Volume 71 No 5 May 1995

RadCom

Radio Communication

The Journal of the Radio Society of Great Britain

THE VOICE OF AMATEUR RADIO FOR 82 YEARS

Peace in Europe May 1945

Victory in Europe

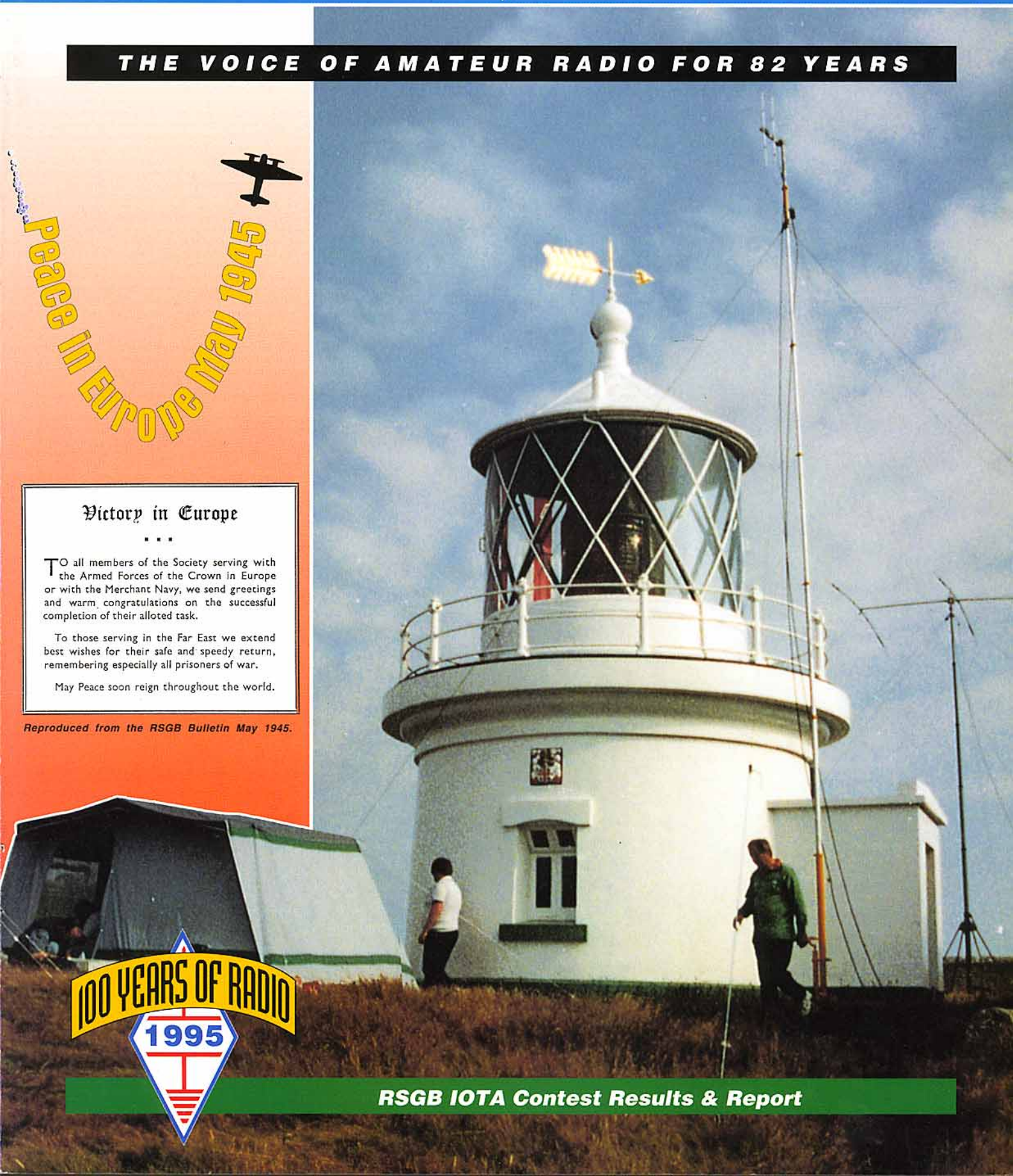
• • •

TO all members of the Society serving with the Armed Forces of the Crown in Europe or with the Merchant Navy, we send greetings and warm congratulations on the successful completion of their alloted task.

To those serving in the Far East we extend best wishes for their safe and speedy return, remembering especially all prisoners of war.

May Peace soon reign throughout the world.

Reproduced from the RSGB Bulletin May 1945.



100 YEARS OF RADIO 1995

RSGB IOTA Contest Results & Report

THE THREE POINTS OF THE KENWOOD TRIANGLE REPRESENT ADVANCED TECHNOLOGY, QUALITY AND STYLE

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

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KENWOOD

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RadCom

COVER PICTURE:
GW4VEQ/P on St Tudwal's Island active in the 1994 RSGB IOTA Contest.
Feature: Page 83.

NEWS AND REPORTS

TECHNICAL FEATURES

REGULARS

PRODUCTS

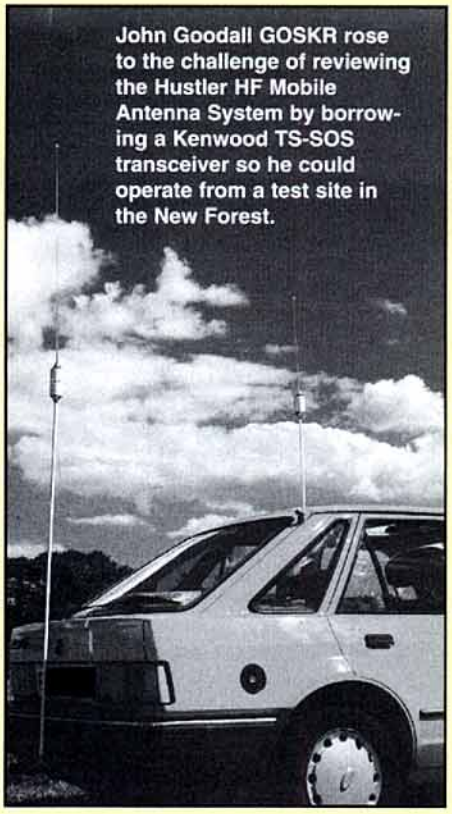
The Hustler 6-BTV, ground mounted

The Hustler 6-BTV in my opinion is very well made, it looks like it should certainly stand up to a few high winds when other aerials wouldn't (as I've found in the past, despite wind survivability claims!). I've used several commercial trapped verticals over the years, and the 6-BTV worked just as well, if not better, than others. When ground mounted, it gave good performance over unobstructed paths.

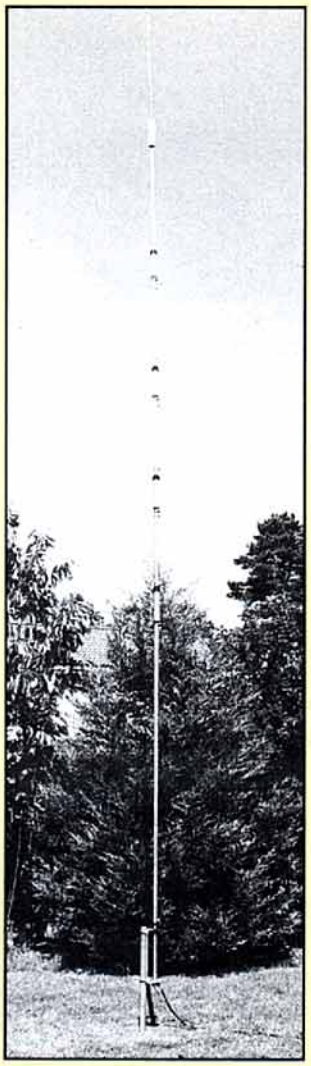
The supplied instructions were extremely clear and concise, following these I had the aerial assembled in less than half an hour.

What did suprise me was the relatively low price, for the quality of construction I found this to be very reasonable indeed. If you're in the market for a compact ground-mounted HF multi-band vertical, I wouldn't hesitate in recommending the 6-BTV.

Chris Lorek G4HCL



John Goodall GOSKR rose to the challenge of reviewing the Hustler HF Mobile Antenna System by borrowing a Kenwood TS-SOS transceiver so he could operate from a test site in the New Forest.



Before long, I had the RM-20S resonant on 14.160MHz, with the s.w.r. reading just above 1.1:1. This was with 360mm of tip protruding from the adjuster.

At 14.058MHz, the FISTS frequency, I found the s.w.r. was acceptable at 1.6:1. The dial reached on 2:1. This proved an even greater bandwith than that published by the manufacturers.

I worked RA3REM and RK3VWF, both with reports at 5 and 6; YU70GW and 9A1CAH 5 at 9, all on 50W.

I found that using the Hustler HF Mobile Antenna System was indeed a pleasure.I think that the cost of the 'Standard Resonators', which I feel are adequate for this country, is quite reasonable for the excellent quality of the equipment.

Picture and Quote from John Goodhall review in Practical Wireless

"The best antenna there is for HF!"

I have tested the Huster HF Mobile with the rated power and have measured the Q factor and it is the nearest to 300 in any antenna I have seen! I have also fed it with inductive and capacitor matching including both to obtain 50 ohms input on 40/80 mtr and and have a band width of between 50 and 75 kcs compared with other mobiles which had only 10 to 15kc band width. The best antenna there is for HF! Since using the Hustler I have contacted stations in "India VU2TTC", "Sri Lanka 457RO", "Trinidad 9Y4TD", Africa 9X5GC'. "KA1V/TS, 3DAAOBM, Australia VK7OH, Barbados 3P9EM and the Falklands VP8CGH with signal reports ranging between 5/5 to 5/9, as for 9Y4TO who was surprised when I told him I was mobile due to my signal strength. A station in Johannesburg called me "ZS8BEW" as he thought I was in one of the Johannesburg suburbs, this was when I was in contact with KC9B1 we then had a three way contact, not bad from a car don't you think

As for the antenna, I have tried inductive coupling and capacity matching as per ARRL handbook mobile section and this was not needed.

The resonators are very well constructed as so the most which can be used as a 1/4.wave on 6mtr, the band width is as advertised for each band, "as the instructions state 2.1 swr or better", I obtain 1.5 to 1 and less on 10, 15, 20 mHz but what did suprise me was the band width on 80 mtr as with other antennas. I could only move frequency of about 10 kcs either but with this resonator I can move 30 kcs either side of the tuned frequency. Now when i go camping all I take is the required camping equipment and the Hustler antenna which I use with a TM-band adaptor, so I can operate any three frequencies without having to change resonators. The mast is hinged so it can be folded to fit the trunk and apart from that I also use the quick disconnect attachment which I also obtained from Coastal Communications.

To end this letter which sounds like an advert, all I wil say to past, present or future mobile operators is, try this antenna and I can tell you that they will not be disappointed with the results and also excellent service from Coastal Communications.

73 David Hudson, G4WOE E. Sussex

NEVADA

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... This Month I have released our New Drae Low cost Magnetic Loop Antennas. They are perfect for loft mounting or as a low profile outdoor antenna. I have a full info sheet available upon request.

73 Mike Devereux G3SED

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CLP501050	6m Linear with pre-amp; 10W drive; 50W output	***£169.95***
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CLP7010100	4m Linear with pre-amp; 10W drive; 100W output	***£289.00***
CLX14410100	2m Linear; 10W drive; 100W output	***£219.00***
CLX1443100	2m Linear; 3W drive; 100W output	***£255.00***
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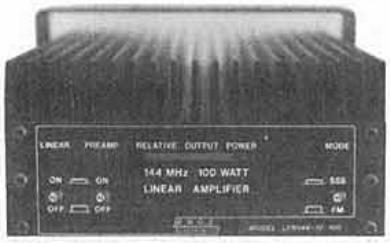
If you'd like all the secrets of the top Dxers, we've a great book written by the experts themselves. It's called the VHF UHF DX Book and contains chapters on propagation, antennas, transceivers, transverters, linears, pre-amps, accessories and most importantly, the techniques you should use to get the most out of VHF and UHF operating.
Its bang up to date.



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H THE WORLD

Great New Wire Antenna Systems From

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Chelcom's CAHFV1 h.f. vertical antenna (see last month's ad) has become the fastest selling h.f. vertical in the UK, with over 250 happy users. Hot on the heels of this wonderful antenna, Chelcom have now produced a superb range of new wire aerial systems and components. Once again they've chosen to use only the highest quality components, from specially designed balun cases and dipole centres to the wonderful new FlexWeave™ antenna wire. Just wait 'till you see FlexWeave™ - a multi standard wire so flexible you can tie knots in it and undo it time and time again. It is used in all their ready to hang antennas and also available on its own for those who like to roll their own!

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Chelcom G5RV's

These G5RV's really need to be seen to be appreciated. You really need to check out the quality compared to other cheaper varieties - there is no comparison! Again the components used are of the highest quality, specially designed for heavy duty use and built to last. For most people, erecting antennas is a major problem - better to do it just once! Chelcom offer the largest range of G5RV's catering for most installation requirements.

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

Membership application forms are available from RSGB HQ

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The RadCom Leader

Changes to the VHF & UHF Bands

A Chance to Comment

THE INCREASING DEMAND for spectrum for new commercial services is resulting in severe pressure on Amateur allocations. Over the last few years there have been a number of Spectrum Reviews, both on a national and international basis, to identify how these needs can be met and to plan the changes in the long term to achieve harmonised allocations between countries.

One of the main objectives of the European Radiocommunications Committee (ERC), a body of CEPT, is to implement a co-ordinated frequency allocation table throughout Europe by the year 2008. Having sought input from users and administrations, it has just published the results of the Detailed Spectrum Investigation (DSI) Phase 2, 29.7 MHz - 960MHz, which seeks further comments from users and administrations on its proposals. The 220 page document is a very comprehensive review of this part of the Spectrum in Europe, and its recommendations are intended to apply to all countries in CEPT.

The recommendations are summarised in the news pages opposite, and a copy of the 7 page section covering the Amateur Service is available from HQ on receipt of an SASE. It is hoped to include this text in full in next month's *RadCom*.

It proposes substantial losses to the 432MHz band but offers improved status to the remaining part. The Primary allocation at 50 - 52MHz and some new Secondary allocations will be attractive to countries which do not have 50 or 70MHz at present. However, several countries, including the UK, already have many of these allocations, and the reduction in the 432MHz allocation is a big price to pay. Bearing in mind that some of administrations may not implement all of these proposals or changes in status.

These proposals do not necessarily represent the views of CEPT, ERC or the administrations. They are only proposals at this stage, and may change significantly as a result of the public consultation process. ERC will consider the inputs later this year, and give an initial response by April 1996, with the final position being published by the end of 1996.

Our initial response has to be with the RA by the end of May, so we will need any input *as soon as possible*, in the next few weeks. Please send comments to the Chairman of LAC, c/o RSGB HQ.

Dr J Gannaway, G3YGF
Chairman Licensing Advisory Committee,
Council Member for Zone D

RadCom NEWS

● STOLEN FROM the shack of G4OPP: Trio TS-711E VHF transceiver, S/N 5050348. The unit had the callsign G4OPP programmed into the DCS facility. Any information to G4OPP QTHR or to Maidstone police on 01622 608186.

Stolen from G3BUF's car when in North London: Alinco DR-110E, S/N 0001262. Any information to G3BUF on tel: 01263 861434.

And stolen from G0PEV's shack: a Trio Kenwood TS-830S, S/N 2031294 and a Trio Kenwood AT-230 antenna tuner, S/N 3010546. Any information to G0PEV, QTHR.

● WELWYN-HATFIELD Amateur Radio Club is sponsoring an exciting new competition - the 'WHARC Open Constructors Challenge'. Anyone may enter a self-made radio-related project. The prize is a trophy and £50. To assist with the organisation of this event, participants are requested to give an outline of the project to the Secretary by 30 May. Judging will take place in Welwyn Garden City in November. Full details may be obtained from the Secretary on 01920 462241 (evenings).

● THE DRAGON Amateur Radio Club is putting on a number of special event stations at Penrhyn Castle, Bangor, in Gwynedd, this year. The first is on 28 May (National Gardens Open Day), when they will be using their club callsign, GC4TTA.

● THE RADIO Society of Bermuda will be operating a special event station, VP9RND, from the Royal Naval Dockyard in Sandy's Parish, Bermuda, from 1200UTC on 20 May until 2000UTC on 21 May in order to commemorate the 200th anniversary of the dockyard.

● SSL HAS informed the Society that as of 5 April, the latest callsigns allocated were in the G*0VX* and G*7UQ*, and Novice calls in the 2*0AK* and 2*1DV* series.

New Council Member

RSGB COUNCIL HAS co-opted D Whalley, G4EIX, to fill the vacancy in Zone B (the Midlands) until the next election. His address is 1 Lees Farm Drive, Madeley, Telford, Shropshire TF7 5SU, tel: 01952 588878.

Ionosphere Pioneer Honoured at King's College, London

Appleton Plaque Unveiled

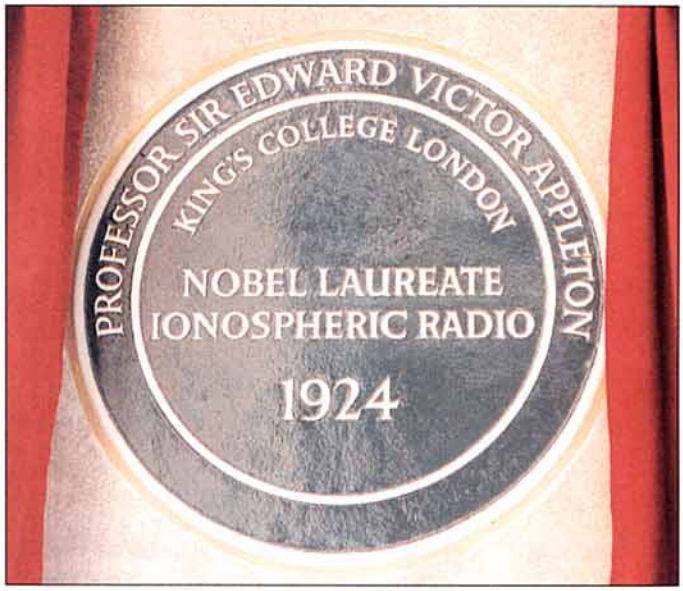
AT KING'S COLLEGE London 'Radio and Communication Day' on 24 March a plaque commemorating the pioneering work of Sir Edward Appleton was unveiled by his daughter, Mrs Rosalind Appleton-Collins, in the presence of RSGB President Clive Trotman, GW4YKL, General Manager Peter Kirby, G0TWW, and other VIPs.

The event was part of the National Week of Science, Engineering and Technology and this is the second year that King's College has run a radio exhibition. RSGB representatives were on hand to answer questions from the general public about amateur radio and about the Novice licence.

The Radio and Communication Day also featured, presentations on 'The History of Radio at Kings' and 'What the Wild Waves are Saying', together with a series of hands-on demonstrations on the development of radio from its beginnings and into the next century. Organisations involved included the Remote Imaging Group, the Southgate and Edgware radio clubs and the Air Training Corps.

King's College has a long history of teaching science and members of staff have included Wheatstone, Max-well and Appleton.

Appleton went on to win the Nobel prize for physics.



Mrs Rosalind Appleton-Collins (above) unveiled this plaque commemorating the work of her father, Sir Edward Appleton, at King's College, London.

Frank Hall, GM8BZX

WE REGRET to announce that Frank Hall, GM8BZX, Zonal Council Member for Scotland, died suddenly on Sunday, 2 April.

A full obituary can be found on page 92.

The Amateur Service in Europe

DSI Phase 2 Recommendations

THE RECENTLY PUBLISHED Detailed Spectrum Investigation Phase 2 Report (see this month's *RadCom Leader* column) makes a number of recommendations for the Amateur Service and these are quoted below. It is hoped to publish the full text of the recommendations in next month's *RadCom* but any member requiring an earlier copy is invited to send an A5 SASE to the Amateur Radio Department at RSGB HQ. Members' views on these proposals should be sent promptly to the LAC Chairman, c/o RSGB Headquarters.

Report Extracts

Recommendations

The DSI Management Team recommend in the context of the European Table of Allocations and in accordance with the foregoing, that

- *the Band 50 - 52MHz be allocated to the amateur service on a primary basis, the band 51 - 52MHz additionally to be allocated to the mobile service;*
- *frequencies in the vicinity of 40.68MHz be considered for amateur propagation beacons;*
- *a minimum of 100kHz in the band 70 - 70.45MHz be allocated to the amateur service on a secondary basis according to national considerations, if feasible, centred on 70.2MHz;*
- *the band 144 - 146MHz be maintained with its current status;*
- *the band 430 - 440MHz be*

CONTINUED ON PAGE 10

CONTINUED FROM PAGE 9

reduced to 432 - 438MHz with primary status for the amateur service. The band 435 - 438MHz to be allocated to the amateur satellite service on a primary basis. It is additionally recommended that the 433MHz ISM and low power band be reviewed after an appropriate time period to ascertain whether alternative arrangements for ISM and low power render its retention unnecessary;

- *the band 919.5 - 920MHz be allocated to the amateur service on a secondary basis.*
- *It is further recommended that the regulatory issues outlined in section 10.4.4 [reproduced as 'Other Matters' below - Ed] be addressed by the appropriate constituent body of the ERC.*

Other Matters

The DSI Management Team have been asked to deliberate on two other matters, the first concerns a current problem with regard to Recommendation T/R 61-01, the CEPT amateur licence. It has been requested that amateurs which are licensed to operate in the 50MHz band be able to use their equipment when travelling to other countries that authorise 50MHz, under the same conditions that apply to nationals of that country.

The second is also a regulatory matter where it appears that some amateur operators are unable to participate in propagation research, because they are not authorised to listen to amateur beacons in a band in which they are not licensed to transmit. Both issues would not seem to the DSI Management Team to be insurmountable problems and it is hoped that administrations can solve these short term difficulties within the normal work of the ERC.

Commentary

The document discusses a number of matters in depth before making these recommendations. The points and suggestions are summarised below:

- Amateurs research a variety of propagation modes, and their observation and beacon programmes should be encouraged.
- A request to re-allocate 29.7 - 30MHz to the Amateur Service should be deferred to a future DSI.
- The use of FSK beacons with 10dBW ERP is suggested for propagation research in a band centred on 40.68MHz, following a request to be able to track the progression of propagation openings. The possibility of a beacon allocation at 60MHz should be reassessed when TV broadcasting is no longer operating below 68MHz.
- 51 - 52MHz should be shared with the mobile service.
- Allocation of 146 - 148MHz to the Amateur Service cannot be justified in view of the current and foreseen use by the land mobile service.
- An allocation at 220MHz would be impracticable in CEPT countries due to its proposed use for terrestrial digital audio broadcasting.
- The interference problems with the ISM allocation at 433.92MHz are recognised, and it is hoped that this allocation may become obsolete in the very long term as these devices move to other bands.
- Spectrum at 430 - 432MHz and 438 - 440MHz should be taken to provide additional spectrum which is urgently needed for the land mobile services in major European cities.
- The remaining 432 - 438MHz allocation would be Amateur Primary on a shared basis and may become exclusive if ISM and Low Power Devices transfer out.
- The radio location use around 420 - 450MHz could transfer to 240 - 380MHz in the long term.
- Amateur TV activity on the 432MHz band should be transferred to bands above 1GHz, unless modern DSP techniques can enable it to operate in the reduced bandwidth available at 432MHz.
- A possible 919.5 - 920MHz allocation could be available if the band 915 - 920MHz is allocated to ISM.
- In summary, it hopes that the losses at 432MHz are balanced by the improved status of the remaining 6MHz together with a gain of up to 2.95MHz in other parts of the DSI range.

RA Launches Spectrum Strategy

THE RADIOCOMMUNICATIONS Agency has published *A Strategy for the Use of the Radio Spectrum*, the first of an annually updated strategic plan for the RF spectrum.

Launching the strategy document on 30 March, Technology Minister Ian Taylor said, "Features of the strategy include plans for the introduction of digital technologies in broadcasting which should allow more programme channels to be carried within less spectrum, and in the long term should release frequencies for other services such as mobile communications . . . It takes into account, not only Government policies and plans in the UK, but also the development of harmonised frequency plans in Europe and the rest of the world."

The first edition of the strategy focuses on areas with major economic and strategic impact - broadcasting, mobile communications, fixed and satellite communications. Future editions will cover all the major areas of interest and concern to the radio community.

Copies of *A Strategy for the Use of the Radio Spectrum* are available from The Information and Library Service, Radiocommunications Agency, Room 605, Waterloo Bridge House, Waterloo Road, London SE1 8UA, tel: 0171 215 2072, fax: 0171 928 4309.

Technology Minister Ian Taylor introduces the Spectrum Strategy.

Comments are invited on the overall spectrum strategy from businesses and individuals with an interest in the use of the radio spectrum. They should be sent by 29 September to Don Pennell, Room 506, Waterloo Bridge House, at the address above, making the envelope 'Spectrum Strategy'.

● THE ADMINISTRATIONS OF Latvia and Portugal have recently implemented CEPT recommendation T / R 61 - 01, the recommendation on the CEPT amateur radio licence. The Portuguese administration includes the Azores, Madeira and Macao.

April Caption Corrections

ON PAGE 13 of April's *RadCom*, all the captions of the photographs were transposed. G3MYM is top left, G7LNJ is top right and G7SDD is pictured below.

And it just had to happen! There are now *two* members of RSGB Council called Richard Horton: G4AOJ and G3XWH. The one photographed on page 11 of April *RadCom* is, in fact, G3XWH. Apologies to all concerned.

Four members of Chiltern DX Club - G3OZF, G4DQW, G4JVG and G0HSD - operated GB0DX in the *CQ* WPX SSB contest on 25 - 26 March, making 2729 QSOs with 921 prefixes for a score of over 6 million points. Other British participants included G3NLY, G4UJS, GB6BT, GW4BLE, GX0OBS and GX0FDX. Above: Andrew, G0HSD; Don, G3OZF and John, G4DQW operating GB0DX.

Commemorating the Start of the Peace

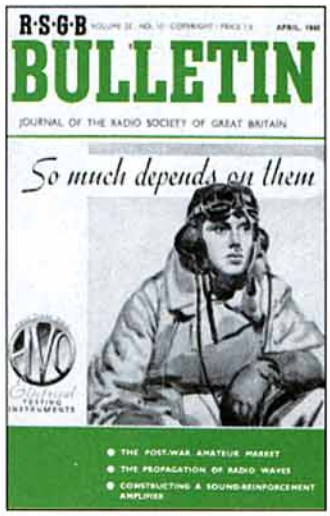
UK Special Event Prefixes

THE COUNCIL of the Society has agreed to support the issue of the special event prefix GR in remembrance of the 50th anniversary of the cessation of hostilities. The council felt strongly that the RSGB should support the issue of these callsigns not in an act of celebration, but in remembrance of all those who lost their lives, and to commemorate the start of peace.

It should be noted that GR-prefix callsigns are not a general issue; rather they are an alternative to GB callsigns for bona fide stations commemorating the 50th anniversary of the end of WWII. The issue of GR-prefix callsigns to groups who have *already* applied for GB callsigns to commemorate the anniversary of VE Day is under way.

● GR0VEY IN YEOVIL will be part of a WWII display organised by Yeovil Town Council and the Yeovil Amateur Radio Club on 8 May. The display will include a working B2 spy 'suitcase' transceiver, which the club hopes to put on the air, and AR88, HRO and Utility broadcast receivers.

● DUTCH AMATEUR radio society VRZA is offering an award for stations contacting at least three of the PI45 special event stations, which will be on the air for the whole of May. PA5MEI will be active 1 - 13 May only and counts as two contacts. Applications should be sent with $10 before 15 July to: Ad de Bok, PE1EBJ, P O Box 56, 5320 AB Hedel, The Netherlands.



RSGB in Hyde Park Celebration

THE RSGB has been invited to participate in the massive Hyde Park VE Day National Celebration on 6 / 7 / 8 May sharing a stand with the Air Training Corps. Over 2 million people are expected to visit the event. Each day will have a specific theme: Saturday - 'Comradeship, Remembrance and Thanksgiving'; Sunday - 'The Youth of Today and Tomorrow'; and Monday - the Vet Day Party.

● ON 20 MAY THE Norwegian Radio Historical Society will operate LA1D from the Niels Juel WWII museum near Oslo. The equipment to be used will include the EK10/SK10 combination used in Fokker 52 planes on 80m CW, the EK2/SK2 on 40m CW and the KW-2000 on 80m SSB.

Special Event Stations

THE FOLLOWING special event stations which will be celebrating the 50th anniversary of peace in Europe over the long weekend of 6 - 8 May, and a number will also be active throughout the month. We have assumed that licensees will take the option of changing from GB to GR prefixes. However, some stations may use the normal GB prefix (for example, if QSL cards have already been printed). A list of special event stations *not* associated with 50th anniversary celebrations appears in the *Events Diary* as usual.

GB2IWM	Imperial War Museum, RAF Duxford, Cambs.
GB2RN	*HMS Belfast*, London
GB50LD	Liberation Day (Jersey)
GB50LIB	Liberation (Guernsey)
GR0CHF	Coal House Fort
GR0CVE	Crich Victory In Europe
GR0DBL	Dubmire British Legion
GR0FYO	Fifty Years On
GR0KPC	Kinmel Park Camp
GR0LAN	Lancaster Bombers
GR0OVC	Ollerton Victory Celebrations
GR0PAX	Peace
GR0RNS	Royal Navy Special
GR0VE	Victory in Europe
GR0VED	Victory In Europe Day
GR0VEY	Victory In Europe - Yeovil
GR0VIE	Victory In Europe
GR2BPX	Bletchley Park Station X
GR2CWR	Civilian Wireless Reserve
GR2FGS	France Germany Star
GR2HA	Harrowbeer Airfield
GR2HWV	Horwich War Veterans
GR2PAX	Latin For Peace
GR2RAF	Royal Air Force
GR2VE	Victory In Europe
GR2VEC	Victory Europe Colerraine
GR2VER	VE Day Remembered
GR2VIE	Victory In Europe
GB4ATC	Air Training Corps
GR4CVE	Chappel Victory Europe
GR4CWR	Civilian Wireless Reserve
GR4FAA	Fleet Air Arm
GR4OVE	Royal Observer Corps VE Day
GR4SBL	Southport British Legion
GR4VED	Victory in Europe Day
GR4VES	Victory over Europe at Sporle
GR4VEU	Victory in Europe
GR4VIE	Victory in Europe
GR5OD	Force 'O' On D Day
GR5OS	Operations Southwick
GR5OV	Victory
GR5OVE	50th Anniversary VE Day
GR5OY	50th Year - VE Day
GR5SF	Special Forces
GR5VE	Victory in Europe
GR6BBR	Buntings Bonface Road
GR6HVE	Hever Victory Europe
GR6VE	Stonleigh Park Victory Europe
GR8VE	VE Day RAFARS
GR50RN	Royal Naval VE call
GR50RS	Royal Signals VE call
GR50VE	50th Anniversary VE Day (RAFARS)

THERE WILL undoubtedly be many special event stations throughout Europe celebrating the end of WWII. As *RadCom* went to press, we had received details of the following stations in Norway, the Netherlands, Ukraine and Malta:

LN1V	Oslo National Guard, Norway
PA5MEI	Ede - Wageningen
PI45ADH	Helderland
PI45AML	Amstelland
PI45ARL	Rivierenland
PI45AVG	Achterhoek
PI45CQP/A	VRZA
PI45DEC	DEC
PI45DHG	Den Haag
PI45EDE	Zuid Veluwe
PI45EHV	Oost Brabant
PI45EMN	Emme
PI45GN	Groningen
PI45HVB	Hart v Brabant
PI45JUT	Voorne Putten
PI45KEI	Amersfoort
PI45KGL	Kagerland
PI45PLM	Flevo NOP
PI45RMB	Midd. Brabant
PI45SDH	Apeldoorn
PI45TWN	Twente
PI45UTC	Utrecht
PI45VGZ	't Gooi
PI45VRL	Friesland
PI45VRZ/A	VRZA
PI45WBR	West Brabant
PI45YSM	Ysselmond
PI45ZLB	Zuid Limburg
PI45ZWN	SW Nederland
EU50JS	Simferopol, Ukraine
9H50VE	Laskaris war rooms, Malta

Imperial War Museum, Duxford

A working T1154/R1155 station in the GB2IWM shack.

RAF DUXFORD in Cambridgeshire, part of the Imperial War Museum, is the home of the permanent special event station callsign GB2IWM. On 8 May GB2IWM will operate on 7007 and 14007kHz CW (listening 3kHz up) and on 3770kHz SSB. They hope to make contact with groups in France, Belgium, the Netherlands and Denmark with whom they commemorated the 50th anniversary of D Day last year. GB2IWM will also act as the base station for amateurs using 'suitcase' radios. Duxford is open daily and the Duxford Radio Society buildings, where GB2IWM is located, are manned every Sunday and most Wednesdays.

RSGB VHF / UHF Award News

DAVID ROBINSON, under the unaccustomed callsign WG3I, has been awarded two microwave certificates; the first for a contact over 150km on the 10GHz band and the second for having confirmed contacts with stations in 5 squares on 10GHz. Under the more familiar callsign, G4FRE, David holds many RSGB certificates on a variety of bands including 70MHz, 432MHz, 1.3GHz, 2.3GHz, 3.4GHz and 10GHz.

A bumper package of QSL cards resulted in Geoff Dover, G4AFJ, being issued with four RSGB 50MHz certificates, namely a Standard Transmitting Award, 80 countries (2-way), 200 locator squares and a DX 75 countries Award.

Barry Lewis, G4SJH, received a 70MHz Standard Transmitting Award endorsed 'All contacts made using a home-made transceiver'.

The only application to be received recently from a listener was that from Jan Steenbergen, NL213, when he updated his total of heard countries on 50MHz to 150 confirmed.

Congratulations to all award recipients, who include:

50MHz. 10 countries GJ7MTD, G0SIY. 20c G1LMZ, G8CDW, G7DTD, G7KAO, GW6AYM, 30c GM4ILS, G6FQZ, G1MZD. 40c G4DCJ. 60c GD0TEP, G4SEU, G3KPT. 90c GW6VZW, G7BXS. 100c G7BXS.

50MHz 25 squares G8CDW, G0SLR. 50s G4DCJ, G1LMZ, G1MZD, G7KAO. 100s G6FQZ. 175s G3KPT. 200s G4SEU. 250s GD0TEP. 300s G8BQX. 375s G6HKM.

50MHz DX Award 25 countries GM4ILS, G1LMZ, G1HXH, G1MZD, G8CDW. 100 countries G7BXS.

144MHz. 40 squares / 10 countries G7LIJ. 150s / 20c G4RKV. 175s / 20c GM4ILS. 200s / 30c G4MKF. 500s / 55c G3IMV.

432MHz. 50 squares / 13 countries. G4JZF/M.

1.3GHz. 600km award 2M0ABX. 30 squares G8NEY.

70MHz. Senior Transmitting Award G3NKS.

144MHz. Senior Transmitting Award G3UOL, G1SDO.

Details of the RSGB VHF / UHF awards are contained in the *RSGB 1995 Call Book* or may be obtained from the awards manager, Ian L Cornes, G4OUT, 6 Haywood Heights, Little Haywood, Stafford ST18 0UR, tel: 01889 882262.

Open Day at Waters and Stanton

FOR THE FIFTH successive year, Waters and Stanton will hold their free Open Day at their Hockley premises on Sunday 21 May from 10.00am to 5.00pm. There will be a vast quantity of special offer, end of line, cancelled order, second hand and reconditioned items for sale and loads of bargains for the early caller. Each year there has been a queue of customers at the door ready to snap up the bargains and this year each department will be making a special effort to clear stocks, so don't forget to get there early. As usual, refreshments will be provided free of charge.

Instructors Needed

SINCE THE NOVICE Licence training scheme started in 1991, over a thousand amateurs have enrolled as instructors. But there is a vast potential field out there and so far we have only scratched the surface. More instructors are needed, particularly in the Blandford area of Dorset, the Waveney area around Diss in Norfolk, south-east and south-west London, Warwick, and Alcester in Warwickshire. Anyone interested should write to the Project YEAR Co-ordinator, Phil Mayer, G0KKL, 16 Haig Avenue, Poole, Dorset BH13 7AJ (not QTHR) or tel: 01202 700903.

SSL Service

THE SSL's Radio Licensing Centre has produced a 'Code of Practice' booklet which will be sent to all amateurs when they renew their licences. It will detail the service that can be expected of SSL by you, the licensee. SSL has also tightened some of their service targets - for example, new licences will be issued within five working days of receipt of the application instead of the current 14 days.

The IC-728 Draw: (l to r) Robert Stockley & Dennis Goodwin of Icom, Clive Trotman, GW4YKL, John Rogers, G3CIF, and Diary editor Mike Bamber, G0SHY.

Winners!

AT THE LONDON AMATEUR RADIO and Computer Show, the draw took place for an IC-728 HF transceiver donated by Icom (UK). The free draw tickets could be found in the RSGB 1995 Amateur Radio Diary and a large number had been sent in. The winner was: R H Jones, G3SFO, of Doncaster.

Also at the Show, the RSGB gave away a year's free membership to the 200th, 400th and 600th visitor to the Society's stand. The lucky customers were: S Carvin, EI2CR; P R Finch, G7PKU; and Ann Charles, 2E1DQT.

Ann Charles, 2E1DQT, won a year's free membership at the show.

RSGB at Trafford Rally

THE TRAFFORD Rally (The Great Northern Rally) takes place on 28 May at G-MEX, the Greater Manchester Exhibition and Event Centre. In addition to all the usual attractions, the RSGB will be attending with a book stall and information stand. G-MEX is located in Manchester's city centre, with plenty of parking spaces available, and is also well served by public transport including BR and Metro stations. Talk-in by GB1GMX is on 2m channel S22. For further information see this month's *Club News/ Diary* pages, or phone 0161 748 9804.

Planning News

THE PLANNING Advisory Committee is about to reprint the *Planning Permission - Advice to Members* booklet and there will inevitably be a few minor amendments to the text to bring it fully up to date. Would any member who has recently used the booklet and who can suggest any improvements please send them as soon as possible to: PAC Chairman, G J Bond, G4GJB, Wolvelay House, Woolley, Wakefield WF4 2JJ.

Members should also be aware that the standard letter which is sent out from RSGB HQ in support of a member's planning application has been revised and will in future be sent direct to the local planning authority involved. When requesting such a letter, therefore, would members please supply the following information:

1 The name and address of their council offices.
2 The reference number given to the application, which will be on the acknowledgement form.
3 The address of the site, and whether the application is for the retention of a mast that is already there, or whether it is a proposed new one.

AKD 6001

WE HAVE received the following from AKD: "AKD would like to thank all of those people who took the time and trouble to tell us that the article in last month's *RadCom* regarding the equipment review was misleading with regard to the power output comparison. Yes we know ours is higher power! We will also be offering CTCSS on new rigs, and a retrofit kit for our rigs already in use, when the spec has been decided. Our thanks for your concern and support!" On page 57 of the April *RadCom*, we stated that the AKD 6001 transceiver was lower in power than the Alinco DR-M06. In fact, the AKD 6001 runs 25W (high) and 5W (low) and is therefore *higher* in power. Apologies for this error.

Operation in Monaco

THE ASSOCIATION des Radio-Amateurs de Monaco (ARM) has written to clarify the conditions under which amateurs may operate in Monaco under the provisions of CEPT recommendation T / R 61 - 01. ARM says that radio amateurs from countries which have signed T / R 61 - 01 (including Great Britain, of course) may operate from Monaco *providing* they have informed the Monegasque administration before they arrive of their exact operating location. According to CEPT recommendation T/R 61 - 01: "Because of the extremely small size of the territory, the exact location of operation of an amateur radio station must be indicated to the Direction Generale de Telecom, 25 Bd de Suisse, MC98030, Monaco, Cedex" or by telephone to 93 25 05 05. ARM points out that the border between Monaco and France is not clearly marked and that anyone signing '3A/own call', believing themselves to be in Monaco but in fact operating from French territory, is illegal for both France and Monaco.

However, amateurs holding a *French* licence may operate from Monaco without any prior notification, as there is a bilateral agreement between the two countries in addition to that of T / R 61 - 01.

Braintree Club Award

THE BRAINTREE AND District Amateur Radio Society is 20 years old this month, and to celebrate their anniversary the club is offering an award. The requirement is to obtain 20 points by making 'direct' [ie presumably not via repeater - *Ed*] contact with the club callsigns G4JXG or G6BRH. One point per QSO, but no duplicate band contacts in any one day. Double points for the anniversary special event callsign GB2OAY. Phone or CW may be used, and any band from 1.8 - 430MHz. Single mode or band endorsements are available. Look for the club calls on HF especially on the 2nd and 4th Monday of the month around 1900UTC, prior to the club net on 2m. To apply, send your log extract before 31 December with an A4 SAE plus four first class stamps (or overseas, four IRCs) to: M Kendall, G0EMK, 88 Coldnailhurst Ave, Braintree, Essex CM7 5PY.

Help a Belarus Amateur

DR LARRY Pristavko, EW1AAA (formerly UC2AAA), is a radiobiologist involved in research into the effects of the Chernobyl pollution in Belarus. His daughter Irene, who is a paediatrician, flew over the affected area within a week of the explosion while she was pregnant, and her daughter Olga (now aged 8) has since been found to have very low natural immunity. The area in which they live is still affected by the fall-out.

EW1AAA is trying to arrange for Irene and Olga to spend 2 - 3 months in the summer in an unpolluted area in the hope that this will benefit Olga. Irene is looking for a summer job as baby-sitter, nurse, housekeeper, cook, or will look after an elderly or ill family member. No salary would be involved, only food and accommodation. Ideally, the period would be spent with one family, but two or three shorter stays with different families could be an alternative. If anyone feels they might be able to help, please telephone Mike Birch, G0KDZ, on 01845 597695 before the end of May.

ARI Guglielmo Marconi Award

IN ADDITION to the International Marconi Day award sponsored by the Cornish Radio Amateur Club, which we reported on in the April *RadCom* (pages 17 / 19), we have received information about the *Guglielmo Marconi Award*, sponsored by ARI, the Italian national society. To qualify for the award, work amateurs in all 10 Italian call districts, plus three special event stations using the IY prefix, between 1 May 1995 and 30 April 1996. All bands may be used, but not contacts via repeaters.

To apply for the award, send a list of your contacts with full QSO details and 5000 lira, $5 US, or 10 IRCs to Guglielmo Marconi Award Manager, c/o ARI, Via Scarlatti 31, 20124 Milano, Italy. The application must arrive by 31 December 1997.

G5RP Award Encourages New HF DXers

THE ANNUAL G5RP Award is designed to encourage newcomers to HF DXing. Unlike most DX awards, this one is given for making rapid progress in the recent past, which only relative newcomers have the scope to do. However, you don't have to be young or newly-licensed in order to qualify - the HF DX bug can bite at any age!

Well-established HF DXers have a particular role to play in the G5RP Award scheme. It's up to you to nominate up-and-coming DXers for the award - and your nominations for 1994 - 95 are needed *now*.

If you have someone in mind to nominate for the 1995 G5RP Award, contact Martin Atherton, G3ZAY, 41 Enniskillen Road, Cambridge CB4 1SQ, tel 01223 424714.

Council Brief

Notes of a meeting held on 14 January 1995

Administrative

New Council members E P Essery, GW3KFE; R Horton, G3XWH and M Shread, GM6TAN were welcomed. T I Lundegard, G3GJW, was elected EVP for 1995. D Whalley, G4EIX, was co-opted as Council member for Zone B for the remainder of 1995. Council confirmed the following annual appointments:

Company Secretary: J C Hall, G3KVA;

Executive Committee Chairman: R P Horton, G4AOJ;

Membership Liaison Committee Chairman: P R Sheppard, G4EJP.

Council appointed J N Gannaway as Chairman of the Licensing Advisory Committee. The appointment of Council Liaison members to subordinate committees was made as follows:

ARDF: M Shread, GM6TAN; DCC: I D Suart, GM4AUP; EMC: J Greenwell, G3AEZ; E & R: J Greenwell, G3AEZ; HF: D A Evans, G3OUF; HFCC: E P Essery, GW3KFE; IARU: J Allaway, G3FKM; MW: J N Gannaway, G3YGF; PAC: T I Lundegard, G3GJW; PAB: J Bazley, G3HCT; PSC: E P Essery, GW3KFE; RMG: P R Sheppard, G4EJP; VHF: N Lasher, G6HIU; VHFCC: J Greenwell, G3AEZ; T & EC: R Horton, G3XWH; RAP: I J Kyle, GI8AYZ; PMB: R P Horton, G4AOJ.

Note: The Executive, Licensing Advisory and Membership Liaison Committees are always chaired by a member of Council.

A R Matters

The honour of Vice-President was formally approved for both R J C Broadbent, G3AAJ, and J N Gannaway, G3YGF. Action on the chairmanship of the ARDF committee was continuing. The question of the Society's EMC policy was raised and it was resolved that this would be discussed fully at the next Council meeting.

