest the main competition in Europe came from HG73DX, 9A1A, RU6L and OT4A but no rumours have yet been received about their scores.

The antennas are (left to right): 15m 5-element beam at 80ft; 10m 5-el at 80ft; 20m 5-el at 100ft; 40m 2-el at 80ft; 10m 5-over-5 with top at 90ft, bottom at 65ft; 15m 5-over-5 with top at 100ft, bottom at 60ft; 40m 3-el at 90ft; 20m 4-over-4 with top at 100ft, bottom at 60ft; 150ft vertical for 160m in the distance. Not shown in the picture is a 160m inverted-vee at 110ft away to the left, and an 80m 4-square (four 63ft verticals) to the right.

All the antennas were erected by no more than six people, in two weeks. By 5pm on the Monday following the contest, all had been taken down and packed away. Multi-multi means that all six main HF bands 1.8 - 28MHz can be used at the same time, and all six stations had also to be put together in the trailer and caravans in the days leading up to the contest.

Five-band DXCC was (just) achieved during the 48-hour event with 100 countries worked on 80m. On HF, 171 countries were worked on 15m, 154 on 10m and 160 on 20m. The operators were: G3LNS, G3NKC, G3VHB, G4BAH, G4BUO, G4BWP, G4PIQ, G4VMM, G0AEV, G0AFH, G0HSS, G0UHK (NZ1W), G7ABQ, G7BKO and K1XX.

WIND LOADING

*I HAVE A MAST mounted to the side of the house, with a rotator and antennas on the top (**Fig 1**). How do I calculate the wind loading?*

THIS IS A COMMON SITUATION for people who have small gardens and lack the space (or the money) for a free-standing tower. To sleep soundly when it's blowing a gale, you need some reassurance that the mast and its fixings are strong enough.

Begin by thinking about wind-speeds and the forces they create. There was an excellent article on this subject by G3ZPF [1], since reprinted in G4LQI's *HF Antenna Collection* (see RSGB Bookshelf, page 89). This included a map of wind speeds likely to be exceeded on the average only once in 50 years at various locations around the UK. Measured at an appropriate height of 10m in open level country, these speeds range from 38m/s (85MPH) around London, 48m/s (107MPH) on the west coast and in Northern England, up through 55m/s (123MPH) or more in the Outer Hebrides, Orkney and Shetland. There are two important points in identifying a suitable wind survival speed for your own installation:

1. The windspeed map (from BSI CP3 chapter 5) is purely historical. You may well find that higher speeds have been recorded more recently in your own locality; if so, use those figures.
2. Windspeeds fluctuate enormously, especially in squally conditions, and it's that single gust with the highest speed that puts your antenna most at risk. Whatever survival speed you design to, there's no guarantee that Mother Nature won't produce a freak gust that's even worse... so there's no substitute for having a good insurance policy as well.

Even here in the balmy south-east, I base my own calculations on 45-50m/s (100-112MPH). Further north and west, you already know what wind problems you have to live with - as GM4IPK in Shetland puts it, "All my mistakes end up in Norway."

Fig 2 (reproduced from G3ZPF's article) shows the conversion between wind speed and force per unit area. The round figures that stick in my mind are that at 100mph, every square foot of exposed area suffers a sideways pressure of 25 pounds; or that at 45-50m/s, the wind force is about 150kgf/m^2

AWG	mm	Nearest SWG	mm	Nearest mm^2 size to AWG
8	3.264	10	3.25	10.0
10	2.588	12	2.64	6.0
12	2.053	14	2.03	4.0
14	1.628	16	1.626	2.5
16	1.291	18	1.219	1.5
18	1.024	19	1.016	1.0
19	0.912	20	0.914	0.75
20	0.812	21	0.813	
21	0.722	22	0.711	
22	0.644	24	0.610	
23	0.573	24	0.559	
24	0.511	25	0.508	
25	0.455	26	0.457	
26	0.405	27	0.416	

Table 1: American wire gauges.

IAN WHITE, G3SEK
52 Abingdon Road, Drayton, Abingdon, Oxon OX14 4HP – or @ GB7AVM

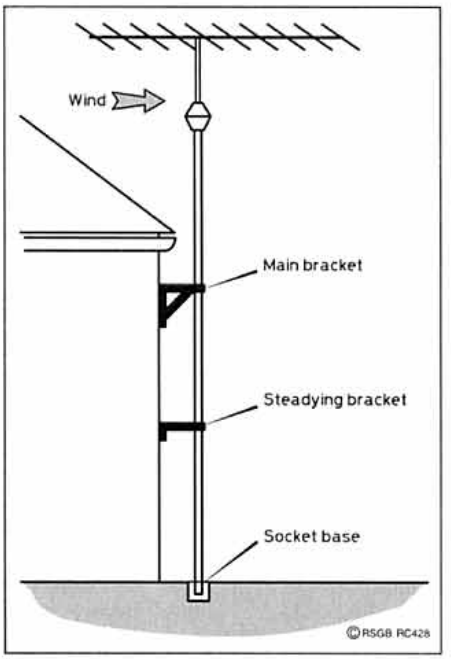

Fig 1: Typical arrangement of a mast bracketed to the wall of a house.

(kilograms force per square metre).

For this application, calculations of wind forces don't require great accuracy. You only need to be sure that all the errors are on the high side. This makes the calculations much simpler. Factors I would deliberately ignore include any wind-shielding effect due to the house, any drag-reducing effects of the round cross-sections of tubing and rotators, and any streamlining effects due to pointing the antennas in any particular direction with respect to the wind. To calculate the force on the wall brackets, it's also 'conservative' (i.e. prudently pessimistic) to ignore the benefits of the lower steadying bracket in Fig 1. With a few similar assumptions as shown below - and always erring on the safe side - the calculations then become very simple. The calculation divides into four parts.

1. Assessing the exposed areas This is where the calculations become brutally simple (**Fig 3a**). A mast which is 10m high and 50mm diameter simple becomes a 10m x 50mm flat slab, fully exposed to the wind. The stub mast above the rotator is treated in the same way as the main mast. The rotator itself is quite a complex shape, but it too can become a flat rectangular slab, of whatever size will completely enclose its height and width dimensions - say 0.3m x 0.2m. Are you getting the idea now? Estimate generously, because any overestimate will add to the factor of safety. Say the antenna is a 2m yagi, with a 5m x 25mm boom and ten elements of 6mm diameter. Since each of the elements is about 1m long, the total flat-slab area is 10 x 1 x 6/1000 = 0.06m^2. Similarly the flat-slab area of the boom is 0.125m^2. I suggest that you forget the fancy aerodynamics and simply add these areas together to obtain a pessimistic total of 0.185m^2. Throw in a little more to account for the clamps etc, and you arrive at a ballpark figure of 0.2m^2 for the whole antenna.

2. Calculating the wind pressure The forces exerted by the wind can be expressed very simply, by imagining each force to act at the mid-height of each component. Thus, although the sideways force on the mast acts upon its whole height, it can be imagined as acting on the same flat-slab area but concentrated at the mid-height (**Fig 3b**). Note that this pessimistically assumes that the wind always comes from the worst direction to maximise the force, and ignores any shielding effect due to the house. Likewise the wind forces on the stub-mast, the rotator and the yagi can be represented as forces acting on single point. If the wind force is 150 kgf/m^2 (windspeed 45-50m/s), applying this to Fig 3b gives the force diagram in **Fig 4**.

3. Force on the wall bracket The wind forces shown in Fig 4 are resisted by the rigidity of the mast, and by the bracket attaching the mast to the house wall. To maximise the estimate of the force F on the bracket, assume that the mast is completely rigid, has no effective support from the lower bracket, and is pivoted freely at the bottom. Once again this simplifies the calculation dramatically: the mast acts as a rigid beam or lever, pivoted at the bottom. To calculate the leverage forces

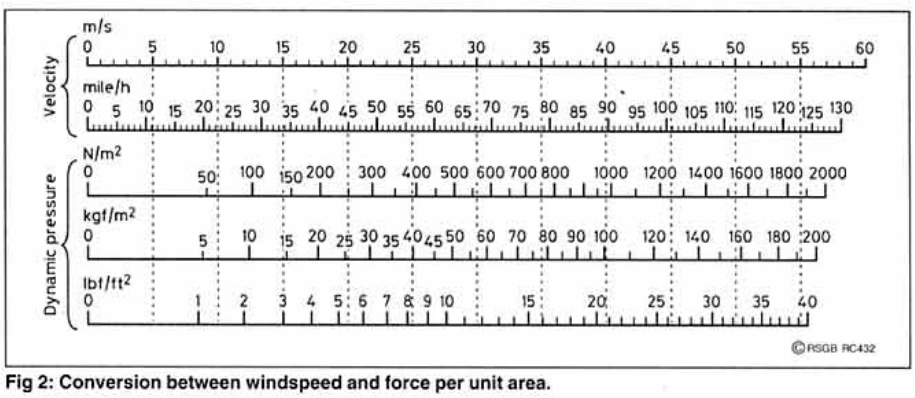

Fig 2: Conversion between windspeed and force per unit area.

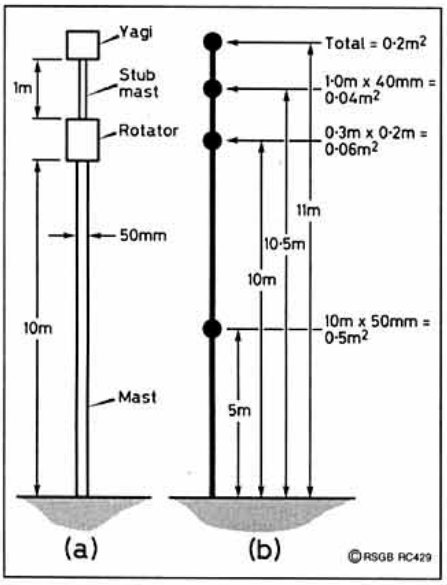

Fig 3 (a): Estimate windage areas pessimistically as flat rectangular slabs; (b): Where the forces act.

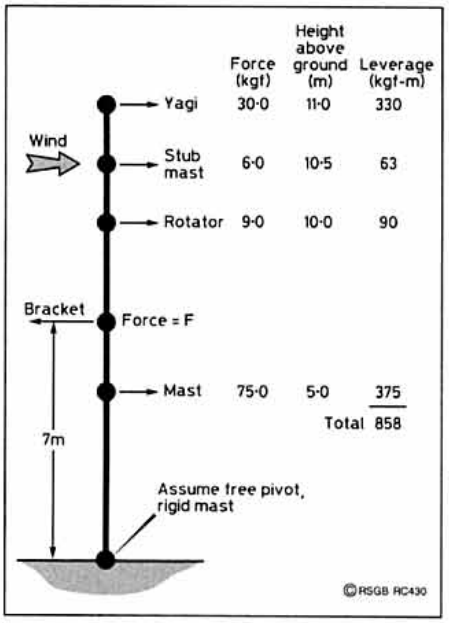

Fig 4: Wind forces from Fig 2b (at 150 kgf/m²) are resisted by the force F on the bracket.

acting on the mast, multiply each force by the height at which it acts, and add up the results as shown in Fig 4. The units of leverage force are kgf-metres (or lbf-feet).

To work out the force F acting on the wall bracket, now divide the total of 858kgf-m by the height above ground of the bracket, assumed to be 7m in Fig 4. This is a very substantial 123 kilograms (270 pounds). The higher the bracket is up the wall, the less the force on it, so it's generally better to fix the bracket high on a gable-end than lower down on a front or back wall. I'll deal with the practicalities of fixing the bracket next month.

4. Bending force on the mast The job of the mast is to support the antenna and rotator against the sideways wind force. Compared with this, supporting the vertical dead-weight is easy. It's OK if the mast sways a little, but not too much or else it will buckle and fail, or break through metal fatigue. The bending force on the mast is concentrated at the bracket (in practice, just above) and if we

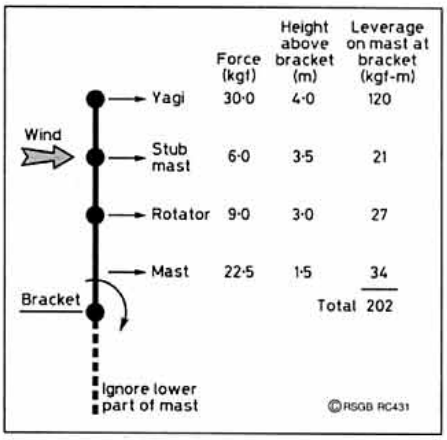

Fig 5: Analysis of bending force on the mast at the bracket. Note that all heights are measured from the bracket upwards (unlike Fig 4).

analyse this (**Fig 5**) it amounts to about 202kgf-m, which is resisted only by the stiffness of the mast itself.

Reliable practical figures for the bending resistance of real-life mast materials are hard to find. They depend not only on the material and cross-section, but also very much on the presence or absence of minor dents and scores which can cause stress concentrations leading to premature buckling and failure. What I can assure you is that thin-walled 2in alloy poles won't survive at the windspeed and loading assumed here. Many, many people have 'been there, tried that', and sure enough it fell down. Use alloy scaffold pole instead; although it may sway alarmingly, it'll probably come through.

If you've been following the calculations, try them again with an extra antenna for another band, stacked at a suitable distance (*In Practice*, August 1993). You'll find that all the forces increase quite alarmingly. Even light 'clothesline' guys can considerably reduce swaying and peak forces, but you should treat those merely as an additional safety factor and design the system as if the guys weren't there. For a true belt-and-braces approach, add proper rope guys that are designed to withstand the main force of the wind [2]. But in case the upwind guy breaks (as well it could) you should still design the wall bracket to handle all the wind forces on its own.

To summarise the whole philosophy: it's always worthwhile to estimate the forces you're dealing with, so get out that calculator! Remember that you're protecting against the worst-ever gust of wind throughout the entire lifetime of the installation, so overestimate the design windspeed. If in doubt when estimating the exposed windage areas, be pessimistic and round your figures upwards. Assume that the worst combinations of forces can all occur together. If you do all this, and over-engineer the whole installation appropriately, you'll sleep all the more soundly through the gales. I'll deal with some of the practicalities next month.

By the way, there's a very good book about the art of making surprisingly accurate numerical estimates from what seems like hardly any prior information. It contains nothing about the wind or electronics, but goes by the wonderful title of *Consider A Spherical Cow* [3].

AMERICAN WIRE GAUGES

WHAT IS THE CONVERSION between US and British wire gauges? What size of wire in square millimetres do I use for the various sizes specified in American articles?

THERE IS NO SIMPLE conversion. Although both systems use numbers to represent a range of standard wire diameters or thicknesses of sheet, none of these standard dimensions match up. When converting from the American wire gauge (AWG) to the British system (SWG), you usually have to select the nearest available. We now have standard metric sizes as well, especially in copper wire, and just to make things confusing, UK mains flex and cables are now rated by their total conductor cross-section in square millimetres.

Table 1 (opposite) shows the common gauges in millimetres. In both AWG and SWG, a higher number represents a thinner wire or sheet, so the two systems run roughly parallel. The thickest common size is probably 8AWG, above which the actual inch dimensions are more common. From 8AWG down to 16AWG, the nearest SWG size is two numbers higher, eg a common thickness for sheet-metal chassis is 14AWG or 16SWG. In this size range, home constructors have little use for the odd-numbered sizes in either system, so they are omitted from the table. From 17AWG down to 26AWG, the nearest SWG size is one number higher. For the heavier wires, the final column shows the nearest British Standard cable or flex size.

By the way, if you're using wire tables from other sources, you may encounter many other systems dating back to the Victorian heyday of mechanical engineering. What we know as 'American wire gauge' is more properly called 'Brown and Sharpe' or 'B&S'. What we call 'Standard wire gauge' is often called 'British Standard' or 'Imperial'. Ignore any tables relating to 'Birmingham', 'Stubs', 'Washburn' or 'US Plate' - they refer to other, different systems. Everywhere except in the USA, these are all gradually giving way to metric sizes.

REFERENCES

[1] 'Wind Loading' by D J Reynolds, G3ZPF. *RadCom*, April and May 1988 (reprinted in *The HF Antenna Collection, RSGB*).

[2] 'Ropes and Rigging for Amateurs - A Professional Approach' by J M Gale, G3JMG, *RadCom*, March 1970 (reprinted in *HF Antenna Collection* and in the *RSGB Microwave Handbook, Volume 1*).

[3] *ConsiderA Spherical Cow* by John Harte. W Kaufman, Inc, 1985. ISBN 0-865760-86-1. ♦

IF YOU HAVE NEW QUESTIONS, or any comments to add to this month's column, I'd be very pleased to hear from you by mail or by packet (see head of column). But please remember that I can **only** answer questions through this column, so they need to be on topics of **general** interest.

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RADCOM TECHNICAL FEATURE

Seven Antennas On One Tower

The final part by Tony Preedy CEng MIEE A45ZZ*

SWITCHING TO 7MHZ is achieved by using S3 to remove both the 5 volt control and 12 volt relay supplies. The antenna therefore automatically defaults to this band. If the 12 volt supply is common to the radio it will ensure that you don't start calling on an HF band with the antenna tuned to 7MHz!

The servo motors are driven only when changing bands, by pressing S2 for a few seconds, after making a selection at S1. This prevents any tendency for the electronics of the control system to respond to RF from the transmitter and similarly we avoid the possibility of the control system causing interference when receiving.

If you need to listen 'off beam' simply select another band to effectively remove the parasitic elements. Because of the narrow beam, which results when the parasitic elements are in use on the higher frequencies, this mode will help when making a general search for signals. Also it may enable you to hear a third station who is on a different bearing to the station with whom you want to have contact, such as a DX net controller, without having to rotate the antenna.

PRELIMINARY TUNING

SLACKEN THE CAPACITOR drive couplings and check the band switching controller for correct output voltages as S1 and S3 are operated. If you do not have an oscilloscope a pair of headphones or an analogue DC meter can be used for checking the pulse outputs. As the preset resistor value is increased the buzz will alter in tone or the meter indication should rise linearly over a range of 3 to 1. Connect the controller to the servo motors and relays and confirm that they can be controlled by the resistors VR1 to VR6 and the switches respectively.

Set VR1 and VR6 and the capacitors to minimum. Lock the capacitor couplings and check that the tuning resistors provide full 180° rotation of the capacitor shaft without either exceeding the range of the servo feedback potentiometer or hitting any endstop on the capacitor. R7 determines maximum rotation by reducing the effective value of the tuning resistors to about 150kΩ.

Check that the relays function correctly. Find a site clear of electricity supply cables and other conductors. Erect, one at a time, the front and rear elements on their respective (vertical) 2 inch half boom sections so that they are clear of the ground and large

conductors. Set the element lengths as shown in Fig 2 (in Part One) and connect the band selector. Energise the relays A to F with + 12 volts. Use a dip meter to check for resonance by coupling close to the end of the hairpins. Adjusting the capacitor should produce a weak dip at 10.4MHz at director or 9.8MHz at reflector.

Check that at maximum capacitance strong dips occurs at or below 14.5MHz, director and 13.4MHz, reflector. You will need to energise the hairpin relays G and H to confirm resonance at 31MHz, director or 27MHz, reflector with the capacitor at minimum. In this case couple the dip meter near the reed relay. Switch off the relay supply and either short the feed end of the quarter-wave 100Ω feeder or disconnect it from the front element.

Tune with the shorting bars and check at the front element hairpin for a weak dip in the selected part of the 7MHz band. The capacitor has no effect on this band. However, 7MHz tuning of this front element is not critical to overall performance and a reasonable discrepancy can be taken up in the ATU.

As explained earlier, the reflector plus hairpin length is set for optimum 10MHz operation and the linear loading is adjusted for the sectors of the 7MHz band by moving the shorting bars symmetrically along the loading lines. Look for resonance at the hairpin on 6.8, 6.9 or 7.0MHz. (A shift of shorting bar position of approximately 180 mm is required for a 100kHz tuning increment). These correspond with low, mid or high band sectors respectively. If you want to operate on the whole band 7 to 7.3MHz this can be done at the expense of gain and back to front ratio at the high end by using the low band settings for reflector and mid band settings for front element. A subsequent change of 7MHz tuning will not influence the other bands. Do not attempt to tune the elements with a dip meter after assembly of the antenna because the results will be confused by mutual impedance.

To summarise the tuning procedure:

1) Element length, 10MHz

2) Linear loading, 7MHz

3) Hairpin length, 14MHz

4) Hairpin tap, 28MHz

FINAL ASSEMBLY

THE ANTENNA SHOULD be assembled using both Fig 2 and the makers' instruction

*Box 71, Seeb Airport 111, Sultanate of Oman

SEVEN ANTENNAS ON ONE TOWER

THE PHOTOGRAPH, which was taken early in the development period, shows my home-made tower with an experimental antenna attached. The boom length was not finalised at this time and it was still supported by stays from an extension of the mast. In final form these stays were not required. Also the rotator, an Emoto type 1105MS, was not yet fitted. The front and rear elements of the seven band antenna are in their final positions but the driven element is not fitted. The other elements belong to a 17m monoband antenna which was being systematically replaced by the seven band antenna without unbalancing the boom.

Because of the severe working conditions, with temperatures sometimes exceeding 50°C in the shade, it was necessary for most of the construction and development to take place by moonlight. During daytime no part of the antenna or any tools could be handled unless kept in an ice box!

The mast is constructed from 16m of 100mm steel tube pivoted on the parapet wall of the bungalow about 4m above the ground. A falling derrick consisting of 8m of 56mm steel tube is permanently attached and shares the mast pivot.

The derrick and mast have stays of 6mm steel wire rope terminated on the walls of the bungalow. Two mast stays are permanently attached to the top of the derrick which is itself fixed to the opposite parapet wall via a bracket when the mast is vertical. A 500kg boat trailer winch, fixed to the wall, is used for single handed control of the mast.

The mast also supports both one end of the author's 160m inverted-L and the Double Delta antenna for 80m, which was described in *Radio Communication* November '93. Readers will appreciate that the municipal authorities in Muscat do not discourage the construction of amateur radio antennas.

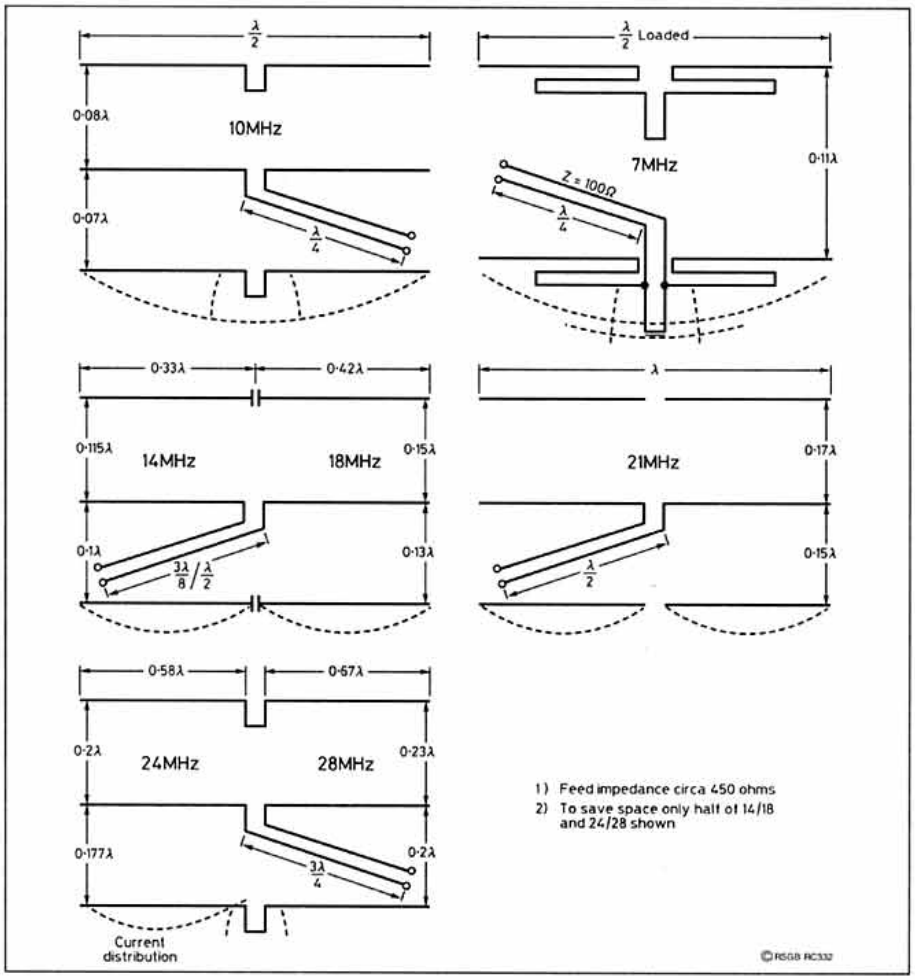


Fig 8: Current distribution of the antenna on each of the seven bands.

manual. Again be very careful of electricity supply wires and make sure that the screens on the sections of dual coaxial feeder and those on the control cables are bonded to boom and tower at each end where appropriate. With an antenna of this size it is necessary to give some thought to handling. If your tower is fixed it will be necessary to use a crane or extension mast and lifting tackle. Either of these will require a rigger working overhead. The centre element need not be attached until last because it is accessible from the tower. However it will be necessary to support the tubes until the insulator clamp bolts are tight.

My preference is for tilt over towers because they allow one to work single handed from the safety of the ground. My method is first to align the rotator and attach the boom and cables whilst they are horizontal. Then to raise the tower slightly to permit 90° rotation before fixing the centre element whilst working on steps. Back on the ground the director is fixed 7ft (2.13m) below the centre element. The tower is raised again and the antenna rotated 180°. Next the tower is lowered and the reflector fixed 8ft (2.44m) from the centre element. This method has the advantage of not requiring a large ground area near the tower on which to assemble the antenna and it is inherently safe, particularly if the boom takes some of the weight off the tower whilst you're working below. Also it is easy to check the relays and servo system as construction proceeds.

Although, as indicated below, the vertical radiation pattern is relatively broad, making antenna height not very critical, 20m is preferred for best compromise performance on all seven bands.

PERFORMANCE

THE CURRENT DISTRIBUTION of the antenna is illustrated in **Fig 8** for each of the seven bands. The antenna works, as was originally intended, as a two element Yagi on 7MHz giving 4.9dBd gain and 15db back to front radiation ratio (makers' figures). On 10MHz it is a close spaced full sized three element Yagi capable of about 7dBd gain and over 30db back to front ratio. The antenna becomes an extended Yagi with wider spacing on the other bands. For example on 21MHz there are effectively six elements. On a test range I measured 19.6dBi (11.5dBd) peak gain on 24.95MHz on the first prototype of this antenna. This was about one decibel more than anticipated. Back to front radiation ratio exceeded 20dB at that time.

The beam is impressively narrow in azimuth on the higher frequencies, rather like the conventional 8-element Yagi that one might use on VHF. The vertical beam width should still be that of a 3-element antenna however. Minor lobes each side of the main beam will be apparent on 28MHz. Gain on the 28MHz band will be reduced if you tune for coverage of the whole band 28 to 29.7MHz. I have tested the antenna at 1kW input on all but 28MHz, where I could only produce 100 Watts.

FINAL TUNING

THIS IS WHERE YOU will really appreciate the servo system because of the flexibility it allows when tuning. You can choose to optimise back to front radiation ratio or gain within a band to suit the preferred mode or current interest. Tuning from the operating position requires a steady local signal off the back of the antenna. For general operating activity within the wider bands (14, 21 and 28MHz) it may be advantageous to adjust the reflector tuning preset resistor for minimum received signal at a frequency near the low end of each band. Adjust the director similarly at a frequency near the high end. The narrow WARC bands can have both elements tuned at the band centre. Beware that it is possible

on some bands to interchange director and reflector functions. A very low power wideband noise source driving a short high horizontal dipole a few wavelengths away is ideal for tuning because it saves having to leave the operating position to change frequency (I used the noise radiated from a defective 11kV power line insulator).

If required the antenna can be set up on non-amateur frequencies within the tuning range. If you find that a null is found only at the extremes of adjustment it will be necessary to alter the hairpin tuning. For example if the 14MHz null is achieved only above 14.3MHz then the main hairpin tuning requires lengthening. After establishing optimum directivity, only now do we sort out settings for the balanced type of ATU.

To avoid the problems associated with running open wire or slotted line into the house, I suggest removing the balun from the ATU and installing it outside in a suitable container. The shortest practicable length of coaxial cable can then connect the balun to the ATU. At least one manufacturer of tuners includes an optional kit for this purpose. You should have no grounds to envy those amateurs with monoband beams and multiple towers because, as Fig 8 shows and as the tile implies, if you complete this project you will have effectively seven monoband beams and not have to rely on multiple towers to prevent their mutual interaction!

At the time of writing amateurs do not have access to the 10MHz band so I cannot put the antenna to work on that band yet in the Sultanate of Oman. ♦

● Eric, G3VRU, is seeking any information for a **Mk 19 Set**, especially schematic and component layout. Also any help in clearing a fault in an Amtor program for a Commodore C64 for use with the AMT-1 Terminal. Please contact him by writing QTHR.

● Keith, G0OZK, needs a circuit diagram for an old **Venner 4-digit counter/timer**, type TSA6634A/2 and/or any information of any surplus cards or PCBs. If you are able to help, then contact Keith QTHR.

● Mike, G3OOQ, needs any advice/information for a **semi-conductor laser (0.4mW) assembly,** possibly from a printer, to use as a pointer? No make, roughly the size of TO3 transistor case, with four flat supply leads, yellow, blue, white and red with polarised flat yellow socket. Sub-assembly carries numbers 24Z57,s708,KSS-121A,107702S. Contact Mike on tel: 0789 205973.

● John, G3OQC, is seeking any information/circuit diagram for a **PACE Fleetmaster FM 3625** modified to accept and fitted with CTCSS board. Has Tx working but cannot open the Rx. Expenses reimbursed or information purchased. If any one can help, thencontact him by telephoning 0705 380705 or write to G3OQC, QTHR.

● Any information of a supplier or other source of **Aluminium tubing** to replace a Jaybeam TB2 Mk 2 Tri-bander driven element, the original sheared in a storm. Dimensions are - Length, 250cm/8ft 4in; OD, 32mm/1.25in; ID, 30mm/1-1/8inch. Anyone able to help to contact Stuart, GM0CAQ, (NOT QTHR) on 0261 833298.

● Len Iceton, G0IIL, is seeking any alignment procedure/information or the possible loan of such material, for an **Airmec Type C864**. Anyone able to help please contact him tel: 0642 559845 or write QTHR.

● Don, G0PRZ, needs manual/circuit diagrams, etc for a **Standard Signal Generator** TF144G No B192, Marconi Instruments Ltd. Unit also marked ZD00390 Signal Generator No 1 Mk3 - Marconi's Service Division have manual back to TF144H but no earlier. All expenses will be reimbursed. Contact Don on tel: 0703 261877 or write QTHR.

● Harjo, DK3VF, need a circuit diagram for a **Sinclair MTV1** - TV Receiver or an address where to get one. All expenses reimbursed. Contact him by telephoning (Germany) 40 7374246 or write to: H Schroeter, DK3VF, Moorfleeter Deich 503, 21037 Hamburg.

● Mr F A Law, G6RHP, wants a circuit diagram and/or service manual for an **Olivetti Dm105 S 9pin Printer**. All expenses paid. If any one can help, then contact him by writing to: 47 Springcroft, Hartley, Longfield, Kent DA3 8AR. ♦

Pat Hawker's Technical Topics

PAT HAWKER, G3VA
London 37 / SE22 8SS

LOW-NOISE OSCILLATORS

RECENT DISCUSSION IN *TT* (September and November 1994) on crystal and LC oscillators concentrated on the achievement of good frequency stability with only a brief mention of another factor that in recent years has become of increasing importance: the reduction of oscillator sideband noise. In September it was noted that the phase noise floor of a precision crystal oscillator can be reduced at the expense of the long term ageing rate. With LC oscillators, achievement of the lowest phase noise similarly requires contradiction of some of the classic requirements for high stability including the lowest possible output from the oscillator device.

But why is low phase noise important? As F N H Robinson noted in his book *Noise and Fluctuations in Electronic Devices and Circuits* (Clarendon Press, Oxford, 1974): "The treatment of oscillators in electronic texts is generally rather brief and mainly concerned with questions such as power output, efficiency and frequency stability (p172)" and "In general, except in nuclear resonance spectrometers and where an oscillator is required as a local oscillator in a superheterodyne system, noise in oscillators is not of much practical consequence. We do see, however, that as a general rule, whenever a few millivolts of signal are required, it is better to obtain it by attenuating a larger signal from a more powerful oscillator than to attempt to design a low-level oscillator (p184)."

Yet only a few years later we find Professor Mike Underwood, G3LHZ, in discussing 'Oscillator Noise Limitations' (IERE Conference Publication No 40, 1978) pointing out that "The noise sidebands of the oscillators in a radio system ultimately limit the interference generated on or received from adjacent channels. A new approach is outlined for deriving the fundamental limiting factors for oscillator noise performance. These are shown to be circuit Q, amplifier dynamic range and phase shift, and varactor RF voltage handling capability."

One of the first engineers to underline the importance of oscillator noise (in microwave systems) was W A Edson 'Vacuum Tube Oscillators' published in 1953, and first brought to the notice of *TT* readers by Walter Schreurer, K1YZW (see *ART7*. pp170-171). Edson wrote: "It is well known that the small voltages within solid conductors and the corresponding random emission of electrons within vacuum tubes set a lower limit on the magnitude of electrical signals which may be amplified and detected. . .It is not so commonly realised that noise voltages also affect the operation of oscillators. It is true that in most oscillator applications the effects of noise are quite small; but in some cases, for example in microwave oscillators used in superheterodyne receivers, the noise sidebands seriously restrict the choice of IF."

He showed that the output power from an oscillator spreads out over a band of frequencies in the type of curve one associates with high-Q tuned circuits: **Fig 1**. The noise output represents a form of jitter in the oscillator, and if fed into the mixer means that the receiver will have some (though much reduced) response to signals over a range corresponding to the spread of oscillator noise power: **Fig 2**. The purity of the output increases with increase of oscillator output and selectivity, and with decrease of frequency and inherent noise of the valve or semiconductor device.

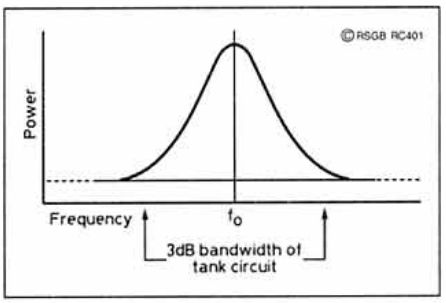


Fig 1: Noise sidebands around a carrier (fo). At the frequency corresponding to the 3dB points of the tank circuit, the noise spectrum begins to rise out of the noise plateau (-174dBm/Hz degraded by the amplifier noise figure) at the rate of 6d/B octave. That is to say the noise power per Hertz of bandwidth increases by four times each time the offset from the carrier is halved. A low noise oscillator requires a strong carrier output and maximum circuit Q. A carrier plus one sideband is mathematically equivalent to the simultaneous amplitude and angle modulation.

In HF and VHF superhet practice, appreciable local oscillator output is barely likely to spread significantly to the signal frequency although care should be taken that oscillator floor noise does not enter the IF channel. However, any significant jitter causes the receiver to respond to loud signals close to the desired signal frequency (Fig 2) due to reciprocal mixing (**Fig 3**). Similarly, if the transmitter oscillator has a corresponding spread of output it will be amplified in the main transmitter stages and there will be radiation in adjacent channels. The output may appear

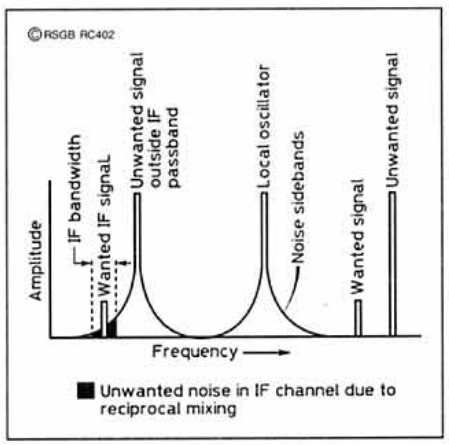


Fig 2: The mechanism whereby reciprocal mixing degrades the received SNR of weak signals in the presence of strong signals due to the noise sidebands of the local oscillator.

stable and apparently 'clean': **Fig 4** , when checked by normal techniques. At HF, oscillator noise falls off rapidly and these effects often only become apparent when trying to receive a weak signal alongside a very strong one. However oscillator noise effects in both receivers and transmitters tend to be much more significant where a PLL-type frequency synthesiser is used: **Fig 5**.

One of the problems in assessing the practical importance of oscillator noise in radio systems is the difficulty of measuring close-in noise without state-of-the-art high-grade professional instruments, seldom found even in otherwise well equipped laboratories. Lord Kelvin, that 19th century colossus of physics, once wrote: "When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind: it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science."

Colin Horrabin, G3SBI, in his quest for a super-linear receiver that could be duplicated by others, has devoted considerable effort to devising a phase-noise measurement set-up which enables him to assess the effect of component and other changes etc, on the phase noise of oscillators (**Fig 6**). He has continued to develop the super low-noise oscillator described in *TT*, July 1994. There is, unfortunately, a practical limit to the improvement in adjacent channel reception that can result from super-linear receivers, at least until the noise sidebands generated in transmitters is reduced to similarly low levels.

The July notes from G3SBI covered the development of a low phase-noise two-coil oscillator using a grounded-gate FET. The most promising version of this circuit used stripline inductors against a groundplane. A further development uses spiral printed circuit inductors to reduce the physical size and achieves a similar basic performance. The July *TT* provides a good example of the design approach to a good low-phase-noise oscillator.

The original work was done with only a high-quality spectrum analyser available to make phase-noise measurements. Subsequently, his phase noise measuring system shows that with an oscillator carrier frequency of 72MHz a noise performance of the order of -153dBc/Hz occurs at about 20kHz. The aim is to develop a frequency synthesiser using

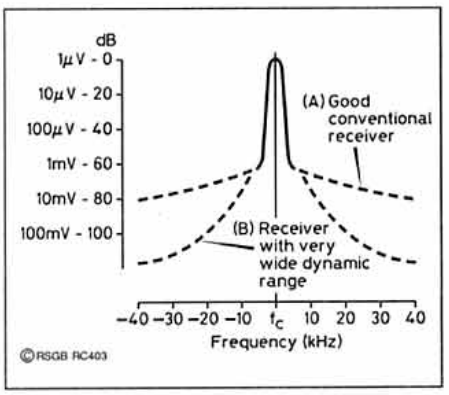


Fig 3: How reciprocal mixing due to oscillator noise can modify the overall selectivity curve of an otherwise very good receiver.

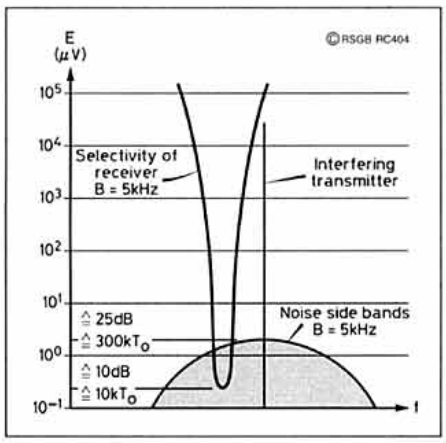


Fig 4: Showing how oscillator noise radiation from a powerful adjacent channel transmission can limit weak signal reception even in the absence of any cross-modulation in a receiver of wide dynamic range.

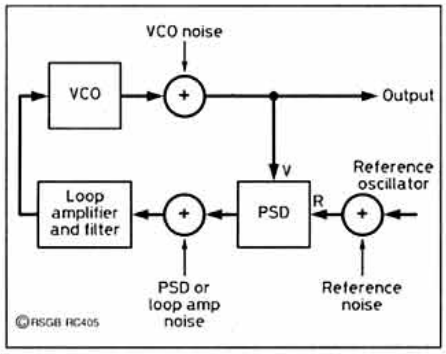


Fig 5: A phase-locked-loop oscillator arrangement is prone to be far more 'noisy' than a straightforward crystal or LC oscillator. The three main sources are the voltage-controlled-oscillator noise, the phase-sensitive-detector noise, and the reference-oscillator noise.

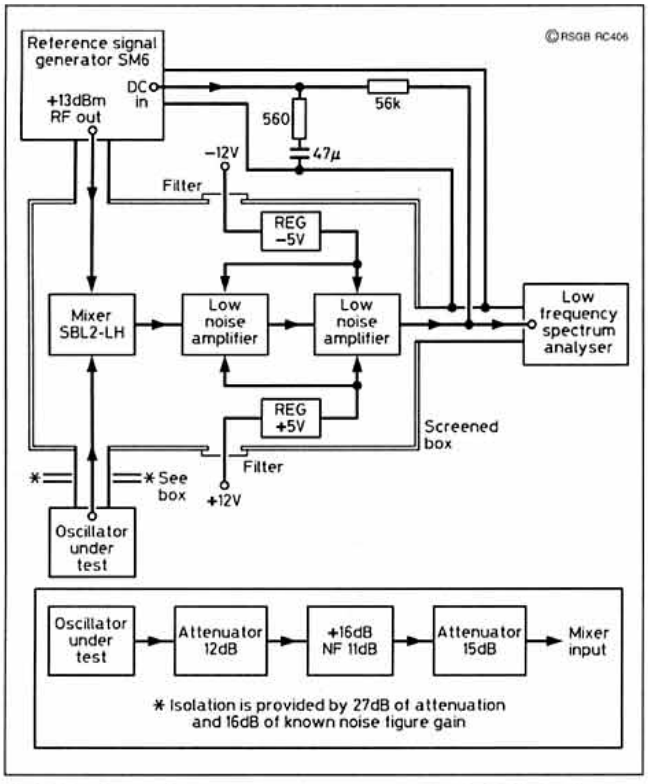


Fig 6: The phase noise measurement system used by G3SBI in the absence of the specialised high-cost Hewlett-Packard phase-noise measuring system.

direct digital synthesis (DDS) chips operating between 60 and 72MHz (to be divided by sixteen for the proposed 9MHz tunable-IF double-conversion receiver). Space limitations mean that a detailed description of this project must be deferred until another month.

In order first to provide background notes on the significance of oscillator noise, it is useful to note that the voltage regulator used on the VCO had a significant effect on the noise performance achieved. An LM317T was used to deliver 9.5V but subsequent RC bypassing was necessary to improve phase-noise performance further out from carrier. The use of the TL431 shunt regulator gave good far-out performance but the series regulator gave significantly better close-in performance (ie at less than 5kHz from carrier).

In *Proc IEEE, 1966*, pp329-330, W A Leeson provided 'A simple model of feedback of oscillator noise spectrum'. This provides a linear model that shows the origins of phase noise in oscillators and has been found to agree well with experimental data. Dr Ulrich Rohde, KA2WEU/DJ2LR provided a check list in his 1983 book *Digital PLL Frequency synthesisers - theory and design* (Prentice-Hall). The check list was based on his interpretation of the Leeson model on how to minimise phase noise in oscillators. Much of KA2WEU's text on oscillator phase noise in his book has been republished in ARRL's *QEX* as 'All about phase noise in oscillators' (Part 1, December 1993; Part 2, presumably January 1994). This is a highly mathematical treatment but general points from his check list include:

- Maximize the unloaded Q.
- Maximize the reactive energy by means of a high RF voltage across the resonator and obtain a low LC ratio. The limits are set by breakdown voltages of the active devices and the tuning diodes and the forward-bias condition of the tuning diodes.
- Avoid saturation at all cost, and try either to have limiting or AGC without degradation of Q. Isolate the tuned circuit from the limiter or AGC circuit. Use anti-parallel tuning diode connections to avoid forward bias.
- Choose an active device with the lowest noise figure. Currently (ie 1983), the best bipolar transistor is the Simians BFT66 and the lowest noise FETs are U310 and 2N5397 up to 500MHz. The noise figure of interest is the noise figure obtained at the actual impedance at which the device is operated. Using FETs rather than bipolar transistors, it is preferable to deal with the equivalent noise voltage and noise currents rather than the noise figure. . . .
- Phase perturbation can be minimized by using high-impedance devices such as FETs, where the signal-to-noise ratio of the signal voltage relative to the equivalent noise voltage can be made very high. This also indicates that in the case of a limiter, the limited voltage should be as high as possible.
- Choose an active device with low flicker noise. The effect of flicker noise can be reduced by RF feedback. An unbypassed emitter resistor of 10 to 30Ω in a bipolar circuit can improve the flicker noise by as much as 40dB.

KA2WEU notes that for low-noise LC oscillators, the highest quality signal generators use air-variable tuning capacitors rather than tuning diodes. He also stresses that while it is relatively easy to calculate oscillators and understand how they work, this does not necessarily optimise their design. He points to the Rohde & Schwarz SMDU signal generator as currently state of the art but to develop such a circuit from design equations is not possible. "This circuit is a result of many years of experience and research and looks fairly simple. The grounded-gate FET circuit provides the best performance because it fulfils the important requirements of the basic equation that allows an estimate of the noise performance of an oscillator."

G3SBI has drawn attention to a new software package that runs on a PC and can predict phase noise performance of oscillators offered as an analysis tool in Compact Software's Microwave Harmonica and claimed to have been successfully validated up to 39GHz but clearly practical experience still counts. Such matters as screening and filtering from 50Hz fields etc become increasingly important where extremely good noise performance is required to provide wide dynamic range.

Geoff Bagley, G3FHL writes: "In the quest for better stability and/or low drift, amateurs have often forgotten the noise output of an oscillator. The output of an oscillator is an approximation to a sine wave. It is really a very, very narrow-band of noise. The spectrum of this noise falls off at various rates, very steeply close to the carrier, perhaps as the inverse fourth power of the frequency offset, then the inverse third power, then the inverse second power, etc, until we reach the zeroth powers, ie the flat noise pedestal on which our 'sinusoid' sits. The quality and usefulness of an oscillator therefore depends not only upon the freedom from drift, but on the width and on the level of the output noise.

"Thus the power level of an oscillator is significant, and so is the noise figure at the input of the active device. According to notes made some time ago, a bipolar transistor is shot-noise limited (in the junction), whilst an FET is thermal-noise limited (in the channel). [Junction intermediate-power-FETs such as the U310, BF247A or 2N4856A have been favoured - G3VA]

G3FHL, who brought to my notice the 1974 book by F N Robinson, writes: "Another topic is the means whereby the level of the oscillation is defined. When you switch on from cold,

some small noises or disturbance are amplified and recirculated round the closed loop of the oscillator until it builds up to our desired output level. Something must be done at this point to restrict the loop gain exactly to unity, so that the signal does not go on growing for ever. This can be done either by AGC or by reaching some form of non-linear limiting level.

"Robinson distinguished between two types of oscillator limiter: (1) A soft limiter with a gentle non-linearity with small curvature, and (2) a suddenly abrupt hard-limiter which chops the tips of the sinusoid to the limiting level of oscillation. According to Robinson the second type of limiter is superior in reducing the close-in noise, such as flicker-noise. He advocates for optimum results a high-level active device with a low noise figure and abrupt hard limiting used with any of the stable oscillator circuits such as the Vackar, preferably not using a dual-gate MOSFET."

SIMPLE VALVE TRANSMITTER PRACTICE

THE SEPTEMBER *TT* item on 'Project 6L6 - 1984 Style' showed that there is still a place for one or two-stage transmitters on the lower-frequency bands that can be built in a couple of evenings from junk box or components salvaged from discarded valve receivers, etc. Valves such as the 807 and to a lesser extent the original 6L6 or post-war derivatives such as the EL84 and the higher power PL504 TV line-scan valves are still available if not found in the junk box. More difficult for the more recent addicts are high-voltage mains transformers and high-voltage, high-current capacitors (electrolytic or RF types) but even these can be found at rallies etc.

But for those who have gained experience only with solid-state black-box rigs the circuit techniques may present something of a puzzle. And even for those who ceased to use valves a decade or more ago, it may be necessary to brush up on such matters as handling high-voltage supplies, tuning pi-network output circuits, neutralising amplifiers with tuned grid and tuned anode circuits, etc etc.

In connection with the 'Project 6L6' transmitter, I must admit that it was not until the circuit was published that I noticed with regret that KH6B had omitted the important safety feature of connecting an RF choke directly across the output, as a safety precaution if the one nanofarad anode coupling capacitor failed and thus put the 350V HT supply directly on to the antenna. Furthermore the coupling capacitor should have been specified as at least 1kV rating since it has to cope with the peak RF voltage added to DC voltage, as well as passing appreciable RF current.

Mike Hall, G3USC (with professional expertise in the field of quartz crystals) makes some pertinent comments on this circuit germane also to valve amplifiers and oscillators in general. He writes: "Can I draw your attention to the circuit of the September *TT*, Fig 11 (the KH6B 'Project 6L6'). It is often forgotten that a blocking capacitor has no effect whatever to remove DC bias from another component which also is a capacitor. The applied voltage simply divides between the two in inverse relationship to their value.

"As an example, one comes across circuits of valve power amplifiers in which the HT feed is to the output end of the pi-network tank circuit and blocking capacitors have been inserted in series with the tune and load capacitors in the vain hope they will be removing DC bias from them. This can only be effective, of course, if they are shunted with a resistor to keep them discharged. Even in Fig 11 (September), if the pi-tank is AC coupled to its load, as could be the case with certain types of antenna tuner, a large proportion of the HT voltage will be applied across the variable capacitors upon which the AC signal will also be riding (a 1nF blocking capacitor seems a bit lowish for use on Top Band). It is usual, but not shown, to keep the variable

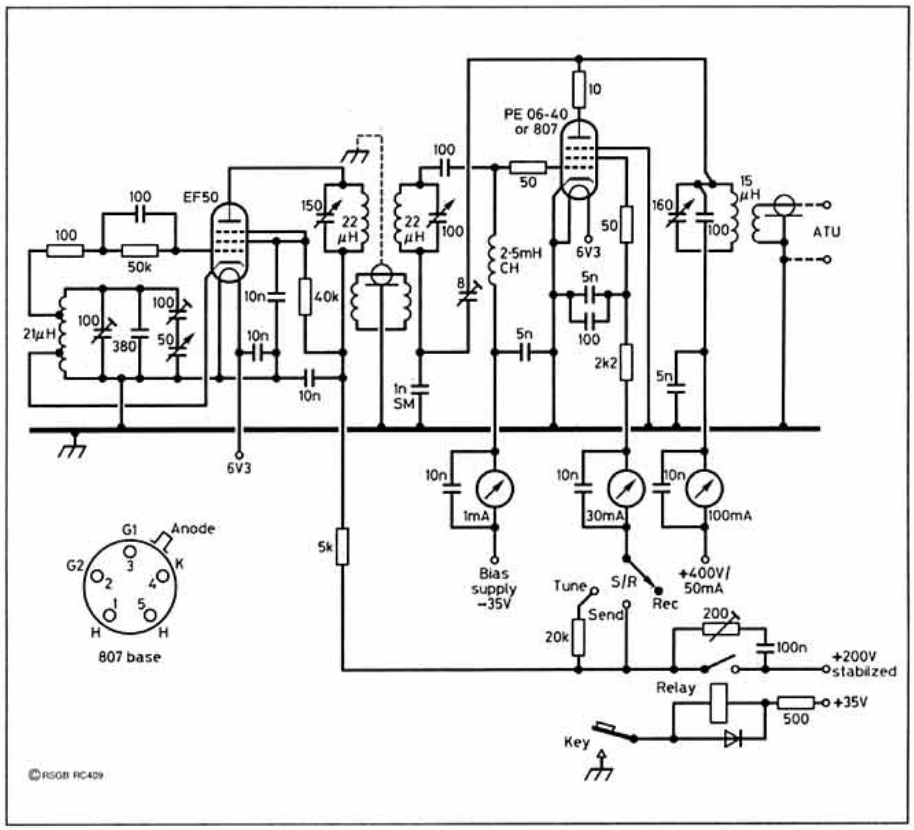


Fig 7: ECO-PA valve transmitter of PA3ZFK. Note that the keying relay is a high-speed type (Philips S50). The oscillator coil is wound on a ceramic former with, diameter 38mm, 26 turns, 0.65mm copper wire, length 40mm to provide 20-22uH inductance. Taps 3.5 and 13 turns from the earthy end. Bandfilter coils on ceramic formers diam 36mm, 30 turns, litz wire 50 x 0.07mm strands, length 35mm; link coupling 5 turns litz wire over 'cold' ends. PA tank coil ceramic former, 51mm dia, 18 turns, 3mm silvered wire, length 50mm, L 15uH, output link coil 2.5 turns insulated wire over the 'cold' ends (used with ATU).

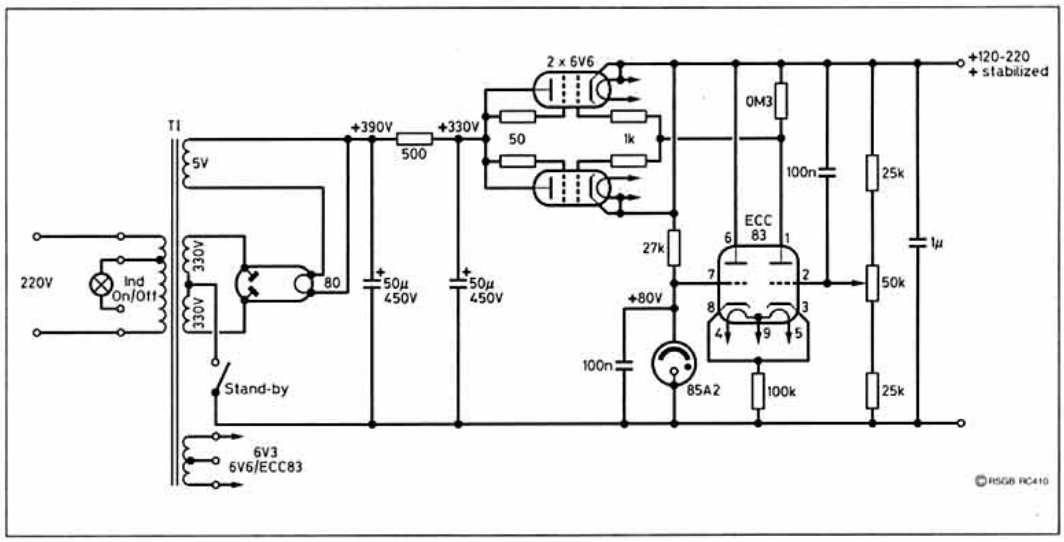


Fig 8: The 120-220V variable-voltage, stabilised PSU as used by PA3ZFK for the EF50 electron-coupled oscillator and the screen supply of the PA valve.

capacitors discharged by fitting a high-current RF choke across the output; this also blows the HT fuse if the series blocker goes short circuit."

"That is by the way. But I also wanted to make the point that crystals are subjected to stress by high applied voltages which affect their frequency and the linearity of their mechanical vibration, both possibly resulting in unpredictable operation. Without a resistor in parallel with the crystal in the circuit of Fig 11, because at DC the crystal is only a very small capacitor, the 5n blocking capacitor is serving no purpose at all. To remove the DC bias of the crystal, I suggest that it be shunted with a resistor of, say, ten times its impedance at the operating frequency or, put another way, ten times the reactance of the load capacitance presented by the circuit: a one megaohm should serve for most Pierce-type HF oscillators."

A crystal-controlled transmitter with a selection of just a few crystals can still be an effective set-up for an amateur prepared to put out CQ calls, but some degree of variable frequency control represents a great convenience and likely to bring more contacts in allowing an operator to reply to other people's CQ calls. Where it is only a question of a relatively small shift to avoid a busy channel, the crystal-VXO is one answer. A ceramic-resonator permits larger shifts but has lower Q and greater susceptibility to temperature variations. An older technique was the vari-gap crystal holder (see separate *TT* item).

There is of course no need to rely on quartz or ceramic resonators for simple valve transmitters: the classic LC oscillators described in the November *TT* can still provide sufficient stability and flexibility even in the absence of buffer stages. P M Bakker, PA3FZK in *Electron*, November 1994, pp607-610 describes 'Een CW-zender voor 80m met buizen' (A CW-transmitter for 3.5MHz with valves). **Fig 7** shows the circuit diagram of the basic transmitter, although PA3FZX also provides details of a stabilised, variable-voltage PSU (120-220V) for the VFO and screen-grid (g2) of the PA (**Fig 8**); a variable negative bias voltage PSU (-20 to -300V); a variable (0 to 35V) relay PSU for the high-speed keying relay etc; and a 400V PSU for the PA.

While this design is by no means the simplest possible it is clearly intended that the performance as a 3.5MHz CW transmitter should meet modern standards, and the stability is stated to be within 250Hz per hour after a ten-minute warm-up period. Interestingly the ECO VFO uses the Lampkin technique (*TT*, November 1994, p80, Fig 2) of tapping the grid of the EF50 down the Hartley-type oscillator coil. This resonant circuit tunes 1750 to 1800kHz with the second harmonic of 3500 to 3600kHz taken from the anode circuit with link coupling to the neutralised PA. The PA valve (PE06-40) is the Philips/Mullard equivalent of the ubiquitous 807.

VARI-GAP CRYSTAL UNITS

GERALD STANCEY, G3MCK was interested in the September *TT* item on quartz resona-

OSCILLATOR AGC

THE GENERAL QUESTION of oscillator AGC as a means of achieving a level, stable output over a wide frequency range rather than primarily for low oscillator noise is currently of great interest to Jack Hardcastle, G3IIR (who some years ago did so much to promote the use of ladder crystal-filters). He writes: "Back in the 1950s, I constructed a valve HF signal generator which used AGC to maintain a constant output from 100kHz to 20MHz but by about 1992 I felt the performance had fallen off so much that it needed replacing. While looking for ideas I came across an IEE conference paper 'VCO with negative dynamic feedback' by E Efstathiou & Z Odrzygozdz of the Warsaw University of Technology (IEE Conference Publication No 303, April 1989) and the circuit in *Amateur Radio Techniques* which you show again as Fig 10 in the September *TT*.

The method of using negative feedback to achieve level control, described in the Polish paper, is shown in **Fig 9;** but I wonder whether the BF961 has protective diodes on the input gates (like the BF981) which may in fact be rectifying the RF). My circuit (**Fig 10**) also uses a dual-gate MOSFET but includes a DC amplifier to give tighter amplitude control. This oscillated happily between 3.5 and 21MHz using appropriate L and C. Without AGC the output exhibited the usual amplitude variation as it was tuned across its range, but this became level once the AGC loop was connected. Unfortunately pressure from professional electronics then diverted me and the signal generator project was shelved. Thus the circuit was never optimised nor was any effort made to extend the range HF or LF, so much remains to be done.

"As I have now taken early retirement, I have revived my interest in this project. At the same time I substituted varicap diodes for the variable capacitor and discovered some unexpected problems caused by their tendency to act as rectifiers when the RF voltage exceeds the DC tuning bias. When this happens it restricts the tuning range at the LF end where the DC bias is at its lowest.

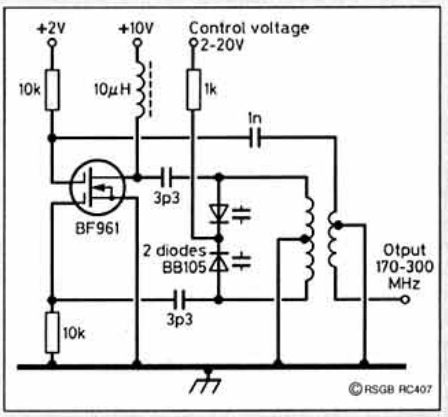


Fig 9: Voltage-controlled oscillator with negative dynamic feedback as described in 1989 by Polish engineers from the Warsaw University of Technology.

I have never seen this effect reported before, possibly because the tuning diodes have been used in the gate or base circuit of the oscillator where the RF voltage is much lower. However this entails using a shunt-fed collector circuit and the RF in the collector circuit will cause stray resonance problems at some point within the range of a wide-band signal generator (or receiver, etc). My aim was to circumvent this by using the series-fed arrangement with the tuned circuit in the collector. By regulating the amplitude of the oscillation it is possible to avoid exceeding the varicap bias and achieve the fullest tuning range.

"Using AGC makes oscillators much more 'designable' allowing variations in inductor Q and crystal activity to be readily compensated. Besides the obvious application in frequency standards and VFOs it could also be applied to GDOs, allowing the oscillator to be kept at its most sensitive level. A number of published designs have used dual-gate MOSFETs and would readily lend themselves to modification to include AGC.

"Someone (possibly Benjamin Franklin) once said "nothing is so powerful as an idea whose time has arrived". Perhaps this could be said of oscillator AGC. In keeping with this I have been planning to apply AGC to a Colpitts VFO but in view of the September *TT* comments I think I will change my mind and apply it to a Tesla (Vackar) oscillator instead."

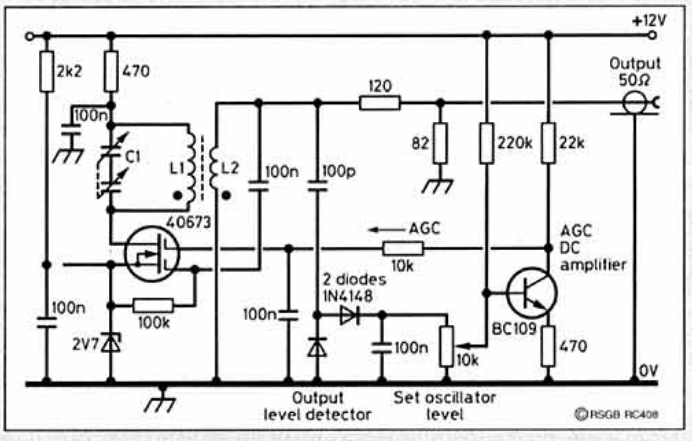


Fig 10: G3JIR's prototype automatic level-controlled oscillator. Tuning range 7.5 to 21MHz with C1 300 +300pF, L1 21 turns, L2 4 turns both wound on 0.25inch diameter slug-tuned former.

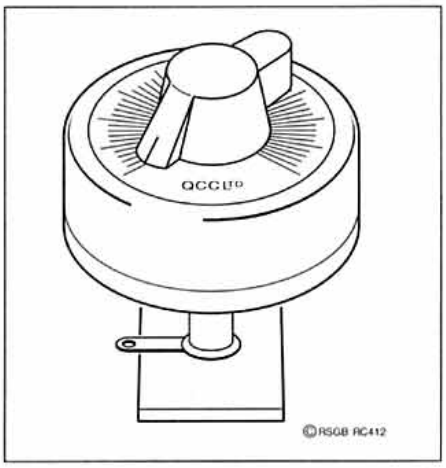


Fig 11: The 1938 QCC vari-gap crystal holder unit provided a useful frequency shift simply by turning the knob. Air-gap holders were soon superseded by plated crystals which provided higher activity.

tors but remains puzzled as to why the vari-gap crystal holders of the late 1930s and early 1940s were not more popular with radio amateurs and soon disappeared from the market. He writes: "Some years ago I acquired two of these vari-gap crystals made by QCC of New Malden. They give about 4.5kHz shift on 3.5MHz and 9kHz on 7MHz."

[An advert in the May 1938 *T&R Bulletin* (pre-war name of *RadCom*) for "A new QCC variable air gap crystal holder. Type AG" (**Fig 11**) states: The gap adjustment is controlled by knob as shown. Used with a 3.5Mc crystal it gives a frequency change of over 10kc on the fundamental frequency . . . . This invaluable feature often means the difference between a 100% QSO and a lost contact. Price including base 27/6d (£1.38p). With a 3.5Mc AT cut crystal 52/6d (£2.68p). With 7Mc LD cut crystal (shift about 7kc) 57/6d. - G3VA]

G3MCK continues: "I am puzzled as to why these were not used more by amateurs as even in those days of not very selective receivers the shifts would seem to have been most useful. In terms of cost the 1940 *ARRL Handbook* gives prices of American vari-gap crystal units as $5.50 compared with $3.00 for normally mounted crystals. This seems to be good value for money. One of the advertisements for vari-gap crystals also refers to cooling and the advantages of the large exposed metal case top! This may well be true as one of the designs in the 1940 handbook is for a 60-watt single-stage crystal oscillator transmitter using a 6L6. The design refers to short valve life but not to possible crystal damage."

I suspect the main reason for the disappearance of the vari-gap units was the development of the centre-plated crystal which rapidly displaced the earlier air-gap mounting. It was found that the activity of the plated crystals was much higher, although it was recognised that the elimination of the gap usually made the coupling between crystal and circuit much closer than was formerly the case. Whatever the mounting it is necessary to remember that any quartz oscillator unit uses material which can break readily whether shocked mechanically or electrically.

The original form of mounting (with the crystal directly between two plates larger than the round crystal plate) in an open rather than enclosed holder, often led to crystal puncturing or other damage from electrical stress. Quite early on air-gap holders were developed to minimise this problem, and it was relatively simple to arrange for mechanical variation of this air-gap. All crystals can be damaged by excessive RF current, and - particularly for such circuits as the power tritet arrangement it was common practice to wire a small 60mA fuse-bulb in series with the crystal to show whether the crystal current was excessive.

In the post-war period, crystal manufacturers pointed out that the centre-plated crystals had proved superior to gap-mounting. They also mentioned that difficulties could arise when a plated and wired unit was substituted in a circuit design primarily intended for the older types of gap-mounting. This is important for those building 'replica' valve transmitters based on pre-WW2 designs which may result in crystal currents that can damage modern plated crystals.

WEAK SIGNAL LIMITATIONS

G3IPV BELIEVES THERE is a simple explanation for this phenomenon based on his experience while experimenting with signal-frequency RF filters. He writes:

"It appears that intermodulation occurs between noise and signals in the upper and lower frequency halves of a bandpass filter and this normally happens in the mixer stage of the receiver or in any non-linearity occurring in amplifying devices.

"When this intermodulation occurs a peak of noise appears at the centre of the receiver passband although this is not normally observed by the radio operator as the peak of the noise is wider than the IF passband, but can be observed when the gain control is reduced as the signals become clearer.

"This phenomenon can be considered as a transitional state between an amplifier and an oscillator. Its effect on degrading weak-signal reception can be reduced by decreasing the RF bandwidth between antenna and the first RF stage of a receiver and ensuring that positive feedback in the RF stages is kept to the minimum possible. Some improvement can also be achieved by placing a gain control between mixer and the preceding RF amplifier or by inserting additional filtering at this point to reduce the sideband intermodulation noise produced in any earlier stages."

A typical signal-frequency filter used by G3IPV is shown in **Fig 12**. Coupling capacitors should be kept to the minimum value required to reduce feedback in the RF stage and increase selectivity.

Although not often mentioned in connection with HF reception, it has, in fact, long been recognised that positive (regenerative) feedback in a pre-amplifier has the effect of increasing the noise factor above that which can be achieved with an entirely stable amplifier. But whether this effect, or other causes of non-linearity, is a complete explanation of the observation that it is easier to read a signal only just above the noise level by reducing receiver gain still seems open to some doubt. Noise is in effect a series of 'spiky transients' with peak levels well above the apparent 'noise floor level' and this could show up also the non-linearity of the human auditory system.

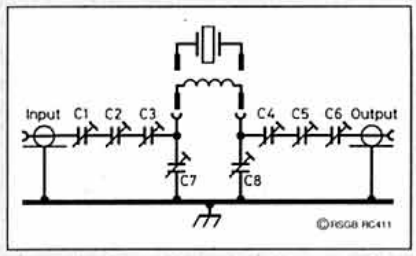


Fig 12: Basic front-end single-section signal-frequency filter (crystal/L-C version) as used by G3IPV in either single section form, or with repeated similar filter sections as required to increase selectivity. C1, C2, C3, C4, C5 and C6 coupling capacitors air-spaced vanes 0.5 to 5pF. C7, C8 tuning capacitors 150pF air-spaced vanes, keep equal in value when adjusting. Metal enclosure 8 by 6 by 3 inches.