Financial Matters

The Hon Treasurer / E C Chairman reported that in general the finances of the Society were in good order. However, book sales and advertising would be subjected to special attention.

The computer project continued on track and had been conservatively budgeted, and vacancies on the staff establishment had led to cost savings.

THIS MONTH'S LEADING FEATURE

Phased Vertical LF Band Antennas

The first of two parts by Bob Whelan, G3PJT*

THIS ARTICLE DESCRIBES practical experience of designing, building and using Phased Vertical Array Antennas on 40m, over a period of 18 months.

WHY THE INTEREST IN PHASED VERTICALS?

DECLINING SUNSPOT ACTIVITY means that the LF bands have become more important. QRM is even heavier, commercial traffic continues to encroach or 'shares' the band with us.

Higher levels of amateur activity makes it necessary to put out a more competitive signal. A directional antenna for reception confers a big advantage of improved signal to noise.

Many amateurs do not have the space for the large antenna systems necessary for good performance on the bands below 20 metres.

Phased arrays offer a way of achieving modest gain and good reception directivity from a low profile antenna. It turns out that the practical gain over the average type of antenna used on the LF bands is impressive. Gains of up to 6dB and front to back ratios of 20dB can be achieved.

Table 1 shows the difference in reception between a ground mounted vertical element phased array (the so-called 4-Square) and a standard ground mounted Butternut vertical antenna.

I have been using 2-Element vertical and 4-Square phased arrays since mid-1993 and through 1993/4 and 1994/5 winters. I have had good results on 40 metres; in *CQ* WW 1993, 95 countries were worked over the CW weekend, in 1994, 111 countries and 34 zones. In 1994 I worked all the good 40 metre DX.

* *36 Green End, Comberton, Cambridge, CB3 7DY*

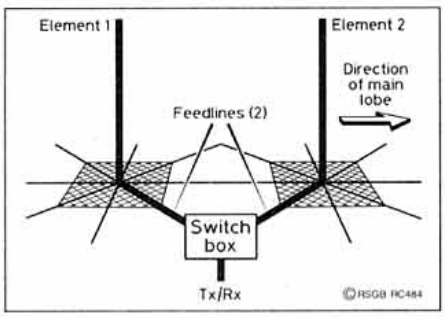


Fig 1: The 2-Element array using λ/4 radiators with elements spaced λ/4.

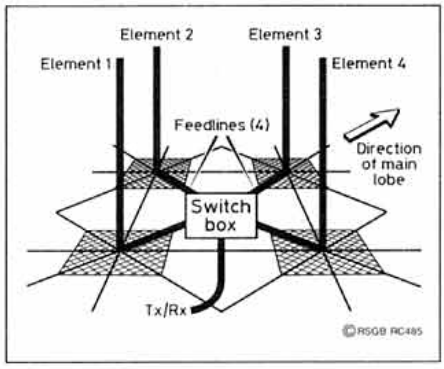


Fig 2: The 4 element array uses λ/4 radiators, arranged in a λ/4-Square, the so called '4-Square' array.

WHAT IS A 'PHASED ARRAY'?

A PHASED ARRAY is a set of similar (usually identical) antennas arranged in a regular geometric way and fed with a specific set of RF sources having a defined relationship to each other in terms of current magnitude and phase. For example, one of the simplest arrays is a pair of λ/4 verticals, spaced λ/4 and fed with RF currents which are equal, but 90° out of phase (quadrature).

Such an array has a gain of 3dB over a single vertical and is featured in many antenna books. However even such a simple array has to be set up properly and many have been disappointed with its performance when it has been constructed casually.

To design an array and get it to work requires a systematic approach. The approach outlined in this article is believed to be tolerant to practical variations from the ideal.

Country	Bearing	Best 4-Square	Butternut	Difference
1400-				
UB5	83	9	5	4
G		7	7	0
PA	84	7	3	4
OK	97	7	3	4
I	131	5	2/3	2/3
1700-1800				
JW	7	9	5	4
UA0	46	7	3/4	3/4
SM	48	9+6dB	9	1/2
SM		7	2	5
VS6	58	9	5/6	3/4
LY	71	7	2	5
VU	81	5	1/2	3/4
SP	87	9	7	2
9A	110	9	5/6	3/4
SV	121	7	5	2
I	131	5/6	1/2	4
EA	194	9+5	7	2/3
0800				
YV5		7	6/7	0/1

Table 1: Comparison with Butternut (6 Feb 1993), in 'S' Meter Units.

PRINCIPLES

THE PERFORMANCE OF a phased array [Note 1] is determined by several factors. Most significant of these is the performance of a single element of the array, the reinforcement or cancellation of the fields from the elements, and the effects of mutual coupling.

The radiation from a single element depends on the sum of the RF currents (I) flowing in all of its elemental parts. For the common ground mounted vertical which is often used in phased arrays [Note 2]:

$$I=\sqrt{(P/R)}$$

where P is the power applied and R is the feed point resistance. R consists of 2 parts, the loss resistance and the radiation resistance. The loss resistance (Rl) arises from the earth, matching and phasing components and losses in the radiator itself. The radiation resistance (Rr) depends on the geometry of the radiator.

The efficiency of a radiator is Eff= Rr/(Rr+Rl) which in terms of field strength = 10 log (Eff).

A ground mounted vertical with four radials has an efficiency of about 55% and the field strength would be only 2.57dB down from the same vertical over a perfect ground. This isn't the same as comparing the field strength from this vertical to another sort of antenna of course. Advertisements and articles which do this are rather misleading.

DIRECTIONAL EFFECTS

A PROPERLY DESIGNED and fed array can, in practice, produce impressive nulls. The key to good performance is being able to control the fields from the elements. Gain is a strictly relative term. The gain is relative to a single element of the array, however efficient that element is.

Mutual coupling between the elements in an array, changes the impedances of the elements from the impedances if the elements were in isolation. These effects can be large and will change current distribution and relative phases. The performance of an array is critically dependent on errors in currents or phase relationships.

A practical phased array system will consist of the set of radiators, the earth systems, feedlines, networks to shift phase and match

impedances and a switch box. This box allows the beam headings to be changed by changing the current distribution amongst the elements in the array.

Peter Swallow,G8EZE, a member of the *RadCom* technical review panel comments:

"Arrays can be difficult to set up if mutual coupling is significant, as in the case of the four-square. The element in the direction of fire has a negative real impedance, ie it injects current into the corporate feed, making the radiation pattern sensitive to phasing errors and small impedance variations between the four drive circuits. The advice about poor connections is particularly pertinent.

BACKGROUND

THERE ARE VERY good published descriptions of the design, construction and testing of phased arrays [1], [2], [3].

The feeding of phased arrays requires a general understanding of transmission lines and matching networks so a copy of Maxwell's book [4] is handy. However, for this article you won't need to do any detailed calculations.

ON4UN describes [1] the four basic approaches that have been described in the amateur literature. I have tabulated these approaches, see **Table 2**, to pick out features which would affect your ability to make your design work.

I recommend the Collins and Lewallen approaches [2] as they do not rely on making good quality RF measurements. RF measurements require some care and are beyond the scope of this article.

Working examples of both array types are in use in the UK and some of the key parts can be purchased if you don't feel confident to build and test them yourself.

To design and test my arrays I have made extensive use of CAD techniques, primarily with the ELNEC [5] antenna analysis program. Although the simple arrays to be described here can be built without it, for the more complex arrays, it is essential. Using this program, the radiation patterns can be modelled with an estimate of the element impedances. The current magnitudes and phase shifts can be optimised based on practical measurements and the various networks adjusted systematically.

There are two systems which you can build, use to gain confidence and make useful measurements.

a) The 2-Element array using λ/4 radiators shown in **Fig 1**, with elements spaced λ/4, has a gain of 3dB and a Front to Back ratio of 20dB with a Front to Side of about 3dB. This array should be fed with equal currents which are 90° out of phase: element 1, 0° and element 2, -90°. This gives the well known cardiod pattern. The lobe is in line with the elements, and the arrow shows the direction of maximum radiation.

b) The 4-Element array shown in **Fig 2**. This also uses λ/4 radiators, arranged in a λ/4-square, the so called '4-Square' array. This has gain of up to 6dB with a Front to Back ratio of 20dB with a Front to Side of 10 -15dB.

The elements are fed with equal currents in the following phase relationship.

Element 1 ..... 0°
Element 2 ..... -90°
Element 3 ..... -180°
Element 4 ..... -90°

The array fires diagonally across the square in the direction of element 3, from element 1 to 3.

As was stated earlier the way to get consistent performance is to use a step-wise, systematic approach. For this reason build and debug the 2-Element first, it can be the first two elements of a bigger array. But unless you are sure what you are doing, to build a 4-Square from scratch is a demanding task.

LAYOUT

THERE ARE IMPORTANT geographical considerations in the siting of a phased array, because it is not possible to cover all azimuth directions equally and contiguously. Normally you will be restricted to two, three or four optimum directions from the aspect of gain and rejection. In the same way consideration has to be given to the effects of propagation.

From Western Europe the main areas of interest suggest some basic orientations:

for a 2-Element , E - W.

for a 4-Square either NE - SW, NW - SE or N - S, E - W.

Clearly some choices have to be made and this entails an understanding of the nulls as well as the main lobes.

Anyone who has tried to work DX on the LF bands knows that the real problem is European QRM and general electrical noise. Most of this QRM seems to arrive on a bearing between 40 and 120 degrees; therefore, when listening to the west using the simple 2-Element array the back null of the array should be set to the east. This implies an orientation of 260 - 80° ie E - W for the alignment of the pair of elements. The advantage of the 4-Square now becomes more apparent in that the wider null allows better rejection and hence better received signal to noise ratios. The null angles are given in **Table 3**. All this is easier to visualise on a great circle map.

Because signals also arrive at a variety of elevation angles, users of phased arrays often comment on the large variations in directivity with distance and time of day. The arrival angle has a big effect on the apparent F/B ratio. The high angle daylight propagation from near Europe is fairly non-directional compared with the array performance over long distances (see Table 1).

Few sites are completely open. Whilst the presence of trees in close proximity does not seem to have much effect on performance, arrays sited in open terrain are more successful. Since ground losses in the general

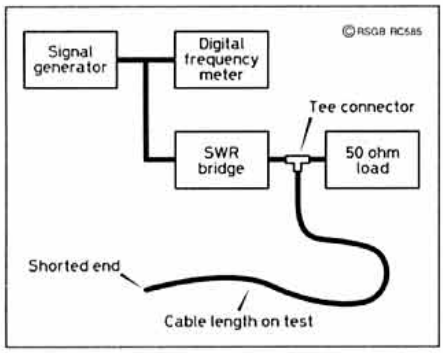


Fig 3: Measurement of coaxial cable velocity factor.

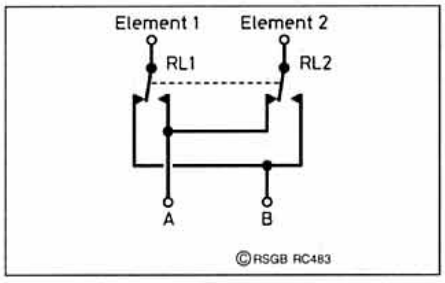


Fig 4: The connection points for two element arrays.

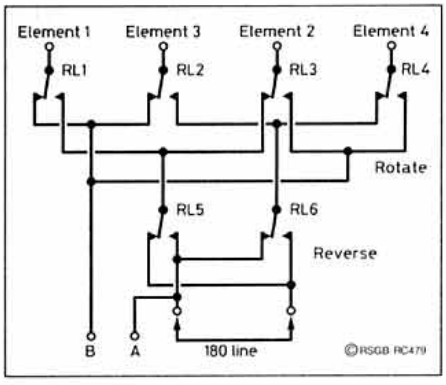


Fig 5: The connection points for four element arrays.

Author	Elements	Feedlines	Phase	Bandwidth	Measurements	Construction	Applicability
Gehrke	any	any	networks	moderate	critical	complex	all designs
Christman	any	specific	networks	moderate	critical	medium	most designs
Collins	λ/4	λ/4	hybrid coupler	good	tolerant	medium	90 deg only
Lewallen	λ/4	λ/4	L section Network	narrow	tolerant	simple	most designs

Table 2: Vertical phased array designs compared.

Antenna	Width of Forward lobe (-3dB)	Width of Rear null (> -10dB)
2-Element	166	80
4-Square	102	180 (>-10) 140 (>-20)

Table 3: Null angles of arrays.

locality govern the overall efficiency, a high conductivity or very wet area is an advantage.

SITE

CONSIDERATIONS OF orientation and earth plane (see later) govern the overall size of the site needed for an array. In the case of the 2-Element array an ideal site would be:

- 0.8λ wide by 1.05λ long ie 32m by 42m for 7MHz.

In the case of the 4-Square array the ideal site would be:

- 1.05 λ square ie a 42m square for 7MHz.

Few of us have this sort of area available and experience has shown that the earth planes can be reduced such that even an area of 4m by 14m could be used for a 2-Element array or a square of 14m for a 4-Square.

In fact there is nothing sacred about the λ/4 spacing. For example, providing that the current phase relationships are changed, satisfactory patterns can be obtained for spacings between 2.5 and 15m corresponding to spacings of λ/16 to 3λ/8 at 7MHz. The optimum phase difference lying between 160° and 60° respectively (for equal current amplitude).

The practical meaning of this is that the exact spacing chosen can be close to λ/4 provided that the phase is compensated for best rejection. ELNEC can be used to find the optimum. The Collins method assumes 90° shifts and thus phase trimming is limited.

7MHZ LAYOUTS

A 7MHz, two element array has spacing = 10.63m

A 7MHz, 4-Square has its side = 10.63m. It is important that the square is indeed square and not a rhombus. The easy way to do this is to lay out two pegs 10.63m apart and position the 3rd peg so that it is 10.63m from one peg and 10.63 x √2 = 15.03m from the other. You can use the same procedure for the 4th peg.

Any conduit needed for the feedlines should be laid first.

At each peg and to support a wooden post, a Metpost [Note 3], is either driven 2 - 3 feet into the ground in the correct position or concreted into a hole. The element is self supporting. To reduce flapping in the wind I mount each element on a 3m x 3" square, wooden post using waste pipe as insulators .

EARTH SYSTEMS

THE OVERALL PERFORMANCE of an array depends on the efficiency of the individual elements. For ground mounted quarter-wave verticals performance is usually limited by the effectiveness of the ground system.

Losses depend on the site and the time of the year. Large radial systems offer one way of achieving a consistent result whatever the local ground conductivity [Note 4].

Earth planes will always be a compromise. I have based my ground systems for 7MHz on a 10 - 12' squares (0.1λ) of chicken mesh, supplemented with radials. This gives about 10Ω loss. With an array all of the individual

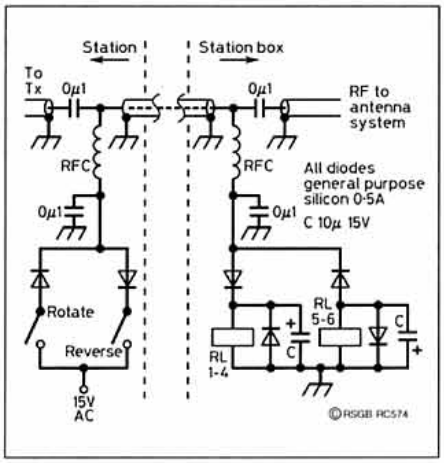


Fig 6: A circuit for powering the relays down the coax feedline from the transmitter.

ground systems have to be identical and bonded together. The reason for this is that the impedances of the elements should be as similar as possible. If not then the performance will vary with direction. This will be seen as reduced F/B ratio rather than forward gain.

At each element a plate or similar solid connection point should be provided. I am using 60cm (2ft) square thin aluminium sheets, see the photograph opposite. Mechanical joints should have a large area so that any contact resistance is minimised and stable. Don't rely on twisted joints they may seem satisfactory but they are unstable with the result that the phasing network settings will change. This can be bewildering.

As it is rather expensive to cover large areas with mesh it is necessary to use radials too. Needless to say the radials or mesh should be very close to the surface. pinned down on the surface of a lawn or under <2cm of soil. Pieces cut from metal coathangers bent into U shape work well as 'lawn pins'; they are nearly always galvanised or lacquered so they resist corrosion. The worms will bury the mesh and radials for you given a good grass growing summer.

One problem is that of corrosion caused by electrolytic action between dissimilar metals. Copper and aluminium joints are particularly bad. Try and avoid joints where corrosion is accelerated because of widely differing electrochemical or galvanic potential.

Looking at a Relative Galvanic Series [6] indicates that aluminium and zinc are compatible but copper should be tinned before joining to either. Always use stainless steel or heavily plated nuts and bolts. Joints should be kept dry, though its difficult to keep such joints dry when the best types of earth are wet!

All of the separate planes in an array should be bonded together and to a common earth point at the geometric centre. This allows the switching box and phasing lines to be placed at a common earth point. The feedline should be earthed to this point with a low impedance braid or tape.

One problem the builder of an array faces is how to make measurements of ground loss. A properly compensated noise bridge can be used to measure element impedance directly. Most noise bridges offered in the amateur market are unsuitable for this purpose.

ELEMENT CONSTRUCTION

ALL OF THE ELEMENTS in this discussion are λ/4 wave resonant, when no other element is coupled to them.

I used a three section construction, 4m of 32mm OD, 4m of 25mm OD and a top section of 15mm and 12.5mm to make the length to approximately 10.3m. Each joint is shimmed, pinned with a screw and fastened with a Jubilee clip to give a good contact. Each of the tubing joints should be taped to keep out corrosion.

This construction is self supporting but each element is attached to a 3m wooden post and insulated with plastic tubing. Large jubilee clips, U bolts and bridges or even heavy duty nylon self-locking cable ties can be used to fasten the insulated elements to the posts. I solved the problem of the elements slipping down through the insulators and shorting to the earth plane by using tape and a screw to pin the insulator.

The exact resonant frequency will have to be determined by *in situ* measurement of each element (with the others open circuit) so the length figures given here are approximate.

When you have the elements erected over the earth planes measure the resonant frequency with a GDO and digital frequency meter. Adjust the lengths so that the elements 2 or 4 are resonant at the same frequency. This might be 7.05MHz. The important point is that each element is resonant at the same frequency.

FEEDLINES

BOTH THE LEWALLEN and the Collins method use elements fed with λ/4 feedlines. 50, 75 or 95Ω cable can all be used, the higher impedances giving better component values in the Lewallen phasing circuits.

Note that, for 4-Square arrays, cable with velocity factors (VF) less than 0.707 will not reach the centre of the square. Foam or air

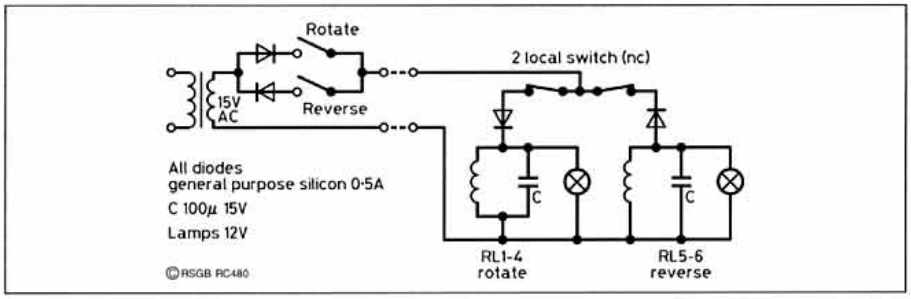


Fig 7: Relay switching circuit using separate 2 or 3 core light duty cable.

Base section of a vertical support showing the Metpost metal post support, vertical element fixed to the wooden post and the aluminium sheet section of the ground plane.

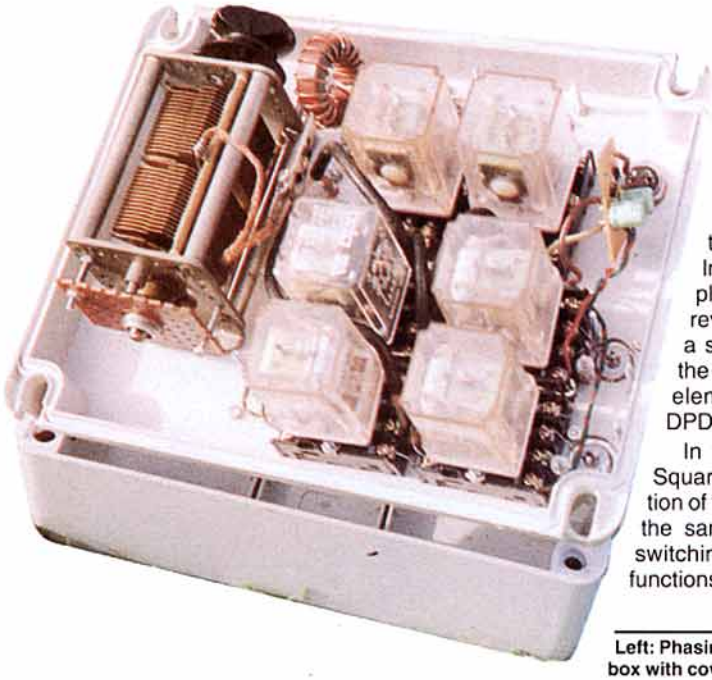
spaced dielectric cables with VF close to 0.8 should be used [Note 5]. To trim these to length the impedance and VF of the coaxial cable to be used have to be known. It is not accurate enough to assume the standard values of VF. The measurement procedure uses a signal generator, a digital frequency meter, a SWR bridge and a 50Ω dummy load. A GDO will not be accurate enough.

A suitable circuit is shown in **Fig 3**. The frequency at which the SWR is a minimum is measured. This should initially be lower than the target frequency. For 7MHz start with a feedline about 9m long. The feedline is then progressively shortened until the frequency for minimum SWR is 7.050MHz.

It should be possible to cut the transmission lines to within 20kHz. It seems best to fit a connector on one end and trim and short the other. Make a note of the frequencies for each feedline as it is a good way to search for cable faults if you have problems later.

To make up a λ/2 line use the same procedure except that you set the generator to half the frequency, ie 3.525MHz.

I used tails for the connection to the elements. These were lengths of tinned braid soldered to the braid and centre conductor of the feedline and tightly sealed with self amalgamating tape. Keep all the feedlines identical.



Left: Phasing line relay switching box with cover removed.

SWITCH BOX

TO BE ABLE TO change direction a switching system has to be used to exchange the feed currents between the elements. In the case of the simple 2-Element array a reversal of direction is a simple exchange of the feedlines to the two elements. In effect a DPDT relay.

In the case of the 4-Square array the selection of four directions uses the same principles. The switching circuit has two functions, a rotation of direction by 90° and a reversal of direction. With these two functions all 4 directions can be covered. This means that a switch box for a Four Square can be used for a 2-Element array.

The connection points for the Lewallen or hybrid coupler for two element and the four element arrays are shown in **Fig 4** and **Fig 5** respectively and table 4 in Part 2.

Internal connections between components should be short. The inner and outer conductors of the coaxial cable must be switched together (to avoid phase shift errors).

Plug-in, 8 pin, 10A DPDT relays are very satisfactory, (12 or 24VDC). These can be fitted in surface sockets with screw connections. (Maplin). A non-metallic, waterproof box is needed. A circuit for powering the relays down the coax feedline from the transmitter is shown in **Fig 6.**

The circuit can be used with a separate 2 or 3 core light duty cable, as shown in **Fig 7**. A further useful feature inside the switch box are one or two lamps to indicate the state of the relays. This is useful during array debugging.

After construction of the switch box it is most important to check the logic carefully. You need to be sure that RF is being distributed correctly to the feedlines. You can check the RF performance by measuring the SWR across the switch by using dummy loads on each antenna port and checking that the SWR is low and consistent for all switch directions (omit the phasing network).

The switch box should be located at the geometric centre of the array and bonded to the earth plane.

NOTES

[1] This section is based on the discussion by Lewallen, W7EL, *ARRL Antenna Book* (1988), pages 8-8 to 8-31.

[2] For this article it will be assumed that the elements are λ/4, ground mounted over an earth plane. The principles apply to elevated radials too but in this case the discussion and behaviour of the earth is different.

[3] A Metpost is a commercial metal post support sold at most garden centres.

[4] The region of greatest loss lies <0.05 λ from the base of the vertical radiator.

[5] See the Westlake advertisement in *RadCom*.

REFERENCES

[1] *Low Band DXing*, page II-53 to II-100, by Devoldere, ON4UN.

[2] *ARRL Antenna Book (1988)*, page 8-8 to 8-31, Lewallen, W7EL.

[3] 'Vertical Phased Arrays' by Gehrke, *Ham Radio*, (May, June, July, Oct, Dec,1983).

[4] *Reflections* by Walter Maxwell, W2DU, ARRL.

[5] ELNEC, Lewallen, W7EL, PO 6658, Beaverton, Oregon, OR 97007

[6] *Fighting Antenna Corrosion by* Roleson, KC7CJ, *QST*, (April, 1993). ♦

. . . to be concluded

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A NUMBER OF recommendations were set down at the recent meeting of the IARU Region 1 HF Committee. This meeting, held midway between the Conferences, marked an opportunity to address issues which could not be put aside until the next conference in the autumn of 1996. The committee recommended that:

1 Each Member Society should approach its telecommunications administration with the request that they do not allocate frequencies to other than the Amateur Service in the band segments which IARU Region 1 has assigned for intercontinental DX-traffic ie 3,500 - 3,510kHz and 3,775 - 3,800kHz.

2 Member Societies (where applicable) should ask members to avoid transmitting in the frequency segment 1,907.5 - 1,912.5 kHz (the 'Japanese DX Window') and to adopt the split frequency technique when attempting to contact stations in this segment.

3 Frequencies 14,230, 21,340 and 28,680kHz should be used as calling frequencies for SSTV/FAX operators and that they, after having established contact, should move to another free frequency within the telephony portion of the band.

4 Satellite down-link band segment on the 29MHz band be changed to 29,300 - 29,510 kHz.

5 The HF Committee reconfirms its decision that the use of the packet radio mode should be discouraged on the 7 and 10MHz bands.

VIETNAM UPDATE

9V1RH HAS SUPPLIED details on XV7SW's activities from Hanoi. Rolf prefers CW and is active on the following spot frequencies for the time being: 14.016, 14.021, 21.016, 21.019, 28.016, and 28.019MHz. He has a rotatable log - periodic antenna about 30m high and runs 500W to a Drake L4B for 14, 21, and 28MHz. He was hoping to put up a 3.5MHz 'sloper' in February but in mid-March still had nothing for 1.8 or 7MHz. His spot frequencies on 3.5 and 7MHz will be 3.505 and 7.033MHz (he is trying to get the latter changed). Rolf is also interested in top band and is collecting information on antennas. XV7SW is with the Swedish Embassy and expects to be there for another two years. He attended the Region 3 Conference in Singapore last September and was subsequently appointed Region 3 Correspondent for Vietnam. David Rankin, 9V1RH, is a Director of IARU Region 3 and regularly visits Vietnam in the course of his business travels. He is thus in good, personal contact with SM5MX/XV7SW.

DX NEWS

JR1XKU MADE SOME interesting findings after analysing his QSL returns, the *RSGB DX News Sheet* reports. His results show that: HB = 80%, ZL = 70%, USA, KH2, OE, OH, VE = 60%, LZ, VK, YB, = 50%, EA, HA, LU, OK, ON = 40%, DL, I, KH6, PY, SM, SP = 30%, CX, F, G, YU, CIS = 10%. Of the UK stations he had worked - and who said that they would QSL - JR1XKU revealed that less than 10% had actually done so, even after two and a half years!

Niels Montanana, G8RWG, is in Bequia in **St Vincent** and will be there until early September and then, after a short break, for a further 12 months from mid-November. He will be active on all bands from 3.5 to 28MHz with CW and SSB and his callsign is J88CX. QSLs go via W7KQF.

From 25 March until 28 May Canadian stations may use the following special prefixes to celebrate the 50th anniversary of the end of WWII in Europe: VX2, VX3, VX7 (= VA2, 3, 7), CJ1 to CJ5 and CJ7 to CJ9 (VE1 - VE5, VE7 - VE9). VX6 (= VE6), XO5 (= VO1), XO4 (= VO2), XN4 (= VY2), and XN5 (= VY1). *Lynx DX Bulletin* reports that the Radio Society of Bermuda will be on the air with the callsign VP9RND from 1200 on 20 May until 2200 on 21 May to commemorate the 200th anniversary of the Royal Naval Dockyard in Sandys Parish. Most operation will be on SSB and special certificates will be issued. They cost US$2.00 or 4 IRCs - cards should go to WB2YQH (see *QTH Corner*). *RSGB DX News Sheet* reports that FM5CD will be using the special call TO2DX during major contests this year.

Sanyi, XU7VK, from Phnom Penh, **Cambodia**, has renewed his licence which is now valid until February 1996. He has also received a special callsign - XU95HA - which he is allowed to use on special occasions. JR1TAG was reported to have been issued with the call 3W6JP to operate from **Vietnam** with effect from 28 February but there is no information about the length of his stay.

K3BYV has been receiving many cards for AP2AA but he wishes it to be known that he is *not* his QSL manager.

According to *DXPRESS*, VP8CID and VP8GGE have been living on **South Georgia.** They left in April but are due to return in August for a further eight month spell. The VP8SGP expedition left them a Cushcraft A3S and a 15m mast.

UA9OBA is scheduled to leave in June for a long duration trip. He hopes to operate from a number of IOTA islands including Scott Island which he believes might be eligible for DXCC status. A visit to **Bouvet Is** is planned during late October/early November 1995.

It seems that stations in the Russian Federation are restricted to 10W on top band and are only allowed to use the 1.830 - 1.850MHz slot. There is to be an expedition by FAIRS (the Foundation for Amateur International Radio Service) and the Friends of Tuva, to the Tuvan Republic ('*CQ*' zone 23) in late May or early June. UA4LCQ and AA6EG are organising an American team of operators and the expedition will last about four weeks. YA/UT9XL is said to have told F6AJA that he will be in **Afghanistan** for several more months and will be active on all bands. He is hoping to obtain documentation. There is now much confusion in **Kuwait** because it seems that the authorities have changed the callsigns held by foreigners to 'Own call/9K2' and re-issued the 9K2 calls to nationals. The former 9K2ZZ is now N6BFM/9K2 and his old call is now re-issued to the former 9K2RA! QSLing has now become somewhat confusing but it seems that 9K2ZZ (who is now N6BFM/9K2) has W8CNL as QSL manager, 9K2ZC (who is KI0K/9K2) uses KC4ELO as does the former 9K2YY (who is now N0YKI/9K2). JA8MWU will be in **Nepal** between 26 April and 10 May as 9N1MWU and active on all bands with CW and SSB.

RSGB DX News Sheet reveals that ZS6YA will be using the callsign ZS9F during major contests this year, and will also be appearing as ZS9RWR for the Rugby Union World Cup tournament until the end of this month.

In the **Ivory Coast** the series of callsigns from TU2AA to TU2ZZ has now been used up and in future new HF licensees will be issued with the TU5AA - TU5ZZ series. The whole TU series is allocated as follows: TU1 = VHF/UHF/SHF, TU2 = HF plus VHF/UHF/SHF, TU3 = experimental stations, and TU4 = temporary licences (HF/VHF/UHF/SHF) valid for six months and obtainable via ARAI (the national society). Bogdan, 5N3/SP5XAR, will be in **Nigeria** until the middle of this month. Lou, ST2AA, specially requests that QSL cards for contacts with him are *not sent direct* because of the unreliable postal service - please apply via his QSL manager WB2RAJ. FR5HG/E on **Europa Is** was due to leave on 30 April. JE8BKW and JH8CLU will be on the air from **Madagascar** between 28 April and 4 May. JH8CLU already has his callsign - 5R8DL - but the other one was not known at the time of writing. A recent *ARRL DX Bulletin* said that documentation for the 3V8BB operation had been submitted and approved and QSLs may be submitted for DXCC credit. It seems that cards from 3X0DEX are not being accepted for DXCC purposes because no documentation has been received by ARRL.

R3/W0YR is in Moscow for three years. He will operate mostly on CW and RTTY but with some SSB.

Swedish amateurs are now using an additional novice prefix - SH. It applies on VHF and UHF and on HF with 100W maximum power [see also *Radcom News*, April - *Ed*].

LRMD HAMFEST

THE LITHUANIAN national amateur radio society (LRMD) stages its hamfest on the last full weekend of July (29/30 July). More than 200 attended last year's

1995 WARC BANDS TABLE

	10MHz	18MHz	24MHz	Total
G4YVV	41	44	19	104 (CW)
GJ4GG	27	36	18	81
G4FVK	4	13	2	19

28MHZ COUNTRIES TABLE

G0AEV	109
G4OBK	101
G0DNV	83
G0MCT	55
G3XBM	32
G0NQC	31
GJ4GG	27
G2FQR	17
GM4CHX	16
G3ING	14

BAND REPORTS

Particularly good conditions on the LF bands during the period covered (mid-February to late March) and RS 25429 remarks that the first night of the ARRL 160M Contest was very rewarding. He heard no less than 112 USA stations plus many in the Caribbean and South and Central America. Thanks to G2HKU, GJ4GG, G3s GVV, ZEM, GW4KGR, G0NQC, 2E0AHQ, RS25429, and the UK Packet Cluster via G4PDQ. Callsigns of stations using CW are printed in italics:

1.8MHz

0000 *A92BE*, CU2CE, JW0C, *S79MX, SV8CS, TA2BK, TU2MA, 6W6/K3IPK, 9K2/N6BFM.*
0100 *FM5BH, HK0/G0SHN*, KP2A, *S92SS, UA0ACG, VP2EZ, VQ9TP, 5T5JP.*
0400 *J75A, PY0FF, ZF2DC, ZS1JX, 5Z4FO.*
0600 FM5DN, P40V, VP5X.
0700 *K6TQ, KP2A, P49V, V26AS*, V31VE, *ZLs 2JR, 2SQ, 4WA.*
1800 *JW0C, KH6CC*, VK3EW, VK6APZ, *ZL2JR, ZL4WA, 9K2MU.*
1900 *VK3EW, VK6APZ.*
2100 *S92SS, V52UUO, VK6AS, VQ9TP, 8Q7SS, 9K2/N6BFM.*
2200 *D68UY, JA3ONB, JA4LXY, JA6IEF, S79MX.*

3.5MHz

0000 A61AN, C6ANI, KL7EF, 5N0GC.
0400 *FG5FC*, PJ9/AB4JI, V44KBC, *3DA0BK*, 5N3/SP5XAR, 8R1AK.
0700 HH2LQ, J37ZY, J69MV, PJ0B, TI2LL, TO2DX, *VP2MEM*, XE1VIC, *ZL3RG*, ZL4BO, ZL7ZB.
1700 EZ7AT, VK3EW, ZL1HY, ZL3LB, ZL7ZB.
1800 HC1KGR, 4S7/JA4FM, 9Q5TT.
2000 A71AK, *JA1HQT, JW0I*, VK7BC, *VK9CR*, VQ9XX, 8Q7SS.
2100 *A92Q*, EL2PP, JJ7XTV, KH0/XE2ET, *TA6ZS, V52UUO*, VK5MS.
2200 *A71CW*, FS5PL, JT1BR, KC0PA/S0, *TA2BO, VK6HD, YI0PIP*, 9M8DB, 9Q5TT.

10MHz

0000 *ST2TA.*
0700 *C53HG, JA2CG, JW0I, TA3DD, TI4CF, VK9LM, ZL3BJ, 6W6/K3IPK.*
1100 *OY3QN, R1FJL, YK1AO.*
1500 *BV7FF, FK8GJ, S01M, UN9LX, VK6HQ, VQ9TP, YJ0ADJ, 9M8/DJ2EH.*
1700 *ST2AA, VK9CR, 3B8CF, 5R8AL, 9M8FC.*
1800 *JX7DFA, KL7HF, S79MX, TU4SR, VK9XY, VQ9XX, ZL4WA, 9J2BO.*
1900 *D68UY, ET3BN, PJ8AD, V52UUO, 5A0CW, 5R8EO, 9X5EE.*
2100 *A22MN, FY5FE, KP2/AA0NC, VP2E/KV1Y, VP8CQS.*

14MHz

0700 *HL3WID*, F5SOI/TJ1, VK9NS.
0800 A71BH, BZ5HAN, JAs, YA/UT9XL, ZL7ZB.
0900 AP2AMR, BV5AS, FK8GM, H44MS, *JT3VB*, KL7XD, VE8KM, *WL7VO, YJ0AXC.*
1000 BV8BC, C21DJ, S01M, VR2EZ.
1700 AH8A, 68UY, FR5HE/E, HS0ZBX, KL7XD, N7ML (Mont), SU2MT, *V85NL*, VQ9XX, XW1.
1800 D2EV, D68QM, KE7BT (Idaho), *S92SS*, 5N3/SP5XAR, 9G1BJ.
2000 FS5PL, *HH2AW, ST2AA, VP5/K0PP, 9X5EE.*
2100 KC0PA/S0, V29NR, VP8CPC.
2200 ET3YU, S92SS, ZF2JC/ZF8.

Hamfest. They came from LY, YL, G, GI, GM, W, SP and DL. The programme was simple; a short welcoming speech, a few exhibitions, a market, participant's VHF sprint contest, lottery etc. This time LRMD is inviting guests from more countries and is developing the idea of holding a Baltic Amateur Radio Seminar/Conference.

LEBANESE LIST

I HAVE RECEIVED a full list of *legally licensed* Lebanese stations (as of December 1994) from Ron Roden, G4GKO, Regional Coordinator of the IARU Region 1 Monitoring System. It reads as follows: OD5s AQ, AR, AW, BC, BE, BO, CN, EP, ET, FD - FI, FZ, GB, GC, GI, HC, HK, HO, HP, HQ, HU, IE, IF, IG, IM, IR, IU, IZ, JA, JE, JI, JL - JQ, JU, JW, JY, JZ, KB, KC, KE, KH, KI, KJ, KL, KM, KO, KP, KR, KS, KT, KU, KV, KW, KZ, LE, LG, LM, LT, LW, MB, MC, MD, MF, MG, MH, MI, MJ, ML, MM, MO, MP, MQ, MT - MW, MY, MZ, NA, NB, NC, NE, NF, NG, NH, NI, NJ, NK, NL, NM, NM, NN, NO, NP, NQ, NR, NS, NT, NU, NV, NW, NX, NW, NZ, OA - OK, OT, OU, PL, PX, QE, QH, QM, QS, QT, RA, RD, RF, RH, RI, RJ, RL, RS, RT, RZ, SA, SB, SC, SE, SF, SH, SI, SK,, SL, SM, ST, TA, UF, US, VT, WS, XY, YL, YO, YT, YU, ZB, and ZM. Unfortunately there are many unlicensed stations using the OD5 prefix.

AWARDS

WORKED ALL SCOTTISH DISTRICTS AWARD

On 1 April 1996 Scotland will undergo a major re-organisation of its local authorities and the present 56 Scottish Districts will become 29 Local Authorities. The result of this is that the WASD Award will come to an end. All QSOs up to 31 March 1996 will be valid for the award. Details are still available from GM3BCL (QTHR). The WASD programme has been very successful but will now pass into history.

5TH IAAF WORLD CHAMPIONSHIP IN ATHLETICS AWARD

For contacting (or hearing) members of the Gothenburg club during the WCA in Gothenburg between 4 and 13 August 1995. A special station 7S6AG will be on the air and to earn the award Europeans need to contact 7S6AG plus five members of the GSA. Via the repeater SK6RFQ on 29.680/29.580MHz one QSO with 7S6AG and two club members. Frequencies to check are 3.515, 3.750, 7.015, 7.050, 14.015, 14.250, 21.015, 21.250, 28.015, and 28.450MHz. Send log details plus US$5.00 before 30 September 1995 to: Goteborgs Sandareamatorer, Box 1143, S-436 23 Askim, Sweden.

Charges for DARC awards have increased to DM15 or £5.00. The award manager has a slightly modified address: Harry Meijer, DJ0PR, P O Box 100560, D-47882.

YU DX CLUB AWARD

For contacting members of the YU DX Club since 26 January 1994. The members concerned must have received your QSL card (these can be sent with the application). YUs need 20, other Europeans 10, and all others five. No band or mode restrictions. Eligible stations (at 20 February 1995) were: YT1AA, AD, AT, AU, BB, IQ, MM, WG. YT6AA. YT7DX. YU1AA, AB, AD, AG, AO, BM, BO, CV, DD, DX, EA, ED, EO, FM, GR, HA, HF, KN, KO, LA, LW, MM, MV, NR, NW, QL, RA, RJ, SB, SJ, TO, TR, WB, XA, ZA, ZZ. YU7AU, AV, FW, FX, LS, RA, RV, SF. YU8DX. YZ1AA, AU, MB. YZ7AA and YU1AG (no time limit with this one). Send certified list plus 10 IRCs to: Srecko Moric, Partizanska 5/23, 11137 Beograd 75, Yugoslavia.

CONTESTS

MASSACHUSETTS QSO PARTY

1800 6 May - 0400 7 May and 1100 - 2100 7 May

1.8 to 28MHz(no WARC bands). Exchange RS/T and QTH (State/Province/DXCC Country/Mass County). One point per QSO on phone and two if on CW/Digital/Video. Multipliers are Massachusetts counties (maximum 14 per band). Score is total points times total multipliers. Look around 1.810, 1.850, 3.550, 3.705, 7.050, 14.050, 14.270, 21.050, 21.130, 21.390, 28.050, 28.130, and 28.390MHz. Certificates will be sent to all country leaders and to those who work all 14 Mass counties. Post entries (before 8 June) to: FARA, P O Box 3005, Framlingham, MA 01701, USA.

ARI INTERNATIONAL CONTEST

2000 6 May - 2000 7 May

1.8 to 28MHz (no WARC bands) following IARU band plans. Band and mode may only be changed after at least 10 minutes on a mode/band. Single-operator CW, SSB, RTTY, and Mixed categories, multi-operator single-transmitter mixed, and listener categories. Italian stations give RS/T plus two letters indicating their province. Non-Italians send RS/T and serial number. QSOs with own country count for multiplier credit only, with other countries in the same continent two points and in a different continent three points. QSOs with Italian stations (I and IS0) count 10. The same station may be contacted on the same band on different modes but only the first counts for multiplier credit. The multipliers are the 102 provinces and each DXCC country (but not I or IS0). Listeners follow the same rules and a station cannot appear on any band more than three times. I have copies of the *1994* rules (SASE please). IBM compatible software to use in the contest is available free. It can be obtained by sending US$5.00 or 10 IRCs to cover the diskette/postage costs. Logs go to ARI Contest Manager, I2UIY, P O Box 14, 27043 Broni (PV), Italy, within 30 days of the contest.

BALTIC CONTEST

2100 27 May - 0300 28 May

Work stations in Estonia, Latvia, and Lithuania. 3.510 - 3.600 and 3.600 - 3.650MHz. Single-operator mixed, CW, SSB, multi-operator, and listener sections. Exchange RS/T plus serial number from 001. Each QSO counts one point for Europeans - two for others. Send logs to arrive by 1 July 1995 to: P O Box 210, 3000 Kaunas, Lithuania.

DANISH SSTV CONTEST

0000 6 May - 2400 7 May

3.5, 7, 14, 21, 28, 50, and 144MHz following IARU band plans. Two points for first QSO with a DXCC country, one point for subsequent contacts. One bonus point for working Danish stations. Mail logs before 3 June 1995 to: Carl Emkjer, Soborghus Park 8, DK-2860 Soborg, Denmark. Copies of rules available (SASE please).

AGCW-DL QRP/QRP PARTY

1300 - 1900 1 May

3.510 - 3.560 and 7.010 - 7.040MHz. CW only. Class A = 5W output, Class B = 10W output, Class C = listeners. Exchange RST + QSO number (from 001) + Class. QSOs with own country count one point, with others two. Each QSO with an A station counts double. The multipliers are DXCC countries on each band. Submit logs before 31 May 1995 to: Antonius Recker, Hegerskamp 33, D-48155 Munster, Germany.

In the **1994 CQ WW WPX SSB Contest G3NLY** is to be congratulated for coming eighth in the world top scores on 14MHz with 3,021,825 points and **GW8GT** for coming world third on 3.5MHz with 1,473,868. In the **All-band** category **GM3BCL** scored 520,490, **G5LP** scored 290,656, **GI0RDJ** 48,081, G0RTI (low power) 27,285, and **GM0GNT** 9,546. On 14MHz **GM3CFS** (low power) scored 78,800. There were only eight UK stations listed - but there were 69 from Germany! In the **Multi-operator (single transmitter)** category **G3OZF** came 14th with 5,202,148 and **GI0KOW** was 15th with 5,175,162, G4UJS 3,570,688, GX00BS 2,936,920, GC3SCA 1,673,250, GB6AR 1,495,865, and GC0DPX 467,116. In the **Single operator (assisted)** class (all-bands) **GW4BLE** scored 151,425 points.