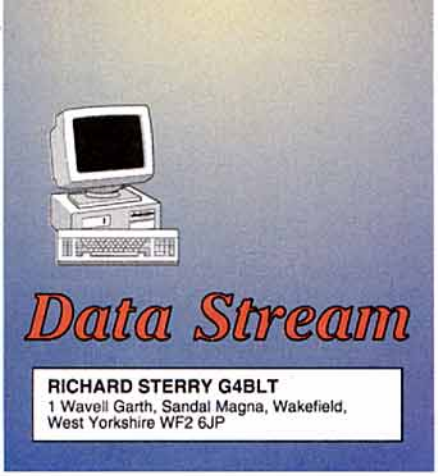
HERE & THERE

REG MOORES, G3GZT, provides a useful technique for winding coils for traps, loading coils, ATUs and PA tank coils. He points out that it is not easy to wind coils with the turns securely fixed so that they do not slip etc, especially when using ceramic and paxolin formers. G3GZI provides an easy solution to this problem: "The answer is simple. Obtain a coil of self-adhesive copper strip, as sold in 'hobby' shops, as used for making 'Terrariums' etc selecting a suitable width as required (typically about 5mm or 0.25inch)".

This can be wound (securely) on the former, the ends being terminated with a soldered on tag and small nut and bolt. A further advantage is that it is easy to solder any 'taps' to the strip at the required points. [I must confess I had to look up 'terrariums' in my dictionary which gives two definitions - 1) an enclosure for keeping small animals, 2) a glass container, often a globe, in which plants are grown - but I recall that self-adhesive copper strip has featured before in *TT* - G3VA].

CORRECTIONS

IN THE caption for the Vackar basic oscillator circuit (Fig 5(c) of *TT* November 1994, p61, the ratios C2:CV and C1:Cx should both be about 6:1 and not 1:6. The text information is correct. In the G3PDM diagram, Fig 9, p62, the FET oscillator should be type 2N3819 (or equivalent) and not the bipolar 2N3794 shown. Incidentally, Dr A J Smith, G4OEP suggests that the stability of the G3PDM Vackar VFO (Fig 7) can be further improved by adding standard source-bias components (say 560ohms to 1K in parallel with 100nF) since this reduces the power dissipation in the FET, stabilises the operating point, and consequently reduces the warm-up drift by a factor, in his experience, of about 5. ♦



Data Stream

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THERE IS INCREASING interest in datacomms programs suitable for running under MS Windows 3.1. PacComm's PacketPet for Windows was reviewed in the September 1994 *Data Stream*, and the reviewer made the comment "the ultimate windows packet program still needs writing". I have since heard of a German program called WinGT v1.51 (Windows Graphic Terminal), which apparently does just about everything that Paket 6 does. Unfortunately an English language version is not yet complete, but I'll bring you news of it as soon as I can.

BUYER'S MARKET FOR OLD PCS

MS WINDOWS 3.1 will not run on anything less than a 80386-based machine, and indeed on slower 386s it does run rather slowly, though graphics accelerator cards and other enhancements do help a great deal. Largely as a result of this, very large quantities of the earlier 8086/8088 (XT) and 80286 (AT) machines are appearing on the second-hand market. The upshot of this is that they are now ridiculously cheap, and absolutely superb value for money. Even a slow XT will run a program like Baycom quite well, and so you have the possibility of getting on packet, including an old PMR rig, for around £100! Although the infamous MSDOS operating system isn't noted for its user-friendliness, the low cost of such machines and suitable peripherals and upgrades, makes them very attractive for amateur radio use.

In fact, now that 80486-based machines, and even Pentium-based ones, have dropped in price considerably, many businesses are now replacing their 386s, so these too can be found at very reasonable prices second-hand, as low as £250 - £300 depending on specification. These machines will run Windows, albeit not very fast, but since most amateur radio software runs directly under MSDOS this is not really a disadvantage, and they will be plenty fast enough.

However, do be wary when buying second-hand, especially from a source previously unknown to you. Just because the label on the casing says the machine is a 386/33MHz, for example, it doesn't mean that this is what is actually inside, as a few people have found out to their dismay!

COMPUTER SUPPORT & SOFTWARE

OLDER COMPUTERS can still give good service for amateur radio use, but without the necessary software and support, they are virtually useless. Here are some more contacts, and if you have any more to add, please let me know.

DRAGON 32/64

The old Dragon 32 and Dragon 64 are machines that crop up on the second-hand market quite a bit, often without the manuals of course. These are quite useful for amateur radio, and quite a bit of software has been written for them over the years.

There is still a user group to provide PD software and support, and you can write to the National Dragon Users Group, c/o Paul Grade, 6 Navarino Road, Worthing, West Sussex, tel. 01903 207585. Although not an amateur himself, Paul can advise on sources of amateur radio software, and there certainly used to be a very active group called DRAGNET at one time. Do remember to enclose that vital SASE!

BBC MICRO

These are now available ridiculously cheap at rallies, together with suitable 5.25" or 3.5" disk drives. They are robustly constructed, and have aged well on the whole, though faulty key switches and tarnished IC sockets can be a source of trouble on older model Bs. Also, the switchmode PSUs are expensive to replace or have repaired, but it is possible to pick up a scrap machine with a working PSU and/or keyboard very cheaply. The Master 128 is the best of the bunch as it has a better keyboard with numeric keypad, and much more built-in software (including a Terminal program), plus full DFS (Disk Filing System) and ADFS (Advanced DFS), and more RAM. The Master 128 does need the all-important 'Welcome Disk', as certain utilities were not supplied in ROM, but it isn't hard to get hold of a copy; I always keep one handy in case anyone is stuck.

These machines make good packet terminals, and there is also some excellent RTTY/AMTOR software available on ROM from BARTG, as well as plenty of PD software for various amateur radio applications. For details of the RTTY/AMTOR ROMs, send an SASE to BARTG, c/o Peter Adams G6LZB, 464 Wippendell Road, Watford, Herts., WD1 7PT.

Although the disk operating system on these machines isn't any more friendly than MSDOS, (they both date from the early 1980s and have many similarities), the big advantage is that the operating system is in ROM, not on disk, and RAM is used very economically. This means that even a machine with a limited memory and a single floppy drive can be very useful. Hard disks were available for these machines, 10 to 20Mb being typical, though have never seen any at amateur radio rallies.

If you need support on these machines, there is an extremely active BBC 8-bit User Group, issuing regular magazine disks and offering an extensive PD library. If interested, please send an A5 or A4 SASE to Chris Richardson, 17 Lambert Park Road, Hedon, Hull, East Yorkshire HU12 8HF, tel. 01482 896868. Although not an amateur himself, Chris is a real dyed-in-the-wool BBC enthusiast, and his PD library does contain amateur radio software.

COMMODORE C64/128

The Commodore 64 was 'born' at much the same time as the BBC Micro, and there is plenty of amateur radio software available, including the packet program Digicom, the forerunner of Baycom for the IBM PC. These machines are also robustly made, though the separate mains PSUs seem to be a bit of a weak point. However, being external it is easily substituted. Disk drives are expensive and not easy to come by, as special Commodore units must be used; you can't just use a standard bare drive like you can with a BBC Micro or an IBM PC.

The Commodore Club 64/128 is very active, and provides support for the C64 and its bigger brother the 128. For details, send an SASE to Paul Timmins G0NDV, 60 Bramwell Street, Netherthorpe, Sheffield, South Yorkshire S3 7PA.

COMMODORE AMIGA

The Commodore Amiga series of machines also has its support group in this country, and this is the Amiga Amateur Radio Users Group (AARUG). Do not do as I did, and confuse AARUG (two As) with ARUG (one A), which is the Atari support group I mentioned in the November column (the organiser of the ARUG,Graham Raynor, G7KCT, is on Packet @ GB7MSW). I can only hope that someone does not start an Acorn Archimedes Amateur Radio Users Group to add to the confusion.

The person to contact is Bob Perks, G0LBQ, 120 Cranes Park Road, Sheldon, Birmingham, B26 3ST. Send him a formatted disk (preferably with something interesting on it) in a padded envelope, enclosing a return address label and return postage, and he will send you the AARUG Info/Catalogue disk by return. If you live outside the UK, you can enclose one IRC or $US1 instead of postage, and if you enclose two IRCs or $US2 Bob will supply the disk as well.

ACORN RISC OS

Readers not active on packet radio may be unaware that there is a certain amount of amateur radio software available for the Acorn RISC OS family of computers, from the original Archimedes A305/310 right up to the new Risc PC. Much of it is in the Public Domain, and some is semi-commercial or sold through AMSAT-UK. If you would like an 800k disk of some of the software, with a list of the rest, please send me two 25p stamps, (or two IRCs if abroad), and a self-addressed label, preferably self-adhesive. Please state whether you would prefer datacomms, or miscellaneous, software on the disk.

OBTAINING IRCs

WITH ALL THESE support groups, anyone writing from outside the UK should enclose an IRC instead of postage. IRCs, (International Reply Coupons), are available at Post Offices and are *not* valid unless franked with a rubber stamp in the bottom left-hand box! I mention this, as I receive quite a lot of unfranked ones myself.

PACKET BANDPLANS

THERE HAVE BEEN quite a few changes to the VHF/UHF packet bandplans in the past year, so at the request of the RSGB DCC, (Data Communications Committee), I am publishing them here for the benefit of the

ordinary user. All channels are 25kHz spacing, unless otherwise stated.

6 METRES

50.600 ..... RTTY calling channel
50.610 ..... AX25
50.630 ..... AX25
50.650 ..... AX25
50.670 ..... AX25
50.690 ..... AX25
50.710 ..... AX25
50.730 ..... AX25
50.750 ..... AX25

Unattended operation is allowed on the above frequencies with prior permission from the local RIS. All the above frequencies apart from the RTTY calling channel are available for issue on BBS NOVs by the DCC.

4 METRES

70.3000 ..... RTTY/FAX calling channel
70.3125 ..... AX25
70.3250 ..... DXCluster access/linking
70.3375 ..... AX25
70.4875 ..... BBS/NODE linking

12.5kHz channel spacing must be used on this band. Unattended operation is allowed on the above frequencies with prior permission from the local RIS. All the above frequencies are available for issue on BBS NOVs by the DCC.

2 METRES

144.525 ..... High speed data
144.550 ..... Secondary BBS access
144.5625 ..... To be allocated, 12.5kHz
144.575 ..... General packet activity
144.600 ..... RTTY calling channel
144.625 ..... TCP/IP
144.650 ..... Primary BBS access
144.675 ..... DXCluster access

Unattended operation is allowed on the above frequencies with prior permission from the local RIS. Formal site clearance is required for remote site operation if a GB7 + 2-letter callsign is required. All the above frequencies are available on BBS NoVs (1 spot frequency only per NoV). Due to the reorganisation of the 144 to 145 part of the band, the frequencies between 144.525 and 144.600 are only being used on a temporary basis and packet users are reminded that frequency occupancy must be checked before use.

70CM SUB-BAND A

430.625 ..... BBS/NODE Linking
430.650 ..... BBS/NODE Linking
430.675 ..... BBS/NODE Linking
430.725 ..... BBS/NODE Linking 50kHz
430.775 ..... BBS/NODE Linking 50kHz

Unattended operation is *not* allowed in Sub Band A unless formal site clearance is obtained. One spot frequency can be issued on BBS NoVs by the DCC.

70CM SUB-BAND B

432.625 ..... TCP/IP & high speed AX25
432.650 ..... AX25
432.675 ..... AX25

70CM SUB-BAND C

433.625 ..... TCP/IP
433.650 ..... AX25
433.675 ..... AX25

Unattended operation is allowed in Sub Bands B & C with prior permission from the local RIS. Remote site operation requires formal site clearance if a GB7 + 2-letter callsign is to be used. One spot frequency can be issued on BBS NoVs by the DCC.

70CM SUB-BAND D

439.825 ..... BBS/NODE Linking
439.850 ..... BBS/NODE Linking
439.875 ..... BBS/NODE Linking
439.925 ..... BBS/NODE Linking 50kHz
439.975 ..... BBS/NODE Linking 50kHz

Unattended operation is *not* allowed in Sub Band D unless formal site clearance is obtained. One spot frequency can be issued on BBS NoVs by the DCC.

Sub bands A and D are under review at the present time, with the possibility of introducing 12.5kHz channels to expand the available channels for linking purposes. Primary user occupancy is being checked before any changes are suggested.

Talks are under way with the RSGB VHF Committee for additional digital sub bands.

23CM (1240MHZ)

1240.150 ..... 150kHz channel
1240.300 ..... 150kHz channel
1240.450 ..... 150kHz channel
1240.600 ..... 150kHz channel
1240.750 ..... 150kHz channel
1240.850 ..... 25kHz channel
1240.875 ..... 25kHz channel
1240.900 ..... 25kHz channel
1240.925 ..... 25kHz channel

RSGB Data Communications Committee Chairman Tom Lilley, G1YAA.

1240.950 ..... 25kHz channel
1240.975 ..... 25kHz channel

Unattended operation is *not* allowed unless formal site clearance is obtained. One spot frequency can be issued on BBS NoVs by the DCC. This band is mainly used for BBS/NODE linking.

23CM (1299MHZ)

1299.000 ..... 25kHz channel
1299.025 ..... 25kHz channel
1299.050 ..... 25kHz channel
1299.075 ..... 25kHz channel
1299.100 ..... 25kHz channel
1299.125 ..... 25kHz channel
1299.175 ..... 50kHz channel
1299.225 ..... 50kHz channel
1299.275 ..... 50kHz channel
1299.325 ..... 50kHz channel
1299.425 ..... 150kHz channel
1299.575 ..... 150kHz channel
1299.725 ..... 150kHz channel

Unattended operation is allowed on this band with prior permission from the local RIS, except in Northern Ireland. One spot frequency can be issued on BBS NoVs by the DCC. This band is mainly used for BBS/NODE linking.

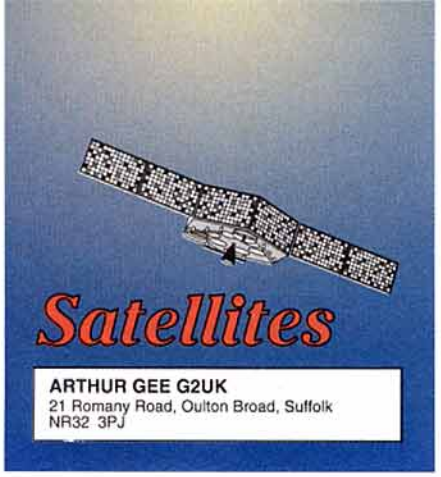
DATACOMMS PERSONALITIES

FROM TIME TO TIME I like to devote a little space to the more human side of datacomms. This month, it's the turn of Tom Lilley, G1YAA (see photo). Tom is currently Chairman of the RSGB DCC (Data Communications Committee) which has a heavy involvement with the applications for data mailbox NoVs (Notices of Variation) and Site Clearances, and for packet node Site Clearances. The DCC also liaises with the DTI RA (Radiocommunications Agency).

Tom is 51 years old, born in Sheffield, and now lives in a cottage near Alnmouth in Northumberland, with his XYL, Mary. He served with the RAF (Air Traffic Control) in the 1960s, and is now a fire officer with the MoD Fire Service at the RAF Boulmer helicopter station in Northumberland. He is the Trade Union representative at the station, and is also a member of the National MOD Fire Service Committee. His hobbies include playing golf, (which he does badly), fishing, shooting, and of course, amateur radio!

Tom joined the RSGB in 1987, became licensed in 1988, and was a founder member of the North East Packet Users Group (NEPUG) in the same year. He has been active on the NEPUG committee ever since, serving in various capacities including that of chairman. He joined the DCC in early 1992, and was appointed Mailbox Co-ordinator in October of that year. In August 1993 he was appointed Chairman of the DCC, in which role he continues.

Tom is also active on a number of other RSGB committees and working groups, including the RSGB/RA Packet Working Group, which will soon discuss the future licensing of amateur digital communications in the UK. ♦



Satellites

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

AT THE BRINK of a new year, it's time for the making of those 'old hat' New Year's Resolutions that one never keeps. How about making yours to help to build up the Phase 3D Fund - and try to keep that one!

Conceived towards the end of the 1980s, the Phase 3D Project was built to give world-wide communication. The so called 'P3 Satellites' followed the success of the low-flying OSCARs 6 through 8. The first of these was lost in 1980 through a launcher failure. The second was launched in 1983, to become the very successful OSCAR 10 and the third of the series, Phase 3C, was launched in early 1988. Phase 3D followed as a breakaway from the plans of earlier satellites, being the first of a new series of larger satellites to be accessible by simple, low-powered amateur ground stations world-wide.

It is interesting to note from the publicity brochure announcing Phase 3D, what its original parameters were to be. It was to be 3 metres in diameter and 0.7 metres in height; 400kg in weight and with a life expectancy of eight years. Facilities would be provided for 145MHz and 1269MHz uplink and 435MHz downlink. A nice little modest specification. Due for launch in 1990.

However plans changed and now in 1995, the satellite has expanded into the form shown in the new column logo above. It will be far more sophisticated than at first planned, due to the quick growth over the past few years in the technology of satellites, amateur as well as professional. So it seems natural that some of the new technology will be included in Phase 3D, particularly in the realm of microwave facilities. Although there is no point in recriminating about the wisdom or otherwise of letting the plans escalate as they did, the big snag is that these cost money and time.

Since amateur radio satellites have to be paid for mainly from voluntary sources, inevitably things have become more and more behind schedule and, with a launch date of July 1996, matters are getting serious.

Progress of its construction is now going ahead satisfactorily. However the financial side still lags behind despite great efforts being made to remedy this. As a matter of course money for amateur satellites does not come from national radio societies [though one-off donations are made from time to time, see this month's *News & Reports - Ed*], government funds, schools or the radio trade. Members of AMSAT groups have to look after their interests themselves.

Ron Broadbent, G3AAJ [inadvertantly shown as G3AJJ in last month's *News & Reports*- sorry Ron - *Ed*], is piloting AMSAT-UK's Fund raising activities for a special effort. Amongst other things he suggests that so far only 5% of the membership have donated to AMSAT-UK's Fund. Members should consider making a donation to the Fund themselves and suggests they also consider approaching the management of their work places for a 'corporate' donation. Many firms these days do have 'charity funds' collected by workers for local good causes. Donations should be sent to: Phase 3D Fund, Hon Treasurer, 94 Herongate Road, Wanstead Park, London E12 5EQ.

STELAR'S FIRST AGM

SOME TIME AGO AMSAT- UK gratefully accepted the offer of two large microwave antenna dishes which were stored away at the Norwich Astronomical Society Observatory. One of these was put to good use for a solar radiation recorder proving very popular with visitors. A move at the NAS to get involved in 'satellites' and radio-astronomy was made, but unfortunately the project was shelved with the imminent move from its existing site to a much better one outside the 'light pollution' area of the city. Usual delays prevented this move for two or three years, giving some time to plan the new observatory thoroughly and to find an alternative site. Ultimately this was located at the corner of the Norwich Aeroclub's aerodrome in an unwanted corner of their flying ground available. Building has progressed rapidly and the new Observatory was opened in September last.

A great deal of help with equipment and sponsorship has been forthcoming from numerous firms in Norwich. We had gifts of electronic equipment, microwave dishes and their mountings and control gear. It became obvious that in the fullness of time, we could have a first class radio observatory - and satellite ground station.

Keith Baker, K3ISF, told the 1994 AMSAT-UK Colloquium about 'Telecommunication Satellites from the World's Garage'.

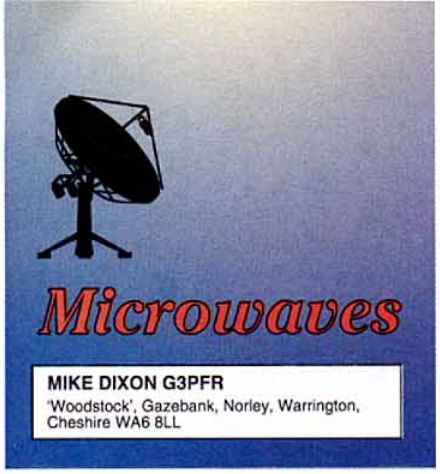
Thanks to the participation of the Hewett School in the JUNO Project, amateur radio had become an accepted subject for educational purposes in schools. This interest is now spreading throughout many other schools in the country. Amongst those in the forefront of this trend is the Harrogate Ladies' College. Collaboration between these two schools brought together other schools similarly interested in this topic. This project was reported in detail in the *Satellites* column in *RadCom* September 1994 under the heading 'AMRED - Amateur Radio in Education'. Known as STELAR - Science Technology through Educational Links with Amateur Radio - they held their first Annual General Meeting at the new Observatory on 16 October, thus officially forming the organisation. Richard Horton, G3XWH, was elected Chairman; Alan Wright, G0KRU, Vice-Chairman; Hilary Claytonsmith, G4JKS Secretary, and David Evans, G3OUF Treasurer. The Constitution of the organisation was presented to the meeting and approved and the Secretary reported on plans for the future. It is hoped to have amateur radio satellite activity going from the Observatory in the not too distant future and STELAR hopes to forge links with educationalists throughout the world who are involved with amateur radio. To this end, three members of the committee have been invited to spend some time at the German equivalent of STELAR - 'Amateurfunk in der Schule' - in March. If any readers have information on interested educational contacts, this would be appreciated. Send to:- Richard Horton, Chairman of STELAR, 7 Carlton Road, Harrogate, North Yorkshire HG2 8DD. Packet - G3XWH @ GB7CYM. Internet COMZRH@GPS.LEEDS. AC.UK. Fax 01423 871027.

SIMPLE ORBITAL PREDICTION AND TRACKING

VIN THOMPSON, G4ULS, has produced an interesting method of determining satellite orbits. In a six page brochure, he shows how to calculate orbits using Orbital Tables only. No need for a computer. The necessary look-up tables for the Russian group of Satellites; for OSCAR11; the Microsats and for MIR, are given. It is available from AMSAT-UK. Ron, G3AAJ, suggests you attach a £1 coin to your request for this 'free of charge' brochure, towards the P3D Fund.

SUB-HORIZON PROPAGATION

PAT GOWAN, G3IOR, reports that the magnetic activity and MUF rise of 19 - 22 August, brought about some remarkable sub-horizon propagation on RS-12 'K' mode. GM4IHJ and G3IOR have been copying excellent signals from RS-10's and RS-12's 29.407 and 29.357MHz beacons respectively when the satellites have been over Antarctica, southern South America and South Africa, over VE8, KL7 and UA0. Much of the time the 29MHz path has been in common with the RS-12 21.210 - 21.250MHz uplink path, so stations have been worked when the satellite is well below the user horizons. Good QSOs by G3IOR included K4ZC, VE2GSX, LU2NI and PJ2MI. Many other stations were copied coming in on the RS-12 downlink who were oblivious to the fact, as they were working terrestrial DX within the uplink passband. ♦



Microwaves

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

MANY OF THE PRESSURES which were imminent when I looked at 1993 in retrospect are still with us. The CEPT DSI and two reviews by the RA (one to do with future spectrum management and the other is another review of the bands above 30GHz) confirmed that these pressures do still exist in nearly all the amateur and amateur satellite microwave allocations. By virtue of the 'set-aside' policy of recommending 'key sub-bands' to be kept clear, wherever possible, for amateur weak signal use, there has been a little immediate relief of this pressure. However, pressure is likely to be renewed at the World Radio Conference (WRC) next autumn and we must continue to press for elevation of status of these sub- bands.

Sadly, I have to report that the CEPT/IARU proposed changes in the 5.7 and 24GHz bands appear to have been rejected in both Germany and the UK, making it difficult to see a clear way forward on the question of common frequencies and harmonisation. I have little doubt that this will prove to be a 'hot potato' at the next, interim, IARU VHF/UHF and Microwave Managers' meeting in Vienna in late February, and at WRC '95.

On a brighter note, 1994 has seen the extension of 10GHz fixed station working to exploit both EME and extended tropo openings, push up contest and ladder scores and expand UK interest in the band. The UK 10GHz record of 1039km has been broken, together with many more noteworthy 10GHz DX contacts using both narrowband and ATV. There has even been a little revival of work on some of the other bands! This year also saw some more growth in usage of the 24GHz band, with our own UK record being extended slightly from 150km to 156km by G4KNZ/P and GW3PPF/P, using WBFM. The next advance, the use of narrowband, has started albeit slowly and is again one of the objectives of the Microwave Committee. This has been aided by the recent release of limited quantities of ex-professional 22GHz equipment, hopefully retuneable to 24GHz. Similarly, a few 49GHz oscillators might help UK amateurs to start some serious investigation of the 47GHz band. A last reminder to start the New Year: the RSGB Microwave Components Service is still available from Mrs P Suckling, G4KGC, at 314A, Newton Road, Rushden, Northants, NN10 0SY or telephone 01933 411446, at reasonable hours please!

Callsign	Worked	Remarks
G4KGC	ON6JZ	
	WA5VJB	
	G3WDG/W5	Operating at WA5VJB
	DJ7FJ	on business trip to USA
	SM4DHN	
	PA3CSG	
	S56UUU	Total of 10 stations
G3WDG	WA6EXV	worked
	OK1KIR	
	G4RFR	
	K9KFR	
	F6KSX	
	WA7CJO	
	WA5VJB	
	PA3CSG	
	S56UUU	
	I4CHY	Total of 13 stations worked

Table1: Recent 10GHz EME contacts

EME UPDATE

SINCE I FIRST REPORTED 10GHz EME contacts, quite a lot has happened! **Table 1** is a summary of a report from G3WDG and G4KGC outlining their recent activity. The results, however, do not indicate the problems recently encountered - for example blown-up HEMT LNAs and blown-up TWTAs, QRM from business trips to the USA and so-on. Maybe that's a story for another time! Meanwhile, well done Charlie and Petra!

Next, a most welcome report from Lyle Patison, VK2ALU (New South Wales), describes his success in completing a VK/W EME contact on 10GHz. To cut a long story short, Lyle had to construct all the G3WDG 10GHz modules (supplied as kits by the RSGB Microwave Components Service), get TWTA bits and pieces, and set up an antenna and antenna steering system more-or-less on his own. He had EME receive capability a year ago and finally scored by working WA7CJO on 09/10/94 with 'M' quality signals. This is a world first and must surely be the ultimate in 10GHz EME DX! Congratulations to both VK2ALU and his operating 'assistants' (see photograph) and the WA7CJO team for a resounding success. Lyle's thanks go to the following stations for their various assistance in helping attain this contact: Kent Britain, WA5VJB; Mike Walters, G3JVL; Charlie Suckling, G3WDG; Peter Day, G3PHO and Des Clift, VK4ZO - a truly international effort!

THE BIG TROPO OPENING

IN MY EARLY DAYS of VHF/UHF operating (at the start of the '60s), the settled and 'quiet' anticyclonic weather, which frequently occurred in September and October, used to yield quite lengthy and phenomenal tropo openings, so beloved of amateurs. Over the past few years, presumably due to the subtle world-wide climatic changes which we are told are happening, these classic autumn openings haven't often occurred. The first two weeks of October 1994 were exceptional and produced spells of propagation to delight all band users from 144MHz up - unfortunately, I was away in China and missed all the fun!

Geoff, GJ4ICD, reported good conditions on the 1.3GHz band over the period 7 - 9 October but with most of his activity concentrated on 432MHz he heard and worked comparatively little on 1.3GHz, except for stations in JO02 and the Martlesham beacon, GB3MHL. A second 'high' on 12/13 October "brought in all UK 23cm beacons at S9+ and G8VR (using 1W) at 559". The early morning hours of 13 October yielded the results shown in **Table 2**, all-in-all a total of five new squares on 23cm, bringing Geoff's score up to 75 squares on 23cm.

A similar story emerges on other bands, as witnessed by Roger's, G4PMK, report for 13 October, also summarised in Table 2. Elsewhere, things were humming on 10GHz, late on the 13th and early on the 14th! G3PHO (Sheffield) set up his 250mW portable equipment looking east from a bedroom window and worked the six stations listed in Table 2. Also heard but 'got away' was DL4EAU/P at 838km, and Peter reported that the PI7EHG, PA0TGA/P, DB1BX and PE1CMO beacons were all putting in good signals. A new UK record on the 10GHz band was set by Roy, G3FYX, and Ted, G3JMY, (both Bristol) who worked SM6ESG at 1137km, the previous record having stood at 1039km for a couple of years. Roy and Ted were disappointed to miss out on SM6HYG, OZ1UM, OZ7IF, DL5KVD, DJ6JJ and PA3DIJ, all of whom

Lyle, VK2ALU (in hat) and helpers (L to R), VK2s KLD, FPN and XGJ. This is the set-up on which WA7CJO's signals were first heard on 21 November 1993. The first QSO was made using 16W to this 1.75m dish.

Callsign	Band	Date	Worked	Square	Comments/DX(km)
GJ4ICD	1.3	12-13/10	DB6BX	JO32	
			DL3YEE	JO42	
			OZ2OE	JO45	more than 1100km
			DL3YEL	JO41	
			SK7QJ	JO76	
			SM6GXV	JO58	
			SM6ESG	JO67	
			SM6EAN	JO57	
			SM6FHZ	JO57	
			SM7UHF	JO65	
G4PMK	3.4	13/10	PA0BAT	JO31	
			DJ6JJ	JO31	
			DC8UG	JO30	
			PE0PJV	JO21	
			DL4EAU	JO51	845km
			DC0DA	JO31	
			PE1JBK	JO22	
	5.6	13/10	PA0BAT	JO31	
			DJ6JJ	JO31	
			DC8UG	JO30	
			DC0DA	JO31	
			SM7ECM	JO65	
			PE1JBK	JO22	
	10	13/10	PA0BAT	JO31	
			DB1DI/P	JO31	
			DL5KVD	JO64	884km

Callsign	Band	Date	Worked	Square	Comments/DX(km)
			SM7ECM	-	958km
			SM7ESG	JO67	935km
G3PHO	10	13/10	DB1DI/P	JO31QX	618km
			PA0BAT	JO31FX	558km
			PA0EZ	JO22FF	469km
			PA3FPS	JO22IJ	430km
			DB1BX	JO32OT	584km
			PA3AGS	JO22JP	428km
G3WDG	10	11/10	G4CBW	-	2-way TV, P5 pictures
		12/10	DF9LN	JO31VJ	59/59
			DL4EAU/P	JO51GO	319/529
		3/10	DL1BKK	JO43NA	52/54
			DC0DA	JO31SL	59/59
			DJ6JJ	JO31LJ	59/59
			DC8UG	JO30UH	519/519
			DK1KR	JO53HW	419/519
			SM7ECM	JO65NQ	529/529
			OZ1UM	JO65DX	58/59+
		14/10	PA3AWJ	JO21GW	57/58
G4KGC		12/10	DK1UV	JO41CT	53/55
			DL4EAU/P	JO51GO	529/59
		13/10	DL1BKK	JO43NA	52/54
			SM6HYG	JO58RG	529/529
			SM6ESG	JO67CC	559/569
			DK1KR	J053HW	529/519
			SM7ECM	JO65NQ	529/529

Table 2: Some of the best DX worked during the big Tropo opening in October '94.

were tried to no avail. It seems that they were at the very furthest SW point of the opening which did not yield the very strong signals experienced by those stations well to the east of Bristol.

Steve, G4KNZ (Bracknell), worked SM4ESG (JO67CC, 1052km) for his best DX yet and PA0EZ (who called in off the back of his dish!). Simon, G3LQR was at such strength that he copied Steve's signal with the changeover relay in the transmit position! Steve made the observation that, first, the best conditions occurred well after midnight (don't go to bed too early) and virtually all continental operators use 432.350MHz as talkback, so that it is a waste of time trying to use 144.175MHz. G3WDG/G4KGC also benefited from the Big Lift and their results are also summarised in Table 2, lifting them well into the lead in the All Time Squares table. All-in-all, an opening the like of which has not been known in many a year!

ACTIVITY AND OPERATING LADDERS

WITH ABOUT SEVEN weeks to run in the 1994 Annual Operating Ladder (courtesy of the *RSGB Microwave Newsletter*), the current position as at mid-November is as shown in **Table 3**. May I remind you that this table doesn't have to be only 10 and 24GHz? It can be *any* of the microwave bands! The All Time Squares **Table 4**, has also seen many significant changes, mainly as a result of contacts made during the Big Tropo Opening mentioned above.

ROUND TABLE

THE DATE OF the first Southern Round Table of 1995 has been tentatively set for Sunday, 5 March at the Rutherford-Appleton Laboratory, Chilton, Nr. Didcot, Oxon. Further details may be obtained from Mike Scott, G3LYP, QTHR, or telephone 01494 881298 at any reasonable hour. ♦

Posn	Callsign	Stns Worked	Best DX (km)	Multiplied score
10GHz				
1	G3FYX/P	69	787	54303
2	G3KEU/P	66	787	51942
3	G3JMY	44	1137	50028
4	G4FCD	78	521	40638
5	G3FYX	34	1137	38658
6	G4KNZ	36	1052	37872
7	G4BRK	43	639	27477
8	G4LDR	44	487	21428
9	G8APZ	36	568	20448
10	G4BRK/P	46	432	19872
11	G3GRO	37	395	14615
12	G8DKK	35	370	12950
13	G8LSD/P	38	313	11894
14	G3GNR	26	451	11726
15	G3UYM/P	33	355	11717
16	G3PHO/P	35	330	11550
17	G3FNQ/P	22	463	10186
18	G3JMB/P	36	282	10152
19	G3ZTR/P	24	417	10008
20	G4MAP	28	308	8624
21	G4EQD/P	20	418	8360
22	G3UKV	21	357	7497
23	G1MPW/P	30	247	7410
24	G3YKE	18	390	7020
25	G4JNT	33	199	6567
26	G4PMK	5	958	4790
27	G3PHO	7	618	4326
28	G3ATM/P	14	271	3794
29	G8AYY/P	12	202	2424
30	G8KMH	1	135	135
24GHz				
1	G4KNZ/P	19	137	2603
2	G3FYX/P	14	143	2002
3	G3PHO/P	11	126	1386
4	G3UYM/P	8	121	968
5	G4MAP/P	7	101	707
6	G4EQD/P	6	97	582
7	G3FNQ/P	4	120	480
8	G8AYY/P	4	86	344
9	G3GNR/P	1	143	143
10	G8KMH/P	1	126	126

Table 3:1994 Operating Ladder.

Posn	Callsign	Locator	Squares Wkd	Best DX (km)
1	G3WDG	IO92RG	44	1008
2	G4KGC	IO92RG	37	1012
3	G4FCD+	IO91KX	27	802
4	G4BRK	IO91DP	24	639
5	G3FYX/P	IO91GI	23	787
6	G3KEU/P	IO91GI	22	787
7	G8APZ	JO01DO	20	1026
8	G4DDK	JO02PA	20	684
9	G3BNL	IO92KA	18	1027
10	G3JMY	IO81RM	17	1137
11	G4KNZ	IO91PJ	16	1052
12	G4LDR	IO91EC	16	775
13	G8KQW/P	IO91GA	15	390
14	G3PHO/P	IO93EH	15	338
15=	G8LSD/P	IO90TV	15	304
15=	G3JMB/P	IO90TV	15	304
17	G4PMK	IO93GT	14	958
18	G4RFR/P	IO80UU	14	414
19	G8DKK	IO91VX	14	370
20	G4JNT	IO9OIV	14	334
21	G3GNR	IO70WT	13	451
22	G4MAP	IO82WJ	13	308
23	G3UKV	IO82RR	12	357
24	G8AGN/P	IO93EH	12	338
25	G4FCD*	IO91JV	11	1039
26	GW4MAP/P	IO82JG	11	311
27	G4PMK	IO93GT	10	739
28	G3NWU	IO94JQ	10	433
29	G3ZME/P	IO82QL	10	270
30	G0API	IO80XS	9	405
31	G0API/P	IO80UU	8	277
32	G3PHO	IO93GJ	4	618
33	G3JMB	IO91WA	4	48
34	G3NWU/P	IO94MJ	3	290

Posn	Callsign	Locator	Squares Wkd	Best DX (km)
24GHz				
1	G3PHO/P	IO93AD	3	126
2	G4KNZ/P	IO83RO	3	120

* = Old QTH
\+ = New QTH

Table 4: 10GHz All Time Squares / DX Ladder.

CONTEST CLASSIFIED

All rules should be read in conjunction with the General Rules published in *Contest News* January 1993

HF GENERAL RULES

GENERAL RULES FOR RSGB HF CONTESTS 1995

1. These rules apply to all RSGB HF Contests, except where superseded by the specific Contest Rules.

2. UK means England, Scotland, Wales, Northern Ireland, Channel Islands and Isle of Man.

3. Entrants must abide by their licence conditions.

4. One contact only with the same station per band counts for points, regardless of that station's operator or callsign. More than one contact with the same operator using different callsigns may not be claimed. Contacts with stations who have no other contest contacts may be disallowed.

5. Duplicate contacts must be logged, with zero points claimed.

6. Cross-band contacts do not score. This does not apply to contacts within the same band where the contacted station transmits outside the receiving station's frequency limits.

7. Simultaneous contest transmissions on more than one frequency are not permitted.

8. Contacts scheduled before the contest do not count for points. Schedules may only be made during the contest (ie in contest time).

9. Proof of contact may be required. Any station may be approached, without notice to entrants, for confirmation of contact.

10. Where a contest is restricted to portable stations:

(a) entrants must operate from the same site for the whole contest;

(b) stations must not be located in a permanent building or shelter;

(c) no permanent building or structure may be used as an aerial support (trees are acceptable);

(d) power must be obtained solely from on-site batteries, portable generators or solar cells, without use of mains;

(e) no equipment, aerials or supports may be set up on site prior to 24 hours before the start of the contest, this does not apply to storage of equipment on site.

11. Only single-operator entries will be accepted unless otherwise stated. A single-operator station is operated by one person, who receives no assistance whatsoever from any other person in operating, logkeeping, checking and so on, and who does not receive notification from others by radio (including packet), telephone or any other method, of band or contest information during the contest.

12. Multi-operator entries are those not covered by rule 11; one operator must act as 'Entrant' and sign the Summary Sheet.

13. All operators of UK stations must be RSGB members except visiting amateurs, not resident in the UK. UK stations may not use special (eg, GB, GX etc.) callsigns nor be /MM or /AM.

14. A contact consists of the exchange (and acknowledgement of receipt) of callsigns and contest data. Incomplete contacts must be logged with zero points claimed. Points are not lost if a non-competing station does not send appropriate information, but a report *must* be logged and any other exchange sent by that station must be recorded. The full contest exchange must be sent to all stations worked.

15. Multipliers, where applicable, are scored per band, and consist of (a) for UK stations: Countries as per the DXCC countries list, except that JA, W, VE, VO, VK and ZL call areas count as separate countries. (b) for non-UK stations: one for each UK county (c) IOTA and SSB FD contests, see specific rules.

16. Where multipliers are applicable the Final Score is the total QSO points for all bands added together, multiplied by the number of multipliers from all bands added together.

17. Where multipliers are not applicable, the Final Score is the total QSO points for all bands plus the total Bonus points (if any) for all bands added together.

18. For contest purposes, /AM and /MM stations are treated as /M stations in their own country. Other stations are regarded as being in the call area / country indicated by their callsign as sent.

19. Errors in sending / receiving callsigns are penalised by loss of all points for the QSO. Errors in sending/receiving other data result in loss of one third QSO points per error.

20. Duplicate contacts with non-zero points claimed are penalised by deduction of ten times the QSO points. Excessive numbers of such contacts may attract other penalties, including disqualification.

21. Points may be deducted or entries disqualified or excluded for any breach of the rules or spirit of the contest. The decision of the RSGB is final.

22. UK stations must use log sheets in RSGB format. Others may use their own National Society's format.

23. Separate logs (with separate page numbers) must be produced for each band.

24. Log sheets must be headed with Name of Contest, Date, Band, Callsign and Page x of n.

25. Log pages should contain 40 QSOs, with columns as follows: Time, Callsign worked, RS(T)/serial sent, RS(T)/serial received, Other Data (specific to the contest), New bonus/multiplier, QSO points. Any RS(T) column left blank will be taken as 59(9).

26. Computer-produced logs are welcome on either fan-fold or sheets, subject to being in RSGB format (and preferably Near-Letter-Quality or better).

27. Each log must also include a list of multipliers/bonuses for each band (where applicable). Entrants should also include a Dupe Sheet for each band. This comprises a list of all callsigns worked, sorted into alphabetical order (or alphabetical order of suffix) together with the serial number sent to that station, or the time of the QSO.

28. A Summary Sheet (RSGB form HFC2 or equivalent) must be included, showing: Contest, Date, Final Score, Station Callsign & address, Name of Club or Group (if applicable), Exchange (eg County Code) sent, Entrant's Name, Address & Callsign and, for each band, Equipment and Antennas used (using the Equipment Coding System set out below) plus power output. If the entry is multi-operator, a list of the Names & Callsigns of all operators must appear on the summary.

29. Contest Logs on Computer Disk

a) Logs submitted on computer disk are welcomed and the HFC guarantees that such entries will receive the same scrutiny as those submitted on paper.

b) All files must be on an MS-DOS (V2.0 or higher) formatted disk, 3.5" (720kb or 1.44Mb) or 5.25" (360kb or 1.2Mb).

c) The diskette label must clearly indicate the contest name and the name of the log files(s).

d) The log file must consist of one logical line of data per QSO. Acceptable formats are CT .Bin, NA .QDF, Super Duper .LOG, G3WGV .LOG, and RSGB standard log format for disk logs.

e) The log data filename must consist of the callsign and the extension .LOG, eg G9XXX.LOG or G9XXX-P.LOG.

f) A paper summary is required to accompany all logs, either an official RSGB HF Contest summary sheet (form HFC2) or a close facsimile as defined in Rule 28.

g) All diskettes become the property of the RSGB.

30. Sample forms for use in RSGB contests are available from HQ. Examples are printed in the RSGB Callbook and may be copied as needed.

31. Logs must be postmarked no more than 15 days after the end of the contest. Acknowledgement will be sent if a stamped, addressed postcard or IRC is enclosed.

32. Logs must be sent to: RSGB-G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey, CR7 7AF, ENGLAND. Logs become the property of the RSGB.

33. Awards are made at the discretion of the RSGB. Trophies remain the property of the RSGB.

34. **Receiving Contests.** The above rules apply, but also:

(a) Only SWLs or holders of licences to transmit *only above* 30MHz may enter.

(b) Entrants should use RSGB SWL Contest forms if possible. The Callsigns of both the 'station heard' (for which points are to be claimed) and the 'station being worked' must be logged.

(c) The same callsign may appear only once in any group of three consecutive entries in the 'Station being worked' column.

(d) The Summary Sheet declaration to include: "I do not hold a licence to transmit on frequencies below 30MHz."

EQUIPMENT CODING SYSTEM

First character - power:

0	0 - 1	watt
1	1.1 - 5	watts
2	6 - 20	watts
3	21 - 100	watts
4	101 - 400	watts

Second character - antenna:

C	Centre-fed (dipole, doublet, G5RV etc)
G	Ground Plane or Vertical
Y	Yagi
Q	Quad or Loop
W	Wire (any other type)

Third character - number of antenna elements.

Fourth character - max height of antenna above ground:

0	0 - 9	feet
1	10 - 19	feet
2	20 - 29	feet

and so on, up to ..

8	80 - 89	feet
9	90 or more	feet

HF CONTESTS CALENDAR

31 Dec	*Canadian (RAC) Winter* (Dec 94, p19)
1 Jan	*Happy New Year* (Dec 94, p19)
8 Jan	AFS (CW) (Dec 94)
14 Jan	AFS (SSB) (Dec 94)
14/15 Jan	*HA DX CW*
14/15 Jan	*AGCW-DL QRP*
17 Jan	LF Cums 1.8MHz (Dec 94)
21 Jan	LF Cums 7.0MHz (Dec 94)
22 Jan	LF Cums 3.5MHz (Dec 94)
25 Jan	LF Cums 1.8MHz
28 Jan	LF Cums 3.5MHz
29 Jan	LF Cums 7.0MHz
28/29 Jan	*CQ WW 160m*
28/29 Jan	*UBA SSB*
28/29 Jan	*REF CW*
2 Feb	LF Cums 1.8MHz
4 Feb	LF Cums 7.0MHz
5 Feb	LF Cums 3.5MHz
11/12 Feb	1st 1.8MHz
11/12 Feb	*PACC (MM)*
18/19 Feb	*ARRL DX CW*
25/26 Feb	7MHZ DX CW
24/26 Feb	*CQWW 160 SSB*
25/26 Feb	*REF DX SSB*
25/26 Feb	*UBA CW*
4/5 Mar	*ARRL DX SSB*
11/12 Mar	Commonwealth

UK COUNTY CODES FOR HF AND VHF CONTESTS

County	Code	County	Code
Alderney	ALD	Isle of Man	IOM
Co Antrim	ATM	Isle of Wight	IOW
Co Armagh	ARM	Jersey	JER
Avon	AVN	Kent	KNT
Bedfordshire	BFD	Lancashire	LNH
Berkshire	BRK	Leicestershire	LEC
Borders	BDS	Lincolnshire	LCN
Buckinghamshire	BUX	Greater London	LDN
Cambridgeshire	CBE	Co Londonderry	LDR
Central	CTR	Lothian	LTH
Cheshire	CHS	Greater Manchester	MCH
Cleveland	CVE	Merseyside	MSY
Clwyd	CLD	Norfolk	NOR
Cornwall	CNL	Northamptonshire	NHM
Cumbria	CBA	Northumberland	NLD
Derbyshire	DYS	Nottinghamshire	NOT
Devon	DVN	Orkney	ORK
Dorset	DOR	Oxfordshire	OFE
Co Down	DWN	Powys	PWS
Dumfries & Galloway	DGL	Shropshire	SPE
Co Durham	DHM	Sark	SRK
Dyfed	DFD	Shetland	SLD
Essex	ESX	Somerset	SOM
Co Fermanagh	FMH	Staffordshire	SFD
Fife	FFE	Strathclyde	SCD
Mid Glamorgan	GNM	Suffolk	SFK
South Glamorgan	GNS	Surrey	SRY
West Glamorgan	GNW	East Sussex	SXE
Gloucester	GLR	West Sussex	SXW
Grampian	GRN	Tayside	TYS
Guernsey	GUR	Tyne & Wear	TWR
Gwent	GWT	Co Tyrone	TYR
Gwynedd	GDD	Warwickshire	WKS
Hampshire	HPH	Western Isles	WIL
Hereford & Worcester	HWR	West Midlands	WMD
Hertfordshire	HFD	Wiltshire	WLT
Highlands	HLD	North Yorkshire	YSN
Humberside	HBS	South Yorkshire	YSS
		West Yorkshire	YSW

RSGB STANDARD FOR CONTEST LOG DATA ON COMPUTER DISK

(1) All files must be in standard ASCII format (ie No TABS or other control characters).

(2) All files must be on an MS-DOS (v 2.0 or higher) formatted disk, 3.5 inch (720k or 1.44Mb) or 5.25 inch (360k or 1.2Mb).

(3) The diskette label must clearly indicate contest name and the name of the log file(s).

(4) The log file must consist of one logical line of data per QSO. Each contact line *must* be terminated with a carriage return character.

(5) The QSO data defined below must appear in each line, except that a hyphen in any field, or a field which is all blanks (spaces) will be taken as indicating a data item which is the same as in the previous contact. Each field except the last *must* be padded out to the correct length with blank characters and neighbouring fields *must* be separated by a blank character. Exact adherence to the start and finish columns given below is not mandatory but all data must be column-aligned within the specified field limits, eg: every callsign must start in the same character column and all must fit between character columns 22 and 36.

char	1 - 6	Date in YYMMDD format
	8 - 11	Time in HHMM format
	13 - 16	Band in MHz (Embedded periods are allowed eg 1.8)
	18 - 20	Mode (A1A, J3E, F3E etc)
	22 - 36	Callsign (left aligned)
	38 - 40	RS(T) sent
	42 - 45	Serial number / Power / Zone / State sent
	47 - 49	RS(T) received
	51 - 54	Serial number / Power / Zone / State received
	56 - 59	New Bonus / Multiplier (country prefix / county code etc)
	61 - 64	Points
	66 - 71	Operator / Station Callsign for multi-op events
	73 - 128	Further contest specific data, eg postcode, county code or QTH locator received. *This field must be terminated by <CR>.* Zero point QSOs such as Duplicates, unfinished contacts etc may be explained here. This field may contain spaces but not tabs.

(6) Logs must be submitted as a single contiguous file (in chronological order of contact) for each station. Separate files for each band are *not* required. The log data filename must consist of the call sign and the extension '.LOG', eg G9XXX.LOG. Entries in contests where more than one callsign is used, eg VHF Field Day or AFS, should contain all the entry's logs on one disk, as separate files. In contests where the same station submits multiple logs on the same band, such as LF Cumulatives, the filename should be suffixed with a distinguishing numeral eg G9XXX1.LOG, G9XXX2.LOG. Only .LOG files should be put on the disk.

(7) Standard abbreviations must be used, eg RSGB three letter county codes, ITU Country prefixes, US Postal Service two-letter State abbreviations, ARRL sections, etc.

VHF/UHF GENERAL RULES

VHF/UHF GENERAL CONTEST RULES 1995

The rules governing all RSGB VHF / UHF / SHF Contests held in 1995 (and thereafter unless changed) will include the following general rules. Queries on VHF contests may be made to: Dave Johnson, G4DHF, 65 West St, Bourne, Lincs, PE10 9PA.

The individual contest rules contain most of the detailed information on the sections, scoring systems and methods of tabulation. Please note that all points claimed for a contact could be lost by both stations if either station logs callsigns incorrectly, including any suffix. The receiving station will also lose all claimed points for a contact where other information is logged incorrectly. Ten times the claimed points will be lost for unmarked duplicate contacts. The committee reserves the right to inspect as per Rule 22 as and when felt necessary.

1. Entries: All entries must be sent to the contest adjudicator at the address shown in the individual contest rules. Entries sent to other addresses will be treated as check logs only. Please check *RadCom* and or the *GB2RS* News for any late changes to adjudicator, it is *your* responsibility to get your entry to the correct adjudicator, if in any doubt you may telephone the VHFCC Chairman. All entries become the property of the RSGB and cannot be returned. Recorded delivery or registered post shall not be used, and such entries may be disqualified, at the adjudicators discretion.

The VHFCC will now accept entries on disc (IBM compatible 3.5"). For this year would entrants using this method please supply a hard copy of the log as well. The normal entry sheets will still be required. If the disc that is sent is unreadable or not of the requisite format then it will be treated in the same way that an unreadable printed copy would.

2. Last posting date: All entries must be postmarked not later than 16 days after the end of the contest or last cumulative activity period, or as specified in the rules for individual contests, or as modified by the VHFCC. (See individual VHF / UHF Contest Rules, as published in *RadCom).*

3. Cover sheets: All entries must be accompanied by a correctly completed current RSGB VHF / UHF contest cover sheet (Form 427-86 or later) for each band used, including full details of antennas and final amplifier devices. In multiband events entrants must also complete a multiband sheet (Form 4422). In contests using a county / country or QTH Locator multiplier scheme, multiplier check lists must also be included (see Rule 14).

4. Operators: All operators must be RSGB members (unless AFS contest, see individual contest rules to see if this applies).

5. Single-Operator fixed stations: Single operator fixed stations are those operated by the licensee in person from his / her normal place of residence or past residence, with no assistance with operating or log keeping during the contest.

6. Fixed stations: To be eligible to enter a fixed station section the station must be located at the Main Station Address as shown on the license validation document. Addresses such as farm fields, open or common land, or government owned land, will be treated as / P, unless operated from a bona fide permanent building. The spirit of the contest will be paramount.

7. Locations: In multiband events all stations forming one entry must operate from one site, defined as a circle of 1km radius. Entrants may not change the location of their stations during the contest.

For VHF Field Day only, no operation (except the normal tests undertaken immediately prior to the start of the contest) allowed in the 24 hours prior to contest start time. Equipment must only be set up within the 24 hour period prior to the contest start time. This includes tents, caravans on site, masts, towers, antennas, or anything else that is to be used in the contest.

8. Valid contacts: No points will be lost if a non-competing station contacted by an entrant is unable to supply an IARU Locator, serial number or any other letter code group that may be required, but the receiving operator must obtain and record enough information to be able to calculate the claimed distance score. Contacts with stations whose callsigns appear on the cover sheet will not count for points, or multipliers. Only one scoring contact may be made with a given station on each band in use during the contest, ie any callsign regardless of suffix or prefix may only be worked for points once. Any non-scoring contacts must be clearly marked in the log. Unmarked duplicate contacts will be penalised at the rate of ten times the claimed score for that contact. In cumulative contests one contact may be made with a given station (as defined above) during each activity period.

9. Radial ring scoring: Contacts made between stations separated by the distances shown in the table will score as indicated.

km	Points
0 -50	1
51 -100	3
101 -150	5
km	Points
151 - 200	7
201 - 250	9
251 - 300	11

and pro rata.

For computer scoring purposes a conversion factor of 111.2 km / degree must be used. In 50MHz contests the maximum number of points per contact is now unlimited.

10. Final Tabulation of multiband and cumulative contests: The final tabulation showing the overall results will be formed by taking the sum of the normalised scores on each band or from the three best sessions in a cumulative contest, or as decided in the rules for the individual contest as published in *RadCom.* The normalised scores will be calculated by dividing each station's points score by that of the band / session leader and multiplying by 1000.

ie Normalised score for each band / session

= Score achieved x 1,000
Band / session leader score

11. Awards: There will be an award to the highest scoring station in each section. An award will also be made to the runner-up in each section. Certificates of merit may be awarded at the adjudicator's discretion. Placement certificates will be awarded if the cover sheet of the contest entered is annotated *'Placement Certificate required'* and a large SAE (A5 minimum) is enclosed.

A Certificate will also be awarded to the highest placed Single Operator (fixed and portable), running 25W or less to a single yagi. This applies to all contests where the power limit is above 25 watts output.

12. Crossband contacts: Crossband contacts do not count for points, except where separately notified in the rules of individual contests.

13. Log keeping: The logs for contest entries must be made out on current RSGB VHF / UHF log sheets or, if computer listings are to be submitted, these must be cut to A4 size, RSGB log format, line spaced to contain 25 contacts per sheet, and be correctly collated (not Z fold). Each sheet must be headed with the entrant's callsign, IARU locator, contest title and sheet number, (the top of any computer generated log sheet must duplicate a standard RSGB VHF log sheet). Logs must be tabulated as follows:

(i) Date / time (UTC)
(ii) Callsign of station worked
(iii) My report on his / her signal and serial number
(iv) His / her report on my signal and serial number
(v) IARU Locator received
(vi) QTH or county received (when required) or comments
(vii) Points claimed radial ring, kilometres or both.

The contest exchange must consist of both callsigns, RS or RST report followed by serial number, and IARU locator. Any complaints received or made about signals must be recorded in the comments column. Gross errors in logging can lead to disqualification.

14. County / country and QTH Locator multipliers:

1) In contests using a county / country multiplier scheme the contest exchange will include the full county name or the code letters shown in the operating guide. Your county must be shown on each log sheet.

2) Each new county or country worked is a multiplier and must be clearly identified on the log; note this includes your own county and country, and that a contact with a station in another G prefix area can count for both a county and a country multiplier (eg GD, Isle of Man). Where more than one station is worked in a particular Scottish region additional multipliers can be claimed for each contact, up to a maximum of three multipliers for each region.

3) In Contests using QTH Locators as multipliers. Each new QTH locator worked, eg JO01, IO91, JN99, KO23 is classed as a multiplier, a check list of QTH multipliers must be provided (similar to that used for Country / County multiplier contests), in any contest using this form of multiplier.

4) The score obtained under rule 9 is multiplied by the total number of multipliers worked to provide the claimed score.

5) A separate list of claimed multipliers must be included showing as a minimum the counties, countries, and / or QTH Locator squares worked in alphabetical order together with the callsign and serial number of the first claimed contact for each multiplier. If other contacts are to be considered as alternative multipliers, should the first contact be disallowed for any reason, then please include callsigns and serial numbers for subsequent contacts with each county, country, or QTH Locator.

6) Rule designation:

14a County / Country multiplier Contest

14b QTH Locator multiplier Contest.

14c Combined County / Country / QTH multiplier Contest.

15. Serial numbers: Serial numbers start from 001 on each band and advance by one for each contact. In cumulative contests serial numbers increment from 001 for each activity period.

16. Power Limits: The DTI licence limits must be strictly adhered to. In an RSGB contest (sponsored or controlled by the VHFCC) where the contest power limit is lower than the DTI licence limit then this limit, (as described in the rules for the contest in question) must also be strictly adhered to. If upon inspection a station is found to be running *illegal* power, or above the contest power limit, the station will be *disqualified. All* operators of that station will be liable to a *ban* on entering all VHFCC sponsored or controlled contests for a period of up to *two* years.

17. Antennas: The same antenna system must be used on transmit and receive, at all times, except at frequencies on or above 13 cm.

18. Sub bands:

a. Stations using telephony in the recognised CW sub-bands are liable to *disqualification.* Entrants must observe the provisions of the IARU / RSGB band plans.

b. Bands other than those included in the contest can be used simultaneously by a separate station for setting up contacts or talkback.

Definition of talkback: No confirmation of QSO details must take place on the talkback frequency, All exchanges for the contest band in use must be made on that band. Talkback frequency can be used for antenna alignment purposes, and confirmation that signals are there, only, and not for giving reports or QTH information

19. Poor signals: Stations which persistently radiate poor-quality signals, or otherwise contravene the code of practice for VHF / UHF / SHF contest operation are liable to *disqualification* or loss of points.

20. Repeaters, Satellites or moonbounce: Contacts made using these modes will not count for points.

21. Proof of contact: Proof of contact may be required.

22. Inspection: Entrants must permit inspection of their stations by members of the VHFCC or its representatives, and give site access information if requested to do so. The inspector must be permitted to remain for as long as desired (the full length of the contest if necessary), and to return to the site for subsequent inspections at any time during the contest. Contestants must demonstrate to the inspector's satisfaction that they are obeying the rules of the contest.

23. Appeal: The ruling of the Council of the RSGB shall be final in all cases of dispute, but must be decided in conjunction with the rules and spirit of the contest.

24. Required exchange information: Where QTH information must be exchanged it shall be given as a point identifiable on an Ordnance Survey route planning map or equivalent (scale 1:625,000) or as a distance and direction not greater than 25km from such a point. Where rule 24 is invoked it should be taken to mean that QRA (locator) and QTH (address) information is required, eg JO01IL 2k South of Southend on Sea! If rule 24 is *not* invoked then read individual contest rules.

25. Foreign entries: Foreign amateurs are allowed to enter RSGB contests but will be placed in a separate section, thus allowing them to compare their entries with those of UK entrants. Winners and runners up certificates will be issued as appropriate. SWLs are also encouraged to enter and a certificate will be issued to the leading foreign SWL and to the runner-up if appropriate.

26. Special calls: Entries from stations using special event calls such as GB, GX, GS or any other special club prefix will not be allowed. Normal club callsigns can of course be used, eg G4ZDA is OK, GX4ZDA is not.

27. Simultaneous transmissions: *No* simultaneous multi frequency transmissions within the same band. In other words you must not transmit on various frequencies in the same band at the same time!

VHF / UHF LISTENERS CONTESTS

1. The 1995 General Rules for VHF / UHF contests will apply except where modified by these rules.

2. Listeners contests are open to all non-licensed members of the RSGB, and to foreign SWLs. Only the entrant may operate the receiving station.

3. Logs must show in columns: (a) date / time (UTC), (b) callsign of station heard, (c) my report on his / her signals, (d) report and serial number sent by station heard, (e) callsign of station being worked, (f) IARU locator given by station heard, (g) QTH given by station heard (if appropriate), (h) points claimed.

On 144MHz the callsign in column (e) may only occur once in every ten contacts logged. CQ and test calls do not count for points and should not be logged. If both sides of a QSO can be heard, both can be claimed for points.

4. The Hansen Trophy will be awarded to the entrant with the highest aggregate score in all SWL contests between March and 10 September inclusive of each year. The aggregate score will calculated in accordance with General Rule 10.

CODE OF PRACTICE FOR VHF / UHF / SHF CONTESTS

1. Obtain permission from the landowner or agent before using the site, and check that this permission includes right of access. Portable stations should observe the Country Code.

2. Take all possible steps to ensure that a site is not going to be used by some other group or club. Check with the club and last year's results table to see if any group used the site last year. If it is going to be used by another group, come to an amicable agreement before the event. Groups are advised to select possible alternative sites.

3. All transmitters generate unwanted signals; it is the level of these signals that matters. In operation from a good site, levels of spurious radiation which may be acceptable from a home station may well be found to be excessive by nearby stations (25 miles away or more).

4. Similarly, all receivers are prone to have spurious responses or to generate spurious signals in the presence of one or more strong signals, even if the incoming signals are of good quality. Such spurious responses may mislead an operator into believing that the incoming signal is at fault, when in fact the fault lies in his own receiver.

5. If at all possible, critically test both receiver and transmitter for these undesirable characteristics, preferably by air test with a near neighbour before the contest. In the case of transmitters, aim to keep all in-amateur band spurious radiation, including noise modulation, to a level of -100dB relative to the wanted signal. Similarly, every effort should be made to ensure that the receiver has an adequate dynamic range.

6. Above all, be gentlemanly at all times. Be helpful and inform stations apparently radiating unwanted signals at troublesome levels - having first checked your own receiver! Try the effect of turning the antenna or inserting attenuators in the feedline; if the level of spurious signal changes relative to the wanted signal, then non-linear effects are occurring at the receiver. Some recent synthesised equipment has excessive local oscillator phase noise, which will manifest itself as an apparent splatter on strong signals, even if there is no overloading of the receiver front end. Pre-amplifiers should always be switched out to avoid overload problems when checking transmissions. If you receive a complaint, perform tests to check for receiver overload, and try reducing drive levels and switching out linear amplifiers to determine a cure. Monitor your own signal off-air if possible. Remember that many linears may not be linear at high power levels under field conditions with poorly regulated power supplies. The effects of overdriving will be more severe if speech processing is used, so pay particular attention to drive level adjustment. If asked to close down by a Government Official or the site owner, do so at once without objectionable behaviour.

VHF/UHF CONTESTS CALENDAR

26-29 Dec	70, 144 & 432MHz Fixed Christmas Fun Contest (Nov 94)	**12 Mar**	70 MHz Cumulatives (Jan 95)
15 Jan	144MHz CW Single Op Fixed / All Other (Jan 95)	**26 Mar**	70MHz Fixed / SWL
22 Jan	70 MHz Cumulatives (Jan 95)	**4 Apr**	144MHz SSB Cumulatives
29 Jan	70 MHz Cumulatives (Jan 95)	**9 Apr**	1st 23cm & 13cm Fixed / SWL
5 Feb	432MHz Fixed / AFS / SWL (Jan 95)	**12 Apr**	144MHz SSB Cumulatives
12 Feb	70 MHz Cumulatives (Jan 95)	**20 Apr**	144MHz SSB Cumulatives
26 Feb	70 MHz Cumulatives (Jan 95)	**6/7 May**	432MHz to 24GHz and 70cm Trophy
4/5 Mar	144 / 432MHz	**20/21 May**	144Mhz and SWL, Single / All Others
		21 May	1st Back Packers 144MHz
		3 Jun	50MHz Trophy
		3 Jun	1st 50MHz Backpackers
		18 Jun	70MHz CW

VHF RULES

144MHZ CW SINGLE OP FIXED / ALL OTHER

When: 15 January, 1000 - 1600UTC

Rules: General Rules apply, plus rule 14a County & Country Multiplier.

Sections: F fixed station single operator, O open (all others), L listeners.

Adjudicator: B Llewellyn, 110 South Ave, Southend, Essex SS2 4HU ******

70MHZ CUMULATIVES

Date: 22/29 Jan, 12/26 Feb, 12 Mar

Time: 1000 - 1200 UTC

Rules: General Rules apply, plus rules 10 and 24 (1995). Full QTH and Locator. Please include a single 4422 summary sheet to show scores for each day and single 427.

Sections: F fixed station single operators, O open (all others), L listeners. Best three logs of possible five, please send all logs for checking purposes, normalisation will decide the best three.

Adjudicator: A Cook Fishers Farm, Tendring, Clacton on Sea, Essex CO16 9AA.

432MHZ FIXED / AFS / SWL

When: 5 February, 0900 - 1500UTC

Rules: General Rules apply. The contest is open to individual entrants (who must be RSGB members), or teams made up of a number of operators who must all be members of the same affiliated society (but do not have to be RSGB members themselves). All members of a team must operate from within 50km of the normal meeting place of the society. No station may represent more than one society. No operator is allowed to use more than one callsign during the contest. In the case of national societies each team must define a separate meeting place and each team member must operate within 50km of that designated meeting place. Multiple teams are encouraged from both national and local societies. The best three scores of each team will be used to form the entry; all team members' logs must be included as the results may be downgraded if logging errors occur, ie the 4th placed member may well have higher points after adjudication, than those notionally above.

Sections: S single operator fixed, M multi operator fixed, L listeners, A AFS.

Team scores will be tabulated separately. Please include RSGB Zone letter on your entry. Each team entry must also include a signed declaration that each operator is a fully paid up member of the entering affiliated society. The address of the meeting place is also required, as is a summary of team members, callsigns and respective scores.

Awards: Certificates will be awarded to the following: leading single operator in each RSGB Zone, leading multi operator station in each RSGB Zone, leading AFS in each RSGB zone, leading SWL.

Adjudicator: G4DHF D.Johnson 65 West Street, Bourne, Lincs PE10 9PA.

AMATEUR RADIO DIRECTION FINDING GENERAL RULES

160 METRE DIRECTION FINDING CONTESTS

1. Events

(a) Qualifying events will be open to members of the RSGB or Affiliated Societies on the strict understanding that they and the members of their teams take part entirely at their own risk and that neither the RSGB nor the organising club shall be held responsible for any loss or damage resulting from taking part in the contest. Every named person taking part in the contest will be required to sign their name on behalf of themselves and the members of their team on a form provided by the organiser at the start acknowledging this and the rest of the rules. Contests will be held on Sunday afternoons, commencing at 1320 and concluding at 1630.

(b) The National Final will be held after the Qualifying Events have been decided and only the following will be allowed to compete:

(i) The winner of the National Final in the previous year.

(ii) Competitors qualifying in the Qualifying Events.

iii) One or more competitors specifically invited by the contest committee.

Only entries under (i) and (ii) will be entitled to win the trophy.

The National Final will be held on a Sunday afternoon commencing at 1250 and concluding at 1630. Note: all times are clock times.

2. Transmitters

In the Qualifying Events, competitors will be required to locate two hidden transmitters, and, on the National Final only, will be required to locate three. All transmitters will operate, using CW and amplitude modulation, in the 1.8MHz band, each with a maximum carrier level of 9dBW and the power output will remain constant throughout the event.

3. Identification

For identification purposes, the callsigns and frequencies (which will be separated by at least 10kHz) will be announced at the start of each event. Identification signals will be given in CW for the first four minutes of the first transmission, immediately followed by two minutes of telephony.

4. Signals

(a) After 1326 (1256 on the National Final) competitors who are satisfied with their bearings may leave the start at their own discretion.

(b) If any of the competitors fail to detect signals from any of the transmitters they will, at 1335 (1305 on the National Final), be given a bearing(s) which, when drawn on the appropriate 1:50,000 OS map, will pass within 4km (8cm) of the transmitter(s) they have not detected.

(c) If none of the competitors detect a signal from any one or more of the transmitters, the starter, in addition to providing the information above, will state whether the transmitter is either: less than 10km, more than 10km but less than 20km, or more than 20km from the start location.

5. Transmission Times

Qualifying Events

1320 - 1324 ..... CW
1324 - 1326 ..... Telephony
1400 - 1402 ..... CW
1402 - 1404 ..... Telephony
1404 - 1600 ..... Random
1600 - 1602 ..... Telephony
1602 - 1615 ..... Random
1615 - 1630 ..... Continuous

National Final

1250 - 1254 ..... CW
1254 - 1256 ..... Telephony
1330 - 1332 ..... CW
1332 - 1334 ..... Telephony
1334 - 1600 ..... Random
1600 - 1602 ..... Telephony
1602 - 1615 ..... Random
1615 - 1630 ..... Continuous

After 1404 (1334 on the National Final) transmissions will continue on telephony for not less than two minute periods at irregular intervals, such periods to be not more than 15 minutes apart. Each transmission will be preceded by a short identification signal in CW of the form '*TEST, TEST, TEST DF DE G . . . . . /P*'. After 1600, transmissions will continue on telephony only. Transmitters will operate on the same fixed schedule of transmissions (ie operating simultaneously) until 1404 (1334 on the National Final) subsequently operating independently, except for the 1600 transmission. Where severe interference is known to exist, slow CW may be used in place of telephony.