PROPAGATION

SMITHY's REPORT this time reads as follows: "With nothing very new happening on the solar front it is interesting to look back over the past year. The 27 day average solar flux fell below 90sfu at the middle of March 1994 and fairly quickly sank to a plateau averaging a little below 80 for about six months before briefly rising again to 90 in mid-October and then back to a slightly higher plateau up to the time of writing at the Spring Equinox. In short, average solar activity has been effectively flat over the year, a situation not uncommon in the late years of a cycle, but it is still quite a bit above the level to be expected at the minimum. It is at this part of the cycle that it can be particularly useful to note the 27 day pattern in band conditions. For the past three solar rotations there has been a repeated spell of higher solar indices coupled with very low geomagnetic activity giving rise to improved HF band conditions."

VK6 ON 1.8MHZ PHONE

GAVIN MORRISON, G3MOU, was talking to old friends DJ0IA, G3NSI, and G0FBW on 1.855MHz SSB one evening in December when he became aware of someone trying to break into the contact. It turned out to be VK6AS who was a 5 by 9 signal and the G3MOU signal was also the same strength in VK6. DJ0IA and a few more Europeans made contact but G3NSI and G0FBW had no copy.

A schedule (arranged by telephone) the next night was successful however signals were weaker but the following night they were 25dB over S9 and VK6AS worked a number of stations. Propagation deteriorated thereafter and the last QSO was on 18 December.

Since then VK6APZ has also worked into the UK. VK6AS's antenna is on a hill and is an 110ft vertical shunt fed at 78ft and an extensive radial system. Steve's is a full wave delta-loop base high strung between two 95 ft towers and top corner fed to produce vertical polarization.

THANK YOU

TO THOSE WHO HAVE supplied input for this month's column. Thanks also go to the authors of the following news sources: *Lynx DX Bulletin* (EA2KL), *Long Island DX Bulletin* (VP2ML), *RSGB DX News Sheet* (G4DYO), and *DXpress* (PA3FQA). Please send everything for the **July** issue to reach me no later than **24 May.** ♦

QTH CORNER

FR5HG/E F6FNU	Antoine Baldeck, BP14, F-91291 Arpajon Cedex, France
R3/W0YR	via AA9DX, P O Box 923, Wood Dale, IL 60191-0923, USA.
ST2AA ST0K	both via WB2RAJ (Please do not send direct)
VP9RND	WB2YQH, Box 73, Spring Brook, NY 14140, USA.
3D2CT	Philip Marsh, G4WFZ, 28 Orcheston Rd, Bournemouth, BH8 8SR.
3D2CU	Mats Persson, Zenithgatan 24 #5, S-212 14 Malmo, Sweden.
5X1F	(new) via WA1ECA, F Dlugokinski, P O Box 772, 154 West St, Litchfield, CT 06759, USA.
9K2ZZ	(see text) ON6BY, Monique v d Dolder, Acacialaan 12 bus 3, B8400 Ostend, Belgium.
9M0A	via JA9AG.

VHF/UHF NEWS

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

SOME AURORAL activity occurred in March but tropospheric propagation was disappointing apart from a lift just before deadline time. With no Sporadic-E, 50MHz was decidedly flat from the British Isles. There is news of summer camps and proposed DXpeditions.

REPEATERS

UHF PACKET REPEATERS GB7TN at Woodbridge (SFK) and GB7TV at Tiverton (DVN) have closed down. GB3NK at Wrotham (KNT) on RB4 resumed service on 11 March. GB3XX at Daventry (NHM) on RB13 came back on 14 March. The Salisbury (WLT) repeater GB3SW on RB9 was back on stream on 17 February.

On 25 February, the 1.3GHz ATV repeater GB3WV, located at Weymouth (DOR) on RT2R, was taken out of service. On 2m, the Ayrshire repeater GB3AY (R2) started up from its new site at Baidlandhill Dairy on 18 March. Another newly-sited VHF relay is GB3VT (R5) at Stoke-on-Trent which began operation on 7 March.

The Kent Repeater Group's March *Newsletter No. 77* includes a membership list showing 283 members. No details of any officers are revealed apart from the editor's. The KRG operates three VHF and five UHF relays. The minutes of last year's AGM, held on 10 June, were included as a separate sheet. The total expenditure on all the repeaters and the *Newsletter* amounted to nearly £1,600 which was just about covered by subscription income.

BEACON NEWS

GRAHAM DAUBNEY, F/G8MBI (JN04), states that FX9VHB (JN12II) is on 144.948MHz. In USB mode on your receiver, tune 600Hz LF for a satisfactory note. It runs 10W to a halo antenna, then switches to 100mW about every 52s. The frequency (QRG) is a bit unstable by a few hundred Hertz. He suggests it could be a good indicator of conditions down to EA3. A beacon in JN26 on 144.978MHz has been heard testing using a club call.

Geoff Brown, GJ4ICD, reports that BV2FG (PL05RA) is QRV daily, except Sundays, on 50.003MHz, running 3W to a five-eighths wavelength vertical antenna. SK3SIX (JP71XF) is a new 24-hour beacon on 50.070MHz. It runs 10W to crossed dipoles from a 500m ASL site.

Geoff posted the following information on his 'Home Page' service on the Internet - the VS6 beacon has been QRT for two years. V31SMC has been sent to G4CVI for despatch to Belize. FP5EK on 50.038MHz is planned for this year. ZS1SES on 50.070MHz is a new beacon - details awaited. V51VHF is QRT. The JY6ZZ beacon was still not QRV on 12 March. The April issue of *Six News* will include a current 6m beacon list.

Victor Frank, K6FV, heard a beacon signing VE6QRM during a recent aurora in the USA. W7HAH also heard it on 50.031MHz sending "VE6QRM/BCN CALG AB BCDA", which suggests it is in Calgary, Alberta. Shep sent a list of beacons heard in Buenos Aires in February by LW5EJU: PJ2SIX (FK52KG) on 50.004, LU9EHF 50.0155, CX1CCC 50.019, YV4AB 50.025, FY7THF 50.037, V44K 50.055, TI2NA 50.0795 and LU8DCH 50.0825MHz. LU9EHF started up on 23 January from Lincoln City and is on continuously running 15W to an inverted-Vee antenna, 60m AGL.

PUBLICATIONS

DUBUS 1/95 HERALDS the 24th volume of this excellent publication. An increasing amount of the 'Technical Reports' section is now devoted to microwave topics, but there are two very interesting articles for VHF/UHF operators in this edition.

In Issue 3/94, I8CVS and I5TDJ published comprehensive details of a cavity preamplifier for 144MHz using an MGF-2116 power GaAsFET. They have now improved the design by adopting input capacitive coupling and simplifying the mechanical construction by using seven-eighths inch Cellflex coaxial cable. This new design has a measured noise figure of 0.4dB, a gain of 21dB and an intercept point of +1.5dBm. This equates to an intermodulation-free dynamic range of 94.8dB in a 2.4kHz bandwidth.

In Issue 1/94, Russel Miller, N7ART, described a 70cm PA using the Russian GS23B tetrode. He has now adapted the design to use the more readily available

RSGB President Clive Trotman, GW4YKL, presents the Louis Varney Cup to Mike Dorsett, G6GEJ, for his work on the AMSAT Phase 3D 2m payload.

YL1050. The article is superbly illustrated with six mechanical and circuit diagrams, plus a performance table. The UK representative of *DUBUS* is Roger Blackwell, G4PMK, who is QTHR.

The Public Domain and Shareware Library (PDSL) sent Issue 19, Supplement 2 of its *PC Shareware Reference Guide*. Five pages are devoted to the ever-growing library of CD-ROM disks, including everything from encyclopaedias to UFOs, games to Internet data and, of course, amateur radio files. The 'Ham Radio' disks section includes propagation, satellites, logging and packet programs, many recently updated. See the Advertisers' Index on page 98 for details.

Derek Thom, G3NKS (GLR), is publishing a quarterly *Four Metres News* the mission being "to stimulate, encourage and promote activity on the 70MHz band .... through the publication of news and information, and in particular about activity, contests and expeditions". Contributions of up to 500 words "on technical or historic subjects related to 4m" are sought and relevant private 'For Sale' and 'Wanted' adverts will be accepted. Send him an SASE - 9 x 4in or larger - for a sample copy. The subscription is £3.80 or 20 19p stamps, remittance made out to D Thom. Derek's QTH is 9 Southern Road, Cheltenham, Glos GL53 9AW.

CONTESTS

STEVE KNOWLES, G3UFY (LDN), sent details of a 24-hour Hungarian contest starting at 1400UTC on 17 June. There are single-op, single band; single-op, multi-band; multi-op, single band; multi-op, multi-band and SWL sections. Bands are 144, 430 and 1296MHz. Exchange callsigns, RS(T) and serial number, full locator. Score QSOs at one point per km on 144MHz, 2pts/km on 430MHz and 4pts/km on 1296MHz. The modes are A1A, J3E, R3E, F3E and G3E. The organiser is the Hungarian Radio Amateur Society (MRASZ). Send entries, before 1 August, to Vak Bottyan Radioklub, Than K.u.l, GYONGYOS, H-3200 Hungary.

Note that the UK Six Metre Group (UKSMG) is running its 24-hour Summer Contest from 0000UTC on 10 June. See page 24 in the April *RadCom* for details. There are several RSGB events in May listed in the Contest Classified pages and the *1995 Call Book and Information Directory*.

NORDIC MEETING

JUKKA SIRVIO, OH6DD, posted a message on the Internet about this year's Scandinavian meeting. The dates are 9 - 11 June at a camp on Knattholmen leirsted, a little island outside the city of Sandefjord in the Oslo Fjord in southern Norway (JO59). Many amateur radio and family activities are listed for this 17th Nordic get-together. Reservations are being handled by Helge Karlsen, LA1BR, whose address is N-2355 Gaupen, Norway. The packet route is LA1BR@LA5G.RAU.E.NOR.EU and the telephone/fax number is 0047 623 54282 between 0900 and 1700.

DXPEDITIONS

PETER AUSTIN, G7BXA (YSW), states that, following the success of last year's Western Isles operation, the Northern VHF Activity Group plans more Scottish activity in June. The proposed itinerary is: 10-13 Islay (IO65); 14 Colonsay and Oronsay (IO66); 15-15 Jura (IO65), 17-23 Mull (IO66) and 21 Iona (IO66). The QRGs are 50.122, 50.222, 144.222 and 432.222MHz, plus HF operation.

The operators include G7HSP, G7DKX, G1LMZ, G4YQW, G0NES and G7BXA, who is the group's chairman. The new club callsign is G7UEG, which Peter says stands for 'Ugly Expedition Group!' If there is sufficient interest, they will consider a special award for working three or more islands. You can telephone Peter after 1400 local on 01132563462.

Peter Bowyer, G4MJS (BRK), secretary of the Black Sheep Contest and DX Group, writes that it is planning a mini-expedition for the Perseids in August. In 1993 and 1994 the group operated from IO94 but "want to be a little more adventurous this time round". He is currently seeking information about sites in southern Ireland.

Several groups have successfully operated from IO51, 52 and 62 in the past and those squares would still be popular. Another suggestion - seen on the VHF Reflector on the Internet - was western France, in which some of the squares are quite rare. The group would be happy to accommodate extra operators for a share of the costs. The E-mail address for contributions is vhf-dx-discuss@insite.parasoft.co.uk and Peter is QTHR.

PROPAGATION

THE FEBRUARY issue of the Six and Ten Reporting Club's *Report*, edited by Ray Cracknell, G2AHU (HWR), states that beacon KS2T (FM29VX) on 50.071MHz is QRV again. The sunspot numbers (SSN) for February were well above those predicted (14-21) at 29.9. The mean solar flux was 85.6.

The first half of the month and the last two days saw generally disturbed geomagnetic conditions. Interestingly, the K indices reached five or more nine times at Hartland, compared to six at the northern Lerwick and Eskdalemuir observatories. This reverse trend has been noted for several months now.

The report includes graphs by Steve Reed, G0AEV (WLT), showing 50 and 28MHz Sporadic-E area openings for 1994. The traditional peak around mid-June is clearly shown as are the autumnal and winter Es periods on 6m. The graphs confirm the complete lack of Es activity in February and March which "is a well established fact that currently denies any explanation".

The back cover features predictions for the SSNs for the remainder of Cycle 22, based on the calculated SSN for June 1994 of 30.9 (+/-5%). The classical method predicts 11 this coming December, but only 3 using the SIDC adjusted values.

METEOR SCATTER

THE ETA-AQUARIDS meteor shower should peak on 3 May around 2300UTC at solar longitude (LS) 43.1°, according to the International Meteor Organization's *1995 Meteor Shower Calendar* and the OH5IY program. Alastair McBeath, the compiler of the IMO calendar, writes: "This is a fine, rich stream associated with Comet P/Halley, like the Orionids in October."

This shower is best observed from tropical and southern hemisphere sites. Its radiant is above a mid-UK horizon between 0200 and 1300. Best times are NE/SW 0330-0830, E/W 0500-1030, NW/SE 0700-1130 and N/S around 0500 and 1100; all times are UTC. There are several other streams in May including the Epsilon Arietids, 9th, LS 48.7°, RA 44°, Dec +21°; Arietids, 16th, 55.5/37/+18° and the Omicron Cetids, 20th, 59.3/28/-4°. These are all daylight streams and are in the OH5IY program.

MOONBOUNCE

BILLY LUNT, KR1R, the ARRL Contest Manager, has confirmed that the dates for the ARRL International EME Competition are 7/8 October and 4/5 November. These are bad choices for Europe, the first being the 432MHz-24GHz contest weekend, the second the Marconi Memorial 24-hour and RSGB 6-hour CW events period. About half the moontime will be contest-free in October, while the two events will clash for 54% of the time in November.

Niels Montanana, ex-G8RWG, is now QRV from Port Elizabeth, Bequia, St Vincent in the West Indies using the call J88CX. He is transverting to 2m from HF with a Microwave Modules transverter to a Tempo 2002 amplifier. The antenna is a single 11-ele DL6WU Yagi at 60° elevation.

His first EME contact was at 0450UTC on 19 March with KB8RQ, who stepped in when WB5LBT could not keep a sked due to antenna problems. W5UN called J88CX afterwards but the QSO was incomplete being ruined by rain static at Niels' end. He plans to erect either four long Yagis or a collinear array later this year.

Roy Reed, G3ZIG (JO02), is still QRV on 2m with a 4CX1500B PA to eight 13-ele DL6WU Yagis. Recent completions have been

with K2GAL, LA8YB, SM5FRH, JL1ZCG, W5UN, SM5MIK, DK1KO, WA6PEV, I2FAK, K7CA, KB8RQ, S51WV, KL7FB, EA3DXU, IK1FJI, HB9CRQ, IK3MAC, W4ZD, VE7BQH, W2CRS, K5GW, WA1JXN, SM5BSZ, I5JUX, OE5JFL, AA4FQ and S57TW.

The April issue of Allen Katz's, K2UYH, *432 and Above EME News* newsletter features input from nearly 30 contributors, plus lots of net news. There is a useful 'For Sale' section. Al's QTH is The Engineering Dept, Trenton State College, Trenton, NJ 08650-4700, USA. His E-mail address is a.katz@ieee.org. The EME BBS is on 00 704 2844854.

Ian White's, G3SEK (IO91), sked weekend proposal for May is 6/7. The Moon's declination is +13.7°, but it is a day apogee period with signal degradation -1.52dB. The sky temperatures for 144/432MHz are 247/14° respectively. The suggested June weekend is 3/4 with similar values. The data are published on page 70 in *DUBUS 1/95*.

50MHZ

IN A NOTE covering his March report, Ted Collins, G4UPS (DVN), reveals it was "one of the poorest months for 6m activity so far. But I guess that any newcomer who worked SP6CPH, OY6A, OZ7DX, SM3EQY, SM7AED and SM7FJE would have considered March not such a bad month, after all."

His annual tally up to 27 March is 18 countries from 294 QSOs, so there is lots to work if you are dedicated.

Ted passed on some contest notes. The UKSMG (South West) Contest Group uses the callsign G0VSM. The licensee is Trevor Day, G3ZYY (CNL). The group, based in the Plymouth area, plans contest activity in the summer. Other operators are G0ESY, G1KTZ, G1YPD, G4ALY, G4KYY, G6ION, G7ANY, G7ART, G7BXS and G7IZU.

This year's Italian 6m Activity Contest has new rules. Dates/times are now every weekend in March, April, May, September, October, November and December; Saturdays 1300-1700 and Sundays 0600-1000UTC. Only contacts in the Italian segment of 50.151-50.163MHz count and stations may be worked once each weekend. The last weekend in September will be viewed as 1 October.

Exchange RS(T) plus locator. Score one point per QSO. Multipliers are countries and squares, including your own with final score

ANNUAL VHF/UHF TABLE
January to December 1995

	50MHz		70MHz		144MHz		430MHz		1.3GHz		Total
Callsign	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Points
G3FIJ	10	1	23	4	38	8	20	4	2	1	111
G1SWH	1	2	20	3	22	7	26	3	6	2	92
G6HKM	1	3	-	-	38	8	32	6	-	-	88
G8ESB	-	-	-	-	17	2	5	2	6	1	33
G1HWY	-	-	-	-	3	4	18	3	2	2	32
G4OUT	-	-	6	1	23	2	-	-	-	-	32
G1AWF	-	-	-	-	23	4	-	-	-	-	27
G3FPK	-	-	-	-	19	2	-	-	-	-	21

British counties are those listed on page 79 in the January 1995 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 July issue is 25 May.

QSO points times countries times squares. The categories are: 1/A Italian stations, 1/B Italian SWLs, 2/A non-Italian stations, 2/B non-Italian SWLs. Logs to be sent to Giovanni Zangara, IW0BET, PO Box 36, I-00100 Roma Centro, Italy. For the first half, the date is by 30 June and for the second, 31 January 1996.

Apart from the morning tropo skeds with G3CCH and the MS ones with SM7AED, the only DX worked from G4UPS were SP6CPH (JO81) at 1154 on 1 March, OY6A (IP62) at 2145 on the 4th and OZ7DX at 0906 on the 9th. Ted suggests the OY contact was via auroral-E as there was a big aurora from Denmark to the Faroes at the time, even though it was weak in Devon.

Palle Prebben-Hansen, OZ1RH, is a member of the OZ9EDR contest team. He enquires if anyone has knowledge and experience of 6m ionoscatter propagation. The group runs lots of power and a 9dBd gain antenna, with ideas for "two real monsters like the M^2 2.5 wavelength long boomers". The group is QRV on 50.160MHz for the Scandinavian contests, 1700-2100UTC, on the 4th Tuesday of the month.

144MHZ

A WARM WELCOME TO some new contributors. Mike Jupp, G1HWY (SXW), is QRV on 2m, 70cm and 23cm from Steyning. His best take-off is towards Holland, Germany and Scandinavia. On this band he runs a TS-790E, 150W PA to a 15-ele Yagi. Phil Manning, G1LKJ (SRY), was out mobile on the evening of 23 March and worked EA1EUI through the local GB3SN repeater. The opening lasted 20min. This was the first time Phil has heard a Spanish station coming through a UK repeater.

Several operators E-mailed comments about the contest on 4/5 March. Steve Redfern, G4AEQ (LCN), found conditions flat with UK activity nothing special but good from the continent. He suggests the variable 6-hour short period probably spread out activity resulting in a low overall QSO rate.

Mike Willis did not give his call - G4FVI perhaps? (Would those using E-mail please state their full name, call and QTH. A short footnote at the end of a message, imported as a text file, is ideal). He did not go out portable and also thinks early March is not a good time for such activity, maintaining that going to the top of a mountain in a snowstorm is irresponsible. He cites incidents earlier this year where people were caught out by the weather in Snowdonia and Scotland. Listening from home revealed virtually no UK activity.

G4MJS's group were out portable but got really cold. They, too, conclude that early March is *not* the correct time of year to go -/P on the east coast of England. Conditions were flat from JO02PV. There was a report of an aurora between G and LA, but they did not find it.

Andy Stafford, G4VPM (SOM), worked a few continentals in the contest and did find the aurora on the Saturday. Best DX were GM4VVX/P (IO78) and GM3JFG (IO77), both all-time new squares. The prize got-away was SM5BSZ (JO89) who peaked RST53A when he was working a string of DLs. Ela Martyr, G6HKM (ESX), operated in the 6-hour section, best DX being 555km to JO41. Rik Royall, G8ESB (YSN), worked GU3EJL (ALD) on 14 March but was away in the 19-25 period, missing the tropo lift. From G3FPK conditions seemed abysmal with very poor UK activity.

F/G8MBI found the contest conditions awful with three low pressure areas covering Europe. Even normally flat band beacons disappeared at times. Graham only worked 50 stations on a casual basis, 20 over 400km, 20 over 500km and, four over 600km. Best DX was G4RGK on the morning of the 5th, Dave tail-ending the regular G4RRA sked contact. At 0920 on the 13th, he copied a big burst from GM7SJC/P on 144.300MHz. He wonders if his report was received as he was only running 40W at the time.

John Nelson, GW4FRX (PWS), found a good aurora in the afternoon of 26 March. YL3AG (KO26) was audible 1504-1631 and was up to S9A at times. Others worked included SM5BSZ, LA2s and a couple of OZs. ES2CW was heard, the event ending around 1845. QTEs throughout were 30-40°. John thinks the reflecting area was small because, though signals were very strong at times, only a few stations were audible at any one time and tended to persist throughout the event.

430MHZ UP

G1HWY IS QRV ON 70cm with his TS-790E running 30W to a 24-ele Yagi. On 23cm Mike uses a TR-751E and LT23S transverter with 10W output to a single 55-ele Yagi. G6HKM made an entry in the 4/5 March contest but Ela did not work any great DX. G8ESB is QRV on 70cm and 23cm and finds activity on the latter band to be on the increase.

Peter Burden, G3UBX (WMD), has more time for operating since resigning from the chairmanship of the VHF Committee. He operated from home on 4 March, 1600-2200, but only worked 12 stations in average to poor conditions. No activity from the north or west was heard. A PA3 portable came up to S5 around 2000 but faded very quickly. Peter wonders what sort of propagation this was. Maybe aircraft reflection?

DEADLINES

PLEASE NOTE the new **July** deadline of **25 May**. The **August** date is **22 June** by which time there should be some 2m Es to report. The tel/fax machine is on 0181 763 9457. My CompuServe address is 70630,603 and the Internet route is 70630.603@compuserve.com. The BT Gold mailbox is 87:CQQ083. ♦

MARTIN LYNCH

G4HKS

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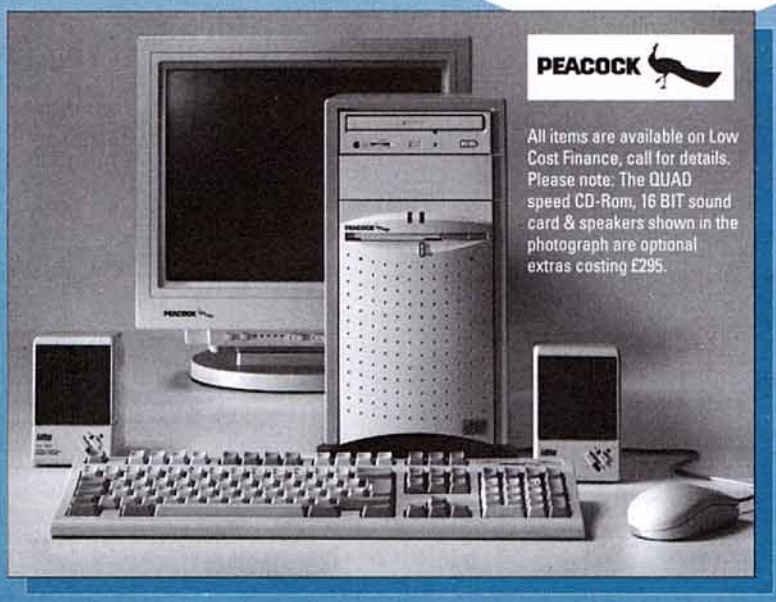

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VGA Mem	1MB, VLB		

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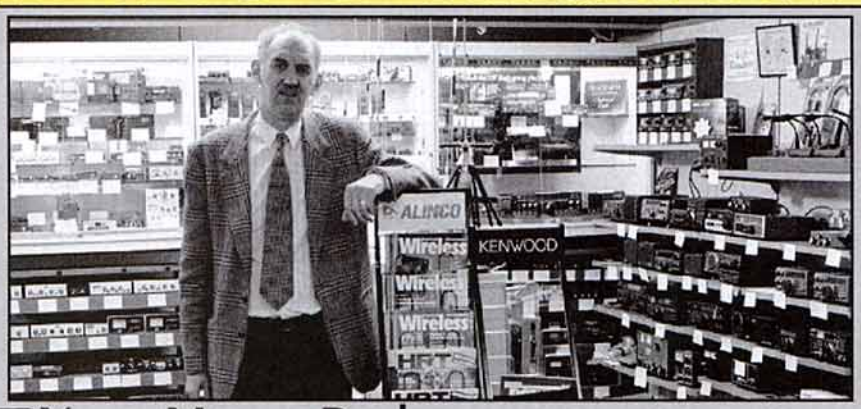

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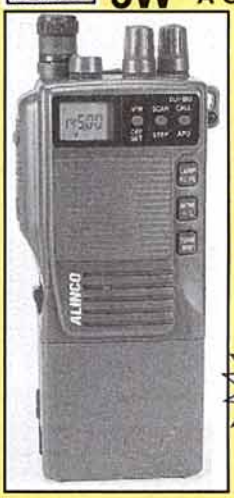

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Leeds	0113 244 9200	Sheffield	0114 285 5492
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HF F-LAYER PROPAGATION PREDICTIONS FOR MAY1995

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 000001111122 024680246802	14MHz 000001111122 024680246802	10MHz 000001111122 024680246802	7MHz 000001111122 024680246802	3.5MHz 000001111122 024680246802
** EUROPE								
MOSCOW	....	....	....111.111.	...1233234 3.	..2566656883	5465544457 88	7642222235 78	53.....24+
MALTA	....	....	....11..132.	...1332236 5.	1..6766678 94	6456555567 99	9864322235 78	++4.....25+
GIBRALTAR	....	....	.....11.	....1111134.	...2554457 83	5116665567 98	9765433335 89	++42....25+
ICELAND	....	....	....	.....1.	....2333345 2	4113555566 77	7665433334 67	5542.....34
** ASIA								
OSAKA	....	....	.....1.....	....12221...	..1243334 141	1..1211124 63	241	....
HONGKONG	....	....	....11111...	...1332232..	..1234335 532	1...1111357 5	253	.....2.
BANGKOK	....	....	...12211....	...2343221..	..1224334 421	21...111357 5	1.....256	23
SINGAPORE	....	....	...12211....	..1334331...	..1234344 31.	21..1111355 1	1.....255	23
NEW DELHI	....	....	...12211122..	..1334334 42.	..2223345 762	421..111357 7	41.....257	2.....24
TEHERAN	....	....11..11..	...22322342.	..1444335 751	1144333457 85	6431...113588	731.....257	4.....24
COLOMBO	....	....11.....	...223221...	..1335333...	.1222434 5...	22...111335 4	51.....257	2.....24
BAHRAIN	.....1..	...1111122..	...32332453.	..1444446 761	2143233457 86	7531...113588	741.....257	5.....24
CYPRUS	.....1..	...1121123 1.	...34433565.	..1666667 872	4256666678 97	8764333346 89	8731111113 68	+4.....35
ADEN	.....11..	...1111232..	...3344466..	..1444557 821	3244223457 66	8641...113588	851.....257	52.....24
** OCEANIA								
SUVA/S	....	....	....	....111.11.	...13322.441	..2331111431	..12....21.	....
SUVA/L	....	....	1	...1.....31	1115.....63	1124121..1342	..12....21.	....
WELLINGTON/S	....	....	....	.....1.	..121..1..41	1134211122 52	..11....22.	....
WELLINGTON/L	....	....	1	2	2111.....15	223412....43	.122....121	....
SYDNEY/S	....	....	...11.....	...23.....	..2552..1212	1124121.12454	...1....252	.....2.
SYDNEY/L	....	....	1	1.....3	3..1.....16	2114121....54	...2....151	.....2.
PERTH	....	....1.....	...232.....	..1454.....	1.34541.....	3211211.1351	2.....255	23
HONOLULU	....	....	....	....1..111.	....22..3321	.1332111231.	..22.....	....
** AFRICA								
SEYCHELLES	.....1...	...1111231..	...3344464..	..1444557 62.	1.3323345 774	7431...113588	851.....257	52.....24
MAURITIUS	.....12...	...1112241..	...3344563..	...4455676..	1.3434345 743	6.41.1113578	831.....257	52.....24
NAIROBI	.....1123..	....112355..	...3344578 1.	...5445678 41	4.3522345 786	8452...12588	873.....257	54.....24
HARARE	.....1233..	....113455..	...2335678..	...4445678 12	5.1633345 756	8353 1..12578	8751.....257	542.....24
CAPETOWN	.....121...	....1125 2...	...1435655...	...3655661..	....6543355..	43.421.12523	8722.....257	552.....24
LAGOS	.....1245..	....1124672.	...1424689 5.	...3545678 7.	2316532 3579 2	8854 2...2577	8752.....257	552.....24
ASCENSION Is	.....1252.	....1.12574.	....422478 7.	....6445789 2	1...5423579 7	61..31..2478	86.1.....257	552.....24
DAKAR	.....1242.	....1.12464.	....3225688.	...1544568 92	3214532 3369 7	8755 31..1378	8852.....157	552.....24
LAS PALMAS	.....11.	....1..1133.	....3323467 1	...1654568 84	4115766 6689 8	9766543 34589	8864211113 68	++3.....3+
** S. AMERICA								
Sth SHETLAND	.....1...	.....131..	.....1453..	.....25751.	2335761	3241 11.12476	7752.....247	552.....4
FALKLAND Is	.....131.	.....2352.	.....24685.	....1457 88.	..1..2335 68.	3353 11.12465	7752.....136	552.....3
R DE JANEIRO	.....132.	.....2254.	2245771	4355784	421.1433358 8	8751 211..268	8852.....37	552.....4
BUENOS AIRES	.....122.	.....1244.	1235772	1...2356785	5112.4334578	8754.1111258	8852.....26	552.....3
LIMA	.....1.	.....12.	12353	1....2334 65	61.1213333 57	8633 3111..25	7752.....2	452.....
BOGOTA	.....	.....2.	11242	1....1233355	6...1333224 7	8523 2111..14	6752 1.....2	352.....
** N. AMERICA								
BARBADOS	.....1.	.....12.	2112253	1....4233465	61.1243322 58	9633 311...26	7752.....3	552.....
JAMAICA	.....	.....1.	1111132	1....2222244	5...2332236	7522 1111..13	5752 1.....1	242.....
BERMUDA	.....	.....1.	1111132	1....2222254	5...4332256	7521 211...24	6752 1.....2	342.....
NEW YORK	.....	.....	.....1.11	1212133	4...3332246	6421 1111..24	4742 1.....1	.42.....
MEXICO	.....	.....	11	.....1211 33	3....232224	4421..11....1	2642.....	.32.....
MONTREAL	.....	.....	11	1112133	4....3333245	6421 1111..24	4742 1.....1	.42.....
DENVER	.....	.....	.....	111	2.....122223	3321..111..1	1442.....	..2.....
LOS ANGELES	.....	.....	.....	11	1.....22222	2232...12..1	.342.....	..2.....
VANCOUVER	.....	.....	.....	.....	1.....12222	2232 11.12111	.242.....	..2.....
FAIRBANKS	.....	.....	.....	.....	...1211 12111	1133 2111 2221	..12.....	.....

The provisional mean sunspot number for March 1995 issued by the Sunspot Data Centre, Brussels was 31.1. The maximum daily sunspot number was 65 on 4 March and the minimum was 0 on 10 March. The predicted smoothed sunspot numbers for May, June and July are respectively: (classical method) 18, 17, 16, (±4); (SIDC adjusted values) 11, 10, 9 (±2). February 95 SESC: solar flux 85.6 Ap 12.0 Smoothed August 94 solar flux 76.1 Ap 17.0

SWL NEWS

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

THE RESULTS package following my October SWL Challenge was circulated in March, but there is an unfortunate error in the Rules for the 1995 event. Those who have received the package should note that the correct dates are 28/29 October and *not* 28 - 30 October. There will be much more about this year's Challenge in a few months' time.

EASISWL

SOME FOURTEEN LISTENERS are now using the 'EasiSWL' computer program devised by Don Ward, G0MDO. Mine has been invaluable in calculating my DXCC totals going back 25 years, and I know that David Whitaker, BRS25429, has done something similar. It would be interesting to hear from others who purchased the disk to find out how they have used it.

For those who did not apply when the initial offer was made, the disk is still available priced £5. For any SWL wanting to put their log on computer, EasiSWL is the program for you. Further details are available, with an SASE, from Don Ward, 9 Little Lane, East Morton, Keighley, West Yorkshire BD20 5DQ.

A SLIGHT DELAY!

THE RESULTS OF last year's RSGB Listeners' Contest have so far failed to appear in print. They have been available for several months, but I forgot to pass them on to the Editor. Please accept my humble apologies.

Twelve entries were received from six countries - G, GM, F, ON, SP and CX. The results are shown in **Table 1**.

1	ONL383	192,521
2	BRS52543	100,539
3	BRS04154	69,285
4	SP-0189-GD	66,550
5	G7JHE	63,216
6	F5JBR/SWL	57,408
7	GM1YPJ	29,875
8	F-11734	29,325
9	RS95258	24,952
10	BRS20249	9,480
11	CX3NO/SWL	4,657
12	F-12875/P	1,537

Table 1: RSGB Listeners' Contest 1994 Results.

TECHNICAL SWL

IN THE DECEMBER *SWL News* I mentioned computer software for monitoring packet messages. With reference to this, Gordon West, RS92605, offers a minor modification used with success at his QTH. It exploits the differential input of the 741 to reject common mode on the input line. Common mode rejection is achieved by connecting the signal return to the receiver via another capacitor to the second input pin of the 741, instead of the computer ground. Gordon also uses a balanced screened pair for the input connection with the screen earthed at the receiver end only.

Graeme, RS44984, asked, through the February column, if anyone could suggest a good design for an adjustable audio filter. Bob, G0ARF, is a member of BARTG and suggests the screen printed circuit board for the R5 Digital Switched Capacitor Audio Bandpass Filter designed by G3ISD. As a keen RTTY DXer, Bob found the filter indispensable under very noisy band conditions as, he says, it chops out almost every interfering signal outside the 220Hz bandpass. The board is available from the BARTG Components Manager (G0PCA) priced £5.25 at 11 St Lukes Way, Allhallows, Kent ME3 9PR.

CQ AWARDS

TO CELEBRATE, its 50th anniversary, *CQ Magazine* are sponsoring a series of awards based around the number 50. All the certificates are free, do not require QSLs and are available to SWLs. The main ones for logging are: 50 stations; 50 stations via repeaters; 50 squares on VHF/UHF; 50 prefixes; 50 countries; 50 US States; 50 US Counties. All loggings must be made during 1995. Why not have a go - none of them seems particularly demanding! It is encouraging to see *CQ Magazine* sponsoring some SWL Awards.

QRP SWL

BILL McCONACHIE, BRS88921, has sent me reports from both the G-QRP Club Winter Sports event at the turn of the year and the Dutch PACC contest in February. Bill has been an active CW listener for 60 years and sends in many QRP reports during the year. It is always interesting to consider the loggings to see how many stations are actually active using low power.

Bill also sends SWL entries to a number of contests and is concerned that the RSGB is abandoning CW SWL contests [The HF Contests Committee Chairman tells us that due to poor support of RSGB CW events by UK SWLs, greater emphasis is to be placed on SWL sections in SSB contests. This includes the IOTA Contest and CW entries will be accepted for this event - *Ed*] but even more disappointed that the G-QRP Club do not advertise SWL sections in their contests.

It would be interesting to hear the G-QRP Club's comments on this matter. In the Dutch contest, Bill logged over 120 PA stations, many using special PA50, PA52 and PA53 prefixes.

Dave Brown, BRS95363, seen here tuning the bands from his shack under the staircase at his Essex QTH.

DX REPORT

ONCE AGAIN, THE star band for the month under review was 1.8MHz - this time on SSB! I have three detailed reports of SSB DX on the band - from David Whitaker, BRS25429; Philip Davies, RS95258, and my own offerings. Starting first with the CQ WW Contest on 24/26 February, David heard 58 DXCC countries, Philip bagged 48, while I heard 57.

Good propagation at last coincided with a 1.8MHz contest. Indeed, Philip heard WR8C work a KH6. DX-wise in Europe, A71CW, A92BE, CN8GI, EA8AFJ, KP2A, P49V, PT7BZ, RX9FM, TA2DS, TI4CF, UK8LD, UN7JID, V26AS, VP5JM, YV2IF, ZL2JR (Philip's 1st ZL) and 9K2MU were reported.

After the contest, operators from four of the leading European stations met on 3.5MHz. From that QSO it seems that OT5T worked 69 DXCC countries and 24 States/Provinces.

The ARRL DX Contest the following weekend again saw David and myself looking for new ones on 1.8MHz. Conditions were very good on the Friday night/Saturday morning but a solar disturbance saw poorer conditions on the Sunday morning. Nevertheless, FG5BP was a new one for both of us (David's 150th country on 1.8MHz) while I also managed FM5DN for a new one. Other good DX was heard chasing W/VE contacts, namely - KP4WS, VP2MFM, VP5X, PJ0B, TI1C, HH2PK, VP2ENR, P40V, PT7CB and 9Y4VU. David also logged 112 Stateside callsigns in all call areas apart from W6 and W7. Just before the contest David heard V31VB for a new one.

Outside the contests, A92BE was a good signal at 2330 on 9 March and he had an enormous Stateside pile-up just after midnight. 4Z4DX was good copy at 0146 on 10 March. But the best conditions were reserved for 12 March when I heard VK6AS (5x6) and VK6APZ (5x5) at 2030. They were my first VKs on 1.8MHz in over 25 years of listening! The 13th gave copy of ZL4WA at 1808 as well as some strong Stateside stations at 2315. Yes, 1.8MHz was certainly the star band!

For those who do not favour DXing on 1.8MHz here are a few goodies: BV4AS, DU9RG, HS1AFN and TN2M on 14MHz; TJ1AG, 5R8DY and 9N1AA on 21MHz; 5X1B on 28MHz; KC0PA/S0 and ST2AA on 18MHz; ZL7ZB on 7MHz, and 9Q5TT on 3.5MHz. Peter Cain, BRS36554, remarked that in the first eight weeks of 1995 he had heard 170 different DXCC countries.

FINALE

CONTRIBUTIONS for the **July** column must be with me no later than **16 May**. ♦

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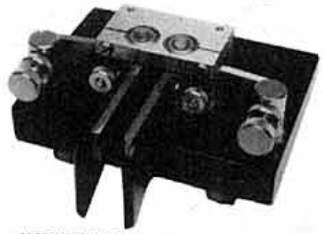

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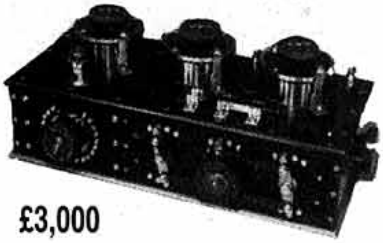

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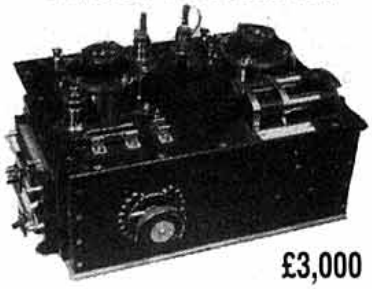

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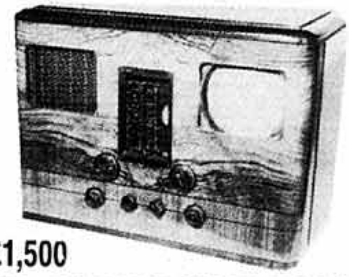

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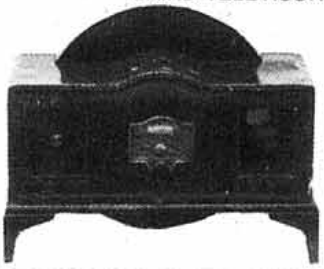

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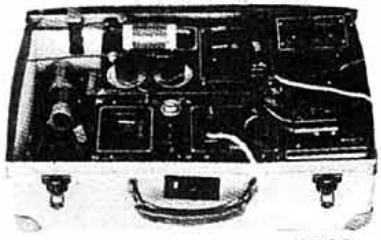

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Contest Exchange

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

ALL OF MY BIG local VHF contest stations and many HF stations have been damaged during the winter with everything from bent stub masts through to snapped tower sections. Successful stations don't let such mishaps get them down for too long. Instead, they seem to get on and repair the thing - often making it even bigger for next time. Remember the well known motto that if your antenna stayed up last winter, it was too small!

ENTRIES PLEASE

KEN CHANDLER, G0ORH, who is contest co-ordinator for the Chiltern DX Club, raised a plea which is close to the hearts of all contest adjudicators. Even if you just get on to make a small number of QSOs in a contest, why not send in an entry. Some people regard contesting as a minority activity, but from the number of different stations logged in many contests it is clear that many people enjoy coming on for a short while during the events. I'm sure that having the results tables actually reflect the true level of activity would generate even more activity in a pleasant example of a vicious circle! In particular, some of the international events are very poorly represented in the results table from the UK, although there is often tremendous activity with some very respectable scores made which are just not declared.

With computer logging, the paperwork is so much simpler now. There are often good chances to win certificates when you least expect to. Many of the big contests have a vast collection of sub-sections, and if you choose the one which you enter carefully you may well stand a chance of doing quite well even with relatively little operating time.

BACKPACKERS

SPRING ALSO MEANS that the season for the Backpackers contests is about to start once again. These short 2m and 6m low-power portable events are designed for people who do not have a complete weekend available to play radio, but who fancy a few hours out of the house on a Sunday in the fresh air. Last month's *RadCom* (page 82) carried a feature of the 1994 event and also included this year's rules. As most of these events run simultaneously with major 2m and 6m contests, there are opportunities for duplicate QSOs to occur. It may happen, for example, if you work someone from home on Saturday in the main contest, and then go out portable on the Sunday and work them again while you are entering the Backpackers event. We recommend that you don't do this because of the confusion it creates, but this is not mandatory, and an exception to the normal duplicate rule is in force for these events. This means that if, as a station entering the main contest, you work someone once in the main contest and then they call you again in the Backpackers event, both contacts will count for points.

HF CW FIELD DAY

THIS IS ALSO the time of year to start thinking about portable contesting on a bigger scale. The first weekend in June is, of course, the time for HF CW National Field Day, and if your club is planning to enter you need to register with haste as **the deadline is 6 May**. See page 79 of *RadCom*, April 1995, for full details.

There has been one significant change to the rules this year which allows the use of an additional second receiver which can be used to search for multipliers etc, and rigs such as the FT1000, TS950 and IC781 with their sub-receivers count as two receivers in themselves. Although it isn't necessary to have a second receiver to have fun, it will certainly help your score. It also gives some more people something important to do during the contest which is great for involving the whole club more fully in the contest.

If you want a second receiver and you don't plan to use one of the 'super rigs' you'll need to think about what you are going to use as an antenna. But if you are in the restricted section you will have to use the same antenna your main station is on. This makes an interesting challenge for you in finding a way of connecting a second receiver to the main transmit antenna without squirting 100W down its front-end! There are several possible options which include using a sequenced switching system to make sure that the second receiver is disconnected from the antenna before the main rig is allowed to go into transmit, or perhaps using some very good diplexers which would enable the receiver to listen on another band while the main rig is transmitting on the first.

Another option could be to try connecting the input of the second receiver to the connection on the main rig which is normally used to connect a separate receive antenna. These are often, but not always, connected to the receive side of the antenna changeover. Check with a sensitive power meter to make sure there are no more than a few milliwatts going to be applied to the second receiver before connecting it. Also, you need to think about the effects of connecting two receivers to the same antenna which will reduce the signal available to both, and maybe by more than you expect. Try it out before the contest.