Contests will terminate at 1630 and, in the event of no one finding all the transmitters in the time allowed, the contest will be declared a one or two station contest, as the case may be, and the winner declared on that basis.

6. Locating Hidden Stations

Competitors may locate stations in any order and upon arrival at each station the competitor must hand his numbered entry form directly to a member of the transmitter crew who will initial the form, mark on it the time of arrival and hand it back to the competitor. The transmitter operator, or his assistant, must if challenged by a competitor holding a DF receiver admit that his is one of the hidden DF stations.

7. Qualifiers and Winners

(a) If seven or more Qualifying Events are held in any one year the first two competitors, not having previously qualified to locate their second transmitter, will go forward to the National Final. If there are six or fewer Qualifying Events, the first three competitors, as defined above, go forward to the National Final.

(b) In the National Final the first competitor to locate his third transmitter (or second transmitter if no one has located three) will be declared the winner.

8. General

(a) Competitors searching likely transmitter sites prior to the commencement of a competition will, at the discretion of the umpire, be disqualified from the competition.

(b) The hidden stations will be located at least 50 yards from any inhabited building and will be directly accessible to competitors without them entering, crossing or trespassing upon property in private occupation.

(c) The hidden stations will be located at least 50 feet from any public highway.

(d) Transmitter locations and starting point shall be covered by one sheet of the Ordnance Survey map (1:50,000 series) and the sheet number must be published prior to the event.

(e) Each competitor must sign on at the starting point and must receive an entry form numbered to confirm with the entry on the starters sheet.

(f) A team shall consist of a competitor plus not more than three others.

(g) Tampering with the transmitter aerial by the competitor or his team is strictly forbidden and may entail disqualification of the competitor. Competitors and their teams must leave the vicinity of each transmitter immediately the signed form has been handed back to the competitor.

(h) Only one portable receiver, capable of being tuned to the 1.8MHz band, shall be carried by any team during the event, and the competitor at the time of his arrival at each hidden transmitter must have his receiver with him and, if required, must demonstrate that it is in working order. However, there is no objection to having a second portable receiver as a reserve for use in the event of failure of the first receiver provided that the reserve receiver remains in the competitor's vehicle until a failure of the first receiver has occurred. Simultaneous use of two receivers may result in disqualification from the contest. The use of any transmitting equipment by the competitor or his team is expressly forbidden. Any aerial connected to a fixed monitoring receiver in a competitor's car must be of a non-directional type.

(i) The aerial in each case will be directly connected to the transmitter without the use of non-radiating feeders. The transmitter will not be operated by remote control.

9. National Organiser

The National Organiser, before the start of any event, shall appoint an umpire whose main function shall be to ensure that the rules are compiled with at the start of the contest.

In the event of any dispute(s) occurring during the contest the competitor may, at his discretion, refer the matter in writing to the Chairman of the RSGB's ARDF Contest Committee no later than 14 days after the event, whose decision shall be final. Nevertheless the competition results, in which the dispute(s) occur(s), may be determined by the umpire's ruling(s) until or unless the RSGB ARDF Contest Committee decides otherwise.

VHF RULES

RESULTS OF SLADE TOP BAND QUALIFYING EVENT

Slade Radio Society started the 1994 qualifying event from Clee Hill on the Kidderminster and Wyre Forest OS Map, No 138. Good signals were heard from both stations by the twenty teams assembled and eager to get going on a grey overcast day.

Station 'A', G3SRS/P, was located beneath one of the many fallen pine trees half way up Brown Clee, due north of the start. Station 'B', G4FRS/P, was located on the east side of the river Severn at Upper Arley, north of Bewdley, again with a long walk or run to locate the hidden transmitter.

Seventeen teams successfully found both stations by 1630 hours, with Steve Stone and Dave Holland qualifying for the National Final.

Pos	Name	Club	Transmitter A	Transmitter B
1	A Simmons	Mid Thames	1429	1518
2	S Stone	Mid Thames	1419	1530
3	C Wells	Mid Thames	1419	1534
4	D Holland	S Manchester	1440	1551
5	G Whenham	Coventry	1448	1552
6	A Collett	Chelmsford	1443	1559
7	M Hawkins	Chelmsford	1443	1600
8	D Brocks	Chelmsford	1442	1601
9	C Plummer	S Manchester	1425	1602
10	R Gray	Mid Thames	1427	1603
11	B Bristow	Mid Thames	1455	1604
12	P Cunningham	Colchester	1458	1605
13	G Foster	Mid Thames	1422	1606
14	J Hall	Ripon	1445	1615
15	C Metcalf	S Manchester	1618	1508
16	C Boyce	Mid Thames	1622	1509
17	T Gage	Mid Thames	1624	1518
18	R Summer	Shrewsbury	1447	-
19	G Blomeley	S Manchester	-	1509
20	R Goodeart	Mid Thames	-	1611

RIPON TOP BAND QUALIFYING EVENT RESULTS

Pos	Name	Club	Transmitter A	Transmitter B
1	B Bristow	Mid Thames	1454	1629
2	T Gage	Mid Thames	14.56	1629.45
3	C Plummer	S Manchester	1439	-
4	D Holland	S Manchester	1454	-
5	G Foster	Mid Thames	1459	-
6	G Nicholls	Banbury	1500	-
7	M Hawkins	Chelmsford	1529	-
8	A Cunningham	Colchester	1605	-

One competitor failed to find either transmitter

1995 VHF ARDF RULES

1. The recommended frequency will be 144.725 MHz.

2. All teams must start the hunt from a pre-arranged start location.

3. The FM carriers, either voice modulated or unmodulated, will be for 30 seconds every 5 minutes. A warning will *only* be given 2 minutes before the *first* carrier is due. The second fox will start transmission as soon as the first carrier ends.

4. Clues will *not* be given as this could give unfair advantage to some teams. For the same reason, the fox should *not* transmit outside the prescribed times on *any* frequency.

5. There are no restrictions on polarisation or antenna type. The antenna should not be moved or adjusted after the commencement of the foxhunt. If a beam is used, it should be directed to the central point of the foxhunt area.

6. Transmission power should be a minimum of 2.5W output and remain constant throughout the event. If a change of power is necessary due to technical problems, the fox will make announcements of such on all subsequent carriers.

7. The transmitters should not be in any location that is private, or requires permission or payment.

8. The team is deemed to be the driver and the passenger(s) in one car. When searching for a portable fox, the team should search together and not spread out, increasing the area of search.

9. Only one set of DF equipment is to be used per team at any one time.

10. Apart from the fox, transmission is forbidden on the fox frequency. When a team has found the fox, they should leave the immediate area, and should not transmit on *any* frequency in the immediate vicinity of the fox.

11. The fox is deemed to be the *transmitter*, not the antenna or operator.

12. The winning team will be the one to find *both* transmitters in the shortest time. It is the prerogative of each team to decide in which order they search for the transmitters.

SALISBURY TOP BAND QUALIFYING EVENT - JULY '94

Sunday 3 July was a very hot sunny day for the start of the Salisbury RSGB ARDF qualifying event which met at Yarnbury Castle. Most teams headed first for the 'A' station G3TRY/P, 20km south west hidden along the old ox drove high up on Cranborne Chase, a remote and beautiful wild deer and fox area.

The 'B' station, G4MDF/P, was very concealed amidst thick rhododendron bushes and fallen trees on the northern edge of the New Forest almost 30km south east of the start.

14 teams took part, signals were good and, apart from a little problem when someone got stuck (the track really was used only for sheep and oxen) all went well. A meeting and tea arranged by Len Tryhorn, G7GKD, and his wife, then took place at 5pm at the club rooms in Salisbury. Thanks go to all members of the Salisbury Radio and Electronics Society, particularly Dick, G0MZI, who managed the event and kept things in order.

Pos	Name	club	Transmitter A	Transmitter B
1	T Gage	Mid Thames	1417	1545
2	M Hawkins	Chelmsford	1427	1549
3	G Whenham	Coventry	1426	1602
4	G Foster	Mid Thames	1424	1602.30
5	G Nicholls	Banbury	1427	1602.45
6	M Standen	Mid Thames	1447	1603
7	c Plummer	S Manchester	1428	1606
8	C Boyce	Mid Thames	1616	1513
9	C Merry	RSGB	1425	1620
10	P Cunningham	Colchester	1447	1629
11	B Bristow	Mid Thames	1508	-
12	P Clark	Torquay	-	1519
13	S Stone	Mid Thames	-	1520

One competitor failed to find either transmitter
Mike Hawkins and Graham Nicholls qualify for the National Final.

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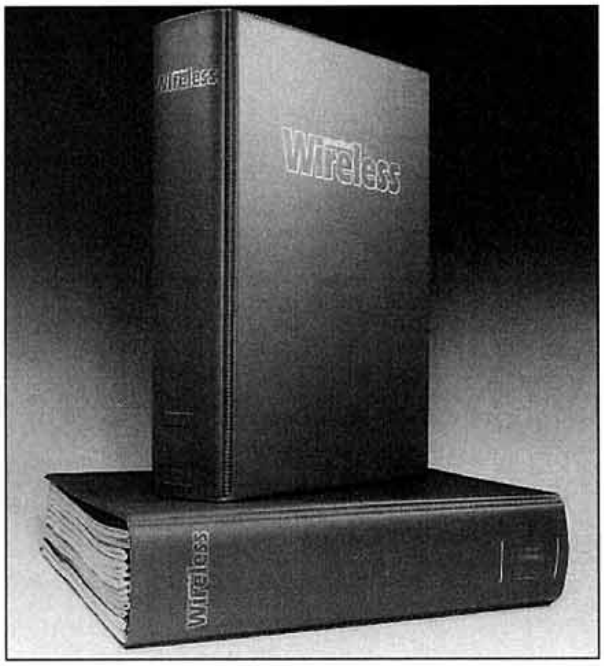

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ICOM 725 bought May 1991, fitted with CW Filter and FM/AM Board, complete with Microset PSU. MFJ948 Delux Aerial Tuner SWR bridge etc, five months old and G2DYM MultiBand trapped Dipole: £695. Private sale but access/visa available. G3KWK, QTHR. (Redditch) 01527 541502

ICOM Rx R9000: £3,000. R71E: £675. R7000E: £675. Condition as new, fitted nearly all extras. Icom 2E 2m H/held: £90. Sonny ICF77SW: £300. HF portable Sony 20PSI Tv with Tuner + Teletext: £390. Buyer collects. Telephone for further info. (Leicester) 0116 270 0827.

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JRC NRD-535 Rx, Bandwidth control, ECSS, Lowe Mod, matching L/S NVA319 with AF Filters, boxed, manual, original condition: £1,100 ono. G7JAI, QTHR. (Warwicks) 01926 54556.

JRC Receiver 0-30MHz, NRD515 Spkr Memory Unit NRH 518 Controller NCM515 Receives only part each 1MHz step. Must sell, best sensible offer. For details ring G4XQZ, QTHR. (Havant) 01705 482539.

KANTRONICS KPC4 Dual Port TNC +KISS Rom: £180. Kantronics Data-engine, two 1200 Baud Modems fitted: £290. TR9130 2m All Mode Tx/Rx: £340. Above items are very clean with original packaging etc. Dat tape drive 5.25inch Frame, Exabyte 8200 (SCSI), uses Video 8 Tapes 2.3Gbyte backup, little used, make me an offer for this one. Bob, G6EIH, QTHR after 7pm only. (Burton on Trent) 01283 814293.

KENWOOD FT140 HF Tcvr: £500 ono. Yaesu FT7 HF Tcvr QRP 15W: £150. Altron Mini 3 el Beam HF: £75. (London) 0171 935 7119.

KENWOOD SM230 Station Monitor with Pan-Display, all test Probes: £200. Also Commodore 64 with D/D and PK S/ware: £100. MFJ Antenna Bridge 0-30MHz, new: £40. (Bolton) 01204 363482.

KENWOOD TR751E 144MHz M/mode Tcvr, boxed with manual and accessories, never used mobile: £450. G0KDR, QTHR. (Saxmundham) 01728 663476.

KENWOOD TR751E 2m M/mode: £475. Icom W2E 2m/70cm Handie: £275. MET 7 ele 2m Antena: £15. All in perfect condition with handbooks and instructions. Prefer buyer collects or arranges carriage. G7JUN, QTHR. (Newent) 01989 720294.

KENWOOD TR751E All/Mode 25W, new, boxed, unused, property Silent Key: £500. Bencher Chrome Paddle, new, unused: £50. (Cardiff) 01222 757556.

KENWOOD TRIO TS830S, CW Filter, excl condx: £475. Kenwood MC50 Desk Mic as new: £25. Buyer collects or pays carriage. G4GLC, QTHR. (Settle) 01729 822299.

KENWOOD TS430S with FM and Filters, exc condx: £500. Grid Dip Meter DM81, unused: £60. Power/SWR Meter CN620A, perfect: £65. G-Whip mobile Ant, unused: £45. Kenwood SW100 SWR/Power remote Meter: £35. Datong FL2 audio Filter: £60. G0CKH, QTHR. (Norwich) 01603 451201.

KENWOOD TS440S, mint, little use: £750. Phillips 3233 Scope 10MHz, D/trace, solid state, manual, probes: £65. G4FPU, QTHR. (Welwyn Garden City) 01707 320741.

KENWOOD TS440SAT, PSU PS52, Kenwood Hand Mic, boxed, manuals, mint: £800. Hustler HF Antenna, 4 band trapped Vertical, boxed, manual: £70. Kenwood AT130 Antenna Tuner, mobile mount, boxed, manual: £75. All items, firm inspect uplift. (Central Scotland) 01506 844001.

KENWOOD TS530S HF Tcvr, good condx, box, manual: £430 delivery included. Kenpro KT-22 2m FM Tx/Rx plus charger: £115. Microwave Modules 144MHz Transverter, mint, 144/28 late model: £85. WANTED HP Laser Jet manual for 2686A. Phone after 7pm. (Loughborough) 01509 261780.

KENWOOD TS530SP, mint condition, never mobile, original packing, Mic, manual, all Bands: £450. Tokyo HC-400L ATU, mint, original packing with dummy loads three antenna inputs: £125. Versaterm TU RTTY/Amtor/CW cased with all leads: £50. G0HFB, QTHR. (East Looe) 01503 262823.

KENWOOD TS680S HF +6m Tcvr, all modes fitted, Gen Cov Rx, 100W 160-10m, 10W 6m. Price includes; Hand Scanning Mic and 2el 6m Beam, immac condition: £575. Hari Trap Dipole for the WARC Bands. Total length 35ft 1:1 Balun fitted: £45. Top Section for Jaybeam VR3 Vertical, comprising 10m, 15m Traps plus Top Whip, similar to I2AVQ includes handbook: £25. (Cardiff) 01222 565681.

KW204 Tx, gd condx, manual, Mic: £100. KW E-Zee Match, vgc: £60. SWR Meter: £10. All plus carriage. Will split. (Bookham) 01372 450508.

LATTICE TOWER Sections, four 14ft X 8inch Triangular Mast sections. Ideal for DIYer to make homebrew aerial mast/s. Plus 10ft RSC. No reasonable offer refused. Can split. Viewing advised no obligation. G1CQX, QTHR. (Sittingbourne) 01795 428685.

LINEAR AL811 good condx, tested, little used: £450 Carriage extra. Altair Grid Dip Meter, as new, boxed: £40. (Leominster) 01568 614470.

LINEAR Power Supply parts suitable for Valve Amplifier 1320V 3A plus cct diagram: £50. Mr V McClure, 43 Roman Way, Seaton, Devon EX12 2NT. Also RTTY and Morse Transceive for STE: £25 disc. Also Designer Programme for 4Mb STE for PCB design, Bureaus and Graphic stock control: £100. (Seaton) 01297 23421.

LOWE HF 150 Rx with wip aerial, little used, pristine condition, boxed. GD0MWL, QTHR. (Isle of Man) 01624 832240.

MAGAZINES including *QST* 1940 - 1960, *Wireless World* 1931 - 1950, *T & R Bulletin Shortwave* 1946 - 1983, *RSGB Bulletins* 1942 - 1963. Various manuals for Ex-Govt Radios. Books include *Radio Handbook* (American) 1936 - 1947, *Radio Handbook ARRL* 1933 - 1969. *T&R Bulletin* 1933 - 1938. Many oethers, phone for list. G6NUZ, QTHR. (Boston, Lincs) 01205 365209.

MAST 68ft Galvanised Steel Triangular Tower. Three Sections with equipment cupboard. Buyer collects. Sensible offer to Mendip Raynet, G4OWH, QTHR. (Nr Bath) 01761 431198.

METEOSAT/GOES Wx Receiving System ICS MET2 SHF Rx, 2.4m Yagi, Ant Pre-Amp, 20m cable IBM comp Interface Card, S/ware with Colour/Zoom facility, stunning pictures of earth every 4min: £300. (Woodford Green) 0181 505 7207.

METERS GALORE from 50uA to 50kV and 2in to 6in: Cost £2 to £5, plus postage or collect. G3IJW NOT QTHR. (Bexleyheath) 0181 303 1879.

MFJ-1278B M/Mode Data Controller, brand new in box: £275. 2x 1Mb 30 pin Simms: £45. 2 Burndept H/helds with one set of Crystals (for conversion): £25. Pye PF2: £10. Wanting Europa Crystals, Gen Coverage Rx, MX294 Wxsat Receiving equipment. G7MXS. (Sheffield) 0114 246 6457.

MICROWAVE Modules MMA144V RF switched Pre-Amp: £20. Lo-pass Filter, professional, 6 section, 50Ohm 55MHz cutoff, 60db at 74MHz, 500W peak i/p, with data: £10. ZX Spectrum Computer with PSU: £10. G8ZGK, QTHR. (High Wycombe) 01494 448030.

PAC-COMM MC-N896 9600 Baud Modem Card new with manual: £75 ono. Amstrad/Pace RS232C: £45. Amstrad RS232C: £30. G1OIO, QTHR. (Seaford) 01323 893278.

PSION ORGANISER model LZ, 32k Base Memory, 2 x 16k Data Packs extra, 64k Total, c/w Formater, excellent condx: £50. G4SLG, QTHR. (Lincoln) 01522 751920.

PSU Mains to 13.2V DC 7A max, brand new: £25. Beckman Digital Voltmeter (RS612-035): £30. GP300 Prog Kit: £50. (Milton Keynes) 01908 506848.

QRP MFJ-9040 40m CW Tcvr: £130. Mizuho 80m CW/SSB including Crystals for CW band: £170. Both 6 months old and under warranty. Owner purchasing multi-band Rig. G3LSW, QTHR. (Scarborough) 01723 374217.

RACAL RA17L, excl condition mechanically and electrically, having been serviced and aligned. Sideband Adaptor possible available. Could deliver: £170. John, G0LXY. Please use answerphone. (Oxford) 01295 720022.

REDIFON 551N Rx, is a superbly stable unit for VFO and fixed operation on LSB and USB and CW. In first class condition: £275. G0LXY. Could deliver. Please use answerphone. (Oxford) 01295 720022.

SANYO VMEX30P Camcorder, many extras, hardly used, only six months old. Best buy in video mags: £350 or Exchange for FT290 Mk2. Contact R Pearce, c/o Norweb, Salthouse Road, Barrow-in-Furness, Cumbria LA14 2UP. (No tel number)

SELLING UP, KW1000 Linear with spare Valves: £350. KW201 Rx: £85. Daiwa ATU: £150. KW Vespa Tx: £85. Yaesu FC707: £95. FT101ZD: £325. Pakratt 232: £190. All vgc, working. Phone. All prices negotiable. (Farnborough) 01252 544268 evenings or 01252 518009 day.

SEM Tranzmatch with Ezitune: £80. Trio TH21E 2m H/held: £70. Neither hardly used. Prices include carriage. G0DWJ, QTHR. (Leamington Spa) 01926 422754.

SILENT KEY SALE G8FAY. FT One: £625. FDK Mobile Tcvr: £110. Belcom 180w 2m Linear: £55. MM-432/100: £70. R-537S Airband Rx: £45. Braun Multimode 2m Tcvr: £70. Kenwood PS30 PSU: £50. Daiwa HF ATU: £50. Daiwa VHF/UHF SWR Meter: £40. Datong FL2: £55. Datong Morse Tutor: £30. RTTY, SSTV Systems, Katsumi, Hi-Mound Keys, CW Monitor, 50ft Lattice Tower - OFFERS. (West Sussex) 01903 892391.

SILENT KEY SALE. Yaesu FT7B + YC7B + FP12: £350. IC202E: £75. Sig-Gen: £20. K1200P Multi-Meter: £10. Diode Tester: £10. Freq Counter 50MHz: £40. CirKit 70cms ATV: £75. KW103 SWR Meter: £35. Plus Morse Keys and Antennas. Hewlet Packard Ink Jet Printer: £100. Please ask for Tony. (Luton) 01582 572719.

SOMMERKAMP FT277, Ext VFO, Datong RF Clipper, manuals, SWR Meter, ATU, G5RV, HF Mobile Whip: £250 ono. Buyer collects. G4DDW. (Rugby) 01455 552599..

SOMMERKAMP FT277ZD (European version of Yaesu FT01ZD), 10 - 160m, inc WARC, c/w fan, Yaesu Desk Mic, manual, box: £400 ovno. Capco SPC300 ATU with manual: £200 ovno. Tony, G0JND/G8YHX. (Buxton) 01298 26800.

STANDARD C8900 10W 2M FM Mobile: £150. SSB Electronics PA2310 10W 23cm Linear: £80. Chris, G6AWM, QTHR. (Twickenham) 01831 814651.

STRONGARM ELECTRIC Winch with Industrial 110V Isolation transformer both new unused. 1225Kg pull: £300 ono. G3GIQ, QTHR. (Ealing) 0181 567 6389.

STRUMECH 40ft Versatower, gd condx, ground post and 21inch Wallmount Stand off Bracket: £450 ono. One B3 Aerial Combiner: £ 18 ono. one B3 Wideband TV Aerial: £25 ono. One Triax UHF group A UnixG2: £33 ono. (Hayes) 01956 505056.

TENNAMAST Wall mounted 35ft Telescopic Mast, c/w rotator Mounting. Delivery possible: £225. GW8AWM. (Usk, Gwent) 01291 672466.

TH3SR 3element Yagi, Daiwa Rotator, manuals, about 20 metres Coax and control cable: £150 CASH. Buyer collects. G3GVV. (Tonbridge) 01732 353360.

TIMEWAVE DSP9 + Digital Audio Filter as new: £190 ono. See RadCom 9/94. GW3YVC. (Cardiff) 01222 755190.

TL922 LINEAR: £900. TS830S: £500. NAG144XL 2m Linear: £225. Kenwood TM221E: £190. Kenwood TH205E: £150. Yaesu FT780R: £250. Yaesu FT480R: £250. SC1 Console for 480/780: £70. Equipment of the late G3BA. Contact G3BHT, QTHR. (Sutton Coldfield) 0121 308 4764.

TONO 9000E Communications Terminal, Tx/Rx Baudot (RTTY) Morse, ASCII, word Processor Modes plus Monitor 12in green screen: £85. FT707, Rx OK, requires new PA Board: £50. Cash Collect. (Surrey) 01342 833359.

TRIO 9130 M/mode Tcvr, excl condx. Comes with all accessories: £350. Phone evenings only. GM1XHZ. (Montrose) 01674 676480.

TRIO STATION Monitor/Scope SM-220 (for TS820/520 Series): £200. Yaesu FRDX 400 Rx: £175. FR100B Communications Rx: £175. FL200B Tx: £175. YC-3550 Freq Counter: £135. FT-790 70cm M/mode: £200. FT209RH 2m Handie, extras: £160. HRO Communications Rx, rack, coils: £50. (Southampton) 01703 865086.

TRIO TR7010 2m SSB Tcvr, very clean: £90. 10m ICOM ICB1050 with AKD 25W Linear: £35. Harrier: £30. Both well modified. (Sutton Coldfield) 0121 353 8874.

TRIO TS520 plus External VFO, need overhaul: £225. Can deliver to E Mids to S Wales. Tel: GW8VHI, QTHR. after 6pm. (Port Talbot) 01585 221788.

TRIO TS520S fitted CW Filter, manual, boxed, buyer collects. G0UAU, QTHR. (Birmingham) 0121 358 3639.

TRIO TS520S, gd condx, new PAs with Shure 444 Mic and manual, Non WARC: £250. G3AMO, QTHR. (Southampton) 01703 846088.

TRIO TS830S: £450. Trio AT230: £120. Trio SP230: £8. Trio LF30A Filter: £20. Weltz CT150 Dummy Load: £15. Box Mast 35ft: £80. Katsumi MK1024 Keyer: £70. AKD Absorb Wavemeter: £15. Yaesu YD148 Mic: £10. New Swedish Morse Key: £10. Phone Mrs Nolloth or Mrs Liew. (London) 0181 529 6441.

TS850SAT, 10 mts old, complete with Auto ATU + MC43S Mic, mint condx, virtually unused: £1,350. Collectors Item, GEC BRT400D Rx: OFFERS. (Elgin) 0134 381 2626.

VERSATOWER P60, Power winch, 15ft Mast and bearing: £300. Jaybeam 12XY 70cm: £5. Parabeam PBM14/2m: £5. 2m Colinear: £5. Buyer MUST dismantle and arrange carriage. Honda E4000 Diesel Generator, 230VAC, 12V and 24V DC o/p at 4KVA: £400. G4EKO. (Yelverton) 01822 853320.

VERY OLD glass Transmitting Power Output Valve, type SD/100A. Approx 21 x 6 inches. A true collectors' item: £30. Paul. (Isle of Wight) 01983 531756.

VHF MC80 Motorola Hi-Band, c/w Mic, Spkr, manual: £25 ono. Colour Monitor Hitachi 20in chassis, manual: £50 ono. (Aberdeen) 01651 882283.

VINTAGE TS515 Trio Tcvr c/w PSU, handbook, vgc and spare set 6146B's: £150. Also Heathkit Transmitter DX100U completly overhauled: £125. (collect only). Ringo Ranger 2m Base Antenna: £35. All plus carriage. Bob, GM0DZW, QTHR. (Grampian) 01339 742341.

YAESU FL2100B Amplifier 1.2kW i/p, works well, 300+ countries worked on 10m: £350. (Knutsford) 01565 634699.

YAESU FL2100Z HF Linear all Bands 160 - 10m. Excellent condx: £500 inc insured carriage. Possible p/ex for KW1000 plus cash. (Shotts) 01501 825111.

YAESU FRG7700 HF Rx, excellent condx with matching Active Aerial and VHF Converter: £250 ono. Also Datong Speech Processor wired for Yaesu 8-pin as new: £50. (High Wycombe) 01494 446593.

YAESU FT101E with Desk Mic, DC leads, handbook, Yaesu FC301 Ant Tuner: £250. G4GOK, QTHR. (York) 01904 608640.

YAESU FT101EX all Bands plus professionaly modified for WARC bands, Mic and Companion Speaker, one owner, unused two years due to moving, vgc for age. Needs service, hence: £150, plus carriage. (Glastonbury) 01458 833205.

YAESU FT102 Tcvr, excl condx, AM/FM and all Filters: £430. PCR Rx restored to exc condx: £60. (Rhondda) 01443 437345.

YAESU FT200 Tcvr Remote VFO: £175 ono. Europa 2m Transverter: £25. Realistic DX-200, 5 band HF Rx: £45. Racal RTTY Terminal RA17 Rx: £180. G0PSI, QTHR. (Nottingham) 0115 946 0670.

YAESU FT200 Tcvr with PSU, Mic and handbook, vgc: £200 ono. G3GNK, QTHR. (Lowestoft) 01502 564387.

YAESU FT209R Accessories. NC18C Charger, NC15 Quick Charger, FNB-4, FNB-3 and FBA-5 Batteries: £65 ono. Jaybeam 6m 4el: £25. Collect, G1WPR. (Kettering) 01536 761490.

YAESU FT221R 2m M/mode: £180. Icom VT200 4m Scanning Tcvr as new, boxed: £180. Icom IC U101 70cm Tcvr as new, boxed: £110. Ill health forces sale. Contact Jim. (Washington) 0191 416 8211.

YAESU FT290 Mk2,gd condx, battery pack, 25W Linear, spare Nicads: £350 ono. Standard C500E D/Band, 2/70 Handy, Nicad batteries: £225 ono. Icom IC255E 2m Mobile: £50. Diamond NR790 2/70 Whip c/w magmount, gutter mount: £35. Tonna Crossed 9 el, 2m: £15. All rigs with info. G7JTV, QTHR. (Wokingham) 01734 732059.

YAESU FT290R1 M/mode,carrying case, Mobile mount, charger, R/Duck: £230 ono. Kantronics KAM all mode Controller: £250. Contact Harry. (Halesowen) 01384 635969.

YAESU FT470 2m/70cm H/held with all Acessories, immaculate: £250. Tennamast 25ft Wall or Ground mounted. Galvanised with brackets, unused: £150 ono. Karl, G0SKN. (Mansfield) 01623 662624.

YAESU FT747GX , 0.1 - 30MHz, 100W PEP tcvr, FM fitted, Hand Mic, handbook, boxed, mint condition: £550. (Saffron Walden) 01799 530763.

YAESU FT757GX2, 2 years old, little use, box and manuals: £600 ono. Kenwood TH28E 2m Tx/Rx 70cm Rx: £190 ono. Both rigs excellent order, good reason for sale. Andrew, GM0UDL, QTHR. (Nairn) 01667 404664.

YAESU FT77 realigned, 8 Band Tcvr: £275. Daiwa PS304 (*not* sold separately) 24/30A, boxed as new: £75. Buyer collects. G3EGS. (Birmingham) 0121 458 2596.

MEMBERS' ADS

YAESU FT840 with FM board. Purchased in April, but must go to pay for new HF Base station: £680. Matching Auto ATU FC10: £220. Both together: £850. Malcolm, G4TJK. (Hook, Hants) 01256 766558.

YAESU FT901DM in vg condx with orig packing: £395 ono. (Wiltshire) 01249 814315.

YAESU FT990DC ex condx Tx + Rx 0-30MHz, Digital Filters, built-in ATU: £1,250 ono. (Halesowen) 01384 565614.

YAESU Rotator Medium duty G600RC including Pole mount, hardly been used: £200. ZX Spectrum +3 Computer with Multiface 3, plus Tapes Discs: £120. Philips Green Screen Monitor: £30. MFJ DXers World map check not including batteries: £20. Brian. Collection only. Phone evening, w/e. (Calne) 01249 816334.

WANTED

AP1086 ISSUE 1 (RAF Radio Stores Ref Nos) Also AP1186 All Sections and APs relating to Radio, Radar equipment. Would purchase Post-War to current Magnetrons, Klystrons, T/R cells, Ignitrons, Thyratrons, Microwave Planar Tubes, TWTs and special CV types. Required R1355 10D/13032, IFF Rxs, R3002, R3067, R3121, Control Unit Type 17. All Unmodified. Excellent Price Offered. Please phone anytime. (London) 0171 511 4786 or FAX same No.

CUSHCRAFT R7 Vertical Antenna. Trio TR-7800 2m Tcvr. Trio Speaker SP230. All VGC. Phone evenings, Suzanne. (Cardiff) 01222 598084.

PNEUMATIC MAST, Clarks DT or Scam type, 10m high, in good working order. GW8AWM. (Usk, Gwent) 01291 672466

73 Amateur Radio Magazine, October 1990. Buy or borrow. All costs refunded. G4RHI, QTHR. (Axminster) 01297 32572.

AERIAL TUNING Unit MFJ 949C model. Versa Tuner 2. Must be in good working order. (Bideford) 01237 476794.

ANY INFORMATION about American Receiver DYMEC 322, made by McKay. Anything about this set would be welcome, manual, circuit. (Guildford) 01483 224327.

DATONG MORSE Tutor, good working order. Phone, evenings prefered. (Potters Bar) 01707 654800.

DRAKE TR4C AF/RF Gain Control Dial and Drive Mechanism. Brian Otter, 9J2BO, PO Box 30222, Lusaka, Zambia.

FRG7700 Rx Memory Unit. G0BEV, phone evenings only. (Tyneside) 0191 281 0999.

G2DAF or G3POM Receiver. Not working, OK as long as not missing any impossible to get parts. Also Wanted AR88 or EA12. G3WCE, QTHR. (Norwich) 01603 250910.

HALLICRAFTERS 538EB Series, Eagle 4 valve, Clarke and Smith, Eddystone 960, EC10, EB35 for CASH. Peter Lepino. Collection possible, phone. (Surrey) 01374 128170 or Fax 01372 454381.

HQ1 Mini-Beam. Fair price paid if decent condition. Details G0DJB, QTHR. Will collect within 50 miles. (Rayleigh, Essex) 01268 773288.

ICOM 735 plus Matching Accessories. Must be in mint condition and boxed. Phone Ben. (Chesterfield) 01246 234885.

ICOM Accessories.CW Filter for 735 types FL32A or FL63A, Spkr SP7, Level Converter CT-17. Good quality Mechanical Bug Key and Morse Key (Ex RAF Prefered). 2m and 70cm All Mode Base Tx/Rx. G3KWK, QTHR. (Redditch) 01527 541502.

KW MONITOR Scope, Case for 19 Set PSU, 52 Set, Transmitter and PSU. WHY? Vernon, G4LVO, QTHR. (Droitwich) 01905 774798.

LINEAR AMPLIFIER for Trio TS130V or TS130S Rig. G0UAU, QTHR. (Birmingham) 0121 358 3639.

MARCONI Deviation Meter Service Manual TF2303 and Trio TS130S. Would welcome loan to copy or purchase. Peter, G3GYE, QTHR. (No telephone number).

MICROWAVE MODULES MMS1 Morse Talker. Must be in gd condition. Len, G0RDV, QTHR. Write or phone. (Kettering) 01536 514544.