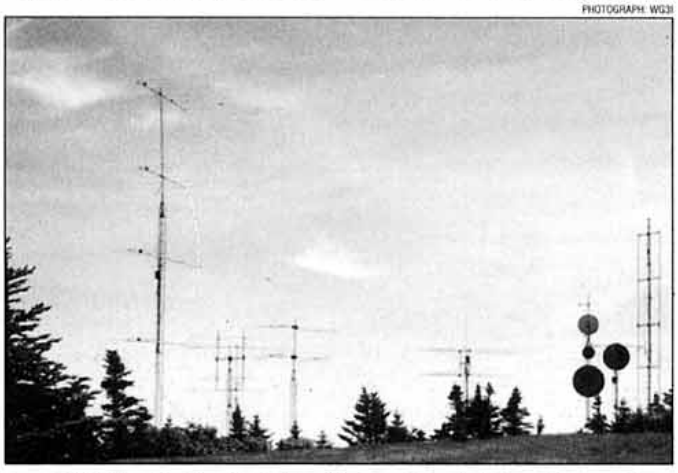
In the open section, matters are far easier because you are allowed as many antennas as you have time and energy to erect in the previous 24 hours. Something quite simple is probably adequate for the spotting receiver, and it may even be possible to use one of the spare antennas from the bands which are not being transmitted on at any particular time. Trying to listen on the same band as the main station is possible, but generally difficult and tiring unless you can get a lot of separation between your antennas. It is much easier to listen on other bands although there can still be interactions here from harmonics and broadband transmitter noise. Unless they are very strong, harmonics are not too troublesome and usually only cause a problem on specific frequencies. On the other hand, broadband transmitter noise can be a major concern although different models of rig differ enormously in their performance. Bandpass filters inserted between the transmitter and antenna help. Sometimes inadequacies in the spotting receiver can be helped by adding bandpass filters between it and the antenna too.

You will also need to think about how to pass the information from the spotting station to the main station. If you are using computer logging, CT by K1EA enables you to network two or more computers together via their serial ports, and send messages from one to another. Of course, this also enables the spotting station operators to have an up to date log in front of them so that they can figure out what multipliers are needed. There is a viable alternative for those of you who are happier with one of the non-networked logging packages, such as G3WGV or EI5DI, or paper logging. But you will need to sort out a slick paper based way of keeping the spotting station up to date with what has been worked by the main station.

Don't forget about the 50MHz Trophy, IARU and Backpackers contests on the same weekend - 6m contests to suit everyone from 4 hours to 24 hours! Last year several groups who entered HF NFD also took a station for 6m with them which gave some of the spare people (particularly the non CW operators) something to do during the HF CW contest. It doesn't take a lot of hardware to put a respectable 6m station together so why not give it a go.

● THE *VHF Contesting Handbook* compiled by the VHF Contests Committee (see April *RadCom News*, page 15) is now available from RSGB HQ at £4.00 per copy. It includes sections on choosing a site, equipment, antennas and recent rule changes and should appeal to contesters of all levels of ability and experience. ♦

PHOTOGRAPH: WG3I



Portable VHF Contesting - USA style. The Mount Greylock Expeditionary Force (W2SZ/1) antenna system of 4 x 6el on 6m, 2 x 16el + 4 x 15el + 4 x 12el (Vert) on 2m, 4 x 26el on 70cm, + Dishes to 10 GHz.

QSL

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

WE ARE always trying to improve the bureau service and are currently examining ways by which this can be achieved. If you have any bright ideas then please let me know.

However, before anyone suggests we introduce stamps or vouchers for non-members to purchase and then use in order to pay for their use of the QSL service, let me explain the problems associated with that course of action should it be introduced. Stamps or vouchers could really only apply to outgoing cards and would be a bit of a nightmare to administer. It might be suggested that the bureau service could be offered to non-members at a cost lower than full membership of the Society, but that runs the danger of causing a significant drop in membership figures. That would not be good for the Society or the thousands of loyal members. What we do at the moment is check outgoing cards against the membership database and if the person is not a member we invite them to join or tell us what to do with their cards. I don't pretend it's the ideal solution but, in fact, we get very few cards from non-members so I honestly do not think the problem is as big as some people suggest.

RSGB QSL Bureau, P O Box 1773, Potters Bar, Herts EN6 3EP, England.

BUREAU PROBLEMS

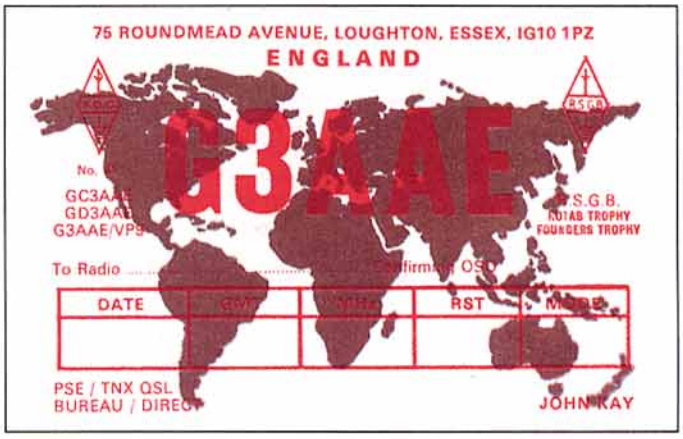
THE BIGGEST headache for QSL Sub-Managers is the non collection of cards, and it is a problem shared by almost every other international bureau. If anyone has any ideas on how to solve that problem then please let me know.

Another problem is caused by those who go to other call areas and have numerous QSOs but make no arrangements for QSLing them. I have tried unsuccessfully to sort out the situation of a G0 who went to Jersey but did not lodge envelopes with anybody as far as we can ascertain. He is not a member of the RSGB and the *Call Book* says his call belongs to a station 'located in the Darlington post code area', which is not very helpful. I have tried the GJ QSL Sub-Manager but he doesn't know who the G0 is. If it rings any bells with someone then please get in touch with me, because the G0E Sub-Manager has hundreds of cards for the operation from hopeful punters all over the world who look as though they are going to be disappointed.

RSGB BUREAU NEWS

THE BUREAU girls tell me that we are starting to receive quite a few cards bearing 'Y' prefixes from DL-land. That, as you well know, used to be allocated to the German Democratic Republic, which no longer exists. We are not quite sure why this trend has developed, unless it's nostalgia breaking out!

Some punters also seem to think that they should send their QSL cards to me for onward transmission and that's terribly nice of them but it really is quicker to send them direct to the bureau address of P O Box 1773, Potters Bar, Herts EN6 3EP.



We have been having problems getting G3AAE's name right over the last couple of months, so we thought we'd let his card speak for itself!

OVERSEAS BUREAUX

WE GET several letters from individual hams in Russia telling us that both P O Box 88 and the new P O Box 59 are unreliable or slow and urging us to use private bureaux being run in opposition to them - at a cost of course. For the record, we send our consignments to P O Box 59, which is the official IARU bureau. It's difficult to see how we can do anything else at the moment but the situation out there still appears to be confused.

Alain, J28DE, in Djibouti, East Africa writes to say that it's no good sending QSL cards direct to the bureau P O Box in Djibouti, because there are postal problems there. As far as his own personal call is concerned, the only safe route is via F2WS using the French bureau or direct to him.

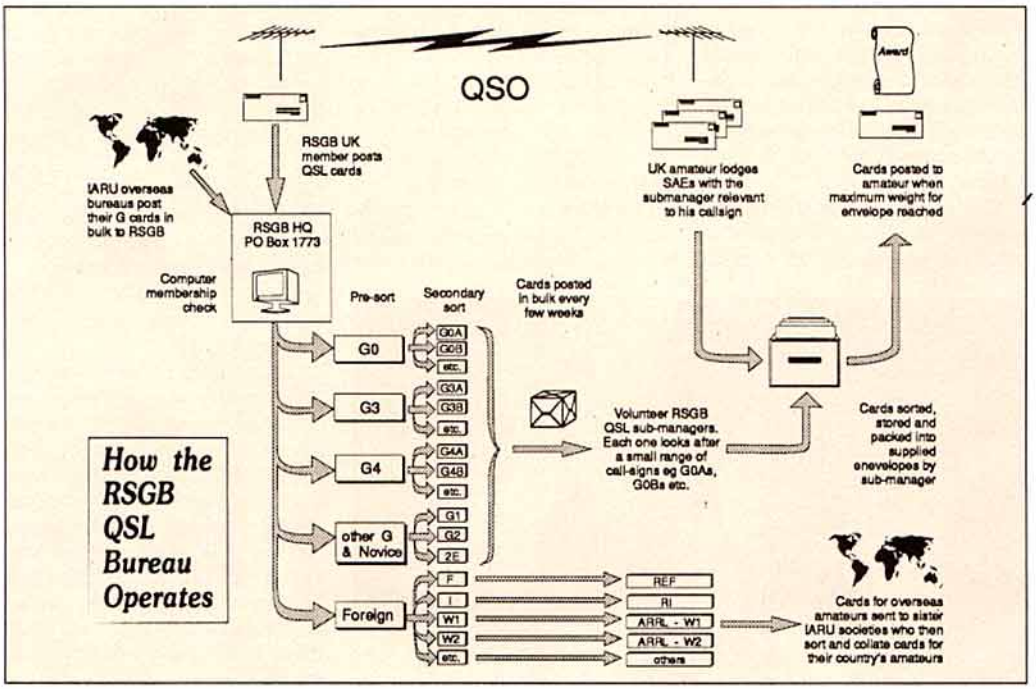
IRCs

REG WOOLLEY, GW8VHI (ex ZD8GW, DA4RG, VP8BPZ and EI3VPO), writes about IRCs. He says he has answered thousands of direct QSLs accompanied by IRCs (International Reply Coupons) and yet he says many of them are not valid. Reg says one problem is that some bear no post office franking stamp, others are franked in the right hand box which invalidates them.

In case there are readers who are unsure a truly valid IRC should be franked by the issuing post office in the *left* hand box only. (Some are also franked in the middle box too but this does not invalidate them). The right hand box is put there to be franked when the IRC is exchanged for postage.

However, I have never met anyone who had actually cashed one and some of the dates on them bear this out. A while ago [November 1993 - *Ed*] we saw a picture in this column of an IRC that started its rounds before I was born!

Reg also says that when QSLing direct it is essential to include an addressed envelope together with some contribution towards return postage. He says he still gets foreign stamps enclosed by people who don't seem to understand that they cannot be used in the UK! ♦



NOVICE NEWS

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

THE DTI HAS launched an information pack, entitled *On The Right Wavelength*, which outlines career prospects for Radio Freqency Engineers. The full colour pack is aimed at sixth formers and undergraduates. Among those targetted are young novices who may be looking for future career opportunities plus older novices seeking a change of direction. Copies of the pack have been sent to a number of schools who are known to have amateur radio interests.

This new drive represents part of a joint venture between the DTI and firms with a vested interest in RF engineering. These firms are contributing about 80% of the estimated £500,000 to be spent over the next three years to promote RF engineering.

One aspect of the initiative involves the electronic engineering departments of three universities - Bradford, Bristol and Surrey - increasing the number of places available on radio-engineering courses. These extra places are due to be filled in the academic year 1995/6 which will hopefully lead to 50 extra graduates a year. Besides financial support, benefits include greater contact between the three universities and industry, more placements and industry involvement in choosing research projects for final year students.

If you would like a copy of *On The Right Wavelength* write to: Joan May, DTI Telecoms Division 2/106, 151 Buckingham Palace Road, London SW1W 9SS tel: 0171 215 1736, fax: 0171 931 7194.

THREE CHEERS

THE TRIO PICTURED (right) have good reason to be cheerful having passed the NRAE. For five years Adrian Hurst, assistant district commissioner for the Venture Scouts, group scout leader Stan Taylor and Venture Scout Iain Elliot were involved with GB2HVS - the Hartlepool JOTA station - as helpers.

Stan is full of praise for the Stockton and District Amateur Radio Group Novice training team comprising Derek Burton, G0GKY; Ken Stairman, G7RLP and Steve Watson, 2E0ADR for their help and encouragement. He also pays tribute to Neil Douglas, G4SHJ, and the members of Peterlee and Easington Radio clubs - especially Bill Raine, G4RXR; Albert Williams, G0MJV; Alan Brown, G0GWD and George Ford, G0MHC, for their help in organising and running GB2HVS and other Scouting activities.

Adrian and Stan have since moved on to the RAE and are due to take their exam next month. I am sure you join me in wishing them success.

Three delighted Novices, who became involved in amateur radio through their Venture Scout activities, display their NRAE certificates. From left to right: Adrian Hurst, Stan Taylor and Iain Elliot, 2E1DOE.

SUPPORT KIDLINK

AS A RESULT OF advance notice of Kidlink '95 in last month's column, I am hoping the event will be bigger and better this year. Some 30 schools have been contacted and hopefully others will join this number.

If all goes well, the airwaves should be kept busy during the event which takes place on Thursday, Friday and Saturday 4, 5, and 6 May. The format is as before; each youngster will make four statements answering the following questions:

1 Who am I?
2 What do I want to do when I am grown up?
3 How do I want the World to be better when I grow up?
4 What can I do to help this to happen?

In previous Kidlink events, youngsters had obviously considered these questions before giving their responses and the statements showed a great concern for the World's future.

Many schools used the experience to focus on other subjects while some youngsters kept in touch with those amateurs they had met.

It would be satisfying to report on Kidlink's success in a future column. But this will only be possible if information reaches me. Were you involved with a school station? Did the idea appeal to the youngsters? Was any other area of the curriculum linked with the experience? Is any future activity planned? Have you any suggestions for future events? Why not tell me so that I can share the results with others.

Please note that as well as contacting one another the participating schools need others to speak to. If you hear a school station, please have a word with the pupils. You never know, someone may have their imagination fired and decide to take up the hobby themselves. I hope to speak to some of those school stations myself - the ironing can wait!

NOVICE CORNER AT CONVENTION

THE 11TH YEOVIL QRP and Construction Convention will widen its scope this year to include Novices. For the first time the event, to be held on Sunday 21 May at Preston School/Centre, will feature a Novice and Beginners' Corner. This will involve a display giving information, help and advice on obtaining both Novice and full licences. Also featured will be examples of the practical aspects of the Novice course including Test Sets 1 and 2, the amplifier, and a ZN416 type radio along with other examples of home-brew equipment.

Readers of *D-i-Y Radio* will be interested to see the Yearling receiver, Super 7 receiver and the Tuna Tester on display - and perhaps compare notes if you have built them. Interested visitors will be able to ask questions of a club member manning the stand.

There will also be formal talks on amateur radio topics, a display of vintage wireless equipment, a construction challenge and the usual traders on hand to supply the bits and pieces for your own construction project once your enthusiasm is sparked. Clive Trotman, GW4YKL, the RSGB President, has promised to attend.

If you need further details or a map, contact George Davis, G3CQR (QTHR) or ring him on 01935 813054.

STELAR

MEMBERS OF SCIENCE and Technology through Educational Links with Amateur Radio (STELAR) are currently holding a Net on Wednesdays.

This takes place at 12.30pm on 3.770MHz - subject to the usual qualification regarding conditions. If the band is closed, the frequency will be 7.048MHz. It lasts for at least an hour with GB2SR from Harrogate or GB5SR from Norwich as 'net control'. With - at present - around 100 schools and colleges affiliated to STELAR, there is a very good chance of meeting some of the youngsters who attend these places of learning. Very often the students go on to become either Novices or full licensees.

I have joined the group a couple of times and was made very welcome. Richard, G3XVW, at Harrogate Ladies' College asked me to invite readers to join them too, as it was, he said, pleasing to introduce students to other amateurs. So, if you have some time to spare one Wednesday lunchtime, do call in.

SEND YOUR TALES

WITH FOUR NRAEs a year, there is a steady stream of new Novices. Every Novice must have memories of the course and the amateurs who helped them on their way.

All Instructors agree that they get their only reward knowing they have done a good job and feel satisfaction when they first hear their students on the air proudly using their hard-won callsigns. I have been fortunate in hearing from many Novices and passing on their thanks.

When, as a new Novice, you have come down to earth - please could you spare a few minutes to revert to that older form of communication - and drop me a line. I will gladly pass on your appreciation and tell any interesting stories you may have. If any instructor has photographs of his/her industrious students, I would be grateful if they could send them to me along with any comments. ♦

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

A TOTALLY computerised new application procedure for IOTA members has been unveiled. With the recent completion of its design, programming and system-testing, the software program is now available. This automates the application process and enables an application to be prepared without any retyping of data at any stage. We believe this is a breakthrough for a major awards programme. The system has been written by John Linford, G3WGV, the author of Turbolog. The IOTA checkpoint will generate a floppy disk for individual members containing:

- An installation program
- A copy of their current IOTA data
- Help files
- A list of islands and their reference numbers
- A special administration program which allows members to examine their current scores, make additions, and submit an update claim (including claims for awards) on disk

This disk is then sent to the appropriate checkpoint with the QSL cards. The checkpoint uploads the data from the disk, at the same time checking the cards and clearing exception reports. The disk is returned to the member with his cards by the checkpoint. Members then have a listing of current credits (which can be printed out). The member's system can be updated as cards arrive and a disk can be sent off to the checkpoint as desired.

New or existing members wanting an IOTA disk should apply to their checkpoint. For G stations this is Phil Marsh, G4WFZ, who is QTHR. Checkpoints for the rest of the World are shown in the IOTA Directory and in the new brochure described below. We hope that the vast majority of IOTA members will, in time, opt for the disk system. It will reduce clerical effort, minimise transcription errors and reduce paperwork. All very worthy objectives! The price for the initial disk is £5, US$8 or 13 IRCs post paid.

CLAIMING CREDIT

ISLAND ACTIVATORS should note that, as part of the IOTA Programme, they can claim credit for the island groups which they activate. They do not need to use their own callsigns but the DXpedition QSL card must confirm that they were team members. This is becoming a popular feature of the programme and greatly encourages the IOTA enthusiast to activate 'that rare one'.

FUN MINI JAUNTS

THOSE SEEKING a fun-filled weekend, or maybe even a week, should consider embarking on an island mini-DXpedition where you can get on the other end of a pile-up. Such operations are relatively easy to organise. Indeed, it is much easier to activate a fairly rare IOTA island than a fairly rare DXCC country. Even in Europe and North America there are many islands which are needed by the chasers and some of these are reasonably easy to access. Preferably choose a period covering a weekend. Not only will this make those with full-time jobs happier but it will increase your QSO tally - you should be able to make in excess of 2,000 contacts. Of course, this process will in future be facilitated by the availability of the IOTA-Yaesu station which will be loaned out to deserving cases.

JOIN THE DEBATE

THIS YEAR'S IOTA Convention - to be held in Bologna, Italy on 13 - 15 October - represents a golden opportunity for participants to hear about the experiences of DXpeditioners and also to debate with the IOTA Committee questions of policy. It is important to the committee to obtain this type of feedback. Many other conventions throughout the World now have an IOTA stream or section so providing a forum for the discussion of matters of interest to the IOTA enthusiast.

There is a great camaraderie among members of the IOTA community. This is shown regularly by a willingness to help each other and to pass information. Just go along to an IOTA Convention and see how well the IOTA gang get on together.

NEW ISLAND PLEA

I WOULD APPEAL to all potential DXpeditioners to get in touch with the IOTA committee if they are thinking of activating a new or rare island group. It is vital both to the DXpedition and to the IOTA committee to ensure that the island being activated will qualify. Annex B or C in the IOTA Directory should be completed and sent to the IOTA committee before the DXpedition is started. A great deal of expense is often incurred in undertaking these DXpeditions and it is highly disappointing for the DXpeditioner if the island does not qualify. Many island chasers will also be very disappointed. If the information is provided we will ensure that the DXpedition is publicised in the *RSGB DX News Sheet*.

In the past, IOTA was dominated by list operations and many keen DXers were put off entering the programme because of these. Nowadays, however, as the number of islands activated and the numbers of participants has increased so considerably, list operations have fortunately become a rarity. They now only feature when made necessary by operator inexperience, equipment limitations or inadequate signal to hold frequency.

Island activators are encouraged to work split frequency whenever a pile-up develops and to recognise that there may be several hundred stations calling them. They should note that - when their signal is weak - they cannot be heard clearly in a major population centre if they insist in listening on their own frequency. We have some work to do in this area because we still find instances of IOTA DXpeditions not working split frequency, thus causing much frustration and achieving slow QSO rates.

Also, could DXpeditioners make sure they set up arrangements to deal with both bureau and direct QSL cards before embarking on a venture. If you are activating one of the rarer groups you can expect a considerable number of direct QSL cards. Please make efforts to deal with these promptly, provided adequate postage is enclosed.

CORRESPONDENCE

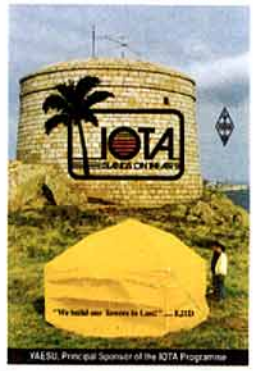
DAVID PLATER, A45XJ, writes from Masirah Is in Oman (AS-014). He is active around 14.170MHz and would be delighted to help anyone needing this group.

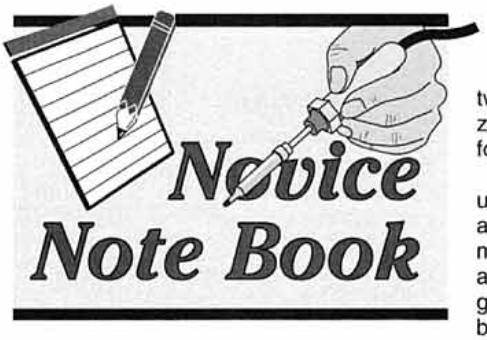
Dennis Cram, GM3NIG, and a number of local amateurs, have activated various Scottish islands in the past. Dennis urges those contemplating an IOTA DXpedition to go ahead and do it. He said: "We've had a lot of laughs, drunk a lot of whisky, been frozen stiff, eaten alive by midges, worked lots and lots of DX and learned to handle the most monumental pile-ups." That says it all! ♦

IOTA BROCHURE

IN ORDER TO market the IOTA Programme throughout the World, we have recently completed a new eight page colour brochure entitled *The IOTA Programme*. This has been funded by Yaesu, our principal sponsors, and will be distributed World-wide with all Yaesu HF equipment shipments. It gives a great deal of information about the programme. Copies are available from me on receipt of a 38p stamped self-addressed C4 envelope or US$1 for overseas readers.

The IOTA Programme





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

THE OPERATIONAL AMPLIFIER

A QUESTION THAT I am asked time and time again is 'What is an op-amp?' A extremely valid question as we frequently see them in circuits but rarely see them described. This description is definitely not the definitive article but to give the Novice an insight into what they are.

The op-amp, or to give it its full title of operational amplifier, is a leftover from the days of the analogue computer where they performed mathematical operations.

What do we need in any amplifier? It has to have the gain that the designer requires it to have, and this has to be consistent from day to day. It also has to have a wide bandwidth to cope with signals whose amplitude is rapidly changing and its output has to be a true replica of its input signal. In addition to this it has to have a high input impedance so that it does not load the circuit to which it is connected and to have a low output impedance so that it can supply enough power to a load without distorting the output wave form.

OPERATION

FOR REASONS THAT will become apparent later the operation amplifier has very high gain, in fact we could, for simplicity, consider it as having infinite gain! An op-amp is usually powered from a positive and negative supply relative to earth. With no input signal the output pin will sit at 0 volts. It has two inputs, an inverting input usually marked '-' and a non inverting input '+'.

A positive going signal on the + input will make the output go positive, but a positive going signal on the - input will make the output go negative. Also, and an even more important feature, is that if both inputs are moved positive or negative at the same time and by the same amount the output will remain at zero volts. In other words the output signal is an amplified version of the difference between the two inputs. It is worth ensuring that you have understood this point and the possible ramifications of it.

Due to the inevitable imperfections the output may not sit at exactly zero when the inputs are zero, this is called the input offset voltage. This small voltage, typically only 1mV, is the voltage difference required between the two inputs to bring the output to zero and in modern amplifiers is so small that for most of our applications it can be ignored.

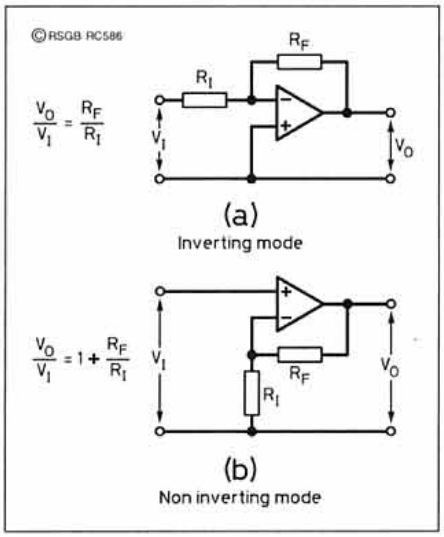


Fig 1: Operational amplifier gain parameters.

Let us look at the gain problem first. We can use negative feedback to set the gain of the amplifier. Now that is a pretty heavy statement if we do not know what we are talking about! Consider an amplifier with infinite gain. Now if we take its output signal and feed back to its inverting input one tenth of its amplitude it will follow that under these conditions the output signal will be ten times the input signal. This is a simplification and the two relevant circuits are shown in **Fig 1** with the formula for calculating the gain.

Two more considerations that are important to ensure that you can use an op-amp with confidence are supply decoupling and layout. It must be remembered that the op-amp is a very high gain amplifier and will oscillate given half a chance. It is important that the supply pins, both positive and negative are decoupled close to the device and that output signals are kept as far as possible away from input circuitry.

If a circuit does not seem to be behaving properly always consider the fact that it might be oscillating at some obscure frequency due to one or both of these two factors.

There are many other imperfections which need to be taken into account in designing a circuit using operational amplifiers, but to understand their operation I think that the above is sufficient. Most of the handbooks will give a far more detailed description and if more is required these are the publications to refer to. ♦

RADCOM TECHNICAL FEATURE

A Box to Measure RF Impedances

By G Billington, G3EAE*

THE BOX IN QUESTION IS an RF potentiometer designed for coaxial feeder impedance measurements in the range 5 to 600Ω. The impedances are calculated from voltage measurements, and the unit is designed to operate with a modern digital voltmeter with an input resistance of 10MΩ or more. A low power RF source capable of giving a couple of watts of harmonic free output into a load of around 50Ω is also required.

The box can be used in either a very simple or in a more sophisticated manner. It is small, cheap, and easy to build, and to a certain extent it is self checking. As well as measuring feeder input impedances it can be used to check the RF value of resistors against known capacitors and to measure RF impedances in general.

PRINCIPLE OF THE METHOD

THE BASIC POTENTIOMETER arrangement and the required measurements are shown in **Fig 1.** The unknown impedance 'Z' is connected in series with a known impedance 'S' to a suitable RF source. The three voltages V_s, V_z, V_{in}, are all measured as described later. 'Z' may then be found using the formula: $Z/S = V_z / V_s$

MEASURING FEEDER INPUT IMPEDANCE: A SIMPLE EXAMPLE

SUPPOSE THAT 'Z' is the input impedance of a coaxial antenna feeder and that a resistor of 56Ω is used as 'S'.

The measured voltages are:

$V_s = 5.0V$; $V_z = 2.5V$; $V_{in} = 7.5V$,

The unknown impedance 'Z' is given by:

$Z = 56 . (2.5/5.0)$

$= 28\Omega$

75 Mount Vernon Road, Barnsley, S. Yorks, S70 4DW.

Of course the important question is whether or not 'Z' is resistive. There is a simple test which will decide this. If $V_{in} = V_s + V_z$, 'Z' is a pure resistance.

Using the given figures: 7.5 = 5.0 + 2.5.

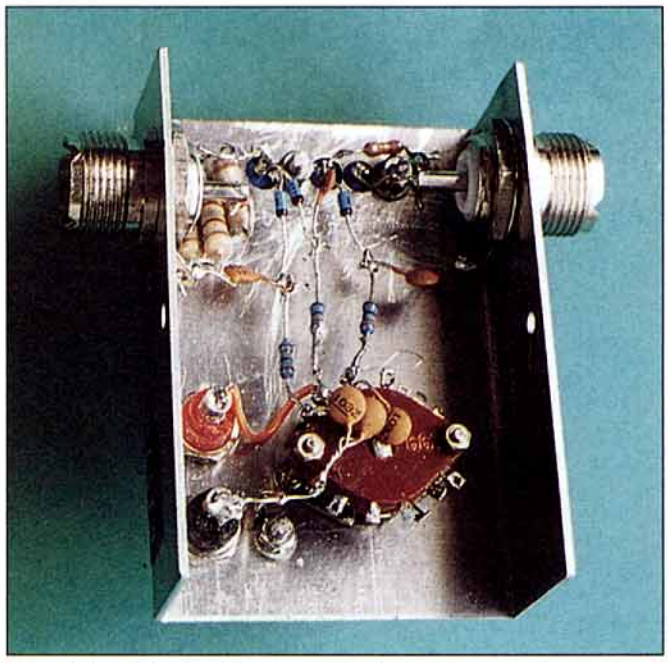
The figures pass the test and 'Z' is a pure resistance.

The procedures just described are easy to carry out and can give a quick reassurance that an antenna is behaving itself.

CORRECTING THE READINGS

If 'S' is a resistance but 'Z' is complex, $(V_s + V_z)$ will be greater than V_{in} but whatever the nature of 'Z' it is not possible for $(V_s + V_z)$ to be *less* than V_{in}. Nevertheless, if the box is set up with 'S' and 'Z" both resistors, it will be found that $(V_s + V_z)$ *will* be less than V_{in} by about 0.15V. (This assumes that the recommended Schottky diodes have been used). If 0.15V is added to all readings, agreement becomes very satisfactory, usually within 0.05V. Using silicon diodes (1N914) the correction was in the region of 0.4V. It is surprising that a virtually constant correction works over the range one to twenty volts.

It will be found that correcting the readings will often have so little effect on the numerical value of 'Z' that it may not seem worth doing, but if you are going on to find the resistive and reactive components as described in the next section, these small corrections are more important.



Internal view of the impedance measuring box.

FINDING BOTH COMPONENTS OF 'Z'

SUPPOSE NOW THAT V_z and V_s have the same values as before but that V_{in} is 6.5V. (Assume all readings have been corrected). As V_z and V_s no longer add directly to give V_{in} we know that 'Z' is not a pure resistance. However, 'Z' is calculated exactly as before: it is still 28Ω but is now a complex impedance. The values of the resistive and reactive components of 'Z' can be found by drawing a triangle as shown in **Fig 2**. The sides represent the three voltages with V_s drawn horizontally. The angle q is then measured. In this case it is 64°. Z may be represented either by the series combination R_s and X_s, or by the parallel combination R_p and X_p (**Fig 3**).

$R_s = Z \cos\theta$ $\quad R_p = Z/\cos\theta$

$X_s = \sin\theta$ $\quad X_p = Z/\sin\theta$

Using $Z = 28\Omega$, $\theta = 64°$

$R_s = 12\Omega$ $\quad X_s = 25\Omega$

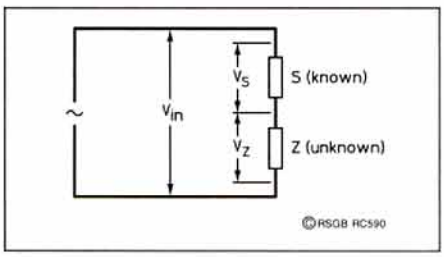


Fig 1: Basic potentiometer principle of the impedance measuring box.

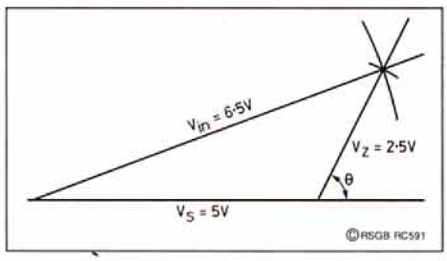


Fig 2: Extraction of Z components from voltage readings.

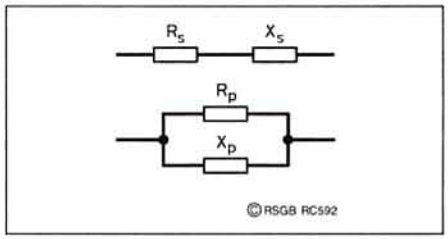


Fig 3: Series and parallel combinations of R and X.

Front panel of impedance measuring box showing the fixed reference connector block.

$R_p = 64\Omega$ $X_p = 31\Omega$

Unfortunately the method described does not tell us whether 'X' is inductive or capacitive. This can be done by making 'S' a known capacitor as described later.

If you do not want to draw a diagram to find θ it may be calculated:

$$\cos\theta = (V_{in}^2 - V_s^2 - V_z^2)/2V_s \cdot V_z$$

CONSTRUCTIONAL DETAILS

THE UNIT IS BUILT into a small metal box. The circuit is shown in **Fig 4**. It is a great advantage to mount 'S' externally using a PCB terminal block. All connections can be kept very short and 'S' can be changed at will. Two Maplin 2-wire 10mm PCB connectors (JX38R or JY93B) are used. The two blocks can be slotted together giving a longer block with four connecting points. This block is bolted down onto the exterior of the box using two 6BA nuts and bolts which must be passed through the two blank holes in the blocks.

A small amount of thin plastic has to be cracked off to allow the passage of the bolts. Each of the screw connectors carries a short wire projection which requires a hole boring so it can pass through into the interior of the box. One pair of the connectors is used to accommodate 'S'. The inner one of the other pair is labelled 'O' and goes to the coaxial output socket and the outer, labelled 'E' goes to chassis by the shortest possible route (**Fig 5**). When using the coaxial output, the neighbouring 'O' and 'S' points are connected by a short link.

When testing the device using resistors, capacitors, etc the link is removed and the test piece is connected between the inner 'S' connector and 'E'. Removing the link disconnects the capacitance of the output socket - about 4-9pF - which would otherwise be in parallel with the test piece. The inner 'S' connection will have to accommodate two wires, one from 'S' and the other either from the test piece ('Z') or from the link.

The above method of construction enables critical connections to be kept very short. It is important that the diode leads are soldered as close to the body of 'S' as possible, ie to the short wires which project from the connectors into the interior of the box. The actual length of the diode leads is not very critical so there is no need to cut them too short and risk cooking the diodes during soldering.

The resistors at the input are to prevent the load on the source exceeding 112Ω or going lower than 22Ω. These are extreme cases. In antenna measurements the load is likely to be closer to 50Ω and nearly all resistive.

The 22Ω resistor can be omitted if desired. Its only purpose is to prevent a short circuit in the unlikely event that 'S' and 'Z' together form a resonant series circuit, which just could happen if 'S' is a capacitor and 'Z' an inductor.

The input resistors also provide a DC leak across the line which is essential for the operation of the diodes. The 22KΩ resistor across the output ensures that there is such a leak under all conditions. Schottky diodes (BAR 28, Maplins QQ13P) are employed.

TESTING THE BOX USING RESISTORS

FIRST REMOVE THE LINK thereby disconnecting the output socket.

Another 1 watt resistor in the range 20 to 200Ω is chosen for 'Z' and is connected between the inner 'S' connector and 'E'. Both 'S' and 'Z' should have leads cut as short as possible. Maplin 1 watt resistors seem to be OK at HF, at least up to 14MHz, the highest frequency used.

Measure the voltages and check that:

1) $V_z/V_s = Z/S$
2) $V_z + V_s = V_{in}$

As explained earlier, better agreement is obtained if a small correction is added to every voltmeter reading. 0.15V was suggested, though in fact anything between 0.13 and 0.15 seems to be satisfactory. Correcting the readings should lead to a small but noticeable all round increase in accuracy, particularly when 'Z' is more than 4S or less than S/4.

Repeat these checks using different input voltages and different values of 'S' and 'Z'. Do not use inputs greater than 20V, and also try to avoid using any voltage reading lower than 1.0V. The diode response is particularly inaccurate at low voltages.

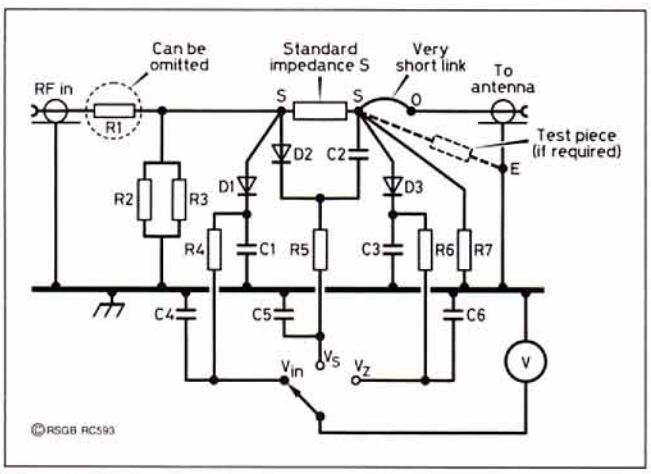


Fig 4: Circuit diagram of impedance measuring box.

USING THE BOX TO MEASURE Z_o AND VELOCITY FACTOR:

The characteristic impedance (Z_o) of a coaxial feeder and also its length in electrical degrees can be both found from the same two pairs of measurements. These are made on a length of the cable. The exact length is not critical but it should not be less than 1/16th of a wavelength, and not more than 3/16ths. Only one end should be fitted with a plug, at the other should be a clean cut.

The cable needs to be plugged into the output socket of the box. A resistance of around 56Ω is used as 'S'. The measurements V_s and V_z are then made:

1. With the far end open circuit and
2. With a good short circuit across the far end. One or two millimetres of the inner core can be exposed, and the braiding pulled over it and soldered or even clipped.

Let the open circuit value of V_z/V_s be denoted by 'P', and the closed circuit value of V_z/V_s be denoted by 'C'

$$Z_o = S \cdot \sqrt{(P.C)}$$

the angular length Ω is given by:

$$\text{Tan}\Omega = \sqrt{(C/P)}$$
$$\Omega = \text{Tan}^{-1}\sqrt{(C/P)}$$

If the actual length of the sample is 'L' metres, then each metre is equivalent to Ω/L electrical degrees.

The wavelength on the line λ_L is given by

$$\lambda_L = L \cdot (360/\Omega)$$

The velocity factor for the line is equal to the line wavelength divided by the free space wavelength λ_o

$$\text{Velocity factor} = \lambda_L / \lambda_o$$

FEEDER LENGTHS LONGER THAN ONE QUARTER WAVELENGTH

The above method can be employed using longer feeder lengths with the following limitations.

1. The length can be any integral number of half wavelengths *plus* a fraction of one quarter wavelength. The extra half wavelengths have no effect on the measurements.
2. If the length is any *odd* number of quarter wavelengths plus a fraction of a quarter wavelength, the ratio C/P must be inverted. In this case:

$$\text{Tan}\Omega = \sqrt{(P/C)}$$
$$\Omega = \text{Tan}^{-1}\sqrt{(P/C)}$$

In both the above cases Ω is the angular length of the final incomplete quarter wavelength which should be somewhere between 20 and 70°. If Ω lies outside these limits (ie if the feeder length is close to a whole number of quarter wavelengths) the results will be very inaccurate. In such cases the feeder should be extended by about one eighth of a wavelength before making measurements.

TESTING WITH CAPACITORS

A CAPACITOR MAY also be used as 'Z', and its reactance found. This is obtained in exactly the same way as with the resistors. The following points should be borne in mind when using a capacitor as 'Z':

1) The nominal value of the capacitance will be effectively increased by 4 or 5pF due to the output capacitance of the device.
2) The voltage addition rule does not hold in

this case. When 'S' is a resistor and 'Z' a capacitor (or vice versa) the rule for voltage addition is:

$$V_{in}^2 = V_s^2 + V_z^2$$

3) The inductive reactance of capacitor leads can easily cancel out one or two ohms of capacitive reactance at HF. Keep the leads as short as you can. The effect is much less important with resistors.

TESTING WITH A COMPLEX LOAD

A SUITABLE LOAD MAY be made from a 1 watt resistor and a close tolerance polystyrene capacitor connected in parallel with lead lengths kept very short. The reactance of the capacitor and the resistance of the resistor should not be too different from each other, or from the resistance of 'S'. 'Z' and 'θ' can then be found from the triangle described earlier, and the values of R_p and X_p found. Again, the nominal value of the capacitor will effectively be increased by 4 or 5pF. As explained earlier, the triangle diagram will not tell you whether 'X' is inductive or capacitive. If a capacitor is used as 'S' the method must be modified slightly, but the triangle then indicates instantly whether the load is inductive or capacitive.

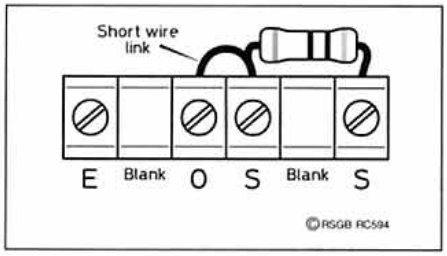


Fig 5: Connector block for the reference components.

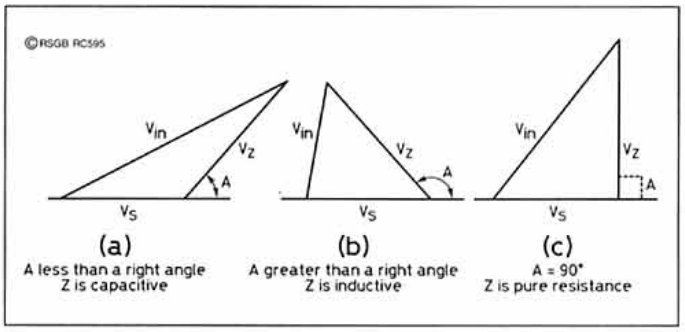


Fig 6: Determination of reactance polarity using a capacitance for 'S'.

USING A CAPACITOR AS 'S'

IF A CAPACITOR OF reactance 'X' is used as 'S'. 'Z' may be found exactly as before:

$$Z = X.\ (V_z/V_s)$$

The method for finding 'θ' is *not* the same. Once again, the voltage triangle is drawn in the same way, and the same angle is measured, but this angle, 'A', in **Fig 6**, is not θ.

θ is equal to either (90-A) or to (A-90), the smaller angle being subtracted from the larger. If 'A' is less than 90° as in Fig 6a the reactive component is capacitive; in Fig 6b the reactive component is inductive. In Fig 6c A=90 which means there is no reactive component and Z is a pure resistance. If Z is a pure capacitance V_{in} is equal to the sum of V_s and V_z, if Z is a pure inductance V_{in} is equal to their difference. If you prefer calculation to drawing a scale diagram, 'O' can be found using

$$\text{Sin}\theta = (V_{in}^2 - V_s^2 - V_z^2) / (2V_s \,.\, V_z)$$

Note that this is identical to the earlier formula except that it gives Sinθ not Cosθ. This can give both positive and negative values for θ. A positive value indicates a capacitive reactance and a negative value indicates an inductive reactance.

COMPARING CAPACITORS

IF BOTH 'S' AND 'Z' are capacitors there is no need to bother working out reactances. The relation simplifies to:

Unknown capacitance = capacitance of 'S' . (V_s / V_z).

Note the voltage ratio is 'upside down'. As explained in the next section, the residual output capacitance will need to be subtracted from the measured value of the unknown.

CONTINUED ON PAGE 96

RADCOM EQUIPMENT REVIEW

The Amazing 1-T-1 Receiver

The first of a two part article by C F Fletcher, G3DXZ*

THIS ARTICLE DESCRIBES the development of a TRF receiver using modern solid state techniques. It is designed to work on CW with full break-in, in conjunction with my transmitter design, featured in *RadCom*, March/April, 1995.

THE EARLY TRF RECEIVER

IN THE 1920s and early 30s the Tuned Radio Frequency (TRF) receiver was quite common. The simplest form, a regenerative detector, could only be used with headphones whereas the grander models sported one or two stages of RF amplification and probably two stages of AF amplification to drive loudspeakers comfortably. Considering the simplicity of the circuits, the performance of some receivers was quite good; the stability and controllability of the regenerative detector determining how easy they were to use.

It is true that the old TRF receiver design had some shortcomings; multiple tuned RF stages are not easy to align, ebonite panels gave rise to hand capacity effects, reaction controls often had a sudden death feel and the transformer/choke coupled AF stages commonly gave rise to instability. Even so, they were very sensitive and with a good set there was little you could not receive.

*12 Park Cresent, Retford, Notts DN22 6UF.

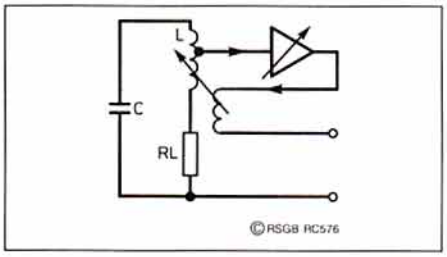


Fig 1: Controlled gain amplifier and positive feedback.

So what chance would the TRF receiver have under today's conditions, with the bands much more crowded and burdened with high-power commercial stations, than when the TRF was in its heyday. Not much you might think, but then there have been some giant strides made in component technology over the last fifty years. So can technology compensate for the more difficult conditions?

Such thoughts drove me to put together the circuit to be described, just to see how well it would perform. The description '1-T-1' is derived from the old valve style '1-V-1' and indicates a regenerative detector receiver with one stage of buffering/RF amplification before the detector and one audio stage after it, but using transistors. Unlike the valve designs of yesteryear, the number of transistors exceeds the number of stages, but integrated circuits keep the device count down. One of the great advantages of solid state design is that only a single 12 volt supply is needed.

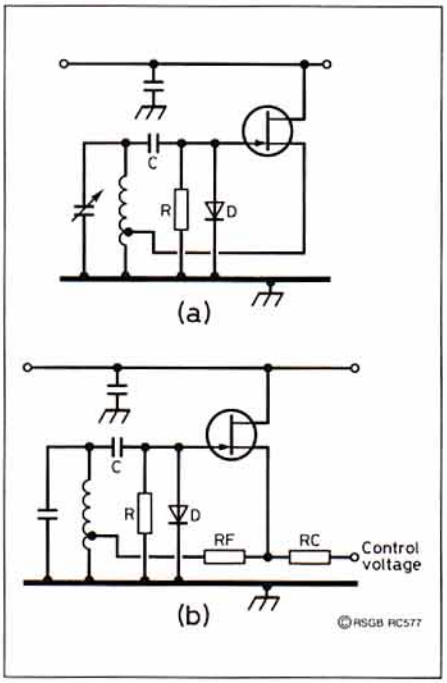


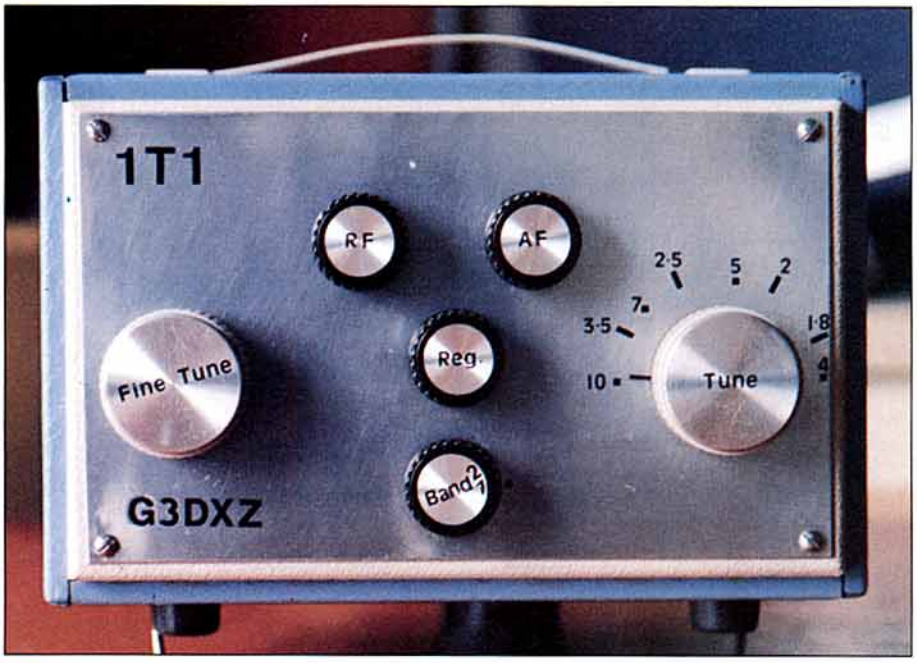
Fig 2: (a) Standard oscillator. (b) Modified by adding resistors Rf and Rc to control oscillation amplitude.

As the TRF type receiver is uncommon these days I will briefly review the various parts of the circuit before making some observations on how it might be constructed.

THE DETECTOR

THE PURPOSE OF the detector is to select the wanted radio frequency (RF) signal from the noise and from it produce an audio frequency (AF) output which can be amplified as required. Thus there are two processes needed in the case of CW or SSB transmissions, signal selection and heterodyne detection.

All tuned circuits have losses, mainly resistive, which limit their Q and thereby their ability to boost the signal at their resonant frequency and discriminate against those off resonance. This receiver employs only one tuned circuit and the Q of a single LC circuit, even when using modern iron powder toroidal cores, is only a few hundred at best and, as such, is too low to provide the selectivity needed. The Q can be massively improved by using an amplifier with controlled positive feedback or 'regeneration', see **Fig 1**. If the degree of regeneration is such that the circuit begins to oscillate gently at the LC resonant



Front panel of the simple 1-T-1 Receiver.

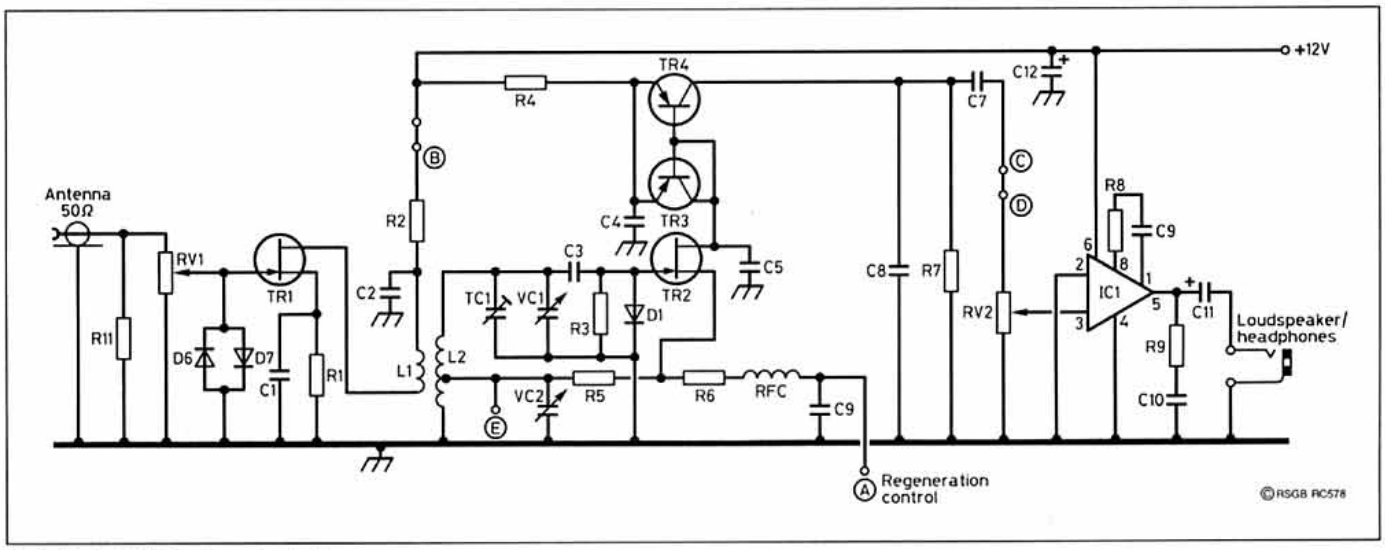


Fig 3: Basic 1-T-1 Receiver circuit diagram.

frequency then the two processes needed for CW reception are available in the one stage. The 'negative-resistance' reflected back into the tuned circuit by the feedback cancels the positive resistance inherent in the inductor and raises the Q, and thus the selectivity, enormously. Simultaneously, the low level oscillation beats with the incoming signal and produces audio signal at the detector output. The whole art of building such a detector is to be able to smoothly control the feedback so that the LC circuit is maintained just on the threshold of oscillation. Such an arrangement has amazing sensitivity and selectivity for a single stage.

The detector circuit chosen is based upon the Hartley oscillator, see **Fig 2(a)**. Normally, the gain of the FET is much greater than that needed to set up oscillation and the amplitude of oscillation is controlled by the negative gate bias developed by gate coupling capacitor **C** and diode **D**. The amplitude of oscillation is usually several volts and, as such, is much too strong for a detector as the oscillation swamps the incoming signal and desensitizes the circuit.

Reducing the circuit's loop gain, by introducing negative feedback with resistor **Rf**, see **(Fig 2(b))**, will reduce the amplitude of oscillation. However, if too much RF is introduced the circuit will stop oscillating altogether. Alternately, additional negative bias can be applied to the gate of the FET (or positive bias to its source giving the same effect); this reduces the mutual conductance of the FET and lowers the circuit gain; and of course reduces the oscillation amplitude.

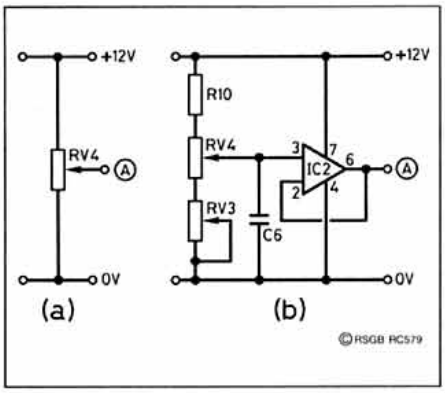


Fig 4: Regeneration control options.

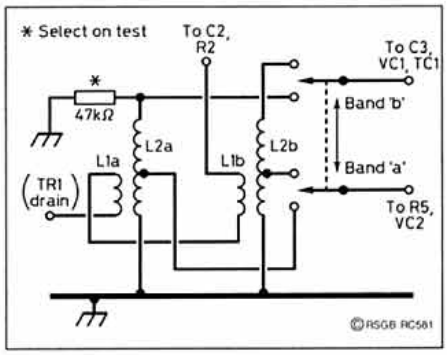


Fig 5: Dual band coil switching.

A combination of these two techniques can make a well behaved oscillator that can be smoothly controlled around the onset of oscillation. Additional positive bias for the FET source, may be introduced by passing current through **Rc** and **Rf** from a variable positive control voltage.

Even with such a basically good mannered oscillator the onset of oscillation still tends to be abrupt as circuit conditions suddenly adjust themselves. Two circuit elements have a major effect; the source resistance of the control voltage and the drain load resistance of the FET. The latter effect, normally introduced by a resistive drain load for the FET, can be eliminated by the use of a current mirror, see **Fig 3**, which maintains the FET drain voltage constant under varying drain current conditions. The former is easily accomplished by the use a modern miracle, in this case a common 741 op amp, **(Fig 4(b))**, to form a control voltage source of very low resistance.

This receiver was intended for general coverage. Four amateur bands are covered, 1.8, 3.5, 7 and 10.1 MHz. To make tuning of SSB transmissions easy, two tuning capacitors are used as was common on old sets, bandset (coarse) and bandspread (fine), but there are limitations with this technique. The normal tuning range (frequency) of an LC circuit using only a variable capacitor is 3:1 maximum. Using this full range results in very twitchy tuning at the HF end, even with a bandspread capacitor. The bandspread effect varies widely at the HF and LF limits; if its right at one end its wrong at the other. However, if the tuning range is limited to 2.5:1 by using a trimmer capacitor in parallel with the bandset capacitor, the overall performance is much improved.

The prototype is fitted with a bandswitch which selects one of two tuning coils **(Fig 5)**. The bands covered are 1.7 - 4.0 MHz and 4.0 - 10.2 MHz. Matching the two coils such that they need about the same circuit gain - for good regeneration control - requires a little fine circuit trimming and this is dealt with later. Extending the range above 10MHz proved difficult if the low frequencies need to be covered, owing to the substantial changes in the Q of the inductors as the frequency rises. If anyone prefers to listen on 14 MHz, I would suggest that a single coil covering 7, 10.1 and 14 MHz would be preferable.

RF AND AF AMPLIFIERS

CONNECTING ALMOST ANYTHING to a high Q circuit affects its operation and an antenna is worse than most. Not only does the antenna impedance change with frequency, its reactance can vary as the wind blows. Connecting an antenna to an oscillating detector guarantees some RF energy is radiated, and without some control over the strength of the incoming signal the detector can easily be overloaded.

All these effects can be eliminated by using a buffer amplifier between aerial and detector. The untuned FET buffer (TR1) shown in Fig 3 together with RF attenuator VR1 are an

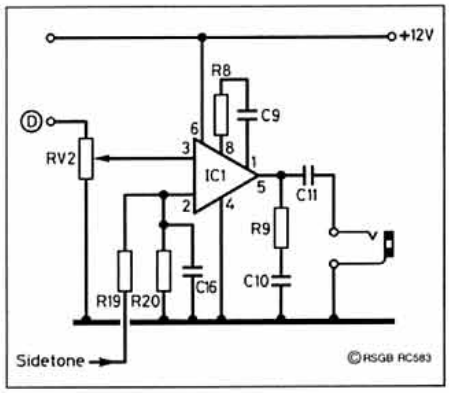


Fig 6: The amplifier audio frequency.

effective solution. The diodes D6 and D7 protect the FET against any excess RF entering the antenna socket.

For the audio end of the receiver, the LM386 IC is ideal for headphone and small loudspeaker use. The gain of the stage is set by R8 and the value shown is suitable for use with low impedance headphones or an 8Ω loudspeaker **(see Fig 6)**.

QSK OPTION

SO FAR, ONLY OPERATION as a stand alone receiver has been considered, but, if one wants to use this set in conjunction with a transmitter, then some form of muting is essential. I have been an advocate of listen-through operation for many years. All my past home-brew designs have featured full QSK so why change now? In practice, a single CMOS 4066 IC, in conjunction with a suitable timing circuit will allow you to listen between the dots at 25WPM. The circuit shown as **Fig 7** was designed to work in conjunction with my simple transmitter design featured in *RadCom*, March/April '95.

The switching sequence is as follows:
1) The antenna connection must be broken at the transmitter to keep out large RF voltages.

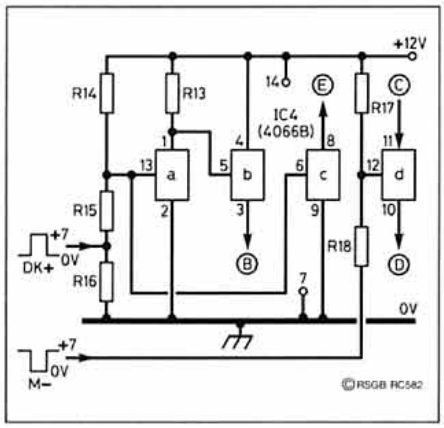


Fig 7: QSK switch.

2) The AF amplifier must be muted to remove thumps from the audio.
3) The RF and detector stages need be desensitised so that they will recover quickly. It is relatively easy to mute quickly a receiver but fast recovery after the transmit period needs careful control of sensitive receiver stages, especially where AC coupling is used.

The four separate analogue switches, labelled a, b, c and d, are housed in IC4, see **Fig 7.** Switch 'a' is used as an inverter and the rest as switch elements. A little adjustment to the incoming control voltages, M+ and DK+, is needed because IC4 is supplied at 12V and the control voltages step between 0 and 7 volts. Resistors R14 to R18 shift the control voltage swing into the middle of the input range of IC4. R16 is needed to disable receiver muting if the transmitter is disconnected and permit normal receiver operation. Switch 'b' interrupts the RF amplifier DC supply and switch 'c' heavily damps the tuned circuit L2 - both of these actions reduce the shock to the receiver front end when the transmitter is keyed. Switch 'd' disconnects the audio amplifier from the detector during transmit. The sidetone is introduced via R19 and R20 to the inverting input of IC1 which was unused in the non-QSK circuit. Thus the sidetone level is determined solely by the sidetone generator and is independent of the receiver AF gain control.

To install the QSK option, simply break the links shown in Fig 3, points B and C/D, and connect in IC4. ♦

. . . to be continued

● Edward Kelly, EI5DR, requires information on servicing a **KW1000 linear amplifier.** A service manual or any advice on fault-finding would be appreciated. Please write to Edward QTHR.

● John Redmond, RS95112, has a **Marconi CSR5 Admiralty receiver** made in 1944 which is still in perfect working order, but would like a manual or other information on it. If you can help, please write to John Redmond, 38 Ochilview, Devonside, Tillicoultry, FK13 6JD.

● Jeremy Owen, G8MLK, requires a copy of **LOCOSCRIPT** on disk to replace a damaged copy used by his mother for her charity work on an old **Amstrad PCW8256 word processor.** All costs willingly covered. If you can help, please contact Jeremy QTHR.

● Derrick Price, G3LYU, needs the wavechange, BFO and volume rectangular control knobs for a **B2 receiver.** Contact him on tel: 01533 876459, or write to him QTHR if you can help.

● Douglas Woodford, G8IB, would like a circuit diagram and any other details of a **KW202 receiver.** All expenses met. Please contact Douglas on tel: 01235 528274 or write to him QTHR.

● Tony Evenett, G3AGZ, wants any information about an instrument repairer who could fix a **Taylormeter 127A** with a broken pointer. As Tony points out, instrument repairers are very thin on the ground these days. If you know of someone who could help, please contact G3AGZ on tel: 01494 782604 or write to him QTHR.

● Harry Stogdale, G4FEQ, would like to hear from anyone with knowledge of the **Shimizu SS105S QRP transceiver.** He wants details of how to make FM boards, fitting 160m and if possible a description of how the rig works, alignment details etc. Contact Harry on 01977 552862 or write QTHR.

● W C Thompson, G4LQO, requires information on where a commercial **mains RF filter** may be obtained. Please contact G4LQO on tel: 01202 631603, *not* QTHR.

● J Peirson, G3UYC, requires circuit diagrams for the **Marconi CR300/1** receiver and its power supply, and for the **Telequipment D83** oscilloscope. If you are able to help, contact G3UYC on 01245 381545 or write QTHR.

● Godfrey Manning, G4GLM, needs a circuit diagram, manual and/or any other information on the **National NC - 77X** communications receiver. If you can help, please contact him on 0181 958 5113 or write to 63 The Drive, Edgware, Middx HA8 8PS.

THE PETER HART REVIEW

IC-736/738 HF Transceiver Family

By G3SJX*

DURING EARLY 1993, Icom introduced the IC-737 HF transceiver as a mid-priced fully featured radio, largely aimed at base station use. This was reviewed in the September 1993 issue of *RadCom*. Early in 1994, Icom released the IC-736, outwardly very similar to the IC-737 but internally completely re-organised. Apart from a number of small enhancements, the IC-736 includes a built-in mains PSU and covers the 6m band at the full 100W power level in addition to the normal HF bands. Later in 1994, the IC-738 appeared, as a lower cost version, omitting 6m coverage and intended for 12V operation without the mains PSU. Apart from these two features, the IC-736 and IC-738 are identical.

PRINCIPAL FEATURES

THE RADIOS COVER USB, LSB, CW, CW narrow, AM and FM. CW narrow selects the narrow IF filter if this option has been fitted. There is no specific provision to cover data modes (RTTY, AMTOR or packet). These modes should use SSB or FM as appropriate with AFSK, unplugging the microphone on transmit to avoid audio modulation.

The receiver tunes from 30kHz to 30MHz and the IC-736 in addition tunes from 45 to 60MHz. Surprisingly, the handbook and short form sales brochure quote a more restricted tuning range of 500kHz minimum and 50 - 54MHz on 6m, probably as the receiver falls out of specification on sensitivity and spurious responses at these wider limits. However, having the wider coverage available on 6m is very useful for monitoring Band 1 TV signals as an indicator of 6m band openings.

The transmitter covers the amateur allocations plus a hundred kHz or so on either side, with 50 - 54MHz in addition for the IC-736. Individual push buttons select the amateur bands, returning the last used frequency and mode on each band. A second press of the band key returns a second frequency and mode for each band. Further key presses toggle between these two settings. This double band stacking register feature is particularly useful when working both CW and SSB modes. A separate key selects general coverage frequencies.

The frequency may be set in a number of different ways. The 50mm diameter main tuning knob tunes in 10Hz steps at 2kHz (200 steps) per revolution or alternatively 20Hz or 50Hz steps at 4kHz or 10kHz per revolution respectively. Extra fine resolution may also be selected, tuning in 1Hz steps (200Hz per revolution). Using the 1Hz, 10Hz or 20Hz step settings, auto speed-up is engaged when the knob is rotated rapidly. A quick tuning step button engages coarser tuning steps of 1 - 10kHz, programmable in 1kHz increments, at 100 steps per revolution. This is useful for larger changes of frequency. UP / DOWN keys step the frequency in increments of 1kHz - 1MHz, programmable in intervals of 1kHz. This is most conveniently left at 1MHz to provide band setting in general coverage mode or at say 20kHz for rapid steering within the amateur bands. The frequency may be entered directly using the numeric keypad which doubles as the band select keys. Last but not least, the frequency may be tuned, albeit rather slowly, using the UP / DOWN keys on the microphone.

The usual A and B VFOs are provided with split frequency capability. These may be

*The Willows, Paice La, Medstead, Alton, Hants GU34 5PR.

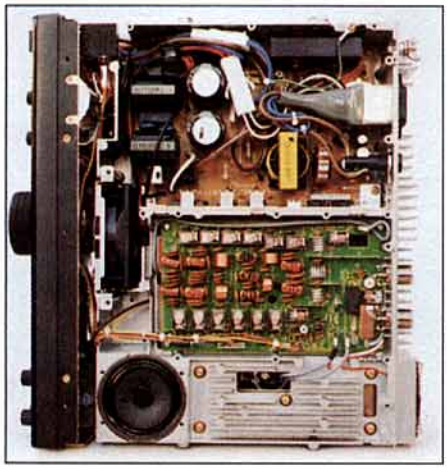
equalised and split operation selected by a single key press. Another button (XFC) allows reception on the transmit frequency and enables this frequency to be tuned from the main tuning knob and other tuning controls. In split operation, the transmit frequency is indicated as a sub frequency on the main display panel. RIT is provided over a range of ±9.99kHz in 1Hz or in 10Hz steps and displayed in the sub display. This is a wider range than on the IC-737. Independent transmit tuning over the same range is also provided.

The IC-736 and IC-738 have 101 memory channels selected by a small click-step rotary control. 89 of these store one frequency and mode, 10 will store two frequencies and modes for split operation and two channels are used to store scan limits. There are the usual read / write operations, including direct tune from any memory location to any frequency, but, as with the IC-737, there is no memory preview. This would have been simple to include as the sub frequency display is already provided for split operation. There is also no provision to partition the memory into smaller units as is done on many radios. In addition to the memories, a memo pad is provided. This is a quick and easy one touch temporary store and recall facility which stores up to 10 frequencies on a stack. This is read out sequentially, last in, first out.

Three scan modes are provided, scanning between two frequency limits, scanning of all occupied memory channels and scanning of selected memory channels. Scan resume condition and scan speed are selectable.

There is no selectable IF bandwidth setting on SSB, AM or FM but variable bandwidth is available on SSB and CW in the form of passband tuning. On CW, narrow bandwidth filters may be fitted to both the 2nd and 3rd IFs as optional extras with a choice of 250Hz or 500Hz bandwidth available. An audio based notch filter is also fitted.

Receive functions include switchable preamp, switchable 20dB input attenuator, dual speed AGC, single noise blanker and all-mode squelch. There is an RF gain control fitted now, this had been omitted from the IC-737. The CW pitch is fixed at 800Hz.



Top view of IC-736 with cover removed.

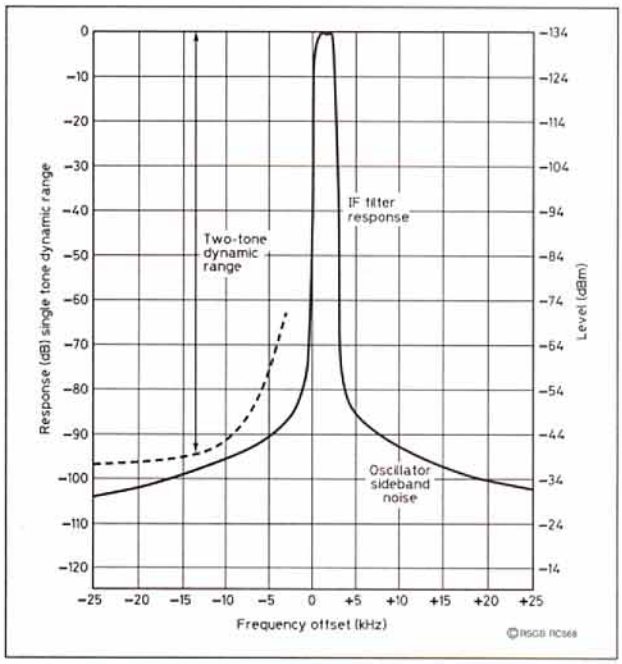


Fig 1: Effective selectivity curve on USB.

Transmit functions include audio based speech processor, built-in CW keyer operating over the range from 7 to 41 words per minute, full and semi break-in on CW, power output variable from a few watts to 100W and VOX. VOX was not provided on the IC-737. Metering on transmit shows relative power output, SWR or ALC level, which is more comprehensive than the IC-737. A sub-audible tone encoder is available as an optional extra for repeater working.

A large backlit LCD panel is used for the display and this is bright, clear and very easy to read. The frequency is indicated to 10Hz resolution with a separate smaller sub display indicating RIT offset or Tx frequency in split operation and the 1Hz resolution digit when selected. The memory channel number is shown and the usual indicators for mode, VFO / memory status etc. When operating on data modes, the displayed frequency needs to be offset to indicate the true operating frequency. A possible solution is to set the RIT to the AFSK offset required.

Both the IC-736 and IC-738 contain an auto-ATU as standard fitment matching antennas up to about 3:1 VSWR, with manually selectable options for handling higher VSWRs. This functions on transmit only and is bypassed on receive. The auto-ATU in the IC-736 also functions on 6m, matching up to about 2.5:1 VSWR. Band stores are provided to give fast tuning by returning to the last used settings when a band is selected. Two separate antennas may be connected and selected from the front panel. Band stores memorise which antenna is used on which band and switch to the appropriate antenna when that band is selected.

Three accessory sockets are provided on the rear panel (see photograph on p43 - the IC - 736 is at the top) to interface to external auto-ATUs, data terminals, Icom linear etc. Relay controlled T / R switching and ALC is also provided for general linear use and these interface connections are common to all Icom HF transceivers. Hence accessories and external connections to other units are all directly interchangeable. The Icom CI-V serial computer control interface is also fitted, fully compatible with other Icom radios. The VOX controls and speech compressor gain setting are provided on the rear panel.

An excellent 62 page instruction manual is included together with a set of circuit diagrams.

DESCRIPTION

THE IC-736 and IC-738 measure 330W x 111H x 285Dmm and fall into the middle size category, ideal for home station use but easily transportable. The IC-738 weighs 8.6kg and the IC-736, with mains PSU, weighs 10.5kg. The transceiver is very sturdily constructed around a diecast main chassis assembly. This supports the upper facing units with integral rear finned heatsink. Two fans are used, to cool the PA and the auto-ATU and these are very quiet in operation. A 6.5cm diameter speaker is mounted facing upward using the diecast assembly as a baffle.

The receiver is triple conversion with IFs of 69.01MHz, 9.01MHz and 455kHz on all modes. The transmit signal is generated at 9.01MHz and mixed via 69.01MHz to the final frequency. The transceiver uses a common front-end signal path for all bands including 50MHz with dual FETs in the receiver RF amplifier and first mixer and a pair of power MOSFETs in the 100W wideband (1.8 - 54MHz) PA. The frequency synthesiser uses the normal combination of DDS (direct digital synthesis) and PLL (phase locked loop) to give fast tuning and good spurious performance with small step size. A lithium back-up battery, easily accessible on the rear of the front panel unit, is used to preserve the memory contents. This has a five year life.

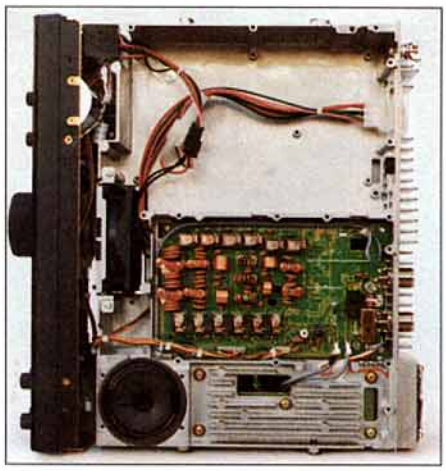
MEASUREMENTS

MEASUREMENTS WERE made using the IC-736, but are applicable to the IC-738 which uses identical circuitry. Details are given in the table with additional comments as follows.

Receiver measurements

S-METER CALIBRATION

The calibration was similar on all modes including FM and shows excellent linearity.



Top view of IC-738 with cover removed.

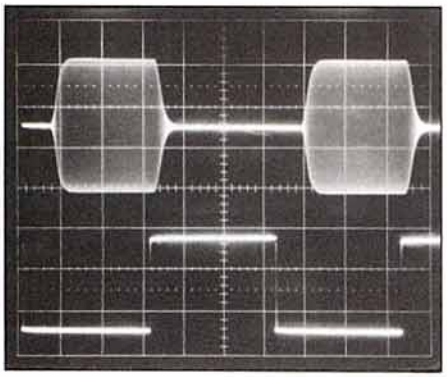


Fig 2: CW Keying waveform at 40WPM in semi break-in mode.

SPURIOUS REJECTION

Rejection of all measured spurious responses including first and second IFs and first mixer image was in excess of 100dB, except on 50MHz where the first IF rejection was 80dB. This is an excellent result.

SELECTIVITY

The review radio was fitted with 500Hz b/w CW filters in both the 9MHz and 455kHz IFs. The measurements show the extremely good skirt selectivity measured on CW which is primarily due to the 455kHz filter. Although this is an expensive filter, it is well worth fitting if CW is of major interest. With both filters fitted, passband tuning is also effective on CW, narrowing the bandwidth still further. This is preferable to fitting 250Hz filters in my opinion. Do not be tempted to economise by fitting only the 455kHz filter and not the 9MHz as the full performance will not be achieved due to dynamic range limitations in the second mixer. The IF bandwidth on SSB was a little narrow for my preference.

STRONG SIGNAL PERFORMANCE

The overall strong signal performance in terms of front-end dynamic range and close-in performance is very good. Although the reciprocal mixing performance is also very good, I measured somewhat better figures for the IC-737 sample reviewed which was exceptionally good. The overall effect of IF filter selectivity and reciprocal mixing is shown in **Fig 1** - an excellent result.

Wideband second order responses measured at 21.1MHz (test signals 11.6 and 9.5MHz) and 14.3MHz (test signals 7.2 and 7.1MHz) showed a response similar to the normal 3rd order 50kHz spacing test.

FREQUENCY CALIBRATION

The receive and transmit frequencies were accurate to within 60Hz. The CW frequency read correctly for a beat note of 800Hz.

Transmitter measurements

POWER OUTPUT

The figures given in the table were measured with the ATU out of circuit. The ATU introduced a loss of about 10 - 15% (0.5 - 0.8dB). The power output was variable smoothly down to 2.5W and the power meter, although calibrated in percentage output, read remarkably close to the true power in watts above 20W. Into a mismatched load, the power output reduced substantially (2:1 VSWR 55W min, 3:1 VSWR 28W min) but the auto-ATU restored output to around the 100W level.

ICOM IC-736 / 738 MEASURED PERFORMANCE

RECEIVER MEASUREMENTS

	SENSITIVITY SSB 10dBs+n:n		INPUT FOR S9	
FREQUENCY	PREAMP IN	PREAMP OUT	PREAMP IN	PREAMP OUT
1.8 MHz	0.14µV (-124dBm)	0.32µV (-117dBm)	20µV	80µV
3.5 MHz	0.14µV (-124dBm)	0.32µV (-117dBm)	20µV	80µV
7 MHz	0.11µV (-126dBm)	0.25µV (-119dBm)	16µV	63µV
10 MHz	0.16µV (-123dBm)	0.32µV (-117dBm)	18µV	71µV
14 MHz	0.13µV (-125dBm)	0.25µV (-119dBm)	18µV	63µV
18 MHz	0.13µV (-125dBm)	0.25µV (-119dBm)	20µV	63µV
21 MHz	0.14µV (-124dBm)	0.25µV (-119dBm)	20µV	63µV
24 MHz	0.14µV (-124dBm)	0.25µV (-119dBm)	22µV	63µV
28 MHz	0.16µV (-123dBm)	0.32µV (-117dBm)	22µV	71µV
50 MHz	0.13µV (-125dBm)	0.16µV (-123dBm)	5.6µV	18µV

S-READING (14MHz)	INPUT LEVEL SSB
S1	0.9µV
S3	1.6µV
S5	2.8µV
S7	6.3µV
S9	18µV
S9+20	200µV
S9+40	2mV
S9+60	18mV

MODE	IF BANDWIDTH -6dB	-60dB
SSB,CW	1970Hz	3320Hz
CW(N)	480Hz	780Hz
AM	8010Hz	13.9kHz
FM	12.6kHz	24.5kHz

AM sensitivity (28MHz): 0.8µV for 10dBs+n:n at 30% mod depth

FM sensitivity (28MHz): 0.18µV for 12dB SINAD 3kHz pk deviation

AGC threshold: 0.6µV

100dB above AGC threshold for +3dB audio output

AGC attack time: 2ms

AGC decay time: 0.2 - 0.4s (fast), 3 - 4s (slow)

Max audio before clipping: 2.1W into 8Ω at 2% distortion

Inband intermodulation products: -30dB

	INTERMODULATION (50kHz Tone Spacing) PREAMP IN		PREAMP OUT	
Frequency	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range
1.8 MHz	+1dBm	90dB	+2dBm	86dB
3.5 MHz	+9dBm	96dB	+17dBm	96dB
7 MHz	+10dBm	98dB	+21dBm	100dB
14 MHz	+11dBm	98dB	+21dBm	100dB
21 MHz	+13dBm	98dB	+24dBm	102dB
28 MHz	+16dBm	100dB	+22dBm	100dB
50 MHz	+2dBm	92dB	+5dBm	92dB

TONE SPACING (7MHz BAND)	3rd ORDER INTERCEPT	2 TONE DYNAMIC RANGE
3 kHz	-31dBm	63dB
5 kHz	-22dBm	76dB
10 kHz	+4dBm	94dB
15 kHz	+8dBm	92dB
20 kHz	+10dBm	98dB
30 kHz	+10dBm	98dB

FREQUENCY OFFSET	RECIPROCAL MIXING FOR 3dB NOISE	BLOCKING	TX NOISE IN 2.5kHz BANDWIDTH
3 kHz	83dB	-22dBm	-76dBC
5 kHz	87dB	-22dBm	-80dBC
10 kHz	94dB	-20dBm	-88dBC
15 kHz	97dB	-14dBm	-91dBC
20 kHz	101dB	-6dBm	-95dBC
30 kHz	106dB	+3dBm	-100dBC
50 kHz	112dB	+3dBm	-103dBC
100 kHz	119dB	+3dBm	-105dBC
200 kHz	123dB	+3dBm	-106dBC

TRANSMITTER MEASUREMENTS

FREQUENCY	CW POWER OUTPUT	SSB(PEP) POWER OUTPUT	HARMONICS	INTERMODULATION PRODUCTS 3rd order	5th order
1.8 MHz	120W	122W	-55dB	-20dB	-35dB
3.5 MHz	117W	122W	-60dB	-28dB	-36dB
7 MHz	115W	120W	-70dB	-26dB	-38dB
10 MHz	114W	120W	-65dB	-28dB	-38dB
14 MHz	113W	120W	-57dB	-26dB	-40dB
18 MHz	112W	117W	-58dB	-21dB	-35dB
21 MHz	111W	115W	-68dB	-20dB	-32dB
24 MHz	112W	119W	-55dB	-22dB	-38dB
28 MHz	112W	118W	-63dB	-20dB	-35dB
50 MHz	108W	112W	-64dB	-16dB	-26dB

Carrier suppression: 55dB. Sideband suppression: 62dB @ 1kHz. Transmitter noise: see table above. Transmitter AF response at -6dB: 450 - 2600Hz. Transmitter AF distortion: 1%. Microphone input sensitivity: 15mV for full output. T/R switching speed (SSB): mute - Tx 7ms, Tx - mute <1ms, mute - Rx 22ms, Rx - mute 1ms Power into load mismatch: see text.

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

SSB PERFORMANCE

Although the third and fifth order transmitter distortion products were fairly poor, they are typical of 12V operated PAs. The higher order products were considerably better than most, probably due to the use of power MOSFETs in the PA. The speech processor did not substantially effect the distortion product level.

CW KEYING PERFORMANCE

Fig 2 shows the CW keying waveform with semi break-in at 40WPM and **Fig 3** the equivalent keying spectrum. With full break-in, there was slight character shortening at this speed but overall a very good performance.

TRANSMIT - RECEIVE SWITCHING SPEED

The measured figures should permit satisfactory operation on all data modes.

ON-THE-AIR PERFORMANCE

I USED BOTH RADIOS in place of my normal Icom set-up and in conjunction with my linear. As with other Icom HF rigs, the linear switching contacts are only rated at 16V 2A. I use an additional external relay to switch my Kenwood TL-922 linear which needs a much higher voltage switching capability.

I was quite impressed with the performance of these radios and could find little to fault. The receiver performed well on SSB and CW with adequate sensitivity on the higher bands and good strong signal performance. I could just detect overload on 7MHz during the evenings but this cleared with the preamp switched out. The audio bandwidth seemed a little restricted on SSB, which reflects the rather narrow IF bandwidth on this mode, but was of good communications quality. The AGC performance seemed entirely satisfactory, an improvement over the IC-737 which had a rather short decay time and tended to chop. I found the notch filter disappointing. Although it did not significantly affect the wanted signal, the depth seemed fairly shallow and being an audio based design, it could not prevent a strong carrier from desensitising the receiver.

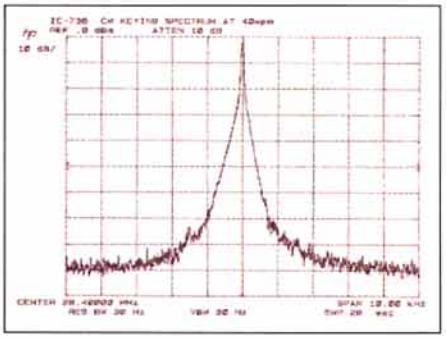


Fig 3: CW keying spectrum at 40WPM. Horizontal 1kHz / division. Vertical 10dB / division.

The transmitter performed very well and good reports were obtained. Full break-in was effective up to quite high speeds and the processor seemed to be clean and provide that extra punch.

The ergonomics were generally good but I continue to dislike the use of auto speed-up which comes into operation at relatively slow tuning speeds. In my opinion, there is really no substitute for a 1000 step per revolution shaft encoder for the main tuning drive (giving 10kHz / revolution with 10Hz step size). Attempts to use cheaper lower resolution encoders together with speed-up and / or switchable step sizes always results in a less friendly system. The tuning is very smooth and is entirely free of clicks or other problems. Split frequency operation is particularly easy to use and the memo pad feature useful. As an equal user of SSB and CW, I am frequently moving between the CW and SSB segments of the bands and I find the use of double band stores for each band a real boon. It seems surprising that this feature has not been included on more radios as it costs virtually nothing to implement.

CONCLUSIONS

OVERALL, I found the IC-736 and IC-738 excellent radios for their price bracket, easy to use with plenty of features, and a very good electrical performance. With full power output available on 6m, the IC-736 will be particularly attractive for the 6m + HF enthusiast. Unfortunately, this band was completely dead during the period of this review.

The current list prices inc VAT are £1649 for the IC-738 and £1969 for the IC-736. The 500Hz bandwidth CW filters cost around £65 for the 9MHz units and £129 for the 455kHz units.

ACKNOWLEDGEMENTS

I WOULD LIKE to thank Icom (UK) of Herne Bay, Kent for the loan of the equipment. ♦

RADCOM USER REVIEW

Alinco DR-150E 2m FM Transceiver

Reviewed by RSGB HQ Staff

THE ALINCO DR-150E is a tiny, but powerful, 2m FM transceiver which also covers the 70cm band on receive. Its features include 100 memory channels, full scanning facilities, 'Channel Scope' (a front-panel panoramic display of seven channels), 1200 / 9600BPS packet connection and CTCSS tone encoder fitted as standard. There are three power output levels: 50W, 25W and 10W, set from a front panel push button.

The transceiver comes complete with a microphone, which contains UP / DOWN and LOCK buttons, a power lead, mobile mounting bracket, a 64-page handbook, a separate schematic diagram and a handy 9 x 5.5cm 'crib' card - an *aide memoir* for setting the operating functions (see below).

Both the antenna and power are connected via 'flying leads' emerging from the rear of the set which are terminated by a power connector (with 15A fuse in the positive lead) and SO239 connector for the antenna. This helps to make the set quick and easy to remove from the car, thus foiling potential thefts. The power cable supplied is long enough to connect directly to the battery and route around the car interior to the mounting position, and is fused with 15A fuses in both the positive and negative leads. These are in addition to the fuse fitted between the power connector and the set itself: an important safety feature. It is worth pointing out that since the set draws 10A when transmitting at high power, no attempt should be made to power it from the car cigarette lighter socket.

The set is really tiny for such high power output - consequently a large proportion of the overall size is made up of the heat-sink. It is so light (800g) that it can easily be pulled around the desk by the microphone lead, or when in the car it is liable to fly off the parcel shelf when negotiating roundabouts, so to avoid damage to both the set and vehicle occupants it is important to ensure that it is properly installed!

CONTROLS

THE CONTROLS consist of a small VFO / memory channel knob, even smaller volume and squelch knobs, a row of nine buttons to control the various functions, and tiny on / off and high / medium / low power buttons. All controls (other than the volume and squelch knobs) have a dual function, with many of the buttons having three or even four functions, depending on whether the 'F' (Function) button is pressed and - if so - for how long. From this it can be inferred that to master the operation of the Alinco DR-150E could take some considerable time, although in practice most users would simply use this multiplicity of functions to tailor the rig's operation to their own liking, and once set they can be forgotten. If you do want to change the operating parameters, however, the 'crib' card would mean that you would not have to carry the instruction book around with the rig.

FREQUENCY COVERAGE

AS SUPPLIED, the transceiver covers 144 - 146 and 430 - 440MHz FM on receive. However, by pushing a combination of front panel keys, the receiver will cover 108 - 174, 430 - 512 and 800 - 999MHz, and in both FM and AM modes. The transmit side will still only operate on 144 - 146MHz FM, and it should be noted that the receive specifications are guaranteed within the amateur bands only.

DR-150T/E REFERENCE KEY			
KEY	F ON	F BLINKING	KEY+POWER ON
F	S METER SQUELCH	SQUELCH TIMER	ALL RESET
V/M	WRITE MEMORY CH	CLEAR MEMORY CH	MEMORY RESET
MHz	CHANNEL STEP	AM/FM(T)	CHANNEL DISPLAY
BAND	SHIFT REVERSE	TIME OUT TIMER	LITZ ON/OFF(T)
SCAN	MEMORY SKIP	SCAN TYPE	DTMF DURATION
SRCH	BELL ON/OFF	NOT USED	
PRI	TONE SQUELCH	DSQ	DTMF DELAY
VFO	SHIFT, SPLIT	VFO RESET	NOT USED
CALL(T)/TONE(E)	KEY LOCK	BEEP ON/OFF	CALL(T)/TONE(E) SETTING
H/L	DIMMER	ATT ON/OFF	

The useful card supplied to help the memory if you wish to re-program the set.

As supplied, the transceiver tunes in 12.5kHz steps when in VFO mode, ie it requires two 'clicks' per channel, but this can be changed to the standard 25kHz channel spacing, or indeed to any of eight possible tuning steps, by one of those user-definable programming functions already referred to.

OPERATING

ONCE PROGRAMMED with 25kHz channel spacing and the standard repeater and simplex channels, the set was very easy to operate. There are several scan modes which are initiated by pressing either the SCAN button on the front panel, or the UP or DOWN buttons on the microphone for more than 0.5 second. The factory default is 'Timer scan' whereby the scan stops when finding a signal and then resumes five seconds later. In order to stop it from resuming scanning, either the 'F' button on the front panel or the PTT switch must be pushed within the five seconds. This was found to be somewhat inconvenient and the 'Busy scan' mode, whereby the scan stops after finding a signal and then resumes two seconds after the signal disappears, was preferred.

There are dual 'A' / 'B' VFOs, as found in most HF transceivers, with the front-panel VFO button toggling between them, but little use was found for dual VFOs since frequency shift operation (for working through repeat-

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DR-150E

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Switchable AM/FM Receive

108-174 / 430-512MHz

800-990 MHz

£349.95

Reviewed This Issue

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DR-610E

2M/70cm 50W/35W

Switchable AM/FM Receive

108-174 / 400-512MHz

Detachable head

£659.95

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ALINCO have more exciting products lined up for 1995 - stay with us!

DR-MO6

6M 10/3W Transceiver

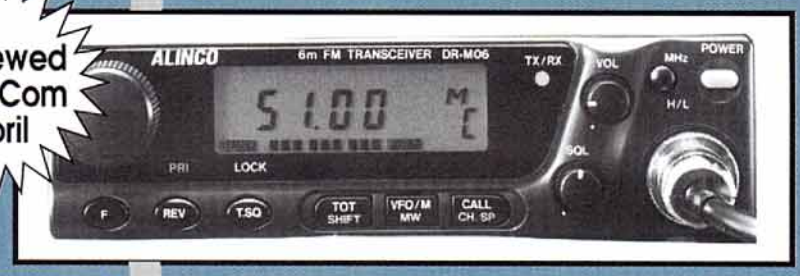
100 memories

Full DX potential

CTCSS Encode

£299.95

Reviewed Rad Com April



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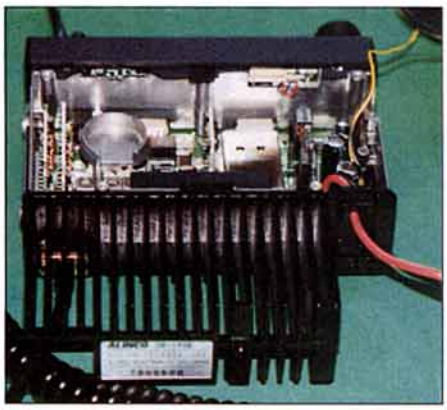


Note the size of the heat-sink required to keep the 50W PA running cool.