MK328 RECEIVER. German WW2 equipment. SSTR - Sets. WHY? Collins 5174 W/3 Mech Filters. OZ8RO, Rag Otterstad, Hosterkobvej 10, DK-3460 Birkerod, Denmark.

MURPHY Rover wanted. Dash Mount. Any condition, working or not. Set has dark blue front with Rank symbol. Mike, GM8KCS. (Edinburgh) 0131 445 5182.

NATIONAL HRO Coilsets. General coverage and Bandspread. All ranges. Any condition. Needed by retired specialist restorer. E F C Owen, 28 Chartfield Road, Reigate, Surrey RH2 7JZ.

OLD TELEPHONES Required. All Types. Wooden Wallphones, 121/221. Bakelite Desk 162/232/332. Candlestick 2/4/150. Bellsets 1/25/26. Red-706. Pushbutton Trimphone. Prefer complete items but parts, metal dials, labels, platted cords, (not curlies), A/B coinbox, PBX switchboard needed. No reproductions. Private collector. (Cheltenham) 01242 524217.

OPUS EGA Monitor or PSU Board or Mains Transformer for same. Any condition considered or VGA Monitor and Card. (Newark) 01636 74362.

OSRAM 912 Amplifier Manual with circuits, component values, etc. Original or copy. Also 350V, dual 6.3V Transformer. Alyn, G7RSK, QTHR. (Ashtead) 01372 277244.

PC-AT386 with EGA/VGA Colour Monitor plus 3.5FD, 40+ HDD, PSU, Keyboard. Also MR750 Daiwa Rotator or Spare Motors for same. (Nr Huntingdon) 01487 841558.

PYE/PHILIPS PF85 UHF H/held working or not. Also PR710 UHF or VHF, any parts or chargers for above. (March, Cambs) 01354 741168.

QTH for Rental purchase, Rural area. Must have ample shack, workshop and sufficient garden for Dipoles and Tower. Any region, Highlands to Channel Islands and Eire. Please write: Stewart, 7 King Street, Driffield, North Humbs YO25 7QW.

QUAD, Leak, Radford etc:- Valve Hi-Fi Equipment, working or NOT. Will pay cash and collect. (Chelmsford) 01245 266027.

RACAL MODEL 836 Frequency Counter, working or NOT working. Good price paid. (Tiverton) 01884 841663.

RACAL SPEEDRACE Equipment; MA228 Exciter, RTA191 Rx, TA349 Linear. RA17L Receiver in "as new" condx. RA63 SSB Adaptor. Parts for TA127 Transmitter. Creed 75 Teleprinter, Tape Reader and Perforator Attachments; Silence covers, Synchronous Motors 120/240V 50/60Hz. Marconi Instruments; Oscilloscopes TF2210, MF Oscillator TF2101, RF Milli-voltmeter TF2603, AF Power Meter TF2500. Nigel, G0UGD, 2 Church Close, Eastbourne, East Sussex, BN20 9QY.

RIBBON and Moving Coil Microphones, Wanted for collection, Also early Cannon - type XLR Plugs. Andrew, G8PTH, QTHR. (Northampton) 01604 844130.

ROBERTS RADIO's M4D 200 and any of their early sets. G6LJR, QTHR. (Maldon) 01621 850450.

SERVICE Manual for Trio TS930S or photocopy or loan. G3JMO, QTHR. (Redcar) 01642 486155.

STILL WANTED, GEM Quad, found one but it was nicked in transit so still looking. Will collect reasonable distance. G0JFU. (Gloucester) 01452 862773.

TEKTRONIX 535A Oscilloscope Manuals to buy or borrow for copying. Also KW2000B or similar HF Tcvr, dead, broken or tired! Anything considered but must be cheap. Private purchase. G4BXS, NOT QTHR. (Nr Plymouth) 01822 853816.

TENNAMAST or similar, Triband HF Yagi, Rotator. Can dismantle uproot and/or collect within reasonable distance. Dale, G3VMK, QTHR. Phone anytime. (Nottingham) 0115 949 1041.

TET HB33SP HF Yagi or parts. Also info manual for same. Phone Jack anytime. (Barry) 01446 747223.

TRIO SP 230 Speaker in good condition. Phone anytime. Fair price paid. G0NDH. (Ferndown) 01202 891249.

YAESU FC902 ATU in gd condx. Best price given. G7LLI, QTHR. (Bromsgrove) 01527 821458.

YO901 INSTRUCTION Manual, good condition, NO Photocopies. Postage paid. Phone Keith, G0CUT after 7pm. (Aylesbury) 01296 86916.

EXCHANGE

BANJO EPIPHONE 5-String vgc, with Electronic Tuner, strap, instruction books, tape FOR Yaesu FT290R Mk2 or FT790R Mk2. Contact Paul, G7PPI (NOT QTHR) evenings (Welwyn-G-City) 01707 333542.

EDDYSTONE 750, Ex-Coastguard for FRG-7 or Similar, WHY. (Tamworth) 01827 58605.

NIKON MOTORDRIVE MD4, mint, boxed, also Burleigh Brooks Computar 65mm f3.5 Professional Enlarging Lens, new, boxed. Exchange for Yaesu FRG7700 with ATU and VHF Converter. Similiar Rx considered. Must be VGC. Cash adjustment either way as required. Phone anytime. (Blandford) 01258 452172.

EVENTS DIARY

CLUB NEWS

DEADLINE - Items for inclusion in the **March 1995** issue must be sent to HQ marked 'Club News - DIARY', to be received by **20 January** latest. If news is received by the published deadline, it should appear in the listing. It is your responsibility to ensure that items are sent DIRECT to HQ in good time. News items should be sent in writing, preferably typed or written legibly, and be signed by the club secretary or the person responsible for publicity.

NOTE: This is primarily a service for clubs affiliated to the RSGB, to whom priority will be given.

AVON

BRISTOL ARC - **NEW SECRETARY** David, G4ZBT. Details G4ZBT 0117 965 4886.

RSGB CITY OF BRISTOL GROUP -. Now meets last Tuesday in every month at New Friends Hall, Purdown, Bell Hill, Stapleton, Bristol, BS16 1BG. Details 0117 967 2124.

SOUTH BRISTOL ARC - 4, CW Activity evening; 11, Talk 'Dont be a victim of crime - & save money' by PC Chisholm; 18, Bring & buy - car boot sale; 25, Photographic equipment evening. Details 01275 834282, 24 hr Answerphone.

WESTON-SUPER-MARE - 9, Annual General Meeting. Details 01934 415700.

BERKSHIRE

BRACKNELL ARC - 11, Annual General Meeting. Details 01344 420577.

READING & DARC - 12, Construction Contest (something I have built) + 3Y0PI video. Details 01734 698274 eves.

READING & WEST BERKSHIRE RAYNET GROUP - The club is urgently seeking new members. Net every Monday evening on 144.775MHz at 7.30pm (local). All contacts welcome. Details Denis, G4KWT 01734 698526.

BUCKINGHAMSHIRE

CHESHAM & DARS - 4, General meeting; 11, talk '6 metre Repeaters' by Ian, G0RDI; 18, Trivial Disputes evening; 15, talk 'The RAIBC' by Shirley, G4HES. Details 01494 676391.

CHILTERN ARC - 18, Annual General Meeting at St Francis Church Hall, Terriers, High Wycombe commencing at 8pm. Details Roy, G4YAN on 01494 534216.

MILTON KEYNES & DARS - ***NEW *** All meetings now in Room 202, Falkener House, Bletchley Park on 2nd and 4th Monday each month at 7.30 for 8pm. Novice Class every Wednesday 7pm. RAE Classes Thursday at G4NJU QTH. Details 01908 672920.

CHESHIRE

MID-CHESHIRE ARS - 2, Committee meeting, 8.45pm Cabbage Hall; 4, 'On Air Night' with RAE Students; 11, Video 'Past Club Events' by Ted, G0RBA; 18, talk 'Practical use of JV FAX' by Mike, G6GAK; 25, On Air night with RAE students. Details 01606 592207.

CLWYD

RHYL & DARC - ***NEW VENUE***. Now meets every 2nd and 4th Monday in each month, United Reform Church Hall, Tynewydd Road, Rhyl at 8pm. Details (GW3UTG) 01745 351362.

NORTH WALES R Rally C - Activities include Novice courses, Morse instruction, Club Station on Air and a City & Guilds Approved Examination Centre. All radio enthusiasts are welcomed to visit. Meets each Thursday at 7.30pm, YMCA Building, Colwyn Bay, Clwyd. Details 01492 513246.

CORNWALL

CORNISH RAC - 5, A good Day in VK, part 2 by Les. Details 01209 820118.

SALTASH & DARC - 6, Bring along your new Christmas 'toys'; 20, A technical talk on BT by John. Details 01752 8444321.

DEVON

APPLEDORE & DARC - 16, Talk 'Space Communications'. Details 01237 477301.

PLYMOUTH RC - 10, talk 'Home Security'; 17, talk 'On your first QSO'; 24, Talk by the Radio Investigation Service; 28, Annual Dinner Dance; 31, Business meeting and natter night. Details 01752 563222.

TORBAY ARS - 20, Contest Entries/Construction Night; Feb 17, AGM. Club nights every Friday at the ECC Social Club, Highweek, Newton Abbot. Details 01803 526762.

DORSET

AXE VALE ARC - 6, Demonstration of members' gadgets and Discussion night; Feb 3, talk 'The Somerset Range of Kits' by G3PCJ. Details 01297 445518.

POOLE RS - 13, Top Band Activity evening; 14, Annual Dinner (venue to be advised); Feb 10, Novice evening. Details 01202 762110.

DYFED

ABERYSTWYTH & DARS - 12, Dyson's night - talk 'Aerials and What Not'; Feb 9, DIY Project 'Building an RF Noise Bridge' by Les, GW3SON. Details 01545 580675.

EAST SUSSEX

CROWBOROUGH & DARS - 26, Annual General Meeting. Meets every 4th Thursday at the Plough & Horses, Crowborough at 8pm. Details 01892 661807.

SOUTHDOWN ARS - 7, Annual General Meeting. Please enquire about RAE and Morse Classes. Details 01323 484282 or G0UOI @ GB7HAS.

MID-SUSSEX ARS -. Formal meetings 1st and 3rd Fridays each month, Club shack open all other Friday evenings. Details 01444 831400.

WORTHING & DARC 4, Discussion evening. Details Roy, G4GPX on 01903 753893.

ESSEX

BRAINTREE & DARS - 9, Operating evening; 16, talk 'Electrical Safety' by Tony, G8LTY; Feb 6, Satellites, part 2 by Frank, G3FIJ. Meets every 1st and 3rd Monday in the month, at Braintree Hockey Club at 8pm. Details 01376 327431.

CHELMSFORD ARS - 3, Film Show; Feb 7, talks 'JVFAX' by G0IPU and 'Noise Bridges' by G2HNF. Details Charles, G0GJS on 01245 256654.

HAVERING & DARC -; 4, Annual General Meeting. Details Brian, G6EBO, c/o Havering & DARC, Fairkytes Arts Centre, 51 Billet Lane, Hornchurch, Essex RM11 1AX.

LOUGHTON & DARS - 6, Illustrated talk + Video 'Dayton Hamvention'94' by John, G8DZH. Details G8DZH 0181 508 3434 (6 - 9pm weekdays or w/ends) or G8DZH @ GB7HSN

GLOUCESTERSHIRE

GLOUCESTER ARS - 4, Equipment setup and Dem; 11, 18, and 25, Construction Group, Novice Licence and Morse Groups. Meets every Wednesday at St John Ambulance Heathville Road, Gloucester at 7.30pm. Talk, first Wednesday of each month. Other Wednesdays as above. Details 01452 421510.

GREATER LONDON

ACTON, BRENTFORD & CHISWICK RC - 17, Annual General Meeting. Details 0181 749 9972.

BROMLEY & DARS - 17, Annual General Meeting. Meets 3rd Tuesday of every month, 7.30 for 8pm at the Victory Social Club, Kechill Gardens, Hayes. Details Alan, G0TLK 0181 777 0420.

COULSDON ATS - 9, Competitive Construction evening. Details 0181 684 0610.

CRAY VALLEY RS - 5, NO MEETING. Details 0181 850 1386.

EDGWARE & DARS 12, Annual General Meeting. Details Rod, G0SQL 0181 204 1868.

GRAFTON RS -; 11, Annual General Meeting. Details John, G0DFZ, 0171 272 2328.

SOUTHGATE ARC - 12, talk 'Receiving Weather Satellite Pictures' by Keith, G3MCD; 26, London AR & Computer Show - Team briefing & strategy. Details 0181 360 2453.

SURREY RCC - 2, Talk 'Slow Scan TV' by Peter, G4WPB. Club meets at "Terra Nova", The Waldrons, Waddon, Croydon. Details Berni on 0181 660 7517.

SUTTON & CHEAM RS - 5, informal meeting; 19, talk 'LIGHTNING' by Fred, G1HCM. Details John, G0BWV on 0181 644 9945.

WIMBLEDON & DARS - 27, Surplus Equipment Sale. Details 0181 540 2180.

GREATER MANCHESTER

MANCHESTER & DARS - Now meets every Tuesday at 7pm. Novice and RAE Courses are run on a continous basis and are free to members. Details G3IOA on 0161 681 5406.

SOUTH MANCHESTER RC - 6, Demonstration of Club Packet System; 13, Mini Lecture Contest; 20, Practical Feeder Impedence Measurement by G4HON; 27, Winter DF. Details G7FQY 0161 969 1964.

GWYNEDD

DRAGON ARC - 2, Chairman's evening - design the club QSL cards and other competitions; 16, Talk 'Who invented Wireless?' by Pat, GW3KJW. Details 01248 600963.

HAMPSHIRE

HORNDEAN & DARC - 5, The Video Signal by Stephen Harding, G4JGS, Sony Broadcast; Feb 2, Junk Sale. Meets at Horndean Community School, room X5, Barton Cross, (off Catherington Lane), Horndean. Details 01705 472846.

ITCHEN VALLEY ARC - 13, talk 'The Radio Spectrum' by Mike, G6AIQ; 27, talk 'How *Ham Radio Today* do their equipment reviews' by G4HCL. Details 01703 732997.

SOUTHAMPTON ARC - Meets 1st and 3rd Monday of every month at Cantell School CDT Block, Violet Road. Details 01703 391414.

THREE COUNTIES ARC - 4, Electronic Warfare; 18, talk 'Local Repeaters GB3GF and GB7GFD'; Feb 1, HMS Warrior. Details Tom, 01428 606298.

HEREFORD AND WORCESTER

BROMSGROVE ARS - 10, Night on Air; 24, talk 'Amateur Radio Observation Service'. Meets at Lickey End Social Club, Alcester Road, Burcot. Details Barry, G0TPG on 01527 542266.

HERTFORDSHIRE

CHESHUNT & DARC - 4, Natter night & members forum; 11, Dud Charman's Aerial Circus Video; 18, Natter night; 25, Talk 'Antenna Measurements' by Peter, G3LDO; Feb 1, talk 'Cellnet basics' by Graham, G7OZM. Meets at 8pm. Details 01992 464795.

HODDESDON RC - Feb 2, Talk by the Editor of *Practical Wireless*, Rob Mannion, G3XFD at 8pm prompt. Details John, G7OCI01920 466639.

STEVENAGE & DARS - 3, Welcome Back - General get together, CW practice Beginners & improvers; 10, 1995 Contest Calender - which contests to enter - Paul, G7PPI; 17, General Get together; 24, Planning Permission by Tony, G0OVO; 31, Video evening. Details Peter, G7HCL on 01438 724509.

WELWYN & HATFIELD ARC - ** NEW VENUE ** the Hyde Club, Holly Bush Lane, WGC. Meets every 1st & 3rd Monday in the month at 8pm. Details 01707 325447.

HIGHLAND

INVERNESS ARC - ** NEW VENUE ** Now meets at the Cameron Youth Centre, Planefield Road, Inverness. Details Ian, GM4JAE, QTHR.

HUMBERSIDE

BRIDLINGTON & DARS -. Now meets at the Links Golf Club, Flamborough in Function room at 7.30pm. Details 01262 671268.

GRIMSBY ARS - 5, AFS contest Organization; 19, Club night on Air. Details John, G3DOT 01472 825899.

NORTH FERRIBY ARS - 6, 13, and 27 will be devoted to construction of a Packet Interface with software and how to operate a packet station; Feb 3, AGM. Details from 01482 656324.

ISLE OF WIGHT

BRICKFIELDS ARS and Vintage Wireless Museum - Club meetings each Monday 7.30pm onwards. 1st Monday of every month, Bring & buy. Each Tuesday Novice Classes and Construction evening by Mike, G0SEB. Morse classes for Novices and B licensed operators when requested. Details 01983 873306.

KENT

BREDHURST R & TS - Meets every Thursday at 8.15pm. Novice and CW classes. Details from G7JBO on 01634 365980.

MAIDSTONE YMCA ARS - 14, RSGB Morse Test (6mm mono phones & Key jacks); 20, Rally meeting G0TAR, 01634 234434; 27, RAE, Morse, club/shack evening; Feb 3, talk 'EMC - don't QRT. Operate!' by G3ORP. Details John, G0RHO 01622 832259.

MEDWAY AR & TS - 27, An evening with Rob Mannion, G3XFD the Editor of *Practical Wireless*. All clubs welcome.; Feb 10, Construction Contest. Meets every Friday, other evenings include construction and Morse as required plus Novice help. Details 01634 685585 or 201462.

SEVENOAKS & DARS - 16, talk 'Emergency Communications' by John, G1YQK. Details from The Secretary, Sevenoaks & DARS, c/o Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG.

WEST KENT ARS -. ** NEW VENUE ** Now meets at the Health Authority's Office, Sherwood Park, Pembury Road, Tunbridge Wells. Details G3OHV, 01892 664960.

LANCASHIRE

BURY RS - ** NEW CONTACT **, now Laurence, G4KLT 0161 762 9308.

THORNTON CLEVELEYS ARS - 9, Quiz organised by Ben, G7SOG; 16, Compact Disc Players by Steve, G4NVF; 23, Two short talks by members; 30, Transmitting evening. Details G4BFH, QTHR.

LINCOLNSHIRE

SPALDING & DARS - 13, Annual General Meeting. Old Fire Station, Spalding at 7.30pm. Details G4OO 01775 750382.

MERSEYSIDE

LIVERPOOL & DARS - 3, Discovery of X-Rays (Dr David Edwards of Liverpool University); 10, GX3AHD on the Air; 17, The New Morse Test by G3AVJ; 24, Quiz; 31, Surplus Sale. Meets at Churchill Conservative Club, Church Rd, Wavertree every Tuesday. Now offer RAE Course, Novice RAE and Morse courses. Details Ian, G4WWX on 0151 722 1178.

WIRRAL ARS - 4, Club open; 18, Using Test gear by Pat, G3FLG. Details G3FOO 0151 644 6094.

NORFOLK

ARC FAKENHAM - 6, Christmas social. Meets at Trinity Church Room, Hempton at 7.30pm. All welcome. Details 01485 528633.

LEISTON ARC - Feb 3, Talk 'Flying Saucers - the truth' by Professor John Allen. Details 01728 832924.

NORFOLK ARC - 4, talk 'Weather & Propagation' by Jim, G3YLA; 11, Noa, Contruction QRP, Morse practice; 18, Know your Radio, Club Quiz by Peter, G3ASQ; Noa, Construction QRP & Morse Practice; Feb 1, DF Equipment. Details 01603 789792.

NORTHAMPTONSHIRE

NORTHAMPTON RC - 19, Talk and slides 'The Lundy Expedition' by Lionel, G5LP. Meets every Thursday at RAFA Club, Grove Road, Northampton at 8pm. Details 01295 760640.

NOTTINGHAMSHIRE

ARC of NOTTINGHAM - 5, Forum and night on Air; 12, talk 'The Light Fantasique' by Tim, G0MLM; 19, Construction / Activity; 26, A talk on Raynet. Details 0115 950 1733.

MANSFIELD ARS - 9, Sherwood Forest and other Awards at 7.30pm. Details 01623 423697 or 792243.

SOUTH NOTTINGHAM ARC - 6, Annual General Meeting - members only; 13, Construction & On Air (HF & VHF); 20, talk 'HF Contesting' by Chris, G3SJJ (Chairman RSGB HF Contests Committee); 27, On Air (HF & VHF) & Construction. Details Julie, G0SOU 01509 672734.

OXFORDSHIRE

BANBURY ARC - ** CHANGE OF VENUE **. Now meets 2nd & 4th Wednesday at 7.30pm at St Johns Church Social Club, South Bar, Banbury. Details 01295 253509.

VALE OF WHITE HORSE ARS - 3, 'Natter night'. Visitors welcome. Details from Ian. Tel: 01235 531559.

SHROPSHIRE

SALOP ARS - 12, talk 'Airband & Aircraft' by John, G0GTN; 19, RAE tuition night and Workshop Evening; 26, talk 'DX Cluster GB7MDX' by G4UJS; Feb 9, Equipment Sale (Not junk). Details Ian, G7SBD QTHR or @ GB7PMB.

TELFORD & DARS - 4, Station equipment night; 11, GB0AA preparation night; 18, Contest preparation 1995; 25, talk 'Microwave TV' by G8VZT; Feb 1, Club equipment evening. All meetings take place at Dawley Bank Community Centre, Telford at 7.30pm. Details Dave on 01952 588878.

SOMERSET

YEOVIL ARC - 5, talk 'Yagi Antenna Design' by G3ZXX; 12, Surplus Equipment Sale; 19, Film & talk on Robotics by G5JJ; 26, Club station on Air & committe meeting. RAE Class held every Thursday for beginners. Details 01258 473845.

SOUTH YORKSHIRE

SHEFFIELD ARC - 2, Bank holiday - 197 club closed; 3, Raynet meeting at club venue; 9, Counselling session; 16, South Yorkshire Open College explained by Steve, G7OCB; 23, Preparation for inter club Quiz competition; 30, How to work HF bands & committee meeting. Details 0114 244 6282.

SUFFOLK

SUDBURY & DRA - 3, talk 'Harnessing Solar Energy' by Mike, G4GGC; N & N ; Feb 7, talk and demo 'Weather Satellites' by Mark, G3CQL. Details 01787 313212 (before 10pm).

SURREY

ECHELFORD ARS - 12, Natter night; 26 TBA; Feb 23, Construction Contest (G8FSZ Cup). Details 01344 843472.

REIGATE ATS - 17, Lecture '25 years of Mobile Radio' by Rodney Gibson of Philips Research Laboratories at 8pm. Details telephone 01342 325322.

TAYSIDE

DUNDEE ARC - 10, Construction Night; 17, Lecture on Local Commercial Radio - Radio Tay; 24, Construction Night; 31, Members Mini-Lectures. Morse classes run weekly. Details from Allan, GM7ONJ, QTHR.

WARWICKSHIRE

MID-WARWICKSHIRE ARS - 10, Five minutes Talk from each member; 24, Dud Charman's Aerial Lecture on RSGB video. Meets on 2nd & 4th Tuesdays at St Johns Ambulance HQ, 61 Emscote Road, Warwick at 8pm. Details 01926 424465.

WEST MIDLANDS

STOURBRIDGE & DARS - 9, On and natter night; 23, Corrosion problems in Amateur radio and other domestic systems by Dr Bob Derricott, G4VPE. Details James French, G7HEZ, 2 Pepper Hill, Stourbridge, DY8 1BJ or packet G7HEZ @ GB7PZT.

SUTTON COLDFIELD ARS - 9, VHF night on Air; 23, Morse Revisited. Details Tony on 01827 874010.

WEST SUSSEX

HORSHAM ARC - 5, Photo Quiz by Adrian, G4LRP. Details Peter, G8SUI 01737 842150.

WORTHING & DARC - 4, Discussion Evening. Details 01903 753893.

WEST YORKSHIRE

DENBY DALE & DARS - 4, talk 'Transatlantic on 2 metres' by Roy, G3OTE; 18, Components evening by Martyn, G3ZXZ. Meets each Wednesday in Pie Hall, Wakefield Road, Denby Dale at 8.30pm. Details Kevin, G1FYS 01484 547553.

HALIFAX & DARS - 17, Visit by Peter Sheppard, G4EJP Council Member for Zone A. Now meets at the Tap & Spile Pub (former Royal Oak) Wards End Halifax. Details 01422 202306.

WILTSHIRE

TROWBRIDGE & DARC - 4, Social; 18, Annual General Meeting. Details Ian, G0GRI 01225 864698 (evenings).

RALLIES AND EVENTS

This is a list of rallies, hamfests, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact callsign and telephone numbers direct to HQ, marked 'Rally News - DIARY'.

22 JANUARY 1995

OLDHAM AR Club Mobile Rally - Queen Elizabeth Hall, Civic Centre, West Street, Oldham, Lancs. Doors open 11am, 10.30 for disabled visitors. Event features many traders with variety of items and a bring and buy. Talk-in on S22 via GB4ORC, commencing at 7.30am. Refreshments will be available from 11.30 in the Failsworth Suite, balcony overlooking the main hall. Again this year, a prize and certificate for the furthest mobile contact with an operator on his way to attend the rally, up to 2pm. Free programme draw prize and parking. Details 0161 652 4164 or 01706 846143.

5 FEBRUARY 1995

SOUTH ESSEX ARS Radio Rally - The Paddocks, Long Road, Canvey Island, Essex (The Paddocks is located at the end of the A130). Doors open 10.30am. Features trade stands, bring and buy, home made refreshments, free car parking. Disabled car parking facilities outside main doors. Admission £1. Talk-in on S22. Details Roger, G0LTO on 01268 693786 or Ken, G0BBN on 01268 755350.

12 FEBRUARY

CAMBRIDGE & DISTRICT ARC Rally - Addenbrookes Ambulance Station, Cambridge. Doors open at 10am. Features trade stands, car boot sale and a bring and buy. Refreshments available. Details from John, G0GKP on 01954 200072.

NORTHERN CROSS Rally - Rodillian School, on A61 between Leeds and Wakefield, near junction M1/M62. Doors open at 11am, 10.30 for disabled visitors and bring and buy. Features usual dealers and groups and a bring and buy stall. RSGB Morse Tests available on demand, subject to two passport photos and the necessary fee. Refreshments available. Talk-in on 2m and 70cm. Entry still £1. Details Dave Gray on 0113 282 7883.

19 FEBRUARY

RSGB VHF CONVENTION - Sandown Park Exhibition Centre, Esher, Surrey. Comprehensive trade exhibition, specialist groups and a lecture pragramme. Details G3MVV 01277 225563, and see ad in this edition.

25 FEBRUARY (SATURDAY)

10th RAINHAM Radio Rally - Rainham School for Girls, Derwent Way, Rainham, Gillingham, Kent. Easy to find off the M2 motorway, junction 4, the A278 or the A2 from Rainham. Follow the RRR arrows. Doors open 10am, 9.30 for disabled visitors. Event features the usual trade stands plus a few new ones selling computers and peripherals, special interest groups: Raynet, RNARS, Packet, Kent Repeater Group and Kent TV Group. and a bring and buy stall. Ample off road parking. Licenced bar, snacks and refreshments, with a place to sit and eat. All on one level with easy access for the disabled. Admission £1, children under 14 free. Further info from Martin, G7JBO 01634 365980.

9th TYNESIDE ARS Rally - Details Stuart G0BEV 0191 281 0999.

26 FEBRUARY

BARRY MOBILE Rally - Barry Leisure Centre, Off Holton Road, Barry. Doors open 10.30am. Features trade stands, a bring and buy stall and refreshments. Trader details from Mike, GW8CMU 01446 711426 and General enquiries from Margaret, GW4GSH 01446 738756.

4 MARCH (SATURDAY)

ABERYSTWYTH & DARS Annual Amateur Radio Rally - Aberaeron School, Aberaeron, Dyfed. Event features trade stands, special interest stalls, Amateur Radio demonstrations and a bring and buy. Plenty of room, easy parking. Town and craft centre nearby. Details from Katy, GW0SFO, 01545 580675.

11 - 12 MARCH (SATURDAY - SUNDAY)

RSGB LONDON Amateur Radio & Computer Show - Lee Valley Leisure Centre, Picketts Lock Lane, Edmonton, London N9. Doors open 10am, with priority admission for the disabled. Event features trade stands, lectures, special interest groups and bring & buy. RSGB Morse Test available on demand (two photos needed). Refreshments. Ample free parking. Talk-in on 2m and 70cm. Details Steve, G3ZVW, 0181 882 5125.

12 MARCH

10th ANNUAL WYTHALL Radio Club Rally - Wythall Park, Silver Street, Wythall, near Birmingham, on the A435, just 2 miles from the M42, junction 3. Features the usual traders in three halls and a marquee, bring and buy stall, bar and refreshments. Talk-in on S22. Admission £1. Details Chris, G0EYO, 0121 430 7267.

19 MARCH

NORBRECK Amateur Radio Electronic and Computing Exhibition - Norbreck Castle Exhibition Centre, Blackpool. Organised by the Northern Amateur Radio Societies Association (NARSA). Details Peter, G6CGF, 0151 630 5790.

26 MARCH

BOURNEMOUTH Radio Society Annual Sale - Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth. Doors open 10.30am until 4.30pm. Features amateur radio and computer traders, clubs and specialised groups, plus refreshments. Admission £1 including free raffle. Talk-in on 2m on S22 by G1BRS. Details from Malcolm, G0UCX QTHR or 01202 747745.

THE MAGNUM Radio & Computer Rally - Details Bob, GM0DEQ on 01563 40048.

PONTEFRACT & DARS, 15th Annual Components Fair & Spring Rally - Details Colin, G0NQE on 01977 677006.

9 APRIL

LAUNCESTON 9th Amateur Radio Rally - Details Roy, G0IKC on 01409 22164 or Rodney, G8HDW on 01566 775167.

WHITE ROSE Rally - ** NEW VENUE ** Leeds Universaty. Details Allen, G7ELS PO Box 73, Leeds LS1 5AR or tel 0973 189276.

16 APRIL

CAMBRIDGESHIRE Repeater Group Amateur Radio Rally - Details Darren, G1ERM on 01223 60601 evenings.

22 APRIL (SATURDAY)

INTERNATIONAL MARCONI DAY H/Q - Details Norman, G4USB 01209 212314.

RSGB HEADQUARTERS Open day. Details Fay, 01707 659015.

CONTINUES ON P92

CONGRATULATIONS

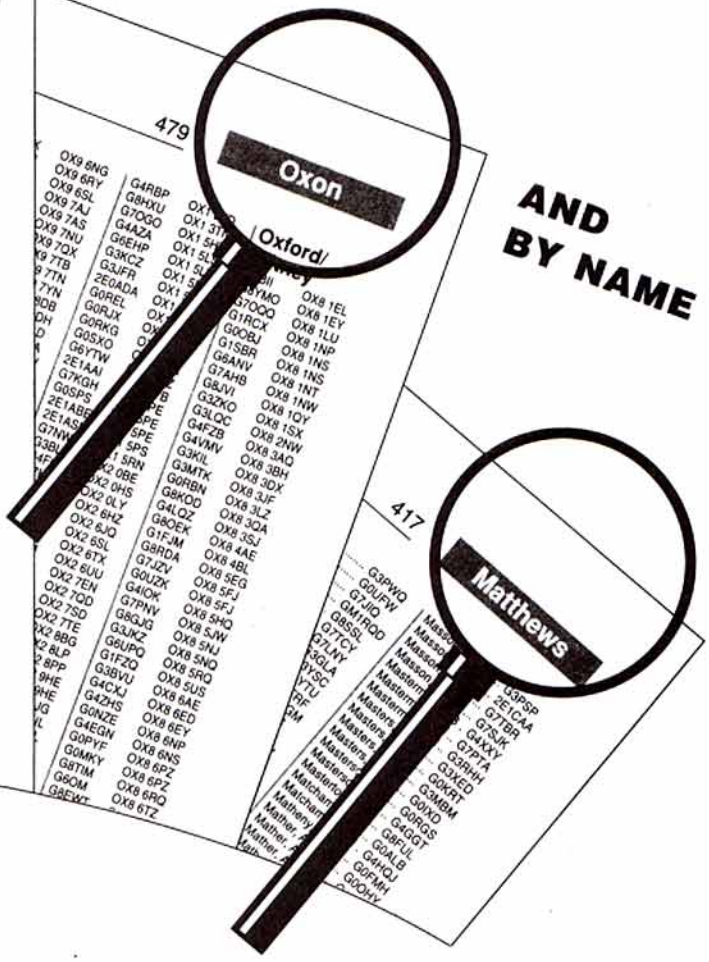
To Mr JA Lake, RS 17973, on reaching 50yrs of continuous membership this month.

THE 1995 RSGB CALL BOOK

The Pages Speak for Themselves

LISTS BY CALLSIGN

BY POST TOWN



AND BY NAME

PLUS . . .

A 125 page Information Directory which includes - Band Plans; Beacon Listing; Club Information; Contest Rules and Calendar; Countries Checklist; EMC Help; GB2RS frequencies and times; WAB Areas; Meteor Scatter; Morse Practice Transmission Times; Packet Radio Nodes and Mailboxes; Propagation Explained; QSL Bureau Information; RAE Help and Test Centres . . .

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ANTENNAS

		NON-MEMBERS	MEMBERS
Antenna Compendium – Vol 1	(ARRL)	£10.25	£8.72
Antenna Compendium – Vol 2	(ARRL)	£10.25	£8.72
Antenna Compendium – Vol 3	(ARRL)	£13.50	£11.78
Antenna Compendium Set Vol 1,2,3	(ARRL)		£23.00
The Antenna Experimenter's Guide	(DDP)	£10.00	£8.50
The ARRL Antenna Book 17th Edition	(ARRL)	£17.99	£15.29
All About Cubical Quad Antennas	(RPI)	£8.50	£7.23
All About Vertical Antennas	(RPI)	£9.10	£7.74
Beam Antenna Handbook	(RPI)	£7.50	£6.38
HF Antenna Collection	**(RSGB)**	**£10.99**	**£9.34**
HF Antennas For All Locations	**(RSGB)**	**£13.99**	**£11.99**
Practical Wire Antennas	**(RSGB)**	**£8.50**	**£7.22**
Simple Low Cost Wire Antennas	(BPI)	£9.07	£7.71
Yagi Antenna Design	(ARRL)	£11.30	£9.60
W1FB's Antenna Notebook	(ARRL)	£8.10	£6.89
Low Profile Amateur Radio	(ARRL)	£5.99	£5.09
Antenna Impedance Matching	(ARRL)	£14.99	£12.74
Reflections: Transmission Lines And Antennas	(ARRL)	£14.99	£12.74
Transmission Line Transformers	(ARRL)	£14.99	£12.74
Quad Antenna Handbook	(ARRL)	£11.99	£10.19

BEGINNERS AND NOVICES

Amateur Radio For Beginners	**(RSGB)**	**£3.50**	**£3.50**
D-i-Y Radio Magazine Subscription	**(RSGB)**	**£9.00**	**£7.65**
First Steps In Radio	(ARRL)	£5.50	£4.68
Radio Amateurs Examination Manual	**(RSGB)**	**£7.99**	**£6.79**
How To Pass the Radio Amateur Exam	**(RSGB)**	**£7.99**	**£6.79**
The Novice Licence Student's Notebook	**(RSGB)**	**£5.99**	**£5.09**
Practical Antennas For Novices	**(RSGB)**	**£5.99**	**£5.09**
RAE Revision Notes	**(RSGB)**	**£4.99**	**£4.24**
Revision Questions For The Novice RAE	**(RSGB)**	**£5.00**	**£4.25**
Now You're Talking – 2nd Edition	(ARRL)	£13.00	£11.03
Operating An Amateur Radio Station	(ARRL)	£2.50	£2.13
Training For The Novice Licence – Instructor's Manual	**(RSGB)**	**£6.50**	**£5.52**
W1BS's Novice Antenna Notebook	(ARRL)	£7.25	£6.17
D-I-Y Radio (1st Pilot Issue)	**(RSGB)**	**£1.81**	**£1.54**
D-I-Y Radio (2nd Pilot Issue)	**(RSGB)**	**£1.81**	**£1.54**
Understanding Basic Electronics, 1st Edition	(ARRL)	£12.50	£10.63

CALL BOOKS

New Callbook Information/Directory 1995	**(RSGB)**	**£10.00**	**£8.50**
North American Callbook 1994	(RACI)	£20.00	£17.00
International Callbook 1994	(RACI)	£20.00	£17.00

EMC (BREAKTHROUGH)

The Radio Amateurs Guide To EMC	**(RSGB)**	**£7.99**	**£6.79**
Interference Handbook	(RPI)	£8.75	£7.44
Radio Frequency Interference	(ARRL)	£12.00	£10.20

GENERAL TECHNICAL

Amateur Radio Techniques 7th Edition	**(RSGB)**	**£9.50**	**£8.08**
ARRL Handbook 1995 - **New -**	(ARRL)	£19.50	£16.57
Hints/Kinks For Radio Amateurs	(ARRL)	£7.60	£6.46
Solid State Design For The Radio Amateur	(ARRL)	£9.25	£7.87
Technical Topics Scrapbook 1985-89	**(RSGB)**	**£9.00**	**£7.65**
W1FB'S Design Notebook	(ARRL)	£6.30	£5.36
New Radio Communications Handbook	**(RSGB)**	**£20.00**	**£17.00**
New RSGB Amateur Radio & SWL Diary	**(RSGB)**	**£4.20**	**£3.57**
New RSGB Amateur Radio & SWL Diary with callsign etc (up to 10 digits)	**(RSGB)**	**£6.20**	**£5.57**
P&P ONLY 50P FOR DIARIES			
Radio Buyers Source Book	(ARRL)	£10.99	£9.34

HISTORY

World At Their Fingertips	**(RSGB)**	**£6.00**	**£5.10**
The Bright Sparks Of Wireless	**(RSGB)**	**£12.50**	**£10.63**
History Of QRP In USA, 1924-60	(ARRL)	£9.50	£8.08

HUMOUR

R F Byrne's Unpublished Masterpieces	**(RSGB)**	**£2.00**	**£1.70**

LOG BOOKS AND LOG SHEETS

Log Book – Transmitting	**(RSGB)**	**£3.00**	**£2.55**
Log Book – Receiving	**(RSGB)**	**£3.50**	**£2.98**
Log Book Cover	**(RSGB)**	**£4.50**	**£3.83**
Log Sheets – HF Contest	**(RSGB)**	**£4.00**	**£3.40**
Log Sheets – VHF Contest	**(RSGB)**	**£4.00**	**£3.40**

MAPS/CHARTS/LISTS/ATLASES

		NON-MEMBERS	MEMBERS
Beacons Region 1 / UK, & UK Repeaters	**(RSGB)**	**£1.00**	**0.85**
Countries/Awards List	**(RSGB)**	**£1.00**	**0.85**
Great Circle DX Map (A4 card for desk)	**(RSGB)**	**£1.50**	**£1.28**
Great Cirlce DX Wall Map	**(RSGB)**	**£2.50**	**£2.13**
Grid Locator Atlas	(ARRL)	£3.50	£2.97
Islands On The Air Directory (2nd Ed) POST FREE	**(RSGB)**	**£6.90**	**£6.00**
IOTA Anniversary Booklet POST FREE	**(RSGB)**	**£6.90**	**£6.00**
Locator Map Of Europe (A4 card for desk)	**(RSGB)**	**0.99**	**0.84**
Locator Map Of Europe (wall)	**(RSGB)**	**£1.50**	**£1.28**
World Prefix Wall Map	**(RSGB)**	**£2.99**	**£2.54**
Locator Map Of Old West Europe (wall)	**(RSGB)**	**£1.50**	**£1.28**
Meteor Scatter Data Sheets	**(RSGB)**	**£2.50**	**£2.13**
International QSL Bureau List	**(RSGB)**	**£1.00**	**£0.85**

MICROWAVES

Microwave Handbook Volume 1	**(RSGB)**	**£9.99**	**£8.49**
Microwave Handbook Volume 2	**(RSGB)**	**£14.99**	**£12.74**
Microwave Handbook Volume 3	**(RSGB)**	**£14.99**	**£12.74**
Microwave Set, Vol 1, 2 & 3	**(RSGB)**		**£25.50**

MORSE CODE

Morse Instruction Tapes 5 to 10WPM (2 tapes)	(ARRL)	£10.50	£8.93
Morse Instruction Tapes 10 to 15WPM (2 tapes)	(ARRL)	£10.50	£8.93
Morse Instruction Tapes 15 to 22WPM (2 tapes)	(ARRL)	£10.50	£8.93
Morse Code For Radio Amateurs	**(RSGB)**	**£3.99**	**£3.39**
Morse Code The Essential Language	(ARRL)	£5.10	£4.34

OPERATING AIDS

ARRL Operating Manual	(ARRL)	£12.10	£10.29
The Complete DXer	IDIOM	£10.00	£8.50
Low Band DXing (2nd Edition)	(ARRL)	£12.99	£11.04
DX Edge Software For The PC	(XANTER)	£13.99	£11.89
DX Edge Propagation Aid	(XANTER)	£13.99	£11.89
KIBV DX Awards Directory	(KIBV)	£17.06	£14.50

QRP (LOW POWER)

QRP Classics	(ARRL)	£11.00	£9.35
G-QRP Club Antenna Handbook	(GQRPC)	£6.99	£5.94
G-QRP Club Circuit Handbook	**(RSGB)**	**£8.50**	**£7.23**
W1FB's QRP Notebook (2nd Edition)	(ARRL)	£7.40	£6.29

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One Year (airmail)	(ARRL)	£88.24	£75.00
One year (surface mail)	(ARRL)	£34.41	£29.25
Two Years (surface mail)	(ARRL)	£70.73	£60.12
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OAP One Year (surface mail)	(ARRL)	£30.88	£26.25

RADCOM BACK ISSUES AND BINDERS

Radio Communication Easibinder	**(RSGB)**		**£5.99**
Bound Vols: 1985, '86, '87, '91, '93 available	**(RSGB)**	**£22.00**	**£18.70**
Back Issues: Please telephone for availability	**(RSGB)**	**£3.50**	**0.50**

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DX News Sheet	**(RSGB)**	**£28.24**	**£24.00**
Microwave Newsletter	**(RSGB)**	**£9.40**	**£7.99**

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SATELLITE

Satellite Anthology – 3rd Edition	(ARRL)	£8.00	£6.80
Satellite Anthology – 2nd Edition	(ARRL)		£3.50
Satellite Experimenters Handbook	(ARRL)	£12.75	£10.84
The Space Radio Handbook	**(RSGB)**	**£12.50**	**£10.63**
The Mir Spacecraft Handbook	(AMSAT)	£4.51	£3.83
The Weather Satellite Handbook	(ARRL)	£14.99	£12.74

SHORT WAVE LISTENER

World Radio And TV Handbook 1994	(RPI)	£16.50	£14.03
Complete Shortwave Listener's Handbook 4th Ed.	(TAB)	£23.25	£19.76

0956 70 73 73 **CREDIT CARD HOTLINE** **0956 70 73 73**

Twelve Hour Opening

The RSGB Sales Office is open from 8am to 8pm Monday to Friday, and from 8am to noon on Saturday.
Call 0956 70 73 73 - This line is for credit card orders ONLY.

for the Radio Amateur and SWL

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The Amateur TV (ATV) Compendium	(BATC)	£5.75	£4.89
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Packet Radio Primer	**(RSGB)**	**£8.50**	**£7.23**
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Am Packet Rad Link Layer Protocol	(ARRL)	£6.50	£5.53
RTTY Awards	(BARTG)	£4.26	£3.62
VHF/UHF			
All About VHF Amateur Radio	(RPI)	£9.50	£8.08
VHF/UHF DX Book	(DIR)	£18.00	£15.30
Radio Auroras	**(RSGB)**	**8.99**	**£7.64**
VHF-UHF Manual 4th Edition	**(RSGB)**	**£10.50**	**£8.93**
MEMBERS' SUNDRIES			
Badges: Callsign standard*	**(RSGB)**		**£3.00**
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Lapel mini	**(RSGB)**		**£1.00**
Lapel standard	**(RSGB)**		**£1.00**
** includes engraving*			
MEMBER'S HEADED NOTEPAPER			
100 sheet octavo			**£3.00**
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		NON-MEMBERS	MEMBERS
RSGB TIES			
New Style, Navy			**£6.50**
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Post free			
CAR STICKERS			
RSGB Diamond	**(RSGB)**		**0.84**
I Love Amateur Radio	**(RSGB)**		**0.99**
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I'm Monitoring	**(RSGB)**		**0.99**
Pencil	**(RSGB)**	**0.26**	**0.22**
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Stick on Bug	**(RSGB)**	**0.59**	**0.50**
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ITEMS MAY, FROM TIME TO TIME, SELL OUT. IF THIS IS THE CASE WE ARE HAPPY TO PLACE YOUR ORDER ON OUR 'BACK ORDER FILES' AND WE WILL SUPPLY YOUR GOODS AS SOON AS POSSIBLE.

HOW TO ORDER

PRICES. Retail prices are followed by members' discounted prices. If you are a member, please quote your call sign or RS number when ordering. All prices include VAT (where applicable) and are subject to change without notice. Except where otherwise stated, please add postage as follows.

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Newsletter and magazine prices include postage. Overseas Airmail and first class UK post prices are available on request.

AVAILABILITY. Goods are available over the counter at RSGB Headquarters 9.15am to 5.15pm, Monday to Friday. However, you are strongly advised to confirm availability of goods by telephone before visiting Headquarters.

PAYMENT. Payment may be made by post, enclosing a cheque or postal order. These should be crossed and made payable to 'Radio Society of Great Britain'. If sending cash please use registered post. We accept Visa and Access (Mastercharge) cards and our telephone number for credit-card orders is 0956-707373.. Our Giro account number is 533 5256.

DELIVERY. Goods will be despatched to UK destinations by 2nd class letter post or parcel post, or surface mail to overseas destinations. Please allow 28 days for delivery.

ORDER FROM: **RSGB SALES (CWO)**
Lambda House, Cranborne Road,
Potters Bar, Herts EN6 3JE

Access VISA *PLUS AMEX & DINERS CLUB*

Credit card hotline: 0956 707373
Or use our fax: 01707 645105

The 1995 RSGB Diary

WE ARE PLEASED to announce the publication of a diary dedicated solely to radio amateurs *and* shortwave listeners. At last information will be at your fingertips (or in your pocket!) wherever you go. This attractive, black finish, gold embossed diary has been printed by Letts and published by Bambers with cooperation from the RSGB. Contents include*:

- **1995 Rally dates**
- **International Q Codes**
- **RSGB Committees**
- **Latest Bandplans**
- **RST codes**
- **Equipment Log**
- **Contest dates**
- **RSGB Honorary Officers**

AS WELL AS MANY ARTICLES . . .

. . . such as Cracking the Code, Listening Via The Bureau, Good Operating Practices, AMSAT UK, WAB Awards, IOTA, Amateur Television . . . Contributing authors include: Hilary Claytonsmith, G4JKS; Roy Clayton, G4SSH, Chief Morse Examiner; Ray Pyman, RS1257; Ray Eckersley, G4FJT; Ron Broadbent, G3AAJ and Peter Kirby, G0TWW . . .

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IMPORTANT: This is not a standard diary with a few extra pages inserted - we have designed this diary from start to finish with *your* needs in mind.
*Please note this is only a small selection of what is covered in this diary.

Radio Society of Great Britain
Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE

EVENTS DIARY

CONTINUED FROM P88

23 APRIL

BURY RS Annual Rally - Details G4KLT, 0161 762 9308.

SWANSEA ARS Amateur Radio and Computer Show - Details Roger, GW4HSH 01792 404422.

30 APRIL

BRITISH ATV CLUB (BATC) Rally - Details & trade enquiries Mike, G6IQM 01788 890365 or Fax 01788 891883.

EAST CLEVELAND ARC Annual Rally - Details 01287 638119.

6 MAY (SATURDAY)

DARTMOOR Radio Rally - Details Ron on 01822 852586.

8 MAY (MONDAY)

MID CHESHIRE ARS Rally - Details David, G4XUV 01606 77787.

14 MAY

DUNSTABLE DOWNS Radio Club National Amateur Radio Car Boot Sale - Plot details on 01582 451057.

MARS/DRAYTON MANOR Radio and Computer Rally - Details Norman, G8BHE 0121 422 9787(evenings).

21 MAY

11th YEOVIL QRP & Construction Convention - Details G3CQR, 01935 813054.

28 MAY

EAST SUFFOLK Wireless Revival - Ipswich Rally - Details Bob, G7HZV on 01394 271257 or 01473 645885.

MAIDSTONE Mobile Rally - Trade bookings Ian, 01622 630000.

TRAFFORD Rally (The Great Northern Rally) at G-Mex - Enquiries Graham, G1IJK on 0161 748 9804.

4 JUNE

SPALDING Amateur Radio and Computer Rally - Details G4TWR, 01775 722940.

11 JUNE

ELVASTON CASTLE National Radio Rally - Details from Ken, G3OCA, 01332 662818. Trade enquiries, Keith, G1ZLQ 01332 662896.

ROYAL NAVAL Amateur Radio Society Annual Mobile Rally - Details Clive, G3YTQ on 01329 234143.

18 JUNE

THE GORDON Rally (The North of Scotland AR Convention) - Details GM6TAN QTHR.

2 JULY

YORK Radio Rally - Details Dave, G7FGA 01904 790079.

8 JULY (SATURDAY)

CORNISH Radio Rally and Computer Fair - Information & booking Ken, G0FIC 01209 821073.

9 JULY

SUSSEX Amateur Radio & Computer Fair - Information and booking Ron, G8VEH 01903 763978 or 0273 417756 office hours.

22 JULY

AIR FORMATION Open Day - Colerne Airfield. (RSARS) Stall applications etc to RSM G Baldry on 01225 743240 x 5256.

23 JULY

COLCHESTER Radio & Computer Rally - Details Richard, G7BIV, 01376 571239.

2nd HUMBER BRIDGE Amateur Radio Rally - Details or bookings Roly, G0UKS 01482 837042.

30 JULY

SCARBOROUGH ARS Radio Electronics and Computer Fair - Details Ross, G4ZNZ 01723 514767.

6 AUGUST

RSGB WOBURN Rally - Woburn Abbey, Bedfordshire. Details from Norman Miller, G3MVV, 01277 225563.

13 AUGUST

38th ANNUAL DERBY Mobile Rally - Details 0332 556875.

20 AUGUST

6th GREAT EASTERN Rally - Details Ian, G0BMS 01553 765614 or at GB7OPC.

WEST MANCHESTER Radio Clubs 'Red Rose' Rally - Details Dave, G1IOO 01204 24104 evenings only.

27 AUGUST

TORBAY ARS ANNUAL Mobile Rally - Details John, G3YCH, QTHR; 01803 842178.

3 SEPTEMBER

PRESTON ARS 27th Mobile Rally.

VANGE ARS Rally - Details Stuart, G1VWB 01375 859632.

10 SEPTEMBER

SOUTHEND & DRS 75th Anniversary Radio & Computer Rally - ***NEW VENUE***. Details Ron, G0UAW on 01702 353676 or Fax Martin, G0OQR on 01702 602271.

8 OCTOBER

KIDDERMINSTER & DARS Rally - Details G8JTL 01384 894019.

20/21 OCTOBER (FRIDAY/SATURDAY)

LEICESTER AR Exhibition - Details Frank, G4PDZ on 0116 287 1086.

12 NOVEMBER

MARS-STOCKLAND Radio/Computer Rally - Details Norman, G8BHE on 0121 422 9787.

26 NOVEMBER

WEST MANCHESTER Radio Clubs Winter Rally - Details Dave, G1IOO 01204 24104 evenings only.

GB CALLS

The list below shows special event stations licensed for operation during this month and up to 8 August. It was taken from the HQ computer on 6 June. These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days.

JANUARY		
7	GB2SR	Stelar Radio
8	GB4ORC	Oldham Radio Club
13	GB0KLH	Kenilworth Lions Hunting
21	GB5SR	Stelar Radio Net
27	GB0AAS	Air Ambulance Service
	GB0CAA	County Air Ambulance
	GB13FRI	Friday The Thirteenth
	GB2AAS	Air Ambulance Service
	GB2CAA	County Air Ambulance
	GB2TLL	The Lavendon Line
	GB4CAA	County Air Ambulance
28	GB0FFL	Flight for Life
	GB4AA	Air Ambulance
	GB4AAS	Air Ambulance Service

SILENT KEYS

WE REGRET TO record the passing of the following radio amateurs.

G0JBG	Mr D Barnes	11.07.94
G0JDN	Mr G T Armitage	
G3BAJ	Mr A G Adams	
G3JUT	Mr T J Jones	15.10.94
G3NOY	Mr H Heath	
G3OLC	Mr K R Nolloth	04.10.94
G4BUY	Mr P C Hufton	31.07.94
G4GGQ	Mr C A Mountford	
G4JDB	Mr R R Mills	15.10.94
G4NDB	Mr G A Pealin	13.10.94
G4RT	Mr W L Millar	01.11.94
G5DJ	Mr C Jardine	23.10.94
G5HA	Mr P Hamlyn	26.09.94
G8AJP	Mr S R Eade	18.10.94
G8WQS	Mr W G Reid	
GI0HOM	Mr J F Porter	17.10.94
GI4OUE	Mr A Logan	25.09.94
GJ6IGF	Mr D J Gallicham	06.09.94
RS49728	Mr F M Lane	

WILL YOU TALK TO OUR CLUB?

THIS IS A common request from Club Secretaries, many of whom are frequently scratching around for a lecture which the members will enjoy, won't find too technical (or too basic!) and given by a speaker who can make a good presentation. But how do you treat the lecturer?

Do you confirm with him/her two or three days beforehand, or do you leave it to him to remember and confirm with you? Do you check up on the requirement for visual aids when you book the speaker? Do you offer refreshments when the speaker has come a long way? Of course you pay expenses. But do you then want to haggle over the cost - 'it would be cheaper if you came by car'. If the speaker has come by train, do you make sure that if he is catching the last train back that you see him off - just in case there's a cancellation? If he's coming by car, do you reserve a car parking space for him, and make sure that there are plenty of people around to help him carry any equipment - in *and* out? The provision of a decent map, and/or talk-in is a minimum politeness, even if he has been once a year for the last three years. A popular lecturer can well be doing some 20 or 30 lectures a year, and although he gets invited back every year, can you really expect him to remember the details of getting to your particular club? Do you make sure that there is somebody available to help him set up, and that he's not left standing around like a lemon while the club members get together - that you introduce him to the Chairman and committee members? Finally, does the Secretary write a thankyou letter?

A lot of these things aren't done by clubs, and this can well result in a lecturer "not being available on any of your club nights this year". Or "I'm not giving talks any more" - and then you see him advertised on *GB2RS*. If your speaker is coming from some distance, it's only a courtesy to advertise the meeting fairly widely to maximise the audience, and to make it seem worthwhile him giving up his time to come to talk to your club.

If the speaker does phone while you're out, and a message is to be taken to call back, try to get whoever takes the message to sound as if they are slightly interested - not "He's a volunteer, so you'll have to phone back to save our phone bill". Remember that the speaker is doing you a favour. Professional rates for a two hour lecture are often £150 or more, plus expenses, while most radio clubs expect to get away with the cost of the petrol - or sometimes, less. A lecturer may well have come straight from work, driven for two hours or so without a break or a proper meal, and face an arrival back home at 2330 or later - just to talk to your club.

You may not believe that some of the things that I've listed really happen. They do, and so do many more - such as rooms shared with a beetle drive or a TV set, locations where the lecturer is refused admission because he's not a member, and there's no-one available to fetch a member to sign him in, clubs where the talk-in is from a handheld that proves to have a flat battery, and there's no-one with another rig, and clubs where the slide projector won't take professional slides. On this last, be warned - professional 35mm slide mounts are much thicker than the holiday snaps type, and not all projector magazines will take them. Take it from someone who averages 25 club lectures a year that these occurrences are all too frequent! You may feel that only a *prima donna* would want these things, but if you want, the lecturer again, treat him as if he's important.

Peter Chadwick, G3RZP.

RSGB – at Your Service

SOME OF THE RSGB'S TEAM OF VOLUNTEER EXPERTS — AVAILABLE TO HELP YOU

Zonal Council members

Zone A (North of England): Peter Sheppard, G4EJP, 89 St Catherines Drive, Leconfield, Beverley, North Humberside HU17 7NY. Tel: 01964 550397.

Zone B (Midlands): Post vacant.

Zone C (SE England and East Anglia): Neil Lasher, G6HIU, 8 Highwood Grove, Mill Hill, London NW7 3LY. Tel: 0181 201 1578.

Zone D (SW England): Julian Gannaway, G3YGF, Dean Hill Barn, East Dean, Salisbury, Wiltshire SP5 1HJ. Tel: 01794 40008.

Zone E (Wales): E Paul Essery, GW3KFE.

Zone F (Northern Ireland): Ian Kyle, GI8AYZ, 1 Portulla Drive, Pond Park Road, Lisburn, Co Antrim BT28 3JS. Tel: 01846 665034.

Zone G (Scotland): Frank Hall, GM8BZX, 45 Priory Cottages, Lunanhead, Forfar, Angus DD8 3NR. Tel: 01307 467565.

For general advice and details on local clubs, or if you don't know who to contact:

Your **RSGB Liaison Officer** see this page and October *RadCom*, page 91.

Specialists

Antenna Planning: Booklet free to members from RSGB HQ. Planning application refused – RSGB Planning Panel, via RSGB HQ. Planning Advisory Committee Chairman – Geoff Bond, G4GJB, QTHR.

Audio Visual: Library Coordinator – David Simmonds, G3JKB.

Awards: For contest awards, refer to the appropriate contest committee. For other awards, enquiries and applications go to either the: HF Awards Manager – Fred Handscombe, G4BWP; IOTA (Islands on the Air) Awards Manager – Roger Ballister, G3KMA or VHF (and Microwave) Awards Manager – Ian L Cornes, G4OUT. Trophies Manager – David Simmonds, G3JKB.

Band Plans and operating practices: See the *RSGB Call Book* or January 94 *RadCom* for latest bandplans. For policy, contact the appropriate spectrum manager or committee chairman: HF Committee Chairman – David Evans, G3OUF, QTHR; VHF Committee Chairman – Peter Burden, G3UBX, QTHR; Microwave Committee Chairman – Steve Davies, G4KNZ; HF Manager – Post vacant; VHF Manager – Dave Butler, G4ASR; Microwave Manager – Mike Dixon, G3PFR.

Beacons: HF Beacon Coordinator – Prof Martin Harrison, G3USF, QTHR. VHF Beacon Coordinator – John Wilson, G3UUT, QTHR. Microwave Beacon Coordinator – Graham Murchie, G4FSG, QTHR.

RSGB Contests: First contact the appropriate contest adjudicator (see the contest rules). For policy, contact the respective Committee Chairman: HF Contest Committee – Chris Burbanks, G3SJJ, QTHR; VHF Contest Committee – David Johnson, G4DHF, QTHR; ARDF (direction finding) Committee – Post vacant.

EMC: Advice on solving breakthrough and other electromagnetic compatibility matters: Committee Chairman – Robin Page-Jones, G3JWI, QTHR.

Emergency: Emergency Communications Officer – Greg Reilly-Cooper, G0MAM.

Exhibition & Rally Committee: Chairman – Norman Miller, G3MVV, QTHR.

History: Society Historian – George Jessop, G6JP.

IEE: Liaison Officer – Peter Saul, G8EUX.

Licensing: LAC Vice-Chairman – Julian Gannaway, G3YGF, QTHR. Licence Renewals – SSL, PO Box 885, Bristol BS2 8RH. New Licence Applications – SSL, PO Box 884, Bristol BS2 8RH. SSL Help Desk – 0272 258333.

Membership Liaison: MLC Chairman – Peter Sheppard, G4EJP, see Zone A (left).

Morse: Morse Practice Transmissions Coordinator – David Pratt, G4DMP. Chief Morse Test Examiner – Roy Clayton, G4SSH.

Packet Radio: Datacomms Committee Chairman – Tom Lilley, G1YAA, QTHR.

President: Clive Trotman, GW4YKL, QTHR.

Propagation: Propagation Studies Committee Chairman – Charlie Newton, G2FKZ, QTHR.

QSL Bureau: Outgoing cards – PO Box 1773, Potters Bar, Herts, EN6 3EP. Incoming cards – your QSL sub-manager (see *RSGB Call Book* or November *RadCom*, p91 for a list). QSL Bureau Liaison Officer – John Hall, G3KVA.

Repeaters: Repeater Management Group Chairman – Geoff Dover, G4AFJ, 31 Newbold Rd, Kirkby Mallory, Leicestershire, LE9 7QG.

Spectrum Abuse: Packet – Via Datacomms Committee. Repeaters – Via the Repeater Management group. Other – Via Licensing Advisory Committee. Intruder Watch Coordinator – Chris Cummings, G4BOH.

Technical & Publications: Committee Chairman – Dick Biddulph, G8DPS, QTHR.

Training and Education: Committee Chairman – John Case, GW4HWR, QTHR. Radio Amateur's Examination – George Benbow, G3HB, QTHR. Novice RAE – Hilary Claytonsmith, G4JKS, QTHR. Project YEAR Coordinator – Phil Mayer, G0KKL.

The Society has a large number of volunteer experts available to help and advise members on a wide variety of subjects. Each month we will be focussing on a different section of the volunteer workforce, whilst still giving brief details of the main office-holders. See also the Information Directory section of the *RSGB Call Book*.

RSGB Liaison Officers

Part 1: Counties Avon – Herts

AVON (Zone D) – D Collins, G4ZYF, 63 Church Road, Hanham, Bristol BS15 3AF. Tel 0272 676381.

BEDFORDSHIRE (Zone B) – Geoff Linssen, G0PIZ, 401 Dallow Road, Luton, Beds LU1 1UL.

BERKSHIRE (Zone D) – Dave Chislett, G4XDU, Hilltops, 2a St Marks Road, Maidenhead, Berks SL6 6DA. Tel Home: 0628 25720; Work: 081 540 0600 ext 2086.

BORDERS (Zone G) – Ian Wilson, GM4UPX, 30 Howdenburn Court, Jedburgh, Roxburgh TD8 6JP. Tel 0835 62656.

BUCKINGHAMSHIRE (Zone D) – Ron Ray, G3NCL, Flat 4 Victoria Villas, Gladstone Road, Chesham, Bucks HP5 3AD. Tel 0494 776420.

CAMBRIDGESHIRE (Zone B) – Mr Michael Brooke, G8HXR, 70 Wooton Avenue, Old Fletton, Peterborough PE2 9EG. Tel 0733 340485.

CENTRAL (Zone G) – Brian Waddell, GM4XQJ, 'Carsemount', 3a Polmont Road, Laurieston, Falkirk FK2 9QQ.

CHESHIRE (Zone A) – Dave Glover, G1VJP, 216 Alder Street, Newton-le-Willows, Merseyside WA12 8HS. Tel 0925 225445.

CLEVELAND (Zone A) – Chris Flanagan, G7NRO, 21 Pentland Ave, Billingham, Cleveland TS23 2PG. Tel: 0642 553345.

CLWYD (Zone E) – Peter Higgs, GW4IGF, Oulton, Parkside, Rossett, Wrexham, Clwyd LL12 0BP. Tel 0244 570212.

CORNWALL & ISLES OF SCILLY (Zone D) – Bert Hammett, G3VWK, 'Rosehill', Ladock, Truro TR2 4PQ. Tel 0726 882758.

CO ANTRIM (Zone F) – Belfast: Gordon Curry, GI6ATZ, 4 Rocklands, Annhilt, Hillsborough, Co Down BT26 6NU. Tel 0846 638896. Co antrim: Albert Henry, GI4CRL, 23 Long Common, Ballymena, Co Antrim BT42 2NU. Tel 026641068.

CO ARMAGH (Zone F) – Raymond Ashe, GI8RLE, 49 Deans Walk, Sleepy Valley, Richhill, Co Armagh BT61 9LD. Tel 0762 870423.

CO DOWN (Zone F) – North: see under Co Antrim, Belfast. South: see under Co Armagh.

CO DURHAM (Zone A) – New – John Deamer, G4SJY, 28 Brackendale Road, Durham DH1 2AB. Tel 091 384 8313.

CO FERMANAGH (Zone F) – see under Co Armagh.

CO LONDONDERRY (Zone F) – Victor Mitchell, GI4ONL, 1 Myrtlefield Road, Londonderry, Northern Ireland BT47 1PG. Tel 050 431 1019.

CO TYRONE (Zone F) – see under Co Londonderry.

CUMBRIA (Zone A) – Mike Gibbings, G3FDW, 5 Meadowbank Lane, Grange over Sands, Cumbria LA11 6AT. Tel 0539 532433.

DERBYSHIRE (Zone B) – refer to Zonal Council Member.

DEVON (Zone D) – Mr D Hind, G3VNG, Greengates, 4 Thornyville Villas, Oreston, Plymstock, Plymouth PL9 7LA. Home Tel 0752 401511.

DORSET (Zone D) – Phil Mayer, G0KKL, 16 Haig Avenue, Canford Cliffs, Poole, Dorset BH13 7AJ. Tel 0202 700903.

DUMFRIES & GALLOWAY (Zone G) – refer to Zonal Council Member.

DYFED (Zone E) – Martin Goodall, GW8ZMU, 91 Uzmaston Road, Haverfordwest, Dyfed SA61 1UA. Tel 0437 764009.

EAST SUSSEX (Zone C) – Jim R Harris, G4DRV, Upton, Crowborough Hill, Crowborough, East Sussex TN6 2DA. Tel 0892 655894.

ESSEX (Zone C) – Malcolm Salmon, G3XVV, 54 Church Road, Rivenhall, Witham, Essex CM8 3PH. Tel 0376 514377.

FIFE (Zone G) – Post Vacant – refer to Zonal Council Member.

GLOUCESTERSHIRE (Zone D) – Post vacant – refer to Zonal Council Member.

GRAMPIAN (Zone G) – Mr Stewart Cooper, GM4AFF, 10 Cliff View, Newtonhill, Stonehaven, Scotland AB3 2GX. Tel 0569 731407.

GREATER LONDON (Zone C) Post vacant – refer to Zonal Council Member.

GREATER MANCHESTER (Zone A) – See under Cheshire.

GUERNSEY & DEPENDENCIES (Zone D) – Brian Ayres, GU1HTY, Rousey, Bailiffs Cross Road, St Andrews, Guernsey, CI. Tel 0481 36104.

GWENT (Zone E) – Peter Dombrowski, GW1NYO, 30 Hillary Road, Newbridge, Newport, Gwent NP1 5DD. Tel 0495 246359.

GWYNEDD (Zone E) – North: Dewi Roberts, GW0ABL, 23 Lon Hedydd, Siglan Farm Estate, Llanfairpwll, Anglesey, Gwynedd LL61 5JY. Tel 0248 713647. South: Post Vacant. Refer to Zonal Council Member.

HAMPSHIRE (Zone D) – K E Fisher, G0LKX, 102 Fairfield Avenue, Fareham, Hants PO14 1EL. Tel 0329 311724.

HEREFORD & WORCESTER (Zone B) – John Marks, G0OWT, 61 Sebright Road, Wolverley, Kidderminster, Worcs DY11 5UA. Tel 0562 850061.

HERTFORDSHIRE (Zone C) – John Rudd, G7OCI, 23 Grange Gardens, Ware, Hertfordshire, SG12 9NE. Tel 0920 466639.

The LAST WORD

THE DEBIT SIDE

The General Manager exhorts all members to use the direct debit facility for the payment of subscriptions (*The RadCom Leader*, Nov 94) and even offers us a free book token if we do so. Does this mean that the Society is now able to process direct debits?

In January 1993 we were similarly exhorted and I duly completed my direct debit form for the payment of my subscription which was due in May. May came and so did a reminder to pay my subscription. I telephoned the Society and was told that it was a mistake which would be rectified. June came and with it another reminder. More telephone calls and more excuses about the computer. July came and with it the, by now, inevitable reminder. Finally, in August the Society managed to action my direct debit and everyone was happy until May 1994 when the reminders started arriving again.