MANUFACTURER'S SPECIFICATIONS

General	
Frequency range	Tx / Rx: 144.000 - 145.995MHz*
	Rx: 430.000 - 439.995MHz*
Modulation	F2, F3 (FM)*
Antenna impedance	50Ω
Supply voltage	13.8VDC
Current consumption	Tx (high power) 10A / Rx 0.6A
Frequency stability	plus / minus 10 PPM max.
Dimensions	140(W) x 40(H) x 129(D)mm
Weight	approx 800g (body only)
Microphone	EMS-5A
Operating temperature	-10°C - +60°C
Transmitter	
Power output (approx)	High 50W / Mid 25W / Low 10W
Modulation system	Reactance modulation
Spurious emission	not more than -60dB
Max deviation	plus / minus 5kHz
Distortion at 60% modulation	not more than 3%
Microphone impedance	2.2kΩ
Receiver	
Receiving system	Double conversion superheterodyne
IF	First 45.1MHz / Second 455kHz
Sensitivity (12 dB SINAD)	2m band -16dBm or better, 70cm band -10dBm or better
Selectivity	-6dB: 12 kHz or more, -60dB: 28kHz or less
Squelch sensitivity	-20dBm or better
AF output	1.5W
AF output impedance	8Ω

Note: Specifications guaranteed in the amateur band only.
* See text.

ers) does not require the use of two VFOs, but can be achieved on just one. In VFO mode, switching from a simplex to a repeater frequency involves several button pushes to set the 600kHz shift, and the process has to be repeated when switching back from repeater to simplex use. This is inconvenient, and especially so when mobile, but can be overcome by programming all the usual simplex and repeater channels into the set's memory and using the rig in 'memory mode' rather than 'VFO mode'. To initiate the 1750Hz toneburst in order to open a repeater, the front panel TONE button must be pressed; it would be more convenient to have the toneburst available on the microphone PTT switch. However, tone bursts are being used less and less now as CTCSS use increases.

When scanning in memory mode, empty memories are ignored, enabling all the standard simplex and repeater channels (plus any favourite 'spot' frequencies in the all-mode section of the band) to be scanned very rapidly. In VFO mode an upper and lower frequency limit can be set for scanning, so that, for example, the CW and SSB sections can be ignored.

CHANNEL SCOPE

THE 'CHANNEL SCOPE' function will show you activity on seven channels at a time by means of a front panel panoramic display. In VFO mode, the display simply shows activity on the channel selected and on the three channels above and below it. In memory mode, if you are tuned to, say, channel 35, the Channel Scope will show you activity on whatever has been programmed into channels 32 - 38. Only the audio from the selected centre channel is audible (in this example, channel 35). These channels could be any frequencies, and need not be in frequency order, so that you can visually monitor for activity on, say, SU21, S22, your 2m club net frequency, S20, your local 2m and 70cm repeaters, and your favourite 2m simplex channel simultaneously, while listening to the audio on S20 at the same time. This audio is muted for a short duration while the Alinco checks the activity on the other channels every five seconds.

ON TRANSMIT

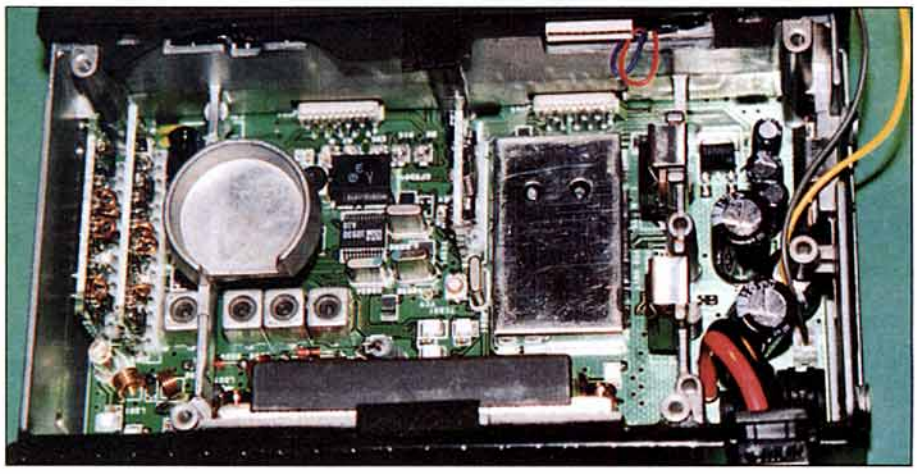
CALLING CQ with 50W on simplex channels can bring forth replies from stations which cannot be copied readily, particularly if - like the car used for the tests - the vehicle is not well suppressed and puts out a lot of 'hash' on 2m!

That is not to say the Alinco DR-150E is in any way insensitive, merely to point out that many stations run only 5W or 10W to perhaps inefficient antennas, and when using this transceiver you may well be heard better than you can hear.

Nevertheless, the 50W output level did permit continued access to repeaters which were providing only 'scratchy' reception when travelling through poor locations, allowing QSOs to continue under circumstances where the signal into the repeater would have been lost completely if using a transceiver of lower power output. This was particularly useful for contacting locals on my 'home' repeater when beyond its primary coverage area. However, beware of opening two or more repeaters simultaneously and causing QRM to other users when using high power!

Simplex QSOs over long distances with well-equipped stations were commonplace - in short, almost any station that could be heard could be worked. The 'low-power' position of 10W was more than adequate under most circumstances, and the 25W medium power level was hardly used: 50W / 10W / 1W may have been a more useful set of power levels than 50W / 25W / 10W.

The set supplied was not tested on packet. However, there are separate connections for 1200BPS and 9600BPS packet operation. The DR-150E costs £349.95 and is available from Waters and Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS, tel: 01702 206835, fax: 01702 205843. ♦



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HDD	See each machine
Controller	VL Bus
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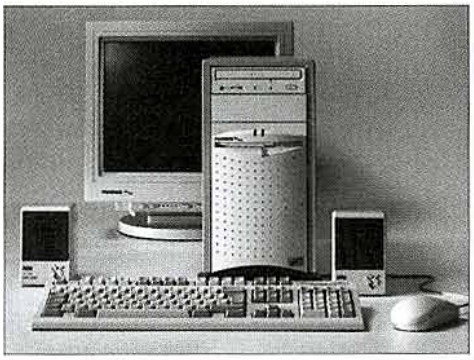
VGA Mem	1MB, VLB
FDD	3.5" 1.44MB
Keyboard	Yes - Cherry
Mouse	Yes - Logitech
Software	DOS V6.2, WFW V3.11
Monitor	14" SVGA .28 pixels Non-interlaced, Low Radiation with Power Management



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RADCOM EQUIPMENT REVIEW

The Howes DXR20 Receiver Kit

Reviewed by Chris McWhinnie, G0MQW

THE HOWES DXR20 kit is an SSB and CW receiver which covers the 20, 40 and 80m bands, plus any other HF frequency band with an optional plug-in module. The receiver is made up of three separate kits: the DXR20 receiver kit itself, the HA20R hardware pack, which includes the case, and the DCS2 S-meter kit. The Howes catalogue states that the S-meter is an 'optional kit', but the hole is already cut in the front of the HA20R chassis and the completed receiver would look fairly odd without the meter. The kits arrived in excellent condition, protected by bubble wrap and curly polystyrene bits. All the components and the hardware for each kit were in polythene bags inside sturdy boxes.

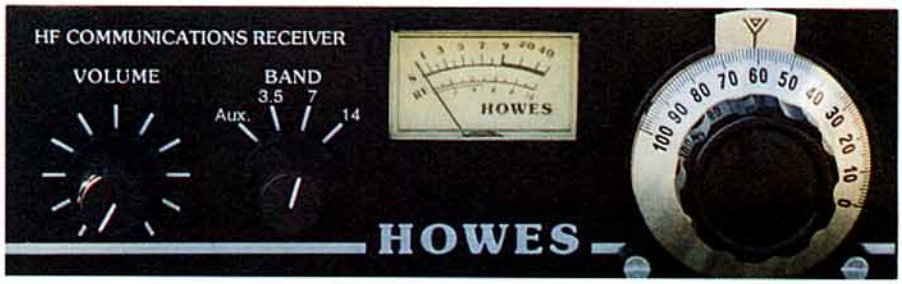
PREPARATION

SPENDING TIME READING the instructions is the most essential preparation for constructing this kit. The DXR20 instructions have a more up-to-date look than those of some earlier Howes kits. The art work is improved and the clear font is much easier to read when constructing. A brief technical description of the receiver reveals that it is of the 'direct conversion' type and that it is possible to cover 1.8 - 30MHz with the appropriate additional modules. There is a full circuit diagram, and explanations of the design. The 'notes on soldering' are essential reading for less experienced constructors, and a good reminder to everyone else. The instructions state quite clearly that a soldering iron of about 25W with a small tip is required, as are small side cutters, long-nosed pliers and a trimming tool. Most kit builders possess the cutters and pliers. However, the trimming tool for the can-type coils may be difficult to obtain, and as many constructors have learnt to their cost it is just not worth taking the risk of using a metal screwdriver. A test meter and a de-soldering pump for that inevitable mistake would have been useful additions to the list.

PCB CONSTRUCTION

FOLLOWING HOWES' notes in order, the first parts to be fitted are the terminal pins, for external connections. These needed some pressure applied with a hot soldering iron to push them through. This can be slightly hazardous, as the iron is inclined to slip and the tip of the iron was bent slightly during this procedure.

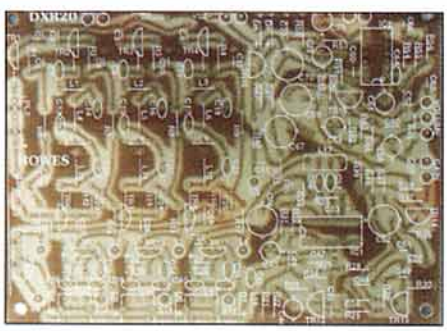
Next came the 56 resistors, which are listed very neatly on the page, fortunately with all the colour bands. A pencil is essential here for marking the list as each resistor is fitted.



The instructions suggest soldering each resistor as it is fitted, although fitting all the resistors first and then soldering them may make it easier to correct any mistakes before soldering. This took exactly an hour, including the soldering, using a natural light bulb, although daylight would have made the job a little quicker. The clear white markings on the PCB and sensible numbering of the resistors helped to locate most holes quickly, although a few were rather elusive.

The 13 axial inductors came next. The body of one was broken by pulling too hard with pliers, but it still worked. Then came the seven diodes and 74 capacitors. The instructions clearly identify which way round the components that have polarity need to be fitted. These notes would be better placed chronologically in the text than in the later parts list. All this took another two hours.

Transistors and ICs were then fitted. Eight of them need their emitter lead removing close to their plastic bodies, as they are being used as switching elements for the RF filters instead of diodes. This was a bit fiddly, and caused some concern that the collector leads which needed to be bent at 90° would snap, although none of them did. Both IC 'chips' also needed the pins bending inwards to fit the PCB. Three coils in screening-cans were fitted next. One was a bit stubborn, as the PCB hole was just slightly too small. That was another one and a half hours.



The main DXR20 printed circuit board.

The most fiddly part of the kit was the mixer input transformer, which needed to be wound on a two-hole balun core. Six turns of blue wire and two turns of yellow wire on the top sounds easy, and so it was until the wires were cut and the ends of the very thin wire stripped of insulation by melting with the soldering iron. It was a struggle to get the four thin wires into the right holes and keep them there long enough to solder them. One wire was a bit short as the coil pulled through but the continuity was tested with a meter and found to be OK. By the time the last components - two six-pin plugs for the optional plug-in frequency ranges - were fitted, another two hours and twenty minutes had elapsed, albeit quite enjoyably.

At this stage a very neat PCB with lots of shiny components and mainly shiny soldering joints was completed. The board's white markings still showed for trouble-shooting and the board was thin enough to hold up to the light to spot unsoldered components and to show up any solder bridges.

HR20R HARDWARE PACK

THE HR20R HARDWARE kit includes a chassis with removable plastic protection and a front panel covering already stuck on, all the knobs, screws and nuts, an 8:1 'vernier dial', the SO239 aerial socket, a 50pF variable capacitor and a set of instructions. A medium cut flat file, a screwdriver and spanner for M3 nuts and bolts and a number of drills were listed as necessary tools for working on the hardware kit. A centre punch is also almost essential, as it is very easy to miss felt-tip marks.

The corners at the back of the base needed rounding off as per instructions, hence the file. Holes needed to be drilled in the base, sides, back and capacitor-mounting bracket.

The small mounting bracket for the variable capacitor needed fitting along with the geared dial which is marked 0 - 100. It is described as 'vernier' and the Japanese design is very neat, but does not have a vernier

scale. The bracket, dial and capacitor needed fitting carefully to make the tuning movement as smooth and light as possible.

THE BOARDS

THE BOARDS ARE supposed to be spaced off the chassis by an M3 nut, but only the most neatly-soldered board could get away with just one nut spacing. The M3 nuts are only a few mm thick and finger pressure on the PCB was enough to ground some of the more artistic soldering joints on to the base. A second nut was therefore added at each corner to provide more spacing. Once the knobs, controls and sockets were installed it was time to wire in the board. Another two and a quarter hours had passed.

Connections to the band-switch, the volume control, and audio output were soldered using the terminal pins. 22SWG tinned copper wire was provided for wiring the capacitor and band-switch and thin co-axial cable for the aerial input. No power lead is provided at all and the inclusion of a fused DC power lead with a matching DC socket would be a welcome addition to the kit.

The HR20R hardware kit and DXR20 PCB and components.

TESTING

A SMALL BATTERY was used for testing the receiver, rather than testing for smoke with a 20A power supply. Headphones were plugged in and power applied. There was a click and a hiss and nothing happened.

The instructions listed seven very sensible suggestions in the case of a non-functioning receiver. The connection of an aerial had been overlooked, but there was still nothing. The band-switch and the aerial input leads were waggled. When the volume control terminal pins were touched, the set sprang into life. The potentiometer had no effect and another waggle established that it was connected the wrong way round and that the three terminal pins all had intermittent connections. They had been overlooked when soldering, as had the aerial pins, but being at the edge of the board this was easily fixed.

DCS2 S-METER ACCESSORY BOARD

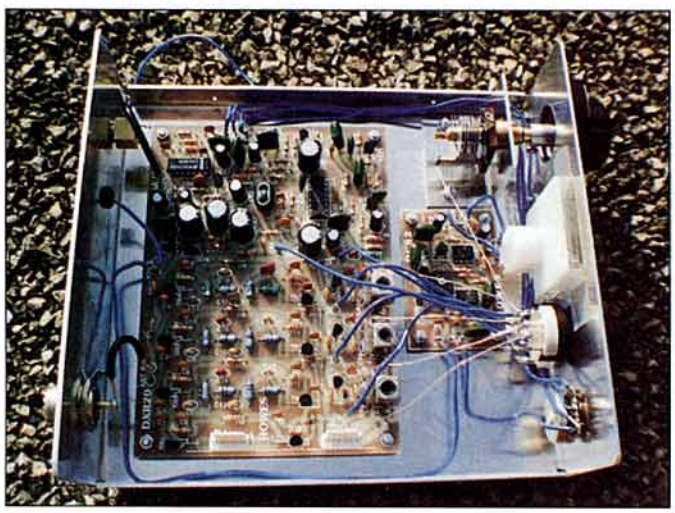
THE S-METER driver, on a second small PCB, took only half an hour to position the components and solder, but it also did not work when it was switched on. Two of the three diodes had been placed the wrong way round, due to being in a rush when wiring up and soldering. It was rather fiddly to remove the PCB from under the front band-switch wiring.

Although the instructions suggest that the receiver should be installed and tested first, I would suggest fitting the DCS2 meter circuit at the same time as the receiver board, but leaving it de-powered. The unit can also indicate relative RF voltage in combination with a low power transmitter.

ALIGNMENT

THERE WAS NO trimming tool supplied, which is an omission. A search through the junk box found a selection of seven, none of which fitted the tiny slot in the three ferrite cores, so a small plastic trimming tool had to be cut down to fit.

Listening to each band suggested that the 80m range was probably above or below the required band, that the 40m range was probably below 7MHz and that the 14MHz band either needed drastic re-aligning or no signals were propagating.



Inside view of completed DXR20 receiver.

It was noted in the instructions that the cores need to move by between 2.5 and 5mm below the can tops. Knowing that a direct conversion receiver has an oscillator at the received frequency, the aerial of the DXR20 was connected to the RF input of a communications receiver and switched to CW. A few turns of the cores took them to the requisite depth and produced healthy whistles. The dial was set to '0' at a few hundred Hz below 3,500, 7,000 and 14,000kHz. The 20m coil was, by nature of the higher frequency, the most difficult to set precisely.

Not everyone will have another receiver for aligning the three coils. The mechanical method of measuring the core depth worked fine for the lower frequencies but I was over 120kHz out in frequency at 20m using that method.

CIRCUIT DESCRIPTION

AN 8-POLE band-pass filter for each band reduces unwanted signals. Switching diodes are used to isolate the required sections. In common with all direct conversion receivers the RF signal is combined in a mixer circuit with an on-board RF oscillator to produce a audio signal, ie an incoming signal at 3600kHz and the VFO set at 3601 or 3599kHz would produce a 1kHz CW note. An SSB transmission would need the receiver's VFO to be tuned to a frequency close to that of the missing carrier.

Audio frequency amplification is followed by audio filtering followed by more amplification up to 1W maximum, which is more than sufficient for a loudspeaker or headphones. The S-meter circuit is driven by the audio stage of the receiver. Two operational amplifiers produce the output to the meter.

PERFORMANCE

THE ACTUAL tuning ranges obtained were:

Dial 0 = 3500kHz, 92 = 3800kHz, 100 = 3810kHz

Dial 0 = 7000kHz, 63 = 7100kHz, 100 = 7175kHz

Dial 0 = 14000kHz, 67 = 14350 kHz, 100 = 14541kHz

The DXR20 was compared with a Sony 2001D portable and the JRC NRD-535 communications receiver. It seemed unfair to compare the DXR20 with the NRD-535 but once it had borne comparison with the Sony synthesised portable and whip aerial, it was only with the use of the additional IF filtering of the JRC receiver - at 20 times the cost - that

I could appreciably improve on the readability of signals from the Howes receiver. A short 5m length of wire or a Howes AA2 HF active aerial was used for all the tests.

The wide-open feel of 80m in particular was refreshing to hear after years of the AGC-bound confines of commercial designs. Noise from the active aerial was far more of a factor than any produced by the RF or AF circuit of this receiver. There was no sign of the breakthrough due to the first harmonic of the oscillator from 40m signals, despite the warning in the text.

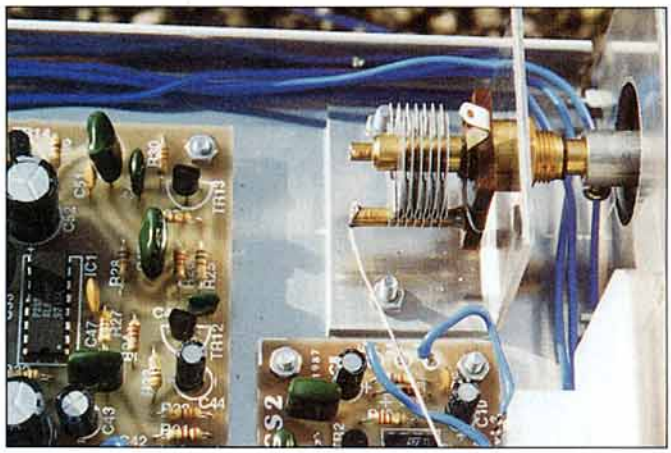
The 40m band appeared to be less sensitive than expected, but this was probably a bonus in the presence of the 41m band broadcasters while the band was in poor shape. The perceived quality of SSB demodulation when signals were well spaced in frequency was better than the Sony portable and the JRC radio.

The 20m band was a disappointment, although not in terms of sensitivity, which was ample. Even with 8:1 tuning reduction gearing in the dial, the wide 540kHz tuning spread make SSB or CW tuning very tricky for those used to commercial communication receivers, although it can probably be mastered with some practice. The range should be reduced and experimentation with the capacitors on the 14MHz oscillator may achieve this.

There was no discernible tuning backlash. The oscillator was stable for all normal purposes, but not recommended for AM demodulation. Stability is aided by the solid case design, voltage stabilisation and stiff wiring.

OVERALL

CONSIDERING THE relatively few components required and the small number of active ones, this receiver gives a very creditable performance and would suit a novice, QRP operator or traveller wanting a small receiver for the most popular amateur bands. The aerial requirement is minimal and the case is very presentable, looking like a commercial product. The S-meter and the box are almost essential, so much so that all three kits should be available as one package with combined instructions, in preference to cross-referencing.



Detail of the main tuning capacitor and DCS2 S-Meter board.

This is an easy route to good amateur band performance at a low financial cost. The dependable results, fine design, ease of construction, layout of the board and written instructions are all in this kit's favour. The overall time to take the receiver from a box of bits to a fully working state was eleven hours, or roughly five enjoyable evenings of work for any grade of radio hobbyist.

The people at Howes sounded very friendly on the phone when I needed the S-meter kit sent to me. They can help with advice, or if you get in too much technical trouble they can intervene for a modest fee.

COST

THE HOWES DXR20 20 / 40 / 80m receiver costs £39.90 in kit form or £67.90 assembled. The DCS2 S-meter costs £10.90 in kit form or £15.90 assembled. Optional Band Module kits (one can be fitted) for 160m, the 5.45MHz air-band, 30m, 15m or 10m cost £7.90. The HA20R Hardware pack (case etc) costs £28.90. Postage and packing is £1.50 for the electronic kits, £4.00 if hardware is included. A suitable trimming tool, if required, is also available from C M Howes Communications at nominal cost. ♦

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.

Icom's newest HF offering is the **IC-775DSP**. It is a top of the range transceiver, with full DSP (Digital Signal Processing) facilities, 'Dualwatch' twin receive capability and 200W output power. This new generation of transceiver design provides enormous flexibility for interference rejection, and tailor-made superior transmitted audio quality, thanks to the DSP unit. Advanced features include: built-in digital noise reduction, digital automatic AF notch filter (which will lock on to and remove even drifting carriers), digital ultra-narrow (80Hz) CW filter, audio peak filter, twin passband tuning, (on both the 455kHz and 9MHz IF filters) and CW reverse mode. There is also a manual IF notch which can be used in conjunction with the digital audio frequency notch filter to provide excellent immunity from 'tuner-uppers' and the like.

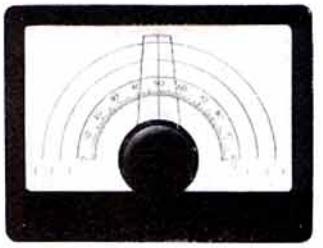
On the transmit side, the IC-775DSP provides superb audio quality on SSB with the DSP unit providing superior unwanted sideband and carrier suppression, a built-in memory keyer and full break-in on CW, and a powerful 200W output level, thanks to power MOS-FET finals.

The first shipments of the IC775DSP are expected this month and the price will be around the same level as those of the other manufacturers' top of the range transceivers.

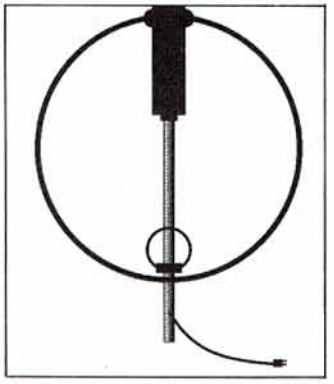
Icom (UK) Ltd, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 01227 741741, fax: 01227 741742.

Home constructors will be pleased to hear that the **Jackson Bros 6 / 36 slow motion drive and dial assembly** is available once again. Perfect for your home-brew direct-conversion receiver, grid-dip oscillator, wavemeter or VFO, the assembly comprises a dual ratio (6:1 and 36:1) ball drive, a black plastic escutcheon, and printed card scale calibrated 0 - 100 and with three blank 180° arcs for calibration by the user. It measures 123 x 95mm overall. The assembly costs £19.50 and is available from:

Isoplethics, 13 Greenway Close, North Walsham, Norfolk NR28 0DE. Tel: 01692 403230.

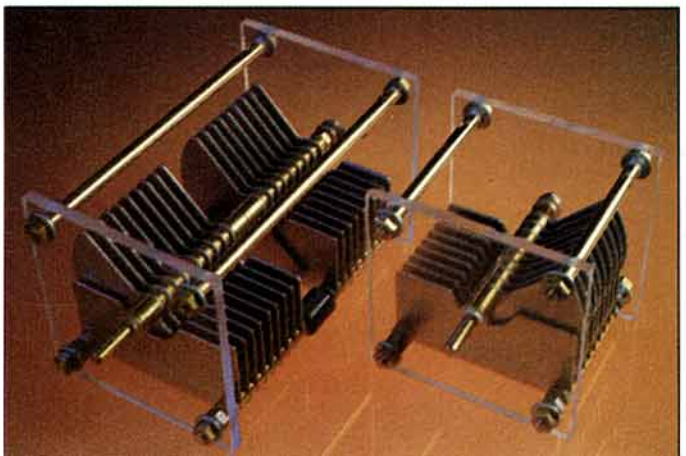


The new **DRAE Magnetic Loop Antennas** are now available. There are two versions: the **ML170**, which covers 3 - 10.3MHz, and the **ML80**, covering 7 - 30MHz. The loop of the ML170 is 1.7m in diameter, while the ML80 measures just 80cm, but both loops are flexible, which will aid their installation in lofts if tight apertures have to be negotiated! They are fully weatherproof, however, and their low profile (13mm diameter coaxial cable for the radiating element) make them particularly suitable for mounting outdoors without attracting undue attention. Both loops will handle 200W PEP on SSB or 100W CW. The ML170 costs £199.95 and the ML80 £179.95.



Also from DRAE are a selection of components suitable for use in high-power ATUs. There are two **variable capacitors**, both capable of handling up to 2.5kW power or 7kV RF / DC voltage: the **TC500** (£34.95) at 13 - 500pF and measuring 10 x 11.7 x 19cm, and the **TC250** (£24.95), 13 - 250pF and 101 x 105 x 88mm in size. The **TC26** is a **roller coaster variable inductor** which will handle 2kW RF without flashing over or overheating. It is available for £39.95. Control knobs for the variable capacitors and a turns counter for the roller coaster are also available. All DRAE equipment may be obtained from:

Nevada, 189 London Road, North End, Portsmouth, Hants PO2 9AE, tel: 01705 662145, fax: 01705 690626.



The **Alinco DX-70 HF transceiver** is probably the smallest HF transceiver yet. Measuring just 178 x 58 x 228mm it is slightly smaller than the Kenwood TS-50S but in addition to all the usual HF bands, it also covers 6m! If even this tiny transceiver is still too large to mount in your vehicle, don't panic - the DX-70 has a detachable front panel (like the Yaesu FT-900) which measures 175 x 32 x 55mm (plus knob projections) and which should fit in even the smallest of modern cars.

The DX-70 has all the usual HF transceiver features, plus some usually only found on 'top of the range' models. These include: SSB, CW, AM and FM modes, 100W output (switchable to 10W), dual VFOs, general coverage receiver, speech processor, wide / narrow filters, full / semi break-in, RIT, IF shift, pass band shift, BFO shift (which enables you to switch to the opposite side of the IF filter), RF attenuator, noise blanker, 100 memory channels, scanning facilities etc. On 6m the power output levels on SSB / CW / FM are 10W / 3W, while on AM they are reduced to 40W on HF and 4W on 6m.

The Alinco DX-70 weighs just 2.7kg. An optional remote kit and manual ATU will be available later.

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

- MRZ COMMUNICATIONS Ltd, suppliers of Icom amateur radio equipment, has been established for 10 years and has recently achieved **BS EN ISO 9002**, the international standard for management and quality assurance.
- G4ZPY Paddle Keys have announced a '3 in 1' **Miniature Twin Paddle Key** to build into home-brew transceivers and a **Miniature Iambic Keyer PCB** with instructions and hardware list.

This Month's Disk Choice

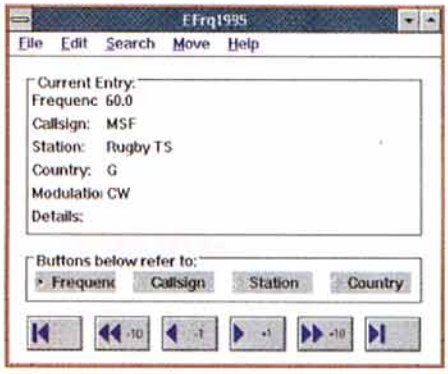
Reviewed by HQ Staff

THE 1995 SUPER FREQUENCY LIST

CD-ROM, Published 1995 by Klingenfuss Publications, Hagenloher Str 14, D-72070 Tuebingen, Germany at DM 50 plus DM 5 overseas airmail. Available from RSGB Sales mid May, POA.

KLINGENFUSS PUBLICATIONS are famous for their comprehensive and well-researched frequency listings. In particular, the *Guide to Utility Stations* is an invaluable book for anyone needing to know what is on what frequency in the HF spectrum. It seems inevitable, then, that Klingenfuss should produce a CD-ROM frequency list so that their data can be accessed more quickly and more flexibly.

The *1995 Super Frequency List* comes on a single CD and runs under Microsoft Windows 3.1. It requires "about 400kb system memory and about 5% of the Windows



resources. Using Windows Help will increase these requirements." Minimum video requirements are a VGA adapter with a resolution of 640 x 480 pixels; users are warned that lower resolutions will lead to loss of image information.

We used Windows for Workgroups 3.11 and the very high resolution screen used for drawing *RadCom's* diagrams. The program is not guaranteed to work with anything but Windows 3.1 and that may be the cause of the truncated words we found on the display.

The disk contains four files containing English and German versions of the 1995 list and the previous listings. Additionally there is a text file of the abbreviations used in the *List* this printed out to 19 pages. Another text file comprises a catalogue of "publications on utility radio stations".

On running the 1995 English data, the main screen appears (see photo). This allows you to step through the list one file at a time or in lumps of ten records, and to order the information by frequency (the default), callsign, station name or country. The 14,000 entries are in the frequency range 23.4kHz to 28.290MHz (it is interesting to spot intruders into exclusive amateur bands, and which countries are the worst offenders) and are 'utilities', ie commercial users but not broadcasters.

Entries can be copied to the clipboard for use in a wordprocessor. The drop-down menu functions are duplicated by keystrokes, in some cases by function keys which proved a rapid way of using the search facilities. The Help function lists a number of subjects but these all refer back to the same four pages which are best printed out at the time of installing.

If you have a need to look up utility stations rapidly, or find them by callsign, station or country, the *1995 Super Frequency List* CD is for you. If you are content with a listing by frequency only, and would like to browse through a wealth of reading material as well, you may prefer the old-fashioned paper version: *The Guide to Utility Stations.* ♦

This Month's Book Choice

Reviewed by John Hall, G3KVA

THE STORY OF THE KEY

by Louise Ramsey Moreau, W3WRE
60 pages, A5, softcovers.
Price £3.95 post free to UK addresses from G C Arnold Partners, 9 Wetherby Close, Broadstone, Dorset BH18 8JB.
ISBN 1898805 075

THIS A5-format book comprises articles reprinted from early issues of *Morsum Magnificat*, the magazine devoted to Morse code. The articles were originally written by the late Louise Moreau, W3WRE, a highly respected telegraph historian and key collector. She died last year aged 77, leaving a magnificent collection of over 300 items to the Antique Wireless Association's museum in East Bloomfield, NY.

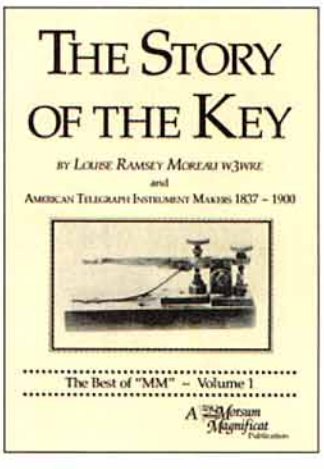
This little book is the first in a series encompassing 'The Best of Morsum Magnificat' and it charts the history of keys in the communications field. It does not pretend to include every key, because there have been over 300 patents for keys from 1844 to the present time in the United States alone. What it does do is highlight the significant milestones in the development of the key, utilising descriptive text and photographs, of which there are more than 75.

It starts with the birth of the key - Alfred Vail's 'Correspondent', which was actually used by the great Samuel F B Morse for his demonstration of the Morse telegraph in 1844, and ends with descriptions and photographs of what we know as the 'bugs' of today. Louise tells how the telegraphers who used these keys modified them to improve their performance and to try to avoid the dreaded 'telegrapher's paralysis' or 'glass arm' - the 19th century equivalent of repetitive strain injury. And those early telegraphers were something else, I can tell you. For instance, a 15-year old boy professional telegrapher called Jimmy Leonard copied morse at 55WPM in 1885 using a pen and ink! It was nothing for these professionals to send from 10,000 to 18,000 words in a single shift. Jimmy and his colleagues would probably turn in their graves at the thought of abolishing the code test for amateurs!

The history is littered with names for keys like 'Camelback', 'Blue Racer' and 'Zephyr'. The book describes in some detail the story of perhaps the greatest key-makers - Vibroplex. You will learn about what was probably the greatest 'bug' of all time. The Vibroplex No 6 first appeared in 1923 and was so smooth and efficient in operation that it was chosen by the military as the standard Signal Corps key. That J-36 key, I know from personal experience, is a joy to use.

You will learn that the term 'bug' (now 'lid') was a derisory term coined during the 19th century by committed brasspounders to describe a lousy operator who used one of the early and inefficient vibrating keys in an attempt to increase speed of sending and relieve the strain caused by sending with a conventional key. Such people were dismissed as able to send code 'fit only for a bug'.

In addition to all this there is an alphabetical list of American Telegraph Instrument Makers from 1837 up to 1900 with an indication of the types of instruments they produced. This list, compiled by Roger Reinke, another noted historian, is taken from *Dots and Dashes*, the journal of the American Morse Telegraph Club.



Although this little book was originally intended for those fascinated by code, it will appeal to a much wider audience. It is a readable and interesting potted history of sending instruments still used by thousands of amateurs worldwide and many will be amazed at how the key they use has evolved over the last 150 years. The key is part of amateur radio history and if you are interested in that then buy the book - it's well worth the £3.95. ♦

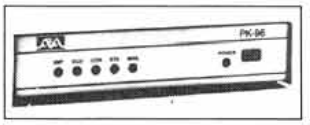
PACKET? .....

Are you:

★ Thinking about where to start but don't know where to begin?
★ Planning on upgrading but don't know where or what to?
★ Need a new TNC connection lead for that nice new shiny transceiver you just bought?

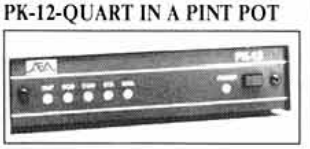
Phone Siskin NOW on 01703 243400! We are the UK's specialised dealer in this field offering the widest range of Packet/AmTor/PacTor related products at all-in prices you'll find hard to beat! Here's just a "sniff" of a few of our best sellers to date...

NEW FOR '95 - AEA's PK-96



Select 1200 or 9600 baud simply by typing ONE command. Includes AEA's powerful Maildrop easily expandable to 128K. PK-96's from Siskin INCLUDE ready made computer and radio cables plus software! **£199.00**

PK-12-QUART IN A PINT POT



If you already own a PK-232 or PK-88 and want to set up a dedicated VHF packet station then the PK-12 is probably for you! Features include AEA maildrop (expandable to over 100K) and open squelch DCD. **£139.00**

The AMAZING TINY 2 MK II

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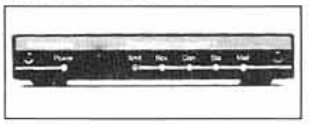

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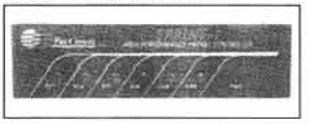

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Pat Hawker's Technical Topics

PAT HAWKER, G3VA
London 37/SE22 8SS

AMATEURS AND THE VE DAY AND VJ DAY ANNIVERSARIES

AS WELL AS representing '100 years of Radio', 1995 is also the 50th anniversary of the end of the war in Europe (May 1945) and in the Far East (August 1945). While some may feel it is time to think more of the future and less of the past, for those of us who were in any way involved in the events of 1939-45, it is difficult not to regard those years as memorable in many ways. Indeed, it was a time of technical development in radio communication, radar and electronic warfare. Much of our present technology can be traced back to the 1930s and 1940s.

I must confess that I missed the original VE day celebrations, having spent the entire day (8 May) travelling by ship and train from London to Brussels, en route back to Eindhoven where the clandestine Dutch Inland Radio Service - in which Dutch amateurs served and too often died - was in course of being wound up. On loan to the Dutch Intelligence Bureau (BI), I had been privileged to act as a control station operator from 1 January 1945. An unidentified Dutch operator at the Apeldoorn station of the Inland Service, is shown in the photo below. This station used Philips 'Luxor' diathermy equipment adapted as a 3.0MHz power oscillator with a three-valve regenerative 'straight' receiver. This station was raided by the Germans on 10 January, 1945. Two of the operators, one of them PA0MB and the other a professional Radio Officer, were both shot in March 1945, as were many others of that Dutch service. Technical details are shown in **Fig 1 (over page)**. At the Alkmaar station, which survived, the Luxor 'transmitter' was modified by PA0XY/PA0ZY into a two-stage MOPA

Most of the 5000 or so pre-war British amateurs used their technical and/or operating skills in aid of the Allied cause, as did many in uniform or as civilians who aimed to become post-war amateurs. Among these were the Y-services (Army, Navy and Air Force intercept services), the Radio Security Service (special intercept service by Voluntary Interceptors or those specially enlisted in SCU3/4 etc), engineers, technicians and operators for the Services, including SOE, and for MI6. Amateurs used their expertise in virtually all branches of the Armed Services and in the civilian radio/radar industry.

Some were required to keep their activities secret for many years; and some have never openly described their wartime work. For example, only after the recent death of Ronnie Ree, G2RX, has it become possible to reveal that he was one of the small group of amateurs who played a vital role in the highly important 'Double Cross' operations. He spent most of the war monitoring the sending of, or himself sending, 'chicken feed' information to the Abwehr by such double agents as Tate, Snow, Celery and Zigzag (the British safebreaker who became, in effect, a triple agent), culminating in the vital Fortitude deception.

It was largely this operation that misled Hitler and the German High Command into keeping elite troops in the Pas de Calais area for several weeks instead of rushing them to counter the vulnerable Normandy landings - and so undoubtedly saving literally many thousands, if not tens of thousands, of British, Canadian, American, French and Polish lives.

G2RX was in fact the anonymous author of Appendix 3 'Technical problems affecting radio communications by the Double-Cross Agents' in Volume 4 of *British Intelligence in the Second World War* (see my Review in *Radcom*, August 1990). In the post-war years he became a senior member of the Security Service (MI5) as principal technical adviser but remained an active amateur for over 50 years until his recent death aged 77 years.

A full obituary appeared in *The Daily Telegraph* (brought to my notice by Ray Herbert, G2KU) but perhaps I can add one story that shows the difficulty of catching out a fully trained Russian GRU radio-agent. G2RX was one of the two MI5 officers who, following the return to England of Alexander Foote, interviewed 'Sonya' who beyond doubt was the most successful clandestine radio-agent active in the UK in wartime and in the immediate post-war period. She had trained Foote to take over her Swiss radio network before coming to England early in 1941 as the wife of an RAF serviceman.

Foote had disclosed to M15 Sonya's past involvement in clandestine radio but there was no proof that she had operated in the UK (for example, sending atom secrets given her by Karl Fuchs). She maintained to G2RX and his colleague her innocence of any illegal activities in the UK and later returned to East Germany, her record as a radio-agent unblemished.

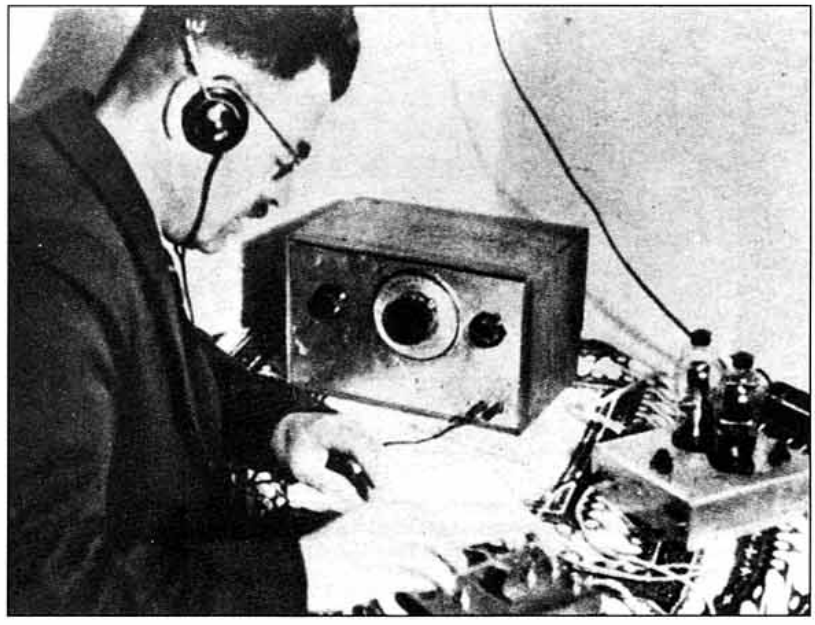
Among others who 'worked' the Abwehr control stations during wartime was Stan Riese, G5SR (post-war with GCHQ) who died some time ago, and also (in the Middle East) two still very well known amateurs: Ken Ellis, G5KW, and Roly Shears, G8KW, who later set up KW Electronics.

A pre-war amateur whose secret work for SOE has never, as far as I am aware, been mentioned in any amateur radio publication is Douglas Brewer, G4LJ, Croix de Guerre. He was one of the Tunbridge Wells group of amateurs who joined the Civilian Wireless Reserve and were called up on 20 May, 1939 when conscription was introduced. Early in 1942, as a fluent French speaker (through his mother's family) he was interviewed in London and then underwent training for SOE at Wanborough Manor, Arisaig, Ringway and Beaulieu. Despite being a skilled radio operator he was, after an internal struggle within SOE, chosen for industrial sabotage. He went on three secret missions to Occupied France, during one of which he delivered and for a time operated a B-2 transmitter-receiver. His story deserves far more space than is available in *TT*.

Another member of the Tunbridge Wells 'Early Birds' was the late Bert Allen, G2UJ, much respected for his VHF column in the *RSGB Bulletin*, who was awarded an MBE for his undercover work in Sweden in 1944 where he was involved with the interception of signals relating to the V2 trials - a story that he never disclosed after the war even to other local amateurs.

Following my remarks on the HRO and AR88 receivers in the December *TT*, I received several comments pointing out that another receiver that played an important role. This was the Hallicrafters S27 receiver, which was used for interception; and for such purposes as an RAF (83 Group for the Tactical Air Force) over-the-horizon duplex phone/rtty radio relay system. S27 receivers were used with 5kW vehicle mounted transmitters and rhombic antennas and proved capable of providing a direct link between Dover and Brussels on about 34MHz (recently brought to my notice by Dennis Willis of Royston who was in charge of one of these units).

The S27 and successors S36 and S37 were high-performance three-band tuneable VHF receivers.



An ill-fated clandestine station (G6) of the Dutch Inland Radio Service at Apeldoorn. It was raided in January 1945 - one of a number that suffered a similar fate around the turn of the year - and two of the operators were shot in March 1945. (*Courtesy* Dick Rollema, PA0SE).

The S27 covered 27-145MHz (S27B 36-165mhz) suitable for AM/FM/CW reception with an IF of 5250kHz. The front-end used three of the famous acorn valves (956 RF, 954 Mixer and 955 Oscillator) with a VR150 voltage regulator and a push-pull audio output stage using two 6V6 valves. A very advanced model for 1940 which was much used and appreciated by the Y-Services for tactical VHF interception of Luftwaffe etc R/T signals.

When UK amateur radio resumed in January 1946 (initially on 1.8 and 28MHz only), it soon became obvious that many changes were coming into the hobby largely as the result of the hot-house of wartime developments. For instance, 'netting' with VFOs was in; crystal control on HF with the need to search the entire band for replies on its way out. Beam tetrodes such as the 807 were in; power with triodes largely out. The superhet communications receiver was in; while the classic 1-V-1 regenerative receiver was on its way to the back shelf. There was the wartime arrival in Europe of Armstrong's frequency modulation, both wideband and narrowband. There was an upsurge in the use of teleprinters on radio links along with the availability of klystrons, opening the way to amateur use of microwaves. Crystal control for VHF with superhet converters replaced the pre-war super-regenerative portable 56MHz transceivers. Small-signal valves included miniature types with battery types having low-

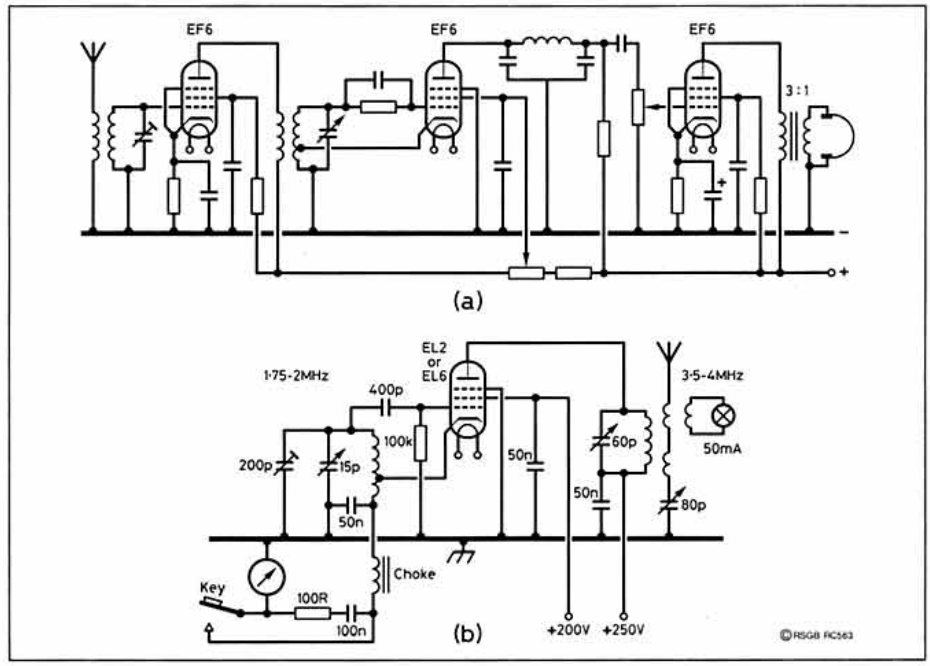


Fig 1: Typical equipment used by the Dutch Inland Radio Service from September 1944 for passing cipher traffic to Eindhoven from the Occupied provinces of Holland. (a) three-valve 'straight' receiver. (b) Single-stage tuneable transmitter improvised from medical diathermy equipment. The single stage master-oscillator inevitably produced rather rough, 'chirpy' notes even at 3MHz. This system is not recommended for modern amateur radio! For the most successful and prolific station at Alkmaar (later at Zaandam, now called Phoenix) Jan Zandbergen, PAOZY, modified the transmitter, adding a separate oscillator stage and using a PEO6/40 power amplifier. The Alkmaar operator was usually Jack Verhagen, a professional marine radio officer. (source PAOSE).

AC SUPPLY MONITORING OF VOLTS AND HERTZ

WITH THE SEASON of field day operation looming ahead, the sound of petrol-electric generators will soon be once again disturbing the rural peace. Where these are DC generators used to charge vehicle batteries there are few problems. But uncertainty on either voltage or frequency or both can arise with 230V or 115V AC generators used directly to power AC mains equipment. A slow-running generator delivering say 30Hz can seriously damage equipment. Again, for home supplies in residential areas, the voltage delivered towards the end of the spur can, at times, fall well below 240V (or even the nominal 230V) affecting transmitter efficiency and the filament/heater voltages for high-cost RF power valves, unless the line-voltage is monitored and a variac or similar device is available to adjust the voltage.

In an article entitled 'A 240 volt AC Line Monitor' (*Amateur Radio*, March 1995, p10-11) Ken Taylor, VK3KAV, describes how to construct a metering device (**Fig 2**) which can usefully be employed both in the field and in the shack. But he warns: "The unit operates directly from the AC mains. It has no protective isolation such as a transformer. All parts of the circuit must be assumed to be operating at mains potential, even with the unit switched off. This can happen if the active and neutral leads are reversed, an all too frequent occurrence."

The author recommends using a fully insulated chassis for this project such as a plastic 'Zippy' box with the meters mounted on the lid. Remember AC supplies can be lethal.

Both meters are readily available 1mA FSD meters. The voltage indicating meter is supplied via a bridge rectifier from the AC input, through a 390k resistor and a 50k trimpot. The frequency indicating portion uses a pulse counting detector, the output of which is supplied to its meter via a 4.7k resistor and a 5k trimpot.

Two back-to-back 15V zener diodes form pulses at the peaks of the voltage waveform. As the polarity of the line voltage reverses so does the action of the two zener diodes, and 5V is developed across the pair in opposite polarity. The resultant voltage at point X is almost a square wave with a frequency the same as that of the line input and an amplitude of 30V peak-to-peak. C1 and R3 differentiate this signal forming positive and negative pulses at point Y. These pulses are rectified by anode bridge rectifier. With an increase in frequency the number of rectified pulses per second increases, causing more current to flow through M2; a lower frequency has the opposite effect.

R1 33k should be rated at least 2W but may be synthesised from two paralleled 68k 1W or better from four 150k 1W resistors if the unit is to be left switched on for long periods.

When completed and carefully checked as regards insulation, circuit faults etc, it can be calibrated with the aid of an AC meter of known accuracy so that 250V represents full-scale deflection of M1 (use a well insulated screwdriver when adjusting the trimpots). Then adjust RV2 so that M2 reads 5 on the scale. If a motor-powered alternator is available, note the rate of change on the meters by slowing the motor down so that the motor reads 4 on the scale (40Hz) and speeding it up so that the meter reads 6 on the scale (60Hz).

VK3KAV makes no claim for originality as he came across a similar device in an ARRL publication.

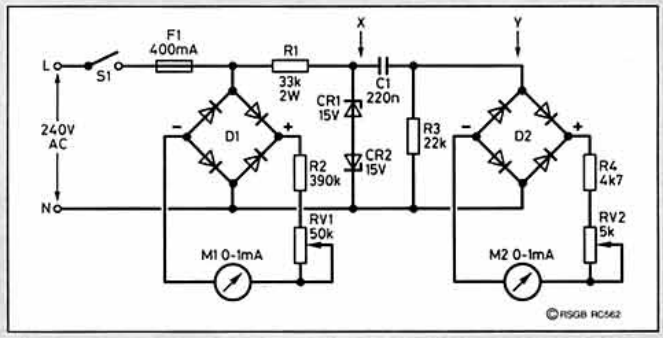


Fig 2: 240V AC line monitor (voltage and frequency) as used by VK3KAV. Note that all components may be at the AC line voltage since there is no isolation. Full precautions should be taken when using or adjusting this device. RV1 is 50k trimpot, RV2 is 5k trimpot. ZD1 and ZD2 are 15V Zener diodes. D1, D2 eight 1N4002 diodes. C1 0.22uF 100VW capacitor. Suitable enclosure is a 50 by 90 150mm plastic Zippy box.

consumption filaments (initially 1.4V, 50mA but soon 25mA). Miniaturisation of components also began, which in the final years of the war had led to pocket receivers and transmitters for clandestine links.

CW was the dominant DX mode and the Yagi close-spaced rotary beam soon became the ambition of many. Coaxial feeder cable put new life into dipole antennas. Meanwhile, surplus ex-Services equipment increasingly replaced home-construction in the period when currency restrictions froze out new American imports. Nobody even imagined the day would come when Japanese firms would dominate the world's amateur radio market!

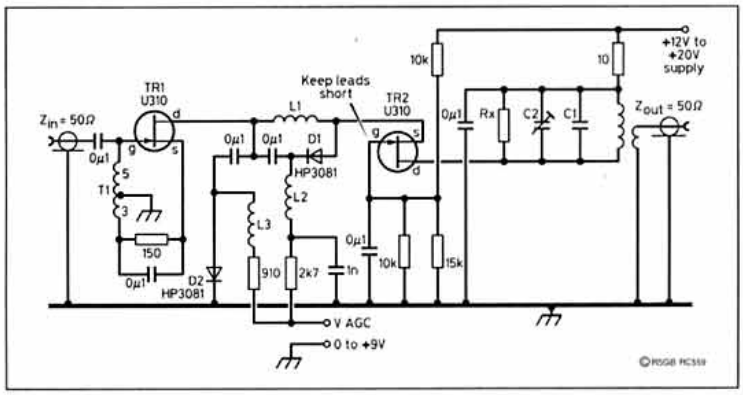


Fig 3: G3SBI's low-noise, AGC-controlled cascode IF amplifier.

LOW NOISE AGC-CONTROLLED IF AMPLIFIER

SEVERAL TIMES IN the past *TT* has emphasised, when discussing modern approaches to the design of receivers with super-linear front-ends, the importance of the IF amplifier that immediately follows a mixer having conversion loss rather than gain. For example, in *TT*, February 1993 I stated: "It should be noted that with any mixer operating directly on the incoming RF signals without pre-mixer amplification, the IF amplifier that follows the mixer, either directly or after a roofing filter, must have a low noise figure and a high intercept figure, with a diplexer arrangement often used to achieve constant input impedance over a broad band of frequencies."

A simplified diagram was included of a grounded-gate FET amplifier capable of providing a 2dB noise-figure, 9dB gain in a 50Ω system for a 45, 70 or 100MHz up-converted first IF stage was reproduced from the IEE's *Radio Receivers* book edited by Dr William Gosling.

Colin Horrabin, G3SBI, recently sent details of a 9MHz cascode-FET amplifier that he proposes to use immediately behind the roofing filters in any receiver using his super-linear H-mode mixer (see *TT*, October 1993, the new edition of *Radio Communication Handbook* or *Communications Quarterly*, Fall 1994). He points out that this could also be a useful approach for anyone constructing high-performance receivers because of the low noise-figure, reasonable gain and intercept point, and the 50Ω input and output impedance which remains constant over the 45dB AGC range.

The circuit diagram of the 9MHz version of this amplifier is given in **Fig 3.** Note that the AGC amplifier must be capable of sinking the current through D1 at 0V (ie maximum gain). The warning to keep leads short in the drain circuit of the second U310 FET arises from G3SBI's experience in finding the initial IP3 measurements were poor due to this stage oscillating at around 400MHz. Performance is given in **Table 1.**

Component notes: The two U310 are Siliconix low-noise JFETs. C1 82pF ceramic, C2 60pF ceramic trimmer (Cirkit), all other capacitors monolithic ceramic (RS Components). Resistors 1/8th watt metal film (RS Components). D1, D2 HP3081 PIN diodes (Farnell). T1 5 + 3 turns of 0.224mm diameter Bicelflux enamel on Fairite Balun core 28-43002402 (Cirkit). T2 (primary) 2.81uH, 31 turns of 0.314mm Bicelflux enamel on Micrometals toroid T37-6 (Cirkit). T2 (secondary) (1) for 16dB gain 3 turns, Rx 8k2; (2) for 13dB gain 4 turns, Rx 3k9. Note that (1) and (2) could be relay switched for use with an SSB or CW filter (loss 10dB or 3dB). L1, L2 and L3 7 turns 0.314mm enamel on balun core 28-43002402 (Cirkit).

		16dB gain	13dB gain
Noise figure		0.6dB	0.6dB
Input impedance		50Ω	50Ω
Output impedance		50Ω	50Ω
Third order Intercept			
Vs = +12V (max gain)		23dBm	26dBm
Vs = +20V (max gain)		28dBm	30dBm
Input for 1dB compression			
Vs=+12V	(max gain)	0dBm	+3dBm
	(max AGC)	+7dBm	+11dBm
Vs=20V	(max gain)	+5dBm	+8dBm
	(max AGC)	+11dBm	+14dBm

Amplifier input and output impedance's are 50Ω regardless of AGC controlled gain. Gain range 45dB.

Table 1: Performance of 9MHz AGC-controlled Amplifier.

ELECTRICITY SUPPLIES

LAST YEAR THERE was mention in *TT* (February 1994, p53-54) of the change from 1 January 1995 of the UK 50Hz mains supply to a nominal 230V AC with a tolerance of -6%, +10-%. I noted: "Since these tolerances cover the present 240V, I remain uncertain whether a voltage change will actually be introduced next January."

This seems to have been an accurate supposition, at least in the London area. With my last electricity account there was enclosed a leaflet - *Standardisation of the supply voltage in the European Union* - which confirms that although the nominal voltage is now 230V, in practice nothing will change.

The leaflet states that "the electricity supply voltage throughout the European Union is to be standardised from 1 January 1995. The voltage at which we presently supply electricity falls within both the existing range and the new range and will not need to be changed . . . . We are presently required to supply you with electricity at between 225.6 and 254.4 volts; after standardisation, the range will be between 216.2 and 253 volts.

Our declared (sic) voltage will be 230 volts . . . . Most equipment currently shows a voltage rating of 240 volts, or 220/240 volts. Over the next few years, the voltage rating shown on new electrical equipment will change, and will show either 230 volts, or possibly 230/240 volts."

So, in typical British compromise, it seems that although officially we are now on 230V supplies, an AC voltmeter will continue to indicate 240V except when the local load brings it down possibly to under 220V. What price European harmonisation!

MORE ON THE 144MHZ RIBBON J-POLE ANTENNA

THE DECEMBER 1994 *TT* item on J-Pole and Slim-Jim antennas continues to attract comment and suggestions. Dr John Belrose, VE2CV, has been using various versions of the ribbon J-antenna since about 1979. He helped to develop this versatile and useful antenna which makes a very effective roll-up and put-in-your-pocket antenna, particularly for hand-held rigs.

"It can be used as a back-up antenna if a standard whip or rubber duck antenna is broken or mislaid. It can provide improved performance over a vehicular mounted half-wave whip if it is elevated above ground level, by suspending it from the branch of a tree. The gain over a rubber-duck antenna can be greater than 7dB."

However, VE2CV takes issue with W1ICP (whose article I quoted in *TT*) and also with J Reynante, KD6GLF, whose article appeared in *QST*, September 1994. Regarding the comments from W1ICP which appeared in *TT*, VE2CV points out that while a ribbon J-Pole antenna can certainly be slipped inside a PVC pipe to form a more permanent base station antenna it then requires re-dimensioning by a significant factor.

KD6GLF proposed its use as a dual-band (146/435MHz) antenna. VE2CV comments that while ribbon J-antenna dimensions for two metres may have a low or acceptable SWR on the 70cm band, the radiator length for the UHF band is 1½-wavelength so that the major lobe is no longer directed at the horizon; in fact the lobe towards the horizon is a minor lobe: see **Fig 4.**

VE2CV writes: "The J-antenna is a half-wave length radiator, fed and matched by a shorted stub one quarter-wavelength long. The feeder transmission line is tapped onto the stub at an appropriate point to match its impedance. If coaxial cable is used to feed the antenna, a balanced-to-unbalanced (current balun) transformer should be used to minimise the current flow on the outside of the cable shield, which contributes to the radiated field.

"A flexible 2-metre J-antenna can be made out of 300Ω twinlead: see the photo (overpage). The length of the radiating part of the antenna is about 0.95 times a free-space half-wavelength (where 0.95 is the experimentally determined antenna factor). The

length of the quarter-wave stub is about 0.83 times a free space quarter wavelength (the factor 0.83 corresponds to the velocity factor for Beldon Type 8230 twinlead). The tap point for a 144MHz J-antenna was determined experimentally to be about 0.0136 times the wavelength.

"In most designs, including my early versions, no balun was used and current flow on the outside of the cable shield affected the radiating properties and impedance (hence dimensions experimentally determined) of the antenna. The effect was noticeable particularly on receive. A variation of the received signal strength could be observed as one ran one's hand along the coaxial cable when receiving a distant station.

"The improved design of **Fig 5** uses a choke balun. This is formed by coiling up a few turns of the feedline which, in effect, inserts an RF choke in the outer conductor (shield) of the coaxial feedline. For the frequency range 144-148MHz, six turns of the feed line coiled into a 2.5cm diameter coil provides an inductor with more than enough impedance to minimise feed-line radiation. It was found by experiment that the optimum location for this stub is one quarter of a wavelength from the tap point. The addition of this coaxial choke coil not only isolates the antenna from its feeder, it broadens the bandwidth, and increases the effective gain of the antenna. The SWR versus frequency response is shown in **Fig 6** (note that for the smaller European two-metre band - 144-146MHz - it would be better but not essential to aim for minimum SWR at 145 rather than 146MHz - G3VA).

"Since the antenna is not self-supporting it can be hung from a tree branch, from the ceiling of a hotel room or suspended from a non-metallic mast or rod. But it should not lie against the supporting device, even if this is non-conducting. It should certainly not be slipped inside a PVC pipe without re-dimensioning it."

PARAMETRIC UP-CONVERTERS

B J MITCHELL, G3HJK, has reminded me of a form of up-converter mixer which came into use for professional/military HF communica-

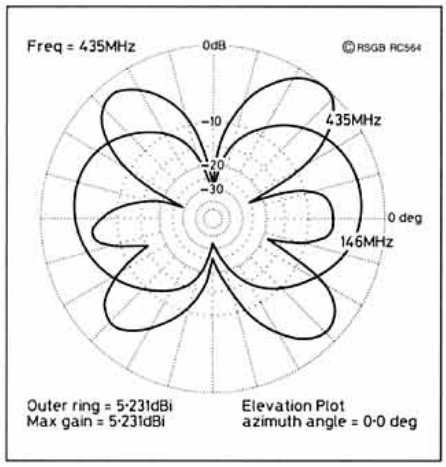
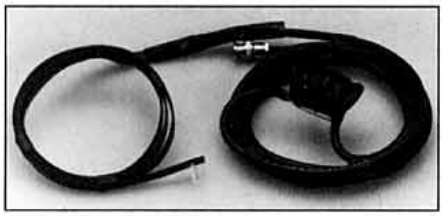


Fig 4: Vertical radiation pattern of a 2-metre Ribbon-J antenna as found with ELNEC by VE2CV at 146 and 435MHz. This shows that while such an antenna could have an acceptable SWR at 435MHz, the horizontal lobe is a minor lobe.



VE2CV's two-metre Ribbon-J antenna showing the current balun formed by coiling a small length of the coaxial feedline.

tion receivers in the late 1960s before the development of high-performance quad-FET mixers. These had extremely good strong-signal performance as well as providing conversion gain rather than conversion loss. This was the parametric up-converter using varactor diodes. It is suitable for use with 'single-span' frequency synthesisers and provides a VHF IF of the order of 70 to 150MHz or so. Although never widely used for amateur equipment, G3HJK points out that there was a paramp up-converter in a Datong HF converter intended for use with 144MHz receivers (although in such a set-up the overall dynamic range would inevitably be limited by that of the VHF receiver).

Looking back to the late 1960s, I found that I had mentioned the paramp up-converter in *TT*, January and February 1968. This resulted in a detailed appraisal (*TT*, April 1968) of the paramp up-converter by Walter Schreuer, K1YZW/G3DCU, who developed and patented this system with Robert Sproul while at National of Malden, Mass(US patent No 3,063,011 of November 1962, filed July 6, 1959).

These items were included in some early editions of *ART* (eg *ART3* of 1970) but, in view of the problem of oscillator noise with VHF sources which limited reciprocal mixing performance, was dropped from later editions. K1YZW explained that for amateur receivers (not then often using frequency synthesis) there were significant advantages in using a 9MHz rather than a VHF first IF. Most of the

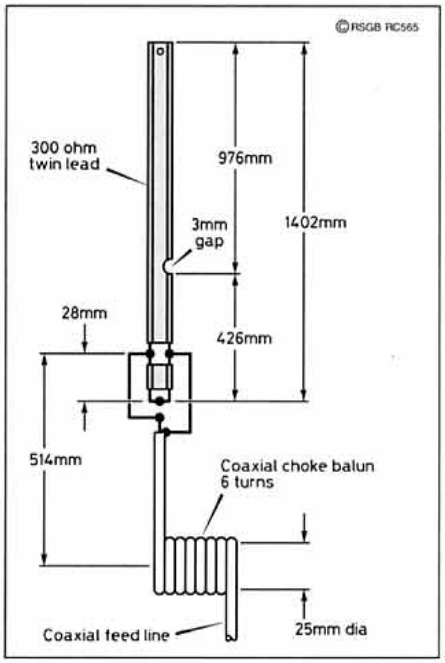


Fig 5: Constructional details of the improved two-metre Ribbon-J antenna as developed by VE2CV.

professional receivers with up-conversion adopted a first IF of 112MHz as in **Fig 7(a)**, since the higher the frequency, the higher the gain of a paramp mixer.

It may be worth looking again at the paramp up-converter now that most high performance receivers use frequency synthesis - increasingly with low noise direct digital synthesis (DDS) - and aim at general-coverage reception (ruling out a first IF within the tuning range). However, one would presumably run into the problem that the dynamic range of a VHF crystal roofing filter would be less than with an HF filter.

K1YZW provided a simplified circuit of the paramp up-converter developed at National (**Fig 7(b)**). He explained that the paramp up-converter could be considered as a cross between a balanced modulator and a coupled pair of circuits. For proper match and maximum power gain, the total capacitance swing (the varactors are considered to be in parallel) should be:

$$\Delta C = \sqrt{\frac{C1 \times C2}{Q1 \times Q2}}$$

Q1 is the Q of the signal circuit when loaded by the antenna only, and Q2 that of the IF circuit loaded by the filter and subsequent amplifier. C1 and C2 are the corresponding tuning capacitances. For simplicity, Fig 7 (b) omits the blocking capacitors and bias feed resistors for the varactors, each of which must be reverse biased. If the circuit was designed for approximate match at all frequencies, the gain at the low frequency end would be excessive.

However, fairly constant gain can be obtained by matching near the high end of the tuning range, purposely mis-matching at lower frequencies and using capacitive tuning. The varactors should have a large inverse voltage rating (100 is typical) and be subjected to a peak-to-peak swing almost as large. The larger these voltages, the stronger the signal which can be handled linearly.

K1YZW added: "The basic idea is to obtain an HF receiver which is virtually free from the usually disastrous effects of strong off-channel interfering signals, such as blocking, cross-modulation etc. If the desired signal together with the strong interference is converted linearly (in amplitude) to a fixed frequency, the latter can then be filtered out.

A conventional (or time variable resistance) mixer would require excessive local oscillator power which must always be large compared to the signal plus interference power, and is quite noisy. The paramp con-

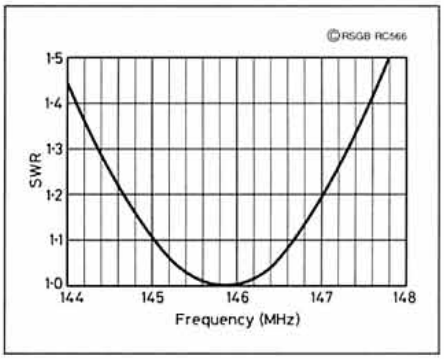


Fig 6. SWR performance of the VE2CV Ribbon-J antenna over the North American two-metre band (144-148MHz).

AGC AUDIO PREAMP FOR DSP FILTER OR TNC

DAVE MILLER, NZ9E in the February *QST* (p58) presented 'An AGC Audio Preamp for All Seasons' with the sub-title 'Make sure your audio filter or TNC is getting exactly what it needs'. He stated: "For the past year, I've been using a pair of the W9GR multiprogram DSPs in my own station set-up and I often wonder how I managed without them. To get the best performance, however, you must maintain the receive audio between certain levels. W9GR kindly provided an input-level LED bar-graph to help you set the correct level. That assistance notwithstanding, it can still be tricky to keep the audio level into the DSP low enough to prevent overload on unusually strong signals, yet high enough to hear the weakest of the weak ones.

"This isn't a problem confined to DSP audio filters. Packet and multimode TNCs also require a reasonably stable audio input. Many modern HF transceivers provide a fixed audio level output . . . . this is fine but the level is still at the mercy of the AGC and AVC circuitry in the radio. And what if your transceiver doesn't offer a fixed output? . . . . you have to tap the audio at the external speaker hack and constantly adjust the volume control as you tune from one signal to another.

"My solution is simplicity itself. It involves the addition of a 'brick wall' audio AGC amplifier between the radio and the DSP audio filter (or TNC). With the AGC preamp in the line, any audio reaching the DSP will not exceed a predetermined level (since it) effectively boosts weak signals and puts a cap on strong ones."

The circuit configuration described by NZ9NE, based on a design used by CW Electronics some years ago, is shown in **Fig 8**. It uses an easily obtained 741 op amp set for an internal gain of about 200. A portion of the output signal is rectified by the 1N4148 diodes, then filtered and fed to the gate of the FET input shunting circuit. As the output rises more of the input signal is bypassed keeping the output level constant. The arrangements offers a 100:1 limiting action, with the output level set from less than unity all the way up to nearly the gain of the amplifier, making the circuit useable for other applications.

The hang time can be adjusted by changing the value of C3 although NZ9E found the 10uF shown about right. If used with a W9GR filter it needs to be slow enough so that the background noise doesn't rise during short pauses in normal SSB conversations, yet fast enough so that sudden audio bursts do not numb the output of the receiver. The preamp's internal gain can be adjusted by replacing R8 with a 100K pot (with a fixed 1K resistor in series with it).

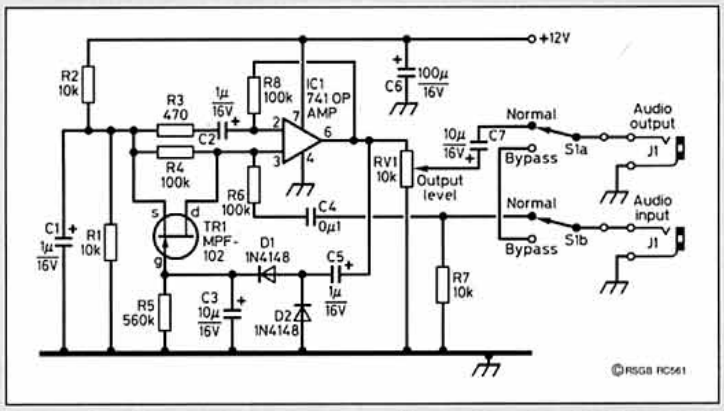


Fig 8: Audio AGC preamplifier as used to provide a level input to a DSP filter or TNC etc. C1, C2 and C3 are tantalum capacitors. C4 100nF mylar capacitor. TR1 N-channel FET (MPF102 or similar). Resistors 1/4 watt rating. RV1 10K linear-taper potentiometer. S1 DPDT switch.

verter, consisting of a varying capacitor, needs only volt-amps, not watts, and being reactive, is almost noiseless.

"The non-inverting 'up-converter' is the only circuit configuration which is stable with changing source (antenna) impedance and also provides some gain. The latter will be larger the higher the output frequency of the 'first IF'. All up-converting receivers suffer from the disadvantage of strong signals at submultiples of the 1st IF causing spurious responses. This is particularly serious in a receiver with a very large linear (or dynamic) range, so that a very high 1st IF is again desirable.

"Another factor in its favour is its help in minimising local oscillator radiation from the antenna. Against the high IF is the need for the highly selective (ie crystal) filter with low insertion loss and low noise amplifier. As a compromise, in the first receiver design 112MHz was chosen, being over three times the highest signal frequency of 30MHz and crystal filters at this frequency have been marketed . . . . I have obtained a useful linear signal input range of about 136dB. In more exact terms, the minimum useful input (10dB above noise) was 0.35uV emf behind 50Ω, with a detector bandwidth of 3kHz and maximum input of 2V which caused a 1dB departure from linearity. The minimum level represents a noise figure of 6dB, which is quite respectable . . . . Theoretically there is no limit to the dynamic range which can be obtained with a single signal . . . . However the real value of a large dynamic range is in combating the effects of large amplitude off-channel interference, and here we run into a severe limitation which is the noise power associated with the local oscillator . . . .

"From the noise point of view the high first IF is a disadvantage since this makes for high local oscillator frequencies and consequently higher oscillator noise power . . . . Because of the limitation represented by the 'purity' of signals, other recent devices are almost as useful, especially for amateur receivers. The latter have a considerable advantage in not being continuous coverage, so that a first IF of 9 or 35MHz may be used . . . ."

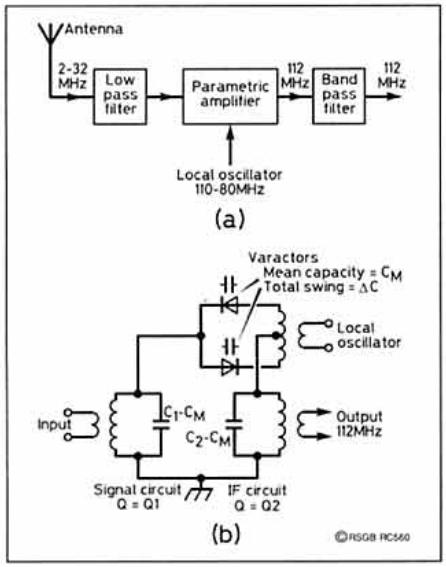


Fig 7: The parametric up-converter mixer. (a) How it was used in the front-end of high-performance HF communications receivers. (b) Simplified circuit diagram of a paramp up-converter as developed by K1ZYW/G3DCU and National engineers.

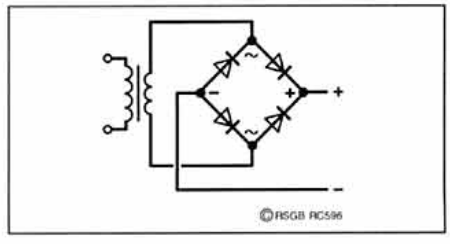
TECHNICAL TOPICS CORRECTIONS

TT, February 1995, p68. Fig 1, shows the same "loss" of 6db at three different heights. This should be 3db at 0.08 wavelength and 1db loss at a height of 0.17 wavelength.

TT, April, Fig 1. Several errors in the circuit diagram for the 'HF Starter Radio'.

R3 shown as 100k should be only 200ohms. The earthy end of RV1 should be connected to the chassis line and not as shown. The text reference to R3 should be R2. Although the values of RV1 and the unnumbered fixed capacitor connected between D2 and the 33uF capacitor are both shown as 150k in the CQ source, it seems likely that these values should be much lower, possibly both both 1.5k or 15k. Apologies for these errors.

Also the orientation of two of the diodes in the full wave rectifiers is incorrect in Figs 2 and 3. The diodes should be orientated as shown below. ♦



IDEAS FROM ABROAD

TRANSLATED AND EDITED BY ERWIN DAVID, G4LQI

Hans-Joachim Brandt, DJ1ZB revisited the inverted-L antenna to optimize it and its matching circuitry for multiband use. From *cq-DL* 2/95.

FIRST LICENCED IN THE 'sixties, my blind friend and former pupil DK5MR returned to the hobby upon his recent retirement. He lives in a terraced house with a back garden 5m wide and 12m deep. He chose a TS440 transceiver with built-in automatic ATU and audible frequency read-out and needed an inexpensive unobtrusive multiband antenna covering his own country and holiday spots around Europe and beyond.

WHICH ANTENNA?

MULTIBAND VERTICALS ARE often recommended for small spaces; price and narrow 80m bandwidth aside, they may be good for local and DX coverage but are less than optimum for the mid-distances. A horizontal wire would fill that gap. I have had good QRP results with an inverted-L of which the horizontal part was λ/4 long on the lowest band, here 3.5MHz [1], so that a current maximum occurs at the corner of the L; it should be as high as local circumstances permit.

ANTENNA PLACEMENT

INVERTED-L ANTENNAS require a good earth or counterpoise. If metallic objects in or near the house are used, interference with domestic electronic equipment is bound to occur. The vertical part of the antenna and its ground mat should therefore be at the far end of the garden **Fig 1**.

A lawn area of only 5 x 8m was available for the counterpoise, but buried radials need not be of any particular length. Three loops of plastic-covered wire were slotted into the sod. The six ends run up to an earth bolt in the ATU through a plastic tube (to avoid RF burns to children and pets). [The outside of the buried coax and control cables running from the mast to the shack, ie beneath the horizontal part of the antenna, are part of the earth mat - *G4LQI*]

The span from the mast to the house is only 12m, considerably less than λ/4 at 3.5MHz (21m). Traps and inductive loading were considered, but both are obtrusive, especially when adequately weatherproofed, and inductive loading might impair performance on the higher frequencies. Capacitive end-loading does not have these disadvantages; two wires were connected to the house-end of the antenna and strung away from the house and towards fence posts on opposite sides of the garden.

How long should the end loading wires be? The end-loaded horizontal wire should have an electrical length of 21m; adding the vertical wire down the 4m pole, the total electrical length, as measured with a dip meter or noise bridge between the downlead and the earth connection, should be 25m. This makes for λ/4 resonance at 3.0MHz. Each end loading wire had to be made 4m long for that.

MATCHING

THE FEEDPOINT IMPEDANCE of this antenna varies widely from band to band. It is lowest at 3.5MHz (hundreds of Ohms) and highest at 7MHz (thousands of Ohms). If this impedance were fed directly by coaxial cable, the impedances seen in the shack would be well beyond the range of the automatic ATU in the transceiver, which, typically, is 15 - 250Ω.

The solution chosen here is a pre-match ATU on the pole, approx. 2m above ground. It contains an L-network with coil taps and capacitors for each of the eight bands, which are selected by relays operated from a control box in the shack. **Fig 2**. Once adjusted, this ATU transforms the antenna impedance to a value which results in an SWR not exceeding 3:1 throughout each band, **Fig 3**, well within the capability of the automatic ATU in the transceiver.

ATU CONSTRUCTION

THE COIL, CAPACITORS AND relays are mounted on a 215x154mm PCB which is housed in a weatherproof plastic cabinet measuring 240 x 160 x 120mm [2]. All wires enter from below and there is a drain hole for condense water at the (intentionally) lowest corner.

Two SPST relays are used for each band. They require adequate contact spacing, (say 2mm), current rating (5A) and insulation. The control box in the shack contains a single-pole 8-way switch [3] and an unregulated power supply to match the coil voltage [4].

The ten-core control cable enters by means of a Centronix-type connector. Of the ten cores, one operates the two relays for each band, one serves as a common earth return, and the tenth is used to remotely key the transmitter in the shack for testing purposes.

The 9μH coil is air-wound with 15 turns of 2mm silvered copper wire, 60mm diameter and 50mm long, which can be tapped at each turn [similar to those sold here under the B&W brand].

The capacitors must be rated for high-voltage and high-current. At 100W RF at 7MHz, the voltage calculated from the final L-network values was 575V. The capacitor should be rated at least 1000V. For 3.5MHz a 250V rating is adequate. Small values can be made from open-ended lengths of RG58 coax (97pF/m) [which may be rolled up. Ceramic transmitting capacitors are often seen at rallies. To buy new, consider Mainline Electronics' type SEM metal clad micas; two in series or parallel may be required to get the desired value and rating. [Beware of WW-2 molded mica types; most of them are now useless - *G4LQI*]

ATU SET-UP

THE TEST EQUIPMENT was set up close to the ATU. It consisted of the transceiver (adjusted for lowest output power, which was further reduced by a 10dB attenuator), a QRP SWR indicator [5] or impedance bridge and a coax jumper to the ATU.

A braid strap was soldered to point Z (in Fig 2), with a miniature aligator clip at the other end; with it, any number of turns of the coil can be shorted out. Similarly, straps with aligator clips were soldered to a foil-dielectric 10-500pF tuning capacitor, allowing it to be connected between point A and the relay for the band being set up. With the fleapower used, tuning is easy; everything can be touched with no danger of RF burns.

CONTINUED ON PAGE 96

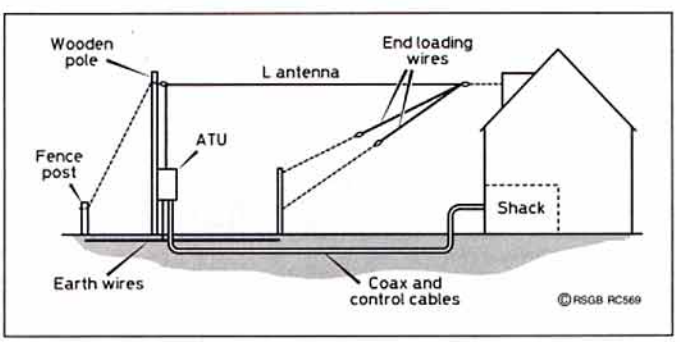


Fig 1: The multi-band inverted-L antenna at DK5MR.

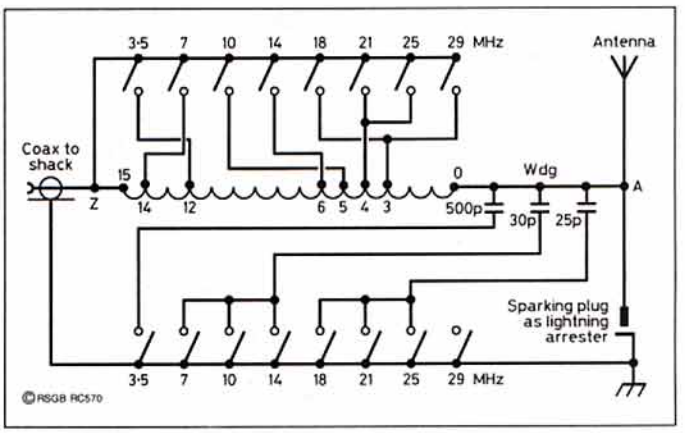


Fig 2: The 8-band pre-match ATU for an inverted-L antenna.

RADCOM TECHNICAL FEATURE

Simple BIK-Pen Test Probes

The second of two parts by E Chicken, MBE, G3BIK*

THE PRINCIPLE OF measurement of the RF RMS voltage probe, shown in **(Fig 5)**, is that series capacitor C charges up to the peak-value of the applied RF signal-voltage, and then a high-impedance voltmeter is used to measure that peak voltage. As with the previously described RF probes, a diode converts the RF into DC hence to charge the capacitor. The capacitor also serves to isolate the probe from any DC that may be present in the circuit under examination.

However, by careful choice of value for the series resistor and a knowledge of the input resistance of the DC voltmeter, the actual voltage displayed by the meter is the RMS value of the RF signal voltage, not its peak value.

From the earlier description of the RF power-measuring probe, it is known that

$$V_{rms} = \frac{V_{peak}}{\sqrt{2}}$$

that could also be expressed as:-

$$V_{rms} = (V_{peak} \times 0.707)$$

which is arithmetically identical.

Now assuming a meter resistance of 10MΩ such as is typical for a digital multimeter, and also by assigning a value of 4.14MΩ (= 240kΩ + 3.9MΩ) to the series resistance of R1+R2, the potential divider formed by the series resistor and the meter resistance yields the required 0.707 multiplication factor, ie 10MΩ/(10MΩ + 4.14MΩ) = 0.707.

So, the meter reads (V_{peak} x 0.707) which is identical to V_{rms}.

Even though the circuit of this probe does not include a load resistor, it could still be used for the measurement of RF power but only if the value of the RF load resistance RL in the circuit under test is known:-

$$\text{Power Watts} = \frac{V_{rms} \times V_{rms}}{RL} = \frac{V_{meter} \times V_{meter}}{RL}$$

Because of the alternating nature of the applied RF voltage, the diode is not permanently in the forward conducting low-resistance state, hence its effective resistance is in the order of kilohms rather than tens of ohms. This probe's input impedance appears as a resistance of about 5kohm in parallel with the diode's self-capacitance of about 1-2pF. If used with a voltmeter of input resistance (R_{meter}) other than 10MΩ, the required total value for R1+R2 to produce a V_{rms} display is given by:

$$R1+R2 = R_{meter} \times 0.414$$

R1 and R2 are then selected from the standard 'preferred' range of values.

CONTINUITY-TEST SOUNDER

IN MANY RESPECTS this tester, shown in **Fig 6**, is the most routinely useful of the probes, and yet it is simply a battery-operated sounder without so much as an on/off switch. The two pen-probes offer ease of connection to the object under test - be it a fuse, a phono-load, or a multi-cored computer-cable. If the circuit to which the probes are applied is electrically continuous, the PP3 battery connects to the piezo-electric solid-state buzzer (eg Maplin KU58N) to produce an audible tone. If the circuit is faulty, no sound is heard. It is as simple as that! This unit really pays for itself when checking for correctness of wiring on a newly assembled PCB or copper stripboard circuit before applying power.

A word of caution. Never use this continuity-tester on anything to which an electrical supply is connected, whether it be battery or mains!

Construction need be no more than a low cost plastic or cardboard box such as may be found in the kitchen cupboard, with the battery and piezo-buzzer held in position by means of double-sided sticky tape or Blu-tak. A dual-miniature battery clip with red and black wires is used with the PP3 battery for connection to the piezo-buzzer and probe-leads. ♦

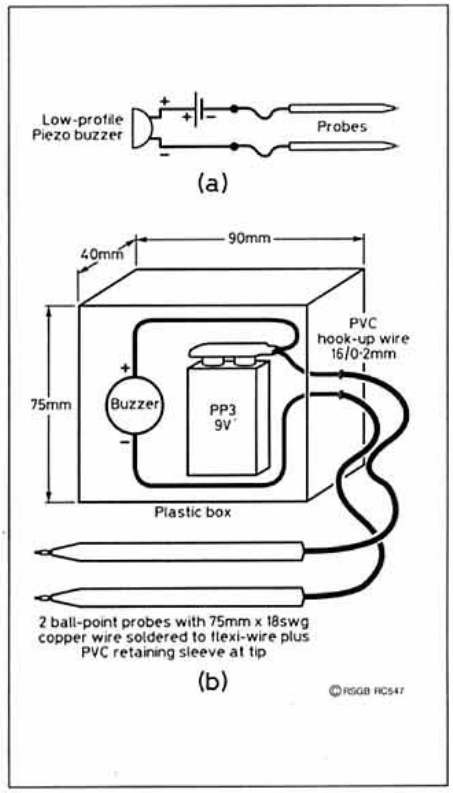


Fig 6: Continuity - Test Sounder; PP3 battery and connectors; solid state buzzer, Maplin KU58N or similar.

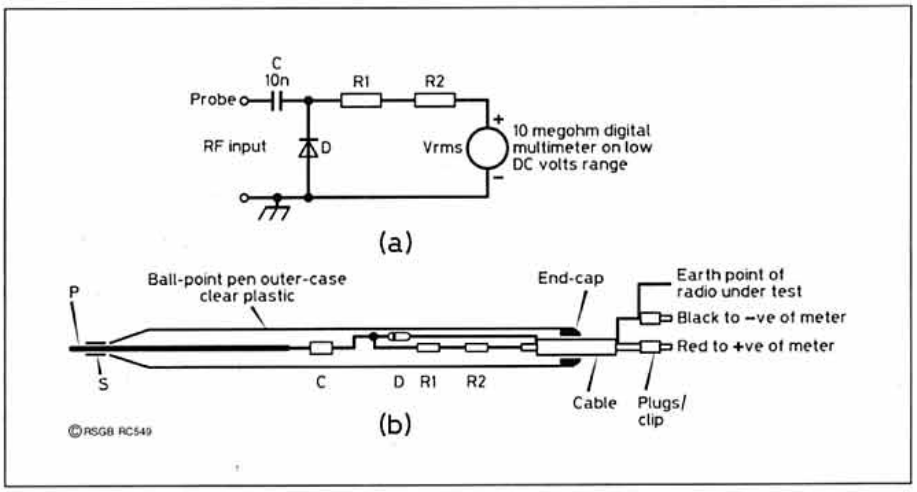


Fig 5: RF RMS voltage probe; P = probe-wire, 75mm of 16-18SWG, or ex 1.5mmsq mains cable; S = sleeve, PVC, tight-fitting (from above cable); R1 =240k, 0.6W, metal-film 6.5mm x 2.5mm; R2 = 3M9, 0.6W, metal-film, 6.5mm x 2.5mm; D = diode, germanium, OA91 or OA95; C = capacitor 10nF, 100V, monolithic resin-dipped ceramic; Cable = screened single, 7/0.1mm or 7/0.2mm, 0.5m long; Plug, 4mm, or to suit multimeter, Red and Black.
Note: Meter reads peak voltage, but with values of R1 & R2 shown it displays RMS value of RF voltage. For meters of other than 10M input resistance Rm, the total value R1 + R2 = (R_{meter} x 0.414).

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RADCOM TECHNICAL FEATURE

The Single Coil 'Z' Match ASTU

By Osborne Postle, G3EFZ

THE DIGEST OF ZL3QQ's Antenna System Tuning Unit (ASTU) by G3VA [1] inspired me to build the unit shown in the photograph. It was constructed from 'near enough' components obtained from the wood-shed and the junk box. This unit will provide an ASTU that will match, without antenna taps or coil changes, doublet type antennas on all amateur bands from eighty to ten metres.

CONSTRUCTION

THE CIRCUIT DIAGRAM shown in **Fig 1** is simple and the photograph is clear enough to enable duplication. Old fashioned bread-board construction makes for rapid assembly of the few parts needed and the hardboard panel enables the two tuning capacitors to be mounted without insulation.