The same pattern of telephone calls and excuses started over again. Finally in July I spoke to the General Manager about the whole sorry saga and of course the fault lay with that ubiquitous computer. In frustration I resigned my membership but the Society kept on sending me the *RadCom*, so in September I had a change of heart and reinstated my membership. However, I cancelled my direct debit and paid by cheque. As soon as I rejoined the Society, yes you've guessed it, the *RadComs* stopped arriving so more telephone calls to the Society. I am now receiving the magazines but I must say that I am not looking forward to May 1995.

I wonder how many other members have had similar problems in the past and how many of those who will be tempted by that book token offer will experience them in the future. Perhaps the Society has got rid of the offending computer, or better still trained its operators, and we will all live happily ever after.

P J Cassidy, G8IED

[The introduction of the direct debit facility has created a few problems, not the least of which being our old and inflexible computer system. A modern replacement system is being installed now and it will be processing subscriptions within a few weeks - Peter Kirby, General Manager]

SMOKE SIGNALS

Just in case nobody else knows (but I'm sure the advertisers have actually achieved exactly what they intend) the letter from Ed Chicken entitled 'Mystery Morse' (*The Last Word*, Dec 94) refers to an advertisement for Silk Cut cigarettes. I saw the advert in Salford over six months ago and it struck me at the time that the number of people who can read Morse must be small. However the '-.- ..- -' is cut out of purple silk cloth. Presumably the idea is to make people discuss the advert (just as I am doing now) before realising that they should be killing themselves by smoking cigarettes.

Chris Harrison, G8KRG

HELPLINE SOLUTION

I have to report surprising results from my *Helplines* request for help with Racal RL17 receivers, including a letter from ZL4TCC, a personal visit from Lincoln; in fact 7 replies altogether, which includes a reprint of the manual and a hand-written solution to my problem which, incidentally, I have now solved. I am sure that I've answered all, but I would like to say "thank you" again to them, and to you, for the help.

L W Wood, G4ZSB

MALTESE LICENSING 1

Please allow me to add to the letter from G4VBH re operating in Malta (*The Last Word*, Dec 94).

1 With your application to operate you will be required to submit a theoretical diagram of the rig you propose to use. Alternatively this may be submitted when you go to collect the licence.

2 Approval in principle arrives by post generally ten days before your date of arrival on the island together with an accompanying letter requesting the Customs Authority at the port of entry to allow importation of the appropriate equipment. I found these gentlemen very pleasant and helpful even if it was 3am!

3 Note that if you go off the island for a day trip - to Sicily, for example, you will have to take the rig with you, thus exporting it and your passport will be stamped accordingly. On return you will be treated as a new arrival without the necessary import authority, and the equipment is likely to be impounded. This exportation/importation rule does not apply to visits to the neighbouring islands of Comino or Gozo.

Greg Lovelock, G3III (ex 9H30M and others)

GENEROUS GESTURE

In reference to the letter 'Czech Cheque' (*The Last Word*, Dec 94) may I on behalf of OK2VZE thank the writer for a very generous gesture. I supplied the original information to the RSGB who very kindly placed the article in *News & Reports*. The vast majority of Czech and Slovak amateurs rely on home brew equipment, and whatever they can obtain from rallies by going over the borders into Germany and Austria. The ability to purchase new equipment is very limited and in real terms extremely expensive - well over several months' salary for a handheld.

The £50 very kindly offered by the reader would, in fact, be the monthly net salary of the average worker. Having spent some time in the Old Czechoslovakia one gets embarrassed by having more than £100 in one's wallet. You can only imagine the struggle that was made by this amateur to fund his trip (albeit by bicycle) and purchase a handheld, only to have had everything stolen in a strange country. If any reader would like to send a donation to either myself or Martin Lynch, I can assure you that it would be well appreciated.

Dave Mann, G0HXN, OK8EXN (QTHR)

[Another member has sent in some currency left over from a trip to OK/OM. This will be passed on as requested - Ed]

UNBUILDABLE GEAR

The letter from GI0NWG (*The Last Word*, Nov 94) touched on the matter of construction. We must never lose sight of the fact that our hobby is aimed at a very mixed group of people ranging from those to whom fitting a PL259 to a piece of co-ax is a major achievement, through home brewers (like myself) with a range of simple and often home-made test equipment, to those souls whose test gear and skills are of enviable proportions.

ICs are wondrous devices - I cannot imagine life without an NE602 - but when it comes to fault finding on analogue gear there is nothing more reassuring than measuring the base to emitter voltage as a guide to seeing whether a transistor is 'on' or 'off'. With simple test gear fault finding on ICs is often a matter of replacing the suspected item and hoping that you don't wreck the one you're putting in. The technical skills in your articles are OK, let's not start having designs for unbuildable gear. Where in Europe can you find high voltage transmitting components except as second-hand anyway?

N D Bonnett, G0NNA/DL6NEE

AN EXCLAMATION!

Can any member inform me what the Morse Code is for an exclamation mark? In *The Morse Code for Radio Amateurs* (6th edition) shows exclamation marks and, underlined, at the top of the page it states "Punctuation to be sent in every case." I have yet to find any mention anywhere of the code for an exclamation mark.

Len Cain, G4IKO

Please note that the views expressed in *The Last Word* are not necessarily those of the RSGB. We reserve the right to edit letters for publication. All letters are acknowledged and may be passed to the relevant department or committee.

CLOSURE OF GB7EVY

Please may I pass on my thanks to Graham Lawton, G7EVY, who has run the BBS GB7EVY. Had it not been for the dedication of the SysOp and the assistant SysOps, G3LWK, G1INU and G7OMN, then I don't suppose I would have taken up packet radio as a main interest in amateur radio when I became licensed.

This BBS has been a huge success amongst the many users in the West Lancashire area and surrounding districts. Nothing has been too much trouble when a request has been made about accessing a particular service in his BBS. Breakdowns have been repaired when most users would be in bed, so that when we awoke the following day the BBS was back in active service, which we users took for granted.

GB7EVY has been in an excellent location with easy access on low power, unfortunately this will no longer be the case as the users will now have to look elsewhere for a BBS. This, in turn, is going to put an extra burden on those other BBS SysOps. It is essential that we look after these dedicated people who provide us with a service 365 days of the year. GB7EVY will be missed but not forgotten.

M B Marsden, G7NDP

THANKS FROM AMSAT-UK

We, the Committee of AMSAT-UK, and fellow members of the Amateur Satellite Organisations world wide, thank the RSGB for the generous donation to the next generation of satellite construction and launch P3D [see photograph on page 13- Ed].

We have to date, in the UK, collected over £31,000, of which 99% has come from radio amateurs such as your good selves. This money will go some way towards our target of £100,000:00 by July 1995, for the launch on 16 April 1996.

We have been asked to sponsor a specific item of hardware on the new satellite which will mean a little over £68,000 will have to be found before that date. We will keep members of RSGB advised on the details in the run up to the launch.

Please convey our thanks to Council and members of RSGB for their support. This new four tonne satellite will surely have something of interest for all radio amateurs worldwide.

Ron Broadbent, G3AAJ, Hon Sec AMSAT-UK

MALTESE LICENSING 2

May I through your pages extend to the staff of the Maltese Licensing Bureau my grateful thanks for the kind and courteous way they processed my application for a Maltese Amateur Licence.

My holiday was for only one week. I had sent my details by fax but did not have the correct currency or bankers draft arrangements then. I received instruction by return that a licence could be issued any day between 8.30 and 12 noon, Monday to Friday.

I arrived on the Saturday in the very early hours. Monday and Tuesday were taken up with trips to various locations on the island. This meant that Wednesday was the only available day to make the trip to Valletta. We arrived at Evans buildings at about 10.30am. We were met by the cleaning lady who advised us that the office was closed as they had just started their winter working hours of business; the clocks had been put back an hour on the Saturday night we arrived. This was a disappointment and I advised her that Wednesday was the only day that I had free to call as the others were booked up. I was quite prepared to repack the gear and forget the idea of any Maltese operation.

The cleaner reappeared with a man who asked me what I wanted and then disappeared for a few moments to be replaced by a lady whom I recognised from a previous visit. In her hand was a file with my fax and other relevant details. She said she could not give me the licence document, but could take my money and issue a callsign. She apologised for the fact that she had no change and asked me if I had the correct money as the cash box had been placed in their safe and the key was not available. That was the least of my worries!

I showed her my hand-portable radio and my UK licence, which she asked if she could copy. She disappeared for a few minutes and reappeared with a receipt for the 3 Malta lire (£6 sterling) and a callsign - 9H3TO.

Since my visit was to end the next Saturday she would arrange for the licence to be sent to England rather than the hotel in Malta. She also gave me an application form to renew the licence when I returned to Malta next year. Two days after my return I received a confirmatory letter stating my Maltese callsign.

Would any Maltese amateur please show this letter to the staff at Evans Buildings. My grateful thanks to all concerned.

Ian Batley, G0IID

CONTINUED FROM P95

MORE DATA ARTICLES

During the past 70 years I have seen many changes in amateur radio and am wondering how soon the popularity of packet will diminish and the operators join the thousands of licensed amateurs whose callsigns are in the latest issue of the *RSGB Call Book* but we never hear them on the air.

In 1924 I was 15 years of age, making crystal 'wireless' receivers. I became a radio enthusiast and still have my first 'Broadcast Receiving Licence' dated 15 November 1924. I continued my hobby with making valve radio receivers until Marconi Radio made their first 5-valve superhet, short-wave receiver. I bought one and entered the exciting world of short-wave listening. I have not had a break nor tired of it to this day, but have no desire to transmit.

Today my wife (a former WWII WAAF radio operator) and I enjoy short-wave listening aided by our weekly *RSGB DX News Sheet*. Recently we found the New Zealand beacon ZLNK on 1919.30LSB and got the same thrill as I did in 1924 when I received Marconi's radio station 5XX at Chelmsford for the first time.

Short-wave listening has always been the breeding ground for future radio enthusiasts; packet never will be, it is a radio novelty - two machines talking to each other and the only aural radio connection with the listener is that hideous noise like oxen trying to be sick. No, we are not anti-packet; we dislike it because it has spoilt our RTTY, AMTOR and Beacon enjoyment.

Thanks to Marconi's wonderful invention, we can enjoy searching the airwaves from the Arctic to Antarctica knowing the phone and Morse code will still be there long after packet has been replaced by another radio novelty.

Ron and Beth Wade SWLs

METRE RULE

Why do we read so many articles in *RadCom* which specify, in the late 20th century, lengths of antennas in feet and inches? In the increasingly integrated world in which we live, the metre is the international standard unit by which lengths are measured. Wavelengths of radio signals are measured in metres.

We want to encourage the young to enter the world of amateur radio, do we not? They are educated in a mathematical system based on powers of 10, and a metric system of measurement, based, logically, also on powers of 10.

Why, then, does there seem to be an unwritten rule that all lengths of antennas, and heights of towers, must be stated in the outdated and illogical domain of feet and inches? The RSGB promotes amateur radio as the hobby of the Space Age - not the Middle Ages!

S Butler G0RFJ

[You have a point and we will try to give units in both *ways as many readers have used the 'old' system for a great many years - Ed]*

PACKET RADIO AND HF PROPAGATION BEACONS

If you tune your HF set to 14.100MHz today you will find packet radio transmissions, but what you *should* find is the HF NCDXF/IARU International Beacon Network. A map showing the network as it was first introduced is shown on the front cover of *RadCom*, September 1983. This world-wide beacon network, in operation for almost 15 years, is now being expanded to a multiband system. This is to include 14.100, 18.110, 21.150, 24.930 and 28.200MHz

I appreciate that 14.100MHz has been stated in various magazines as the packet radio calling frequency *[certainly not in* RadCom - *Ed]*, but the Beacon frequencies are a world-wide agreed allocation and therefore should be avoided if one is to hear and use the beacons as they were designed. Please avoid these frequencies by +/- 3kHz then this would give users with only a SSB filter and not a CW filter the chance to hear the beacons.

A J Underwood GW0AJU

INVERSE LOGIC

Can anyone please explain the wayward logic of many Japanese transceiver manufacturers in placing the LSB mode button *above* that for USB. Fortunately good sense usually prevails in the professional world.

Michael O'Beirne G8MOB

RF TALK

I was interested to read your article in *Technical Topics*, October about the dangers of radio frequency radiation. Both Dr Camelia Gabriel and Professor E H Grant (who is a member of the National Radiological Protection Board) are currently carrying out research in this area at King's College, London.

Every year, Southgate Amateur Radio Club attends King's College to hear a guest speaker of international standing giving a talk on his or her own speciality. Prof Grant gave a highly successful talk on 'The Biological Effects and Possible Health Hazards of Exposure to Radio Frequency Radiation'. This was followed by a question and answer session.

Professor Grant has offered to give this talk again if enough people are interested. Should you wish to attend this talk, please write to me at the address given below, enclosing an SAE. The annual talk given to Southgate is open to all amateurs and should you wish to attend, please let me know, so that I can book a large enough room.

King's College Physics has a long history of radio-related research, with such people as Wheatstone, Maxwell, Appleton and Randall having been members of the Department. The Department still carries out research into Radio Frequency Propagation and other communication-linked topics.

Last year we ran an event called Radio Days, aimed at young people. The RSGB had a stand, whilst other radio interest groups and traders gave their support. In addition, the Science Museum lent us items from their collection. A one-day event will be run on 24 March 1995 and once again we would welcome any support or assistance from radio/communications interest groups. There will also be some state-of-the-art research projects on display and a series of short talks given by expert speakers. This is a free, non-commercial event, and for those taking part, it will prove an unusual and rewarding day.

J M Greenberg G4ZOD

2M TOROID

An improved 2 metre mobile antenna to suit any vehicle or rig: Get a 227ml 'Keepers' jar (Woolworth's). Saw about 5/16in off the cable end of a standard plug, find a bit of thin brass a little more than one inch square. Drill a hole in the centre to fit snugly over the remaining shank of the plug and solder together. Drill a similar hole in the centre of the lid of the beaker and small holes near each corner of the plate. Fasten the plate to the lid with 4 self-tapping screws. Take one metre of 16SWG enamel copper wire (err on the generous side if necessary). Cut the wire into two lengths 54cm and 46cm. Wind each as a solenoid and curve into a torus with about 3/4inch protruding straight at each end. Scrounge an old concentric 10pf preset capacitor and solder the central connector to about 1inch of 3mm wire. Poke this through the lid into the centre pin of the plug so that the capacitor is just proud of the lid. Solder it at the tip of the plug. Mount the larger coil on the other tag of the capacitor and solder the second torus to the first so that it is aligned about 12 above it. Solder a postage-stamp sized piece of thin metal to the free end of the top coil and align it parallel to and just above this torus. Onto the top of the plate stick a pad of foam plastic of such thickness that when the beaker is fitted to the lid it just clamps the antenna. Mount on the car and then tune the capacitor to resonate at 145MHz.

Roger C Jennison G2AJV

DEAR BUT INEXPENSIVE

Mr Cotterill (*The Last Word*, October) questions the expense of radio equipment and mentions the need to encourage the young into amateur radio. As a young (poor) G8 licensee I remember converting a Pye AM10B to 2m, and using that successfully for many months, as I know many others did.

Looking in the same issue's *Members' Ads*, I discover an FM10B for £35 and many other incredibly well-priced pieces of equipment which, carefully chosen, will get anyone on the air for less than the £200 mentioned.

I have bought many items myself in this way over the years, and have found it to be a marvellous way of obtaining excellent equipment directly from those very people who do wish to encourage the young - radio amateurs themselves.

I have not missed the point that Mr Cotterill is wondering why new equipment is expensive, and leaving aside for a moment the discussion on what is considered expensive and what not, why must he have new equipment? My first car wasn't an E-Type.

Nigel C Dear G4DFQ (ex G8HZF)

ALL HANDS TO THE MAST

No wonder that so many groups end up with mangled aerials before the contest starts!

We have arrived at the following system after many years of raising large VHF arrays in everything from shirt sleeve weather to Force 10 gales at 2400ft.

Two of the most dangerous mistakes are to raise the precious aerial before the mast is correctly rigged and to put the heavy rotator at the top of the mast.

We use two sets of guys, one just below the aerial and one half way up the mast. The mast rotates within guy rings. The rotator is held clear of the ground on a 1ft pole. We use 3 guys at each guy ring set at 120°. The 1ft pole is attached to a hinged base plate. I assume that at this stage the mast is completely assembled but no aerial attached.

1. Mark out where the base is to stand. Lay out the mast downwind. Mark out say 15ft from the base point and drive in the down-wind guy peg. Attach all guys to the mast.
2. Turn the mast through 30° to the down-wind direction. At right angles (90°) to mast pace out 15ft. Drive in a guy peg.
   At this point you must take into account if the site is sloping! If the guy point in 2 is *above* the base point by say 2ft, subtract 2ft (or vice versa) from length of guy and mark correct guy length (use a piece of insulating tape). *Repeat 2* for a position 30° on the other side of down-wind line. You can now attach this guy.
3. Completely reverse the mast to the up-wind position with the base in position originally marked (1). Attach the hinged base to ground using two pegs. Attach the marked guy to its peg.
4. Hold on to the down-wind guy rope and with the wind assisting, walk the mast up to the vertical, attach the down-wind guy to its peg.
5. To correct any errors in guy length move the base around until the aerial is perfectly vertical with the guys under tension. Peg base down again.
6. Lower mast. Attach precious aerial and coax and raise into the vertical secure in the knowledge that it will end up correctly rigged. Rig second set of guys.
7. With the aerial mast up in the air, attach a 4ft long 1" pole to the 1ft tube below the rotator. Rotate aerial from the rotator controller to, say, 'South', and now turn rotator and mast with the 4ft anti rotation pole to aerial pointing South. Peg 4ft pole to ground.
   Now all you have to do is get the gear working!

We've never lost an aerial rigged this way in 30 years of contests.

Happy contesting.

M Gibbings, G3FDW

SHAVING CLOSE

May I express my thanks and gratitude to Arthur Butcher, G3KPJ, who recently announced his impending retirement as 'Chairman' of the Shaving Club (an AM early morning net on Top Band).

Qualification for this voluntary position requires you to be on time every weekday at 7.15am, apart from holidays, be polite to all calling stations, and employ good operating and net procedures, all of which are completed before going off to work.

Many licensees and listeners admire Arthur's dedication to the Shaving Club, and wish to be associated with this letter. His high standard of 'Chairmanship' for over 36 years is unlikely to be beaten. The Shaving Club, born 4/2/1927, will never be the same again.

Geoff Wheeler G3ZOF

SPONSOR NEEDED

I am very interested to become a radio amateur. I am not a member or holding amateur radio transmitting licence. I am look for sponsors to sponsor me with some requirements. I need support to help me to build my own communication radio and transmitter.

I appeal to all amateur radio clubs and members who are interested to help me with the following requirements:

1 Printed circuit board diagrams for amateur radio
2 Circuit diagrams for amateur radio handbooks for beginners
3 Amateur Transistors and IC equivalents handbooks
4 Amateur radio components handbooks
5 Amateur radio components/spares/kits

I will appreciate very much to all who will donate anything. I look forward to hear from you.

M Mwale, Box 81523, Kabwe, Zambia.

CLASSIFIED ADVERTISEMENTS

Classified advertisements 55p per word (VAT incl) minimum 14 words (£7.70). Please write clearly. No responsibility accepted for errors. Latest date for acceptance — 5 weeks before 1st of issue month.

All classified advertisements MUST be prepaid.

NB: CHEQUES SHOULD BE MADE PAYABLE TO RSGB.

Copy and remittance to: **Victor Brand Associates, 'West Barn', Low Common. Bunwell, Norwich, Norfolk, NR16 1SY.**

NB. Members' Ads must be sent to "Members' Ads," RSGB Hq.

FOR SALE

YAESU PRICES UP! Price increases of around 5% (say + £100 on FT990) announced — Hurry for old price deals on existing stock — see below — G3LLL...

YAESU SPARES. Mains transformers FT102 £169, FT101ZD £179+£7 p&p — FT290 telescopics £15 p.p. — FM boards (used) FT101ZD Mk 3 £45 p.p. — PA anode chokes FT401/200/101 etc. £18 p.p. — Fans 101 £30 p.p. (slightly used) — DC leads FT757 £14.50 p.p. — C.W. Filters 101E, 101ZD, 707, 102 £67 p.p. — old Yaesu manuals, if not available, photo copies by req. Valves *special prices if you cut this ad. out.* 6JS6C NEC + driver (normally £65) £52 p.p. 6146B + driver (normally £61) £49 p.p. MEM unit FT901/902 (used) £45 p.p. FRDX 400 4m units £17 p.p. G3LLL — see below...

G3LLL'SALE. Massive clear out for callers with cash/cheque and no PX. Closed Dec 24th. Opening Thurs., Fri., & Sat 29th-31st Dec. Phone re other dates, but normally open Tues, Wed, Fri & Sat. Holdings Amateur Electronics, 45 Johnston St., Blackburn BB2 1EF. (0254) 59595.

G4TJB QSL CARDS, CARDS printed to your specifications, send large S.A.E. for samples and full product list. Unit 6, Worle Industrial Centre, Coker Road Worle, Weston-super-Mare, BS22 0BX. Tel: (0934) 512757, (0850) 707257, Fax (0934) 512757.

"RAYNET" YELLOW REFLECTIVE TABARDS with "RAYNET". Medium £10.50, Large £11.00, XLarge £11.50. "RAYNET CONTROLLER" 50p extra.- EPSON PX4+ lap top computer, built-in printer, charger Eprom for packet £46.50 inc pp. Nonreversible battery connectors line/panel mounting (10 pairs/pack) £6.50. Mike Watson G8CPH, Ipswich (0473) 831448.

QSLS 1000 £27.50 (SWLS. Logos. Colour cards. Stamps. Patches — S.A.S.E. for samples) Currie, 87 Derwent St, Consett, DH8 8LT.

MOSLEY ANTENNAE — All the famous British Manufactured Antennae, direct from us including spares/replacements. Mustang, Elan, TA-33Jnr etc. Full details shown in our Handbook, price £1.25 refunded upon purchase of Antennae, Mosley Electronics, 196 Norwich Road, New Costessey, Norwich NR5 0EX (Administrative address only).

ANTI-T.V.I. CUSTOM BUILT HF/VHF AERIALS, Trap-dipoles, multibanders, traps, baluns, parts. Reconditioned TX/RX's, Linears ATU's. Data 38p SAE, Aerial Guide £1.50. G2DYM, Uplowman, Devon, EX16 7PH. Tel: 03986-215 any time.

QSL CARDS. Gloss or tinted cards. SAE for samples to Twrog Press, Penybont, Gellilydan, Blaenau Ffestiniog, Gwynedd LL41 4EP.

ALUMINIUM TUBE. Heavy-duty (scaffold) tube approx. dimensions 20' long, 2" dia, 11/64" (4.5mm) wall thickness. 20' and 10' lengths available @ £1.80 + VAT per ft. C.W.O. Rusper Hire (Crawley) 0293 87 1621 office hours only.

SOLAR/WIND POWER. All sizes and types available. For new catalogue, info, prices send £1 or 4 x 1st class stamps to Keysolar Systems (GW4IED), 4 Glanmor Cres, Newport, Gwent, NP9 8AX.

QSL CARDS — low cost, quick delivery, superior designs, quality guaranteed, personal designs our speciality. L.S.A.E. for samples: The Standfast Press, 5 South Drive, Inskip, Preston PR4 0UT.

AMIDON TOROIDS send £1.00 for catalogue, refundable on purchase. "Choke Baluns" Models for G5RV £28.25, Dipole £36.54, Yagi to fit 1.5" or 2" booms £37.15 inc, or send SAE for full details. Ferromagnetics, P.O. Box 577, Mold, Clwyd, N. Wales CH7-1AH.

QSL, SWL's ECONOMY CARDS. Very low prices, quick delivery, specials a speciality. Sample enquiry to G3ETU, 34 Park Lane Court, Salford, Manchester M7 0LF. Tel: 061-792 9144.

DIY Z MATCH ATU BFO. Loops. PRE Amps. Field strength meter. SAE G2VF, 39 Parkside Avenue, Southampton SO16 9AF.

LANDWEHR VHF/UHF MASTHEAD PREAMPLIFIERS 2 metre 145mas £147 and 70cm 435ma £152. Post & packing £4. Write or phone for leaflet. Qualitas Radio, 23 Dark Lane, Hollywood, Birmingham B47 5BS, Tel: 021-430 7267.

GW3COI — sketches for QSLs etc from your photos or ideas. Penrhynbach, Abersoch, Gwynedd 0758 712675.

RSGB AMATEUR RADIO INSURANCE SCHEME

"ALL RISKS" INSURANCE for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment insurance for affiliated clubs and societies. Details and leaflets from Jennifer Lawson, Amateur Radio Insurance Services Ltd, Shepheards Hurst, Green Lane, Outwood, Surrey RH1 5QS. Tel: 034-284-4000. Fax: 034-284-4554.

COMPUTER SOFTWARE HARDWARE

SUPER-DUPER, the PC Contest Logger. "Highly recommended" — RadCom, September 1993. With printed manual and upgrades for 12 months. HF £25.00, VHF £25.00, both £39.00. Paul O'Kane E15DI, 36 Coolkill, Sandyford, Dublin 18. (00 353 1295 3668).

G4UXD's MORSE TUTOR/PRACTISE: IBM-PC's, BBC's. 100% new "QSO" format. Random everything! Adjustable speed, delay, letter frequency. 100 tests, attach your key £9.99. SAE details/trial. P. Brandon, 1 Woodlands Rd, Chester, CH4 8LB.

G4BMK PACTOR — See display advert this issue. Grosvenor Software, 2 Beacon Close, Seaford, Sussex.

"AS REVIEWED IN THIS ISSUE" SHACKLOG4 *the* PC logging system. Real time and post event QSO logging. QSL labels. Database analysis, reports, import, packet terminal etc. Optional IOTA database (G3KMA). Plus lots more!! Still only £27.50!! SASE (+disk for demo copy) for full details. G3PMR, 30 West Street, Gt Gransden, Sandy, SG19 3AU. 0767 677913.

THE WINTER 1994 G0LOV/G4LUE UK AMATEUR CALLBOOK for IBM compatibles. The Callsign Data is supplied by the Radiocommunications Agency October 1994. Specially written database, easy to install and use. Fast searching, by callsign, address, postcode, surname or wildcard, shows WAB book numbers. Facilities also includes UK repeaters, mailboxes, nodes and Local RIS address and lists radio clubs, and European repeaters. £12.50 plus £1.50 PPI. J. Bailey, 8 Hild Avenue, Cudworth, Barnsley, South Yorkshire S72 8RN.

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FLYING FROM GATWICK? Stay at Mill Lodge Guest House. 4 minutes from airport. Transport available. Telephone (0293) 771170.

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MISCELLANEOUS

COURSE FOR CITY & GUILDS, Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCSE, career and professional examinations, etc) write or phone — THE RAPID RESULTS COLLEGE, Dept JT108, Tuition House, London SW19 4DS. Tel: 081-947 7272 (9am-5pm) or use our 24hr answerphone service 081-946 1102 quoting JT108

VIDEO TAPE CONVERSIONS to and from all modes N.T.S.C.; S.E.C.A.M.; P.A.L.N.; P.A.L.M. Digital processing. Fast and economical service. Also 'cine' conversions. Phone G4WMP 0932 846139.

WANTED URGENTLY 1920's/1990's Q.S.L./Radio cards G.B./The World Collections or small accumulations. Cash offered. Can travel to see larger lots. Simon Hargreaves. Phone 0532 753194 or 0532 612421.

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ADVERTISERS INDEX

NEXT COPY DATE

The display advertisement copy date for our March 1995 issue will be **10th January 1995**

IC-820H

I may not be as big as you... but just try me!

Not really a threat, just a positive way of attracting your attention to the fact that the IC-820H 2M/70cm transceiver may be small (we prefer to use the word compact) but the capabilities of this all-mode, dual-bander leave some much larger transceivers standing, feast your eyes on these features:

- Compact enough to enable mobile and field operations.
- New design DDS (Direct Digital Synthesizer) for super-fine tuning in 1Hz steps.
- Great satellite communications with normal and reverse tracking, separate VFO and memories.
- Independent controls and display on both bands.
- Sub-tuning function assignable to RIT or SHIFT control allows auto-tuning at variable speeds.
- 9600 bps PACKET operation with modulation limiter.
- Optional tone scan.
- Noise blanker to eliminate pulse noise and much more!

ICOM

ICOM manufacture a full range of base-stations, mobiles and handheld transceivers and receivers to cover all popular Ham frequencies... and beyond.
No matter what your requirements, ICOM have the radio for you.
For the full picture and details of your local authorised Icom dealer contact:
Icom (UK) Ltd. Sea Street Herne Bay Kent CT6 8LD.
General Operator: 01227 743000. Sales & Service: 01227 741741. Fax: 01227 741742.

YAESU, Principal Sponsor of the IOTA Programme

Compact HF Transceiver **FT-900AT**

Introducing an HF that's going places.

"With the small snap-off remote front panel design, it's an HF mobile."

"It's a great base, too. Direct keypad entry, built-in antenna tuner, CW keyer with adjustable speed, 100 Watts, Omni-Glow display... Wow!"

"Yaesu did it again!"

Uncompromising HF quality that will change your lifestyle. It's the first transceiver with true HF technology to go mobile in any vehicle or stay at home as a compact base station.

With its revolutionary, small, snap-off remote panel, the controls of the FT-900AT can be installed almost anywhere in your car, truck or camper. Since the 100 Watt RF deck can be installed under a seat or in your car trunk, it's away from critical automotive electronic wizardry. And, for ultimate convenience, the built-in antenna tuner simplifies in-car operation.

As a base station, the compact full function FT-900AT includes direct keypad entry for pinpoint accuracy during quick band/frequency changes. Other features you'll like include CW keyer with front panel speed adjustment, speech processor, twin stacking VFOs, IF Shift and Notch. No competitor offers this! Bonuses, such as signal strength, power output, SWR and ALC digital meters, add value to the FT-900AT, and the proven duct-flow cooling system provides excellent long-term transmit power output reliability and frequency stability. For ease of use, Yaesu's exclusive Omni-Glow display enhances viewing in any light condition. And, since the high speed antenna tuner is built-in, it means less clutter in your shack.

The FT-900AT controls mount almost anywhere in your car, truck or camper. 100 Watt RF deck can mount in trunk, or under seat.

Remote front panel control head measures only 2-1/4"H x 9-1/8"W x 1-1/4" D.

For sheer high-performance, anywhere, the FT-900AT is incomparable and ranks with the FT-1000 to further underline Yaesu as the choice of the world's top DX'ers.

Trust Yaesu to know what you want. True HF you can take with you or leave at home! Available now at your Yaesu dealer.

Specifications

- Remote Front Panel Design
- Built-In Auto Antenna Tuner
- Direct Keypad Entry when used as a Base Station
- Large, Bright Omni-Glow™ LCD Display
- 100W on SSB, CW, FM modes; 25W on AM
- IF Shift and 30db Notch Filter
- Digital S/RF, SWR & ALC Meters
- Programmable CTCSS Encode w/Repeater Offset
- Direct Digital Synthesis (DDS)
- 100 Memory Channels
- Frequency Range
  RX: 100 kHz-30 MHz
  TX: 160-10 meters
- CW Full Break-in Keying w/ Adjustable Speed
- Fast/Slow AGC Circuit
- Intercept Point Optimization
- Duct Flow Cooling System
- Twin Band Stacking VFOs
- Built-in Noise Blanker
- Built-in Adjustable Speech Processor

ACCESSORIES:
YSK-900 Remote Mount Kit
MMB-62 Controller Bracket
MMB-20 Mobile Mtg. Bracket
SP-7 Mobile External Spkr.
SP-6 Base Station External Spkr.
DVS-2 Digital Voice Recorder
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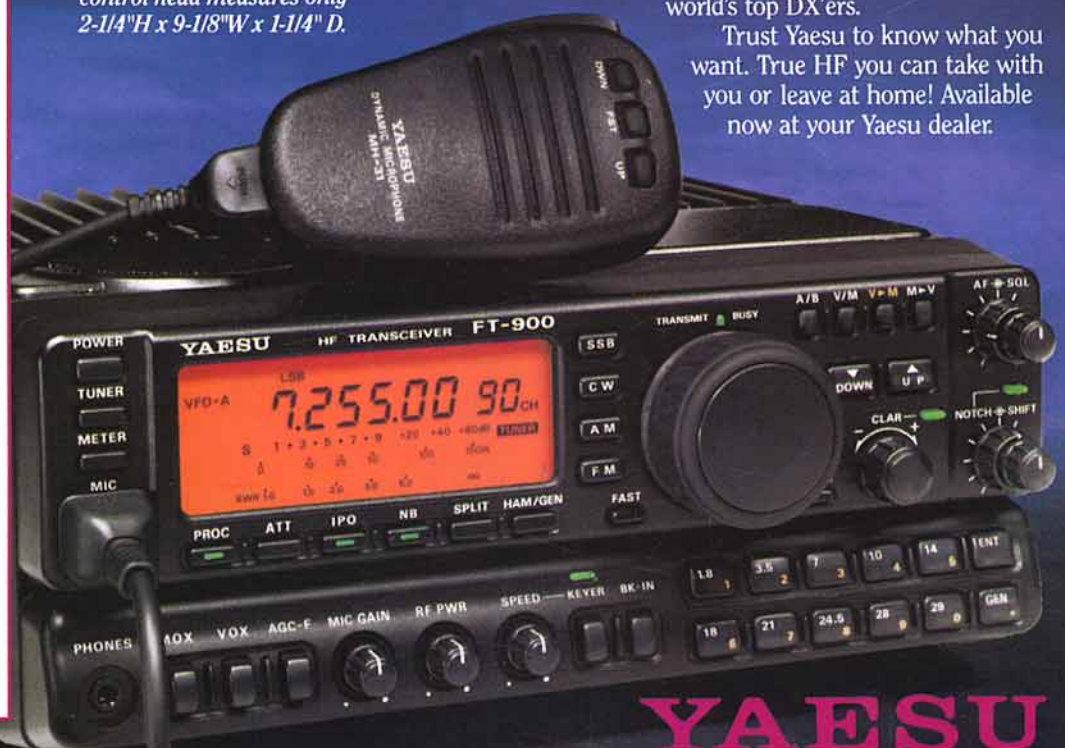
YH-77ST Headphone



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