Hand capacity did not present any problem. The coil L1 of 13 turns is wound on a suitable former - I used a ribbed ceramic former from an ex American wartime tuning unit.

A cardboard or plastic former of about 5.0cm diameter would suffice, although it will not be as convenient to use as the ceramic one because the windings have to be spaced over a length of 8.0cm. Coil L2 is first wound on a former large enough in diameter to make a four turn coil which when sprung will have a diameter of about 6.5cm and ends about 4cm apart to meet the antenna feeders.

Two tapped connections, at 6.5 and 8.5 turns respectively from the earthed end of L1, are soldered in place with leads long enough to connect to the fixed plates of the two variable capacitors C2 and C1. Coil L2 is loosely placed over L1 before soldering the leads to the capacitors. The input coax lead is soldered to C1 and the coil L2 suitably mounted over the earthed end of L1 with permanent connections to the antenna feeders.

IN USE

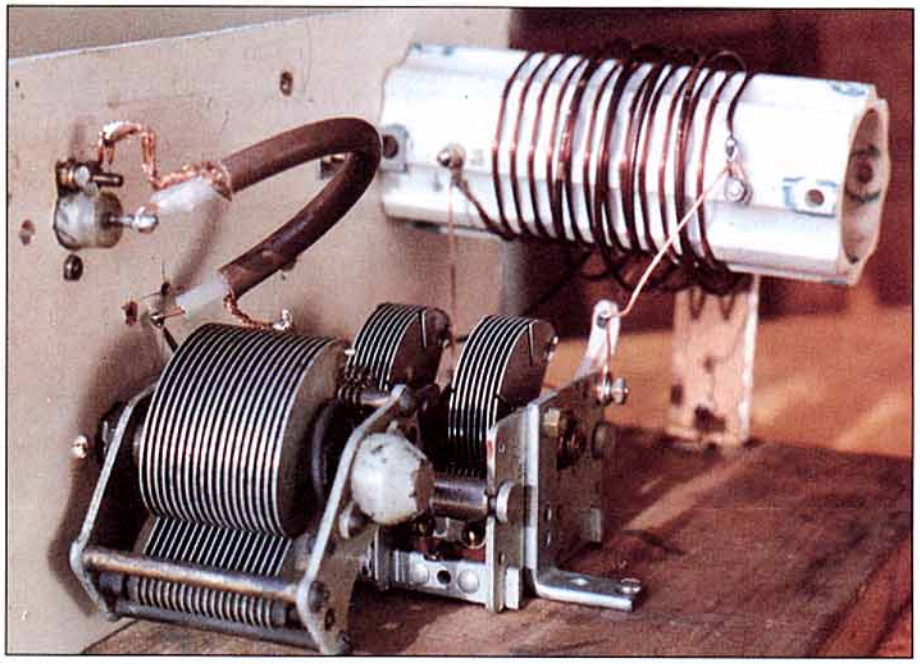
AN ESSENTIAL ADJUNCT to the ASTU is a reflectometer or 'moni-match' [2] as an indicator of the radio frequency voltages present on the coaxial input feeder. Such an indicator is required to assist finding the resonance settings of C2 on each band - not an easy initial task because tuning in and out of resonance is very sharp indeed - even with slow motion tuning dials.

The required optimum setting for each band coincides with a minimum reflected voltage indication in the coaxial feeder from the transmitter. Since a delicate microameter is used for this purpose care is needed not to ruin it by the excessive voltages that might result from mis-matched capacitor settings.

The procedure adopted to minimise such an eventuality is to set the reflectometer initially at a low forward reading until an approximate resonance setting of C2 has been achieved. The reflectometer can then be re-set to give a fairly high forward reading in the safe knowledge that the resultant indication will not overload the meter and fine tuning can proceed.

Some guidance to suitable settings may be gained by reference to the results presented in **Table 1** and **Fig 2**. The figures are taken from dials that are graduated in 100 divisions per semi-circle, so one division or gradation equals approximately two degrees. Thus since 100 grads equals 180 degrees the conversion factor to convert the gradations listed into conventional degrees is 1.8. So a C2 reading of, say, 30 gradations would be 54 true degrees.

As already indicated resonances are very sharply obtained and it is quite easy to miss one by turning the C2 capacitor too quickly - very small slow movements are required - indeed this feature may be the reason why some constructors declare that "they cannot get the thing to work." Another important point to bear in mind when search-



The single coil 'Z' Match, internal view showing construction.

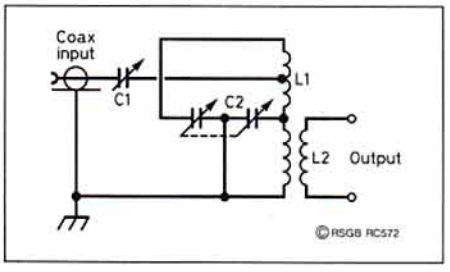


Fig 1: The circuit of the single coil 'Z' Match.

BAND	DIALS		REFLECTOMETER		FIELD
	C1	C2	FORWARD	BACK	
3.5	50	90	60	0	0
7.0	17	31	250	0	25
10.1	20	10	320	0	15
14.0	20	73	360	0	10
18.0	19	51	500	0	30
21.0	12	41	490	0	20
24.8	14	31	450	0	40
28.0	11	26	500+	0	30
	Gradations		Micro-ampere readings		

Table 1: Tuning calibration of the prototype single coil 'Z' Match.

*19 Laburnum Grove, Whitby, South Wirral, L66 2PD

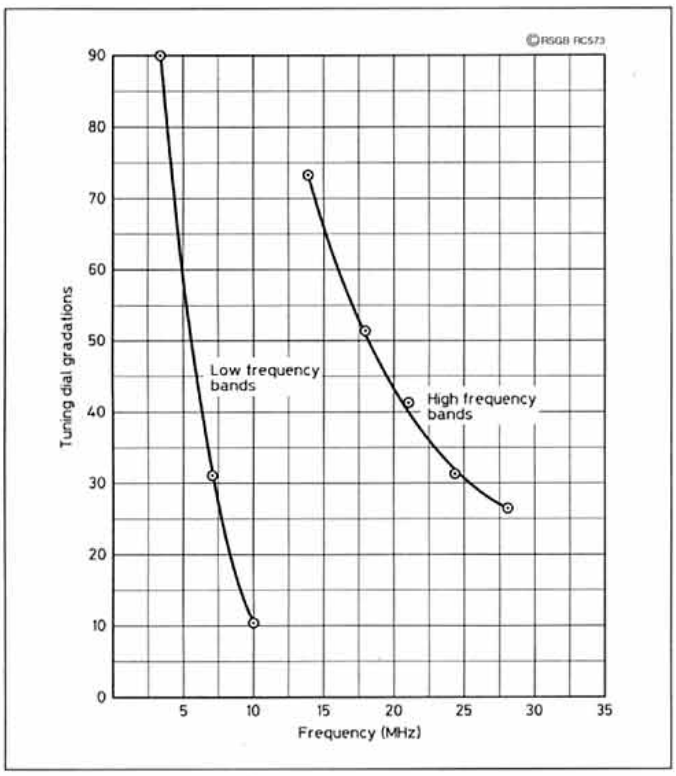


Fig 2: The single coil 'Z' Match, band resonance settings

ing for resonance is that too long a time spent with the power amplifier feeding into an incorrect load may cause damage to the PA if no SWR power reduction circuit is fitted.

RESULTS

AS MAY BE SEEN from Table 1 zero reflected voltages were obtained on all bands and are indicative of good antenna matching. The plot shown in Fig 2 illustrates the comments by W6SAI [3] that the unit tunes from 3.5 to 11MHz with a gap between 11 and 13MHz.

The capacitor C1 remains fairly static during the tuning process although even small dial movement can produce large changes in reflected voltages. From the small capacity readings for C1 in the table it is obvious that 500p is excessive and a smaller value would be appropriate, but the one shown has a built-in slow motion drive, was available and first saw service in Scott Taggart's ST800 way back in 1937. The field strength readings given in Table 1 were taken from a 50 microampere meter fed by a 38cm rod situated alongside the operating position.

CONCLUSIONS

TIME SPENT IN CONSTRUCTING this type of ATU will be rewarded by a unit that can be left permanently connected to the feeders. It is not necessary to change the coil taps or the coupling when changing bands. There is also obviously world wide interest in the design and I along with others await future developments with interest.

REFERENCES

[1] *'Technical Topics', Radcom*, August 1993
[2] *Understanding Amateur Radio*, ARRL, 1971 Second Edition page 209
[3] *'Technical Topics', Radcom* December 1993 ♦

COMPONENTS

Capacitors

C1,	500p receiver type - slow motion drive
C2,	350p dual gang type - slow motion drive

Inductors

L1,	16SWG enamel 13 turns, 4.5cm diameter, 8cm long tapped at 6.5 and 8.5 turns from cold end
L2,	14SWG enamel 4 turns, 6.5cm diameter self supporting over cold end of L1.

Additional Items

Panel and Baseboard 27 x 14cm
Coaxial socket
Earth terminal
18SWG copper connecting wire

IN PRACTICE

IAN WHITE, G3SEK
52 Abingdon Road, Drayton, Abingdon, Oxon OX14 4HP – or @ GB7AVM
g3sek@ifwtech.demon.co.uk

DISPOSING OF FERRIC CHLORIDE

HOW CAN I SAFELY dispose of used ferric chloride solution after etching PC boards?

FOR AMATEUR QUANTITIES, the simplest way is to wash it down an outside drain, using large amounts of water to dilute it. Choose a drain that's connected to the sewer system rather than a local soakaway. This method obviously isn't feasible (or legal) on a commercial scale, but is acceptable if you only have small quantities to dispose of. The reason I suggest an outside drain is to preserve domestic harmony as ferric chloride solution will permanently stain almost anything your household sink might be made of. Also, it will attack the glaze on the toilet bowl if it's at all porous. Be careful when pouring the solution down the outside drain too because it will stain the concrete path or any cement-based building material. Now there's an idea . . .

To dispose of ferric chloride solution in the dustbin or at the dump, you can solidify and neutralise it using ordinary cement. Place some cement in a stout plastic bag, and put the open bag in a bucket to support it. Stir the ferric chloride solution into the cement to make quite a dry mix, and leave it to set. By the way, whatever you're doing with ferric chloride solution, wear gloves and safety spectacles. All those nasty things it does to household materials, it will do to your skin and eyes as well.

CHIP CAPS AND COPPER FOIL

HERE ARE TWO follow-ups from the item in the March In Practice *column about testing chip capacitors.*

G3XTQ STATES THAT rolls of 4mm wide self-adhesive copper foil are available from specialist shops selling craft equipment for stained glass work, at more reasonable prices than in the electronics catalogues.

G4BYV has offered an even better solution which avoids the need for copper foil altogether. **Fig 1** shows that all you need to make a chip-cap adaptor is a piece of single-sided PC board with a saw-cut through the copper, and two pins or bits of wire to plug it into the capacitance meter.

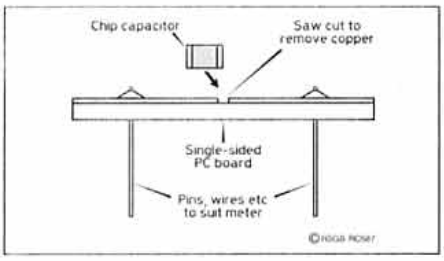


Fig 1: G4BYV's simple adaptor for chip capacitors.

GROUND RODS

DOES ANYONE HAVE any advice or tips on ways to install 8ft ground rods? I am concerned that it might bend if hit with a sledgehammer. (This correspondence came from the Internet, and was summarised by AA2UJ who asked the original question.)

THERE WERE SEVERAL REPLIES, mostly stressing the advantages of the softly-softly approach using water rather than the more obvious sledgehammer.

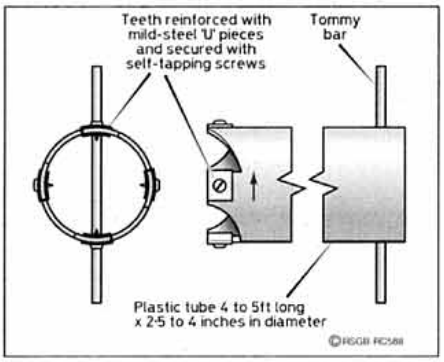


Fig 2: G3TDZ's core drill made from PVC drainpipe. Similar drills can be made from metal tubing.

"Dig a little hole (say 6 inches deep) where you want the rod to go in place. Get a large bucket of water and fill the freshly-dug hole with it. Jam the rod into the water-filled hole. Lift it out and jam it back in again. Repeat as often as needed. The secret here is to make sure the hole for the ground rod is kept very wet. This way, the water is doing all the work for you. I slapped an 8-footer into the ground in 5 minutes this way; no sledgehammer needed. Depending on the type of soil you have, you might need a sledge for the last foot or so. Once you start using a sledge, the up-and-down jamming process won't work any more, so don't use the sledge until you really need to." (Sean Kutzko)

"The way I install ground rods in clay is to take a water hose and soften the soil a bit, then just start pushing the rod a little. Then lift it out of the hole, fill with water and repeat. Don't go over 4 or 5 inches at a time, and make sure the water lubricates the hole and rod. Don't use too much water, because you don't want to wash the hole out. If this doesn't work, build a driver for the rod. To do this, take a piece of steel or iron pipe about 4ft long, screw a pipe cap on one end, slip it over the ground rod and use this to drive the rod and help keep it straight. When you get to the 4ft level you can use a shorter piece of heavier pipe, or a real good friend and a large hammer. I dig a hole and bury my rods completely along with the ground wire, to make mowing easier and avoid tripping over it. If I can't get the rod all the way in, I cut it off with a torch. I also braze, not solder, the ground wire to the rod." (KI5GY)

"I make a blunt point on mine to help them go around the rocks and hardpan. A sharp point makes the rod wander too much." (WB6RZG)

"You should be able to drive the ground rod directly with a sledgehammer, unless it is literally a copper rod and not the much more common copper-clad steel. It's best if you pick a day when the ground is somewhat wet as that'll make it easier." (KD1UJ)

"Don't drive in any ground rods if there is any chance of hitting anything below. Safety glasses are not a bad idea too." (WA3NNA)

If you have the right kind of soil, the 'wet' method is well worth a try. For some soils, it is also possible to sink a length of copper tubing by connecting it to the hosepipe and letting it wash the soil away as you gently push it downwards. However, this leaves an over-size hole and it may take some time to establish good electrical contact with the surrounding earth.

HOLES IN THE GROUND

HOW DO I MAKE a hole for a scaffold-pole . . . or something larger?

FOR CLAY, SAND OR light gravel soils I strongly recommend the method first published 15 years ago by G3TDZ [1]. You use a piece of tubing as a hollow 'core drill', with teeth cut into the end. The original idea involved PVC drainpipe with the teeth reinforced by pieces of metal (**Fig 2**), but for other sizes of hole you can use plain metal tubing. Even aluminium alloy tubing is hard enough, because the teeth don't really need to be hard or sharp. To complete the tool, fit a crossbar handle as shown in Fig 2, or use a mast clamp and a second piece of tubing.

The only difficult part is to start the hole vertically. Dig out any grass to expose the soil, wet the soil to soften it, and then carefully twist the drill into the ground, checking with a spirit-level that it's vertical. The deeper you go, the less you need to worry about alignment because the drill finds its own way. Always take care to push straight downwards and not to lean sideways, as this will open out the top of the hole. If the drill becomes hard to turn, twist it out of the ground and remove the core that's jammed inside. Your aim is to remove all the earth from the hole in this way, not to force it out of the way as if you were driving a spike. Pour a little more water into the hole and continue as far as you need. If you hit something hard, stop drilling - you'll only damage the teeth. Using a hammer and a long piece of steel pipe or a crowbar, try to break up or dislodge the blockage so that the drill will go on past. If that doesn't work, try another location, or maybe the ground is just too stony for this technique. In the right kind of ground it's wonderfully easy; you can make a perfect deep hole in just a few minutes. If the soil is too rocky, it won't have cost you much time or money to find out.

If your pole is simply going to be driven into the ground, try to drill the hole a little on the small side. You'll then find that the pole can be tapped in quite easily and will be a firm fit. On the other hand, a hole drilled using the same size tubing as the pole itself will tend to be slack, especially at the top.The same basic method works for larger holes too. Either you can make a larger core drill or hire a ground auger or fence-post borer, a tool like a 'giant wood bit' available in sizes up to about 8

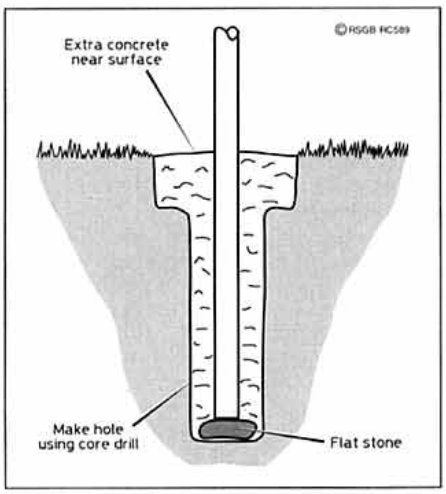


Fig 3: Setting a pole into a tube of concrete to increase its surface area and prevent rocking. Dig out an extra cube of earth at the surface.

inches (before hiring, try a smaller home-made core drill to see if the ground is suitable). To make your pole more resistant to rocking, you can drill a larger hole and set the pole into a tube of concrete (**Fig 3**).

Dig out an extra cube of earth to increase the area close to ground level where the sideways forces are greatest. Ram in the wet concrete mix to make it fill the hole completely. Prop the pole in a vertical position and finish ramming the concrete around it; then leave the concrete to set. In suitable ground, this is an excellent way of planting a light mast or a ground stake for a vertical antenna with a minimal amount of excavation and concrete-mixing. The penalty is that you need to bore a deeper hole than if you were using a large block of concrete, and performance is more dependent on ground conditions. That's why tower manufacturers specify mass concrete foundations - they're much more predictable [2]. As with any rough-and-ready 'civil engineering' of this kind, always limit yourself to situations where the consequences won't be too drastic if your judgement is faulty. Also note that a concreted-in metal pole is valueless as an electrical ground.

FOURTH HARMONIC TVI FILTER

MY 144MHz TRANSMITTER seems to have excessive output at the fourth harmonic, which is out local TV channel. How do I make a G4SWX's 'KISS'-style stub reject filter for the 4th harmonic of 144MHz? How do I tune it?

G4SWX DESCRIBED A RANGE of all-coax harmonic rejection filters in *RadCom* for November 1994 [3]. These included filters for the second and third harmonics, but not for the fourth. A single-frequency rejection filter looks like **Fig 4**: the two open-circuit stubs S1 and S2 are each a quarter-wavelength long at the frequency to be rejected, and are joined by a series length of coax. The length L of the series section compensates for the mismatching effect of the stubs at the fundamental frequency. In this case the fundamental is 144MHz and the fourth harmonic is 576MHz. One wavelength at 144MHz is (300,000/144)mm, ie 2083mm, and the wavelength at 576MHz will of course be one-quarter of that, ie 520mm. In coax such as RG-58 or URM76

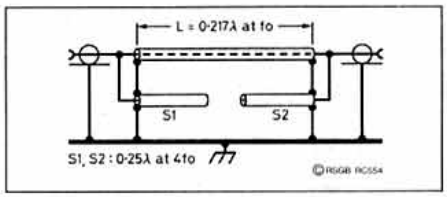


Fig 4: A two-stub 'KISS' filter to suppress the fourth harmonic.

with a velocity factor of 0.66, the quarter-wavelength stubs S1 and S2 will each be (520 x 0.66 / 4)mm long, ie 86mm. At least, this will be the theoretical length. The resonance will be affected by the inevitable lead lengths at the T-joints, so the best way to build the filter is to add an extra 10mm or so, and then trim the stubs back to the true resonant length.

The 'magic' length L required to make this filter present a good impedance match at 144MHz is 0.217 wavelengths – at 144MHz, that is. Again you can use RG-58U or URM76 for power levels up to a few tens of watts. The physical length will be (2083 x 0.66 x 0.217)mm, ie 298mm. This length isn't super-critical because it only affects the matching performance at the lower frequency. If you keep the terminating leads short, you can simply measure the length as shown in **Fig 5** and the impedance match at 144MHz should be good. To build the filter you can coil the series line up into any reasonable-sized metal box, so long as you don't mount the input and output sockets too close together, and the open-circuit ends of S1 and S2 aren't too close to any metalwork (including the coiled-up length L). Fig 9 shows a suggested layout. When you make the T-joints at the input and

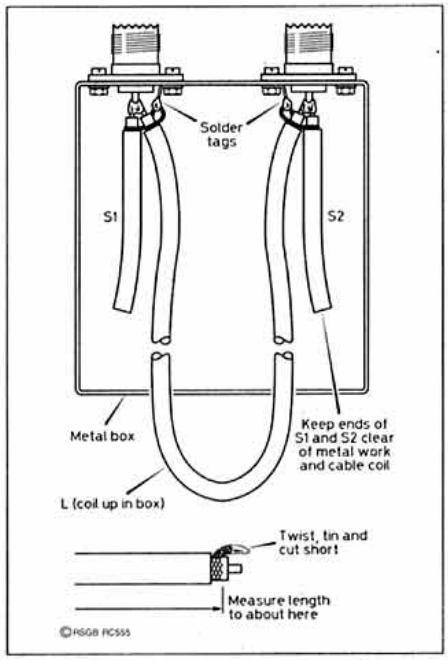


Fig 5: Layout of the two-stub filter. The length of cable L is connected between the two sockets, in parallel with the stubs S1 and S2. Keep all connection pigtails as short as possible, and measure cable lengths as shown.

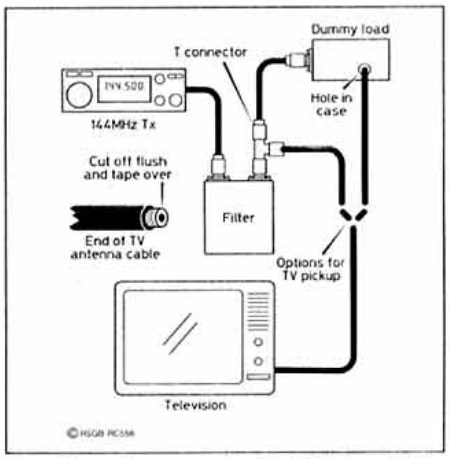


Fig 6: Filter adjustment setup. The TV is tuned to the channel to be rejected. Note that the pickup probe is insulated – a direct connection to the TV set may cause damage.

output sockets, keep the lengths of the pigtail leads as short as you reasonably can.

The lengths of the stubs S1 and S2 are adjusted by loosely coupling the TV set to the output of the filter, while transmitting into a dummy load (**Fig 6**). An open-ended length of coax loosely inserted into the housing of the dummy load will give plenty of signal, or you can couple very loosely to the open port of a T-adaptor between the filter and the dummy load. It is important that the connection between the transmitter and the input of the filter is well screened, to avoid stray pickup bypassing the filter.

Tune the TV to Channel 34 and trim S1 very carefully for minimum signal, each time replacing the lid on the filter. Remove a millimetre or two at a time, using a sharp knife.

If all goes well, the harmonic signal received by the TV will almost disappear after only one stub has been adjusted. However, this weakened signal may actually be a hindrance in adjusting S2. If this happens, short-circuit S1 by sticking a pin through it, somewhere near the open-circuit end. That will nullify its effect, allowing you to trim S2 as you did with S1. When you pull out the pin, you should have excellent attenuation at 4f. Finally, check the VSWR at 144MHz – it should be very acceptable without any adjustments to the series length L. Although this filter won't help if your 144MHz signal is causing 576MHz to be generated directly in the front-ends of local TV sets, it should stand you in good stead with the RIS.

REFERENCES

[1] 'A Hole Borer for Antenna Ground Sockets', J R Hey, G3TDZ, *Radio Communication*, December 1980.

[2] 'Wind Loading' D J Reynolds, G3ZPF, *Radio Communication*, April / May 1988.

[3] 'Stub Filters Revisited', John Regnault, G4SWX, *Radio Communication*, November 1994. ♦

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, packet or E-mail (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.

Data Stream

RICHARD STERRY G4BLT
1 Wavell Garth, Sandal Magna, Wakefield,
West Yorkshire WF2 6JP

AS WELL AS MY packet radio address of G4BLT@GB7WRG.#19.GBR.EU, I now also have an E-mail address of richard@waveg.demon.co.uk on Internet. Feel free to use them!

As a follow-up to the March *Data Stream* item on Baycom-type programs, headlined 'Can I run Baycom on . . . ?', I am advised that version 1 of Ingocom for the Atari ST/STE machines is not terribly stable, to put it kindly, but that there is a much better version 1a available.

RADIO-TO-COMPUTER

A COUPLE OF USEFUL references have come to light on interfacing computers to radios since my feature on this subject appeared in November's *Data Stream*.

The February 1993 issue of *QST* magazine contains a comprehensive interfacing article by Wallace Blackburn, AA8DX, on page 37, including the Icom CI-V bus. It also points out that later Ten-Tec radios have the same interface as the Icoms, with mostly the same command set. Yaesus and Kenwoods are also covered and there is a circuit for building your own general purpose interface.

More up to date, the February 1995 issue of AMSAT-UK's *OSCAR NEWS* has an excellent article on page 2 by A C Hewat, G8NTH, all about interfacing to Icom radios via the CI-V bus, including an interface circuit.

EMBAYCOM IS HERE

THE BAYCOM PACKET SOFTWARE has deservedly earned a very high reputation as excellent software, which has enabled many users to experience packet at very little extra expense, thanks to its use of a simple modem interface. However, the interfaces for JVFAX and HamComm are even cheaper and simpler (little more than a 741 op-amp plus a few passive components) so wouldn't it be nice if Baycom could also use it?

Well, some people doubted that this would be possible, but apparently it now is. Embaycom (EMulate BAYCOM) is an emulator program which carries out the function of a modem, and so interfaces with Baycom as if an external modem were connected; ie the tone demodulation is carried out in software rather than hardware. If you think about it, this is rather clever, but does mean that the computer has even more work to do. Two COM ports are required; one 25-way and the other can be a 9-way.

I have few details at present, so watch out for bulletins about it on your packet screens. The programs seems to be all or partly the work of one Nick Fedoseev, whose callsign is either RT4UZ or UT2UZ; there's some uncertainty on this point.

CONTEST LOGGER PROGRAM

THE SUPER-DUPER CONTEST logger program by Paul O'Kane, EI5DI, isn't the most modestly-titled piece of software I've ever heard of! However, it has developed a very enthusiastic user base among the contest-loving fraternity, and has undergone a number of improvements since it was reviewed in *RadCom* (September 1993, page 31).

There are actually four programs in the Super-Duper (SD) family; the original SD for HF contests, SDV for VHF/UHF contests, SDI for IOTA (Islands On the Air), and SDL for Listeners of IOTA, which is included with the SDI program.

The programs run on any Intel-based machine (IBM compatible) from an 8086 right up to the very fastest Pentium (I trust it doesn't require any floating-point arithmetic). They seem to run fine on the software IBM emulator on my Acorn A5000, which is always a good test of 'properly' written software. I have found that anything which cuts corners to gain speed, or which addresses internal hardware directly, is likely to cause problems with emulators.

A demonstration version of SD is available from several shareware suppliers, including PDSL (Public Domain Software Library) who advertise regularly in *RadCom* under the heading 'Scientific Shareware'. Another suitable supplier is Venus Electronics, 26 Pevensey Way, Frimley Green, Camberley, Surrey GU16 5YJ, tel/fax 01252 837 860. This program (v6.07) is unrestricted for all RSGB HF contests and for entrants to the ARRL DX contest, but for all other contests it is limited to 30 QSOs. Full versions of SDI and SDL can also be obtained from these sources.

For details on SD and SDV, you can E-mail Paul via the Internet at okanep@iol.ie or write to him at 36 Coolkill, Sandyford, Dublin 18, Republic of Ireland, tel +353 1295 3668. The prices are £25 for each program, or £39 for both, either UK or Irish pounds, plus £2.50 postage if you are outside the British Isles.

G4BLT@GB7WRG.#19.GBR.EU and Richard@waveg.demon.co.uk on Internet.

IBM BEYOND DOS/WINDOWS

TO MOST OF US, THE WORD 'IBM' as in 'IBM-compatible PC' is synonymous with the 'MSDOS' Operating System and the 'Windows' graphical user interface. I am as guilty as anyone of this same automatic assumption, and I have been gently taken to task by Bill Scarlett, G3RXS.

Via packet radio, he informed me: "IBM compatible hardware can be used with other Operating Systems besides DOS/Windows, ie UNIX (AIX/LINUX) and also OS/2. I don't know about the UNIX style software situation, but I do know that in this country most of the OS/2 users feel just as much in the 'wilderness' as do the Apple, Acorn, Commodore etc users.

"A few on the Internet probably have access to a reasonable range of Freeware, and I do know that in Germany the packet network allows you to download a mass of relevant software. The software that I am using to type this is part of a package called FlexPacket/2, produced in Germany by a German amateur and documented in German (well, right now it is, but I am hoping for the English translation to vet). Maybe it might be a better idea to talk, not of non IBM-compatible machines and software but of non DOS/Windows software to let in those of us who only use the DOS compatibility and the Windows emulator because we cannot contact others who might have the better OS/2 native software. I was lucky in spotting a reference to FlexPacket/2 in a bull or I might never have known.

"IBM software has always been based around the Intel ?86 type processors and was originally written by Microsoft until they split with IBM. PC DOS has always been a simple thing, effectively just linking programs together. But there was a method of running a terminal emulator program and switching to run another program while keeping it loaded, which I believe started the back room boys thinking. This led to OS/2 V1.x which came in a stand-alone and a comms version. This OS ran multiple programs designed specially for OS/2, and allowed you to switch to a DOS mode to run one DOS program while all else was paused. The stand-alone version was written by Microsoft, whilst the comms version was written directly by IBM. IBM took over OS/2 V2.x completely and this is the OS of which I speak. V3.x became Windows NT and is completely a Microsoft baby.

"OS/2 v2 is for 386 machines and above and is designed to take advantage of all the extras included in these CPUs. It can run programs written especially for OS/2, either using small windows on the desktop to display data, collect it, or issue messages, or it can use a window to function in the older graphic/text mode. It can also run DOS (and of course Windows which is but an extension of DOS) but now at the same time as the OS/2 programs. Part of the reason it can do this is that it can address up to 2Gb of virtual memory and give 512Mb to each OS/2 application that is running, if it needs that much. There is no other theoretical limit to the number of applications running, but obviously there are practical limits, basically in terms of having enough instructions per second to cope.

"The system can run up to 240 virtual DOS machines in theory, again depending on real memory to provide the practical limit for any

Internet News

GEOFF BROWN, GJ4ICD, has introduced a free Home Page which features amateur radio servers and sites around the world. Also included are new pages to the Internet on DXpeditions and beacon listings. The address for logging-in is:

http://www.business.co.uk/~equinox

If anybody would like pages included on the Internet re amateur radio, please contact GJ4ICD on 01534 77067 (office hours).

Lowe Electronics also now has a home page on the Internet. At the moment it only contains an introduction to the company, plus a couple of articles, but the intention is to expand it to include the Lowe catalogue, reviews and articles. The Lowe pages can be found at URL:

http://www.demon.co.uk/lowe/index.html

Please E-mail any comments or suggestions to info@lowe. demon.co.uk.

Part of a screen shot of an IBM compatible PC running OS/2.

one system, and that includes Windows systems as well. The virtual memory leads to some odd figures such as on this system when it had 4Mb of real memory, it regularly had a swap file of 10Mb, implying a much larger virtual size, and Windows applications would often display that they were running in a 5Mb or larger machine. Things could be a little slow at times but you did not have to shut down one job to run another. Since increasing to 10Mb, life has been easier. Guy, G0SUI, (my son) and I, are gradually remembering not to end jobs but just to start another, and a recent trial as a result of your message showed about 16 tasks in the task window all happily working away. Watching a number of DOS graphic games all working away in tiny windows on the screen is quite a hoot!

"We have got one screenshot of the OS/2 desk top to let you see the icons which are a mix of folders, sub-directories, programs and facilities, all with a nice picture behind them. You can customise the system out of recognition if you want but it will provide good defaults as well. There is no major extra software required to run anything, the support for DOS and Windows is all built in, although there is a need to obtain Device Drivers for certain specialised hardware, eg compact disks and very 'hairy' graphics VDUs, and there are also some device drivers written by folk to go better than the IBM-provided ones, normally as Shareware. The main point is that you can run all DOS programs if you want, and they run side by side and protected from each other's mistakes about 99% of the time. It should be 100% but that is yet to come!"

WHERE IS . . . ?

I OFTEN SEE PACKET bulletins asking the question "Where is so-and-so?" If you wish to locate the home BBS of someone, there is a system called White Pages, which may help. Your first move should be to log on to your local BBS, and type the command I (for Info) followed by the callsign, if the BBS is running FBB software or F (for Find) followed by the callsign, if the BBS is running NNA software, I G4BLT or F G4BLT, for example. Most FBB BBSs support WP.

If this fails to help you, then you need to send a WP (White Page) query to a BBS running FBB software. Originally, there was a proposal to have one of these WP 'servers' for each RSGB region, exchanging information with a central national server, GB7BBS. This was never formally adopted, though in practice I find that my local regional server GB7CYM in York is very useful. So, I suggest you first try the nearest busy 'trunk' BBS to your home BBS, and if this fails to produce the desired information, then send to GB7BBS in Bridgenorth. Also, if you have some idea of the area in which the person is located, it is worth sending a query to the most likely BBS that you think they would use. Of course, you are not guaranteed a reply, as not all BBSs support WP queries, especially if they are not running F6FBB software.

A query takes the form of a personal message, and you can list as many callsigns as you wish in the one query, as below:

SP WP @ GB7BBS	(or other BBS)
Query	(enter this as the subject)
G7XYZ ?	(callsign and question mark)
G9ZYX ?	(as many callsigns as you wish)
Ctrl-Z or /ex	(terminate as usual)

The syntax is not actually quite as critical as this, but if you do follow this example then you won't go far wrong.

FIRST 7-PLUS, NOW 5-PLUS!

USERS OF PACKET RADIO will know that you cannot forward 8-bit binary files through the mailbox system. In this context, a binary file is any file consisting of more than simple text, such as picture images, executable files, etc. Originally, this problem was solved using a technique called UUcode, which encoded the files using only the 7-bit ASCII characters within the range 32 - 96, thus effectively disguising the file as text. UUcode has its origins in Unix systems of some years ago, but in fact it is still widely used on the much-hyped Internet!

Later, 7-Plus was developed by Axel, DG1BBQ, to utilise the characters in the range 32 - 255, thus leading to more efficient coding, and smaller encoded file sizes. Also, Axel introduced a very clever means of requesting corrections to corrupted file sections, thus avoiding the necessity to send the entire section again. Although designed around the MSDOS filename and directory structure, the basic technique is not machine-specific. For example, I have a nice desktop version on my Acorn RISC machine, written by John Ingram, G1CWL, and this works extremely well.

Now Günter, DJ3LD, has written a utility called 3LD, which is in effect 5-Plus. It was inspired by 7-Plus, and appears very similar in most respects. However, its purpose is to enable binary files to be sent over links using 5-bit protocol, ie RTTY, AMTOR, and FEC. The program comes in two versions, the decode-only version, for received files, and the full registered encode/decode version which you would need to create 3LD files. The former may be obtained by sending a formatted 720k disc, with self-addressed label and return postage (or 2 x IRC if appropriate). The latter costs 20DM direct from Günter, or £6 if obtained from his friend Paul Brewer, G4OSJ, at 21 Orchard Place, Deer Park, Ledbury, Herefordshire HR8 2XD (note, this is not QTHR). Günter can be contacted on packet as DJ3LD @ DB0FRB.# BW.DEU.EU or you can write to him: Günter Fiedler, DJ3LD, P O Box 1203, 79338 Kenzingen, Germany. Note that if sending for the registered version, you must state your callsign, as this has to be embedded in the program.

MULTYTERM OK ON EMC

MY THANKS TO BARTG (British Amateur Radio Teledata Group) publicity officer, Andy Matheson, G3ZYP, for the following press release.

He states: "BARTG are proud to announce that their new improved Multyterm terminal unit for PACTOR, AMTOR, RTTY, SSTV, CW and FAX has just passed the rigorous EMC testing in compliance with the EU standard EN 50082-1:1993. These tests, carried out by the York Electronics Centre at the University of York, tested the new improved Multyterm for radiated immunity, immunity to electro static discharge, and immunity to electrical fast transient bursts. The RF field generated to test the Multyterm went up to 1000MHz and a field strength of 3V/m. Static discharges were applied to the Multyterm in both 'air space' and 'full contact' up to 8kV.

"BARTG is an amateur radio club and is believed to be the first to have obtained compliance to the EU EMC standard EN 50082-1 1993 which applies to residential environment."

Anyone fancy testing their home-brew TNC in this way? Further details can be obtained by contacting Ken Godwin, G0PCA, 11 St Lukes Way, Allhallows, Kent ME3 9PR, tel 01634 271548.

RTTY FOR THE EINSTEIN

IT IS PROBABLY FAIR to say that RTTY is in decline. It has all but disappeared off the VHF/UHF bands, mostly thanks to packet radio, and is slowly being replaced on HF by newer modes such as Packet, Amtor and Pactor, and to a lesser extent by G-TOR, with a small smattering of CLOVER. Nevertheless, there is still RTTY to be heard over the ether, and I for one would mourn its eventual passing, having started off in datacomms in the early 1970s with a traditional mechanical Creed 7B teleprinter rescued from an Oxfordshire scrap yard!

This brings me to the point, which is that I have received an offer of RTTY software for the Tatung Einstein computer, of which there are still quite a few examples to be found. This is based on the Zilog Z80 processor, and runs under the CP/M operating system, the predecessor of the ubiquitous but somewhat unloved MSDOS. It was a very comprehensive machine for its time, and well-suited to interfacing to amateur radio equipment.

If you would like a copy of the software, please send a formatted 3in floppy disc in a re-usable mailer, together with return postage, and details of your name, callsign, QTH, and if possible, the receiver or transceiver to be used. The address to write to is: Alex Massie, GM3HZX, 'Braeview', 3 Carters Way, Chirnside, Duns, Berwickshire TO11 3XQ. Please note that this is not QTHR, as Alex has recently moved to Duns from Berwick-upon-Tweed.

I don't have details of how this program interfaces to the transceiver, but presumably some sort of 'dumb' interface or terminal unit is required. ♦

Emergency

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THERE IS A COSMOPOLITAN feel to this month's *Emergency* column, with reports of a Wales-Ireland connection, communications from Japan and the Netherlands and a large-scale exercise in Gwynedd. There are also details of a forthcoming report of a multi-agency air-sea rescue exercise involving Northern Ireland and Scotland.

First though, a sincere thank you for the many complimentary messages received after the last *Emergency* column. I would love to take the credit for it but, in truth, it was your own contributions which made that column so interesting. Please keep the reports and suggestions coming in; this is meant to be your page, not mine.

MESSAGE PAGERS

SO MANY OF YOU have taken up the Vodapage Message pager offer that I have been able to negotiate a further, useful concession for those who want it. Personalised Answering is now available to us for only £1 per month, as opposed to the usual £3 per month charge.

There are two advantages to this particular feature. First, you need only advise people to dial 0399 and your personal pager number, instead of having to include the 1133 and explaining that they will be asked for your number when the call is answered. That makes including your pager number on business cards and letterheads much simpler. The second advantage is that calls to your pager will be answered with a greeting of your choice. For example: "Good morning. This is John Smith's paging desk. May I take your message?"

Please note that applications for Personalised Answering *must* be routed through the ECO. Anyone requiring further information should contact me.

HOME OFFICE COLLEGE

SINCE THE LAST *Emergency* column was prepared, several members have attended the Home Office Emergency Planning College at Easingwold, near York, to take part in an Emergency Planning Seminar for voluntary organisations.

As always, those attending were highly impressed by the college facilities and the quality of the lectures.

Raynet usually attends the Annual Communications Workshop at the college each October but received a special invitation to the Emergency Planning Seminar in January this year from the course director and turned out in force.

At the time of writing, we still await details of the revised college fees. These will be circulated as soon as they are available.

Raynet member Wyn Evans, GW6PMC, helps Red Cross volunteers put a casualty into an ambulance during Exercise Rave.

INTERNATIONAL INTEREST

THE RSGB HAS BEEN asked for assistance by amateurs in Japan and the Netherlands who are striving to form a network similar to Raynet in both countries. Readers will be aware of the damage and destruction caused by the earthquakes in and around Kobe, Japan and may have heard about the extensive flooding in the Netherlands.

Attempts have been made in the past to set up emergency communication networks in both countries but the authorities, so far, have failed to see how amateurs could back up their official emergency plans. Although it is impossible to predict the outcome of their renewed efforts, advice has been given and there is a wealth of experience available from within the UK. Since all approaches have so far been made by amateurs rather than by the authorities, we can now only watch with interest for developments and wish our colleagues overseas every success.

HURDLER SUPPORTS CAUSE

MANY GROUPS HAVE BEEN active this year at events organised in support of the British Heart Foundation. At one such event Surrey East Group met British 110m hurdles star Tony Jarrett.

The group was active from 0700UTC to 1700UTC at the 7th BHF Heart of Surrey Walk and was visited by Tony shortly after his arrival on site at 0930UTC.

Britain's star 110m hurdler Tony Jarrett meets David Wheatley, G6UXD and Jean Young of Surrey Raynet Control at the British Heart Foundation Heart of Surrey Walk.

RAYNET - AREN LINK

MEMBERS OF NORTH Gwynedd Raynet and our AREN colleagues in Dublin were recently involved in pre-arranged Irish Sea Communication tests. The tests, which included voice transmissions and data (packet) on VHF and UHF, were described as "part of improved integrated emergency planning for any major incident or disaster which might warrant the setting up of emergency communication links between North Wales and the Republic of Ireland". Another ferry disaster springs to mind as an instance where co-operation between the two could prove vital.

Members of Gwynedd Emergency Planning Unit and the Dublin Fire Service were invited to observe the tests which proved extremely successful. Important and useful contacts were made between respective Raynet and AREN controllers, and both members and observers were impressed by the signal quality and clarity of the voice links. This is also believed to be the first time that the DX Cluster network has been used in this kind of exercise.

Raynet at the Gwynedd County Emergency Centre linked with the Marino Emergency Control Centre in Dublin and it is anticipated that the success of these initial tests will lead to further exercises and closer liaison between the two groups, possibly even exchange visits.

FLOOD ALERT!

THE HEAVY RAINFALL in January, combined with melting snow in some areas, caused several Raynet Groups throughout the UK to be placed on alert by County Emergency Planning Officers. Essex was the first group affected, being turned out only 15 hours into the New Year, but numerous other groups across the country have also been involved. Activities were predominantly confined to monitoring rising water levels and reporting them to Council Emergency Control Centres but, inevitably, rescue centres were opened in some areas in preparation for the evacuation of the local populace. Afterwards, several

groups received letters of thanks and commendation from their respective County Emergency Planning Officers. Interestingly, the National Rivers Authority now has Raynet written into its own Emergency Plan in many of the worst affected areas.

EXERCISE RAVE

ON 26 FEBRUARY 1995, Gwynedd Raynet took part in Exercise Rave, organised by the Llanfairfechan Division of the British Red Cross Society. The following report has been submitted by Tony Jones, GW4VEQ, a Raynet member who attended the exercise in his professional capacity as Emergency Planning Officer with Gwynedd EPU.

Participants: Raynet, British Red Cross Society, St John Ambulance Brigade, the Casualties Union and Gwynedd Emergency Planning Department (observing).

Scenario: A normal First Aid duty tour at a music festival (rave party) goes awry after approximately 30 people are refused entry to the event. Fighting breaks out among the crowd, resulting in many casualties. BRCS members on site begin to treat people pending the arrival of North Wales Ambulance Service but, due to a fire at Ysbyty Gwynedd, no Ambulance Service vehicles are available. Also, the casualty department at Ysbyty Gwynedd has been severely damaged.

BRCS is therefore required to open and run a temporary medical centre near the festival, in a designated Local Authority Emergency Rest Centre. Raynet is required to provide and assist with communications between the scene and the Rest Centre as well as the four BRCS ambulances involved.

Aims: The training exercise is set out for members to practise skills in First Aid and Ambulance Aid, communications and leadership skills in a realistic environment.

More than 85 volunteers converged on the small village of Llanfairfechan on the North Wales Coast on the morning of Sunday 26 February 1995, to participate in a large scale British Red Cross Society exercise. Participants included members of East Gwynedd Raynet Group, 27 members from five different BRCS Groups, members of the Llandudno Division of St John Ambulance Brigade, 30 members of the Casualties Union and two BASICS Doctors.

Exercise participants met at the Llanfairfechan Community Centre between 0900 and 0930UTC where they were briefed by their respective controllers before proceeding to their appointed positions. The Llanfairfechan Community Centre is one of three Primary Rest Centres in the village but had never been tested as a 'live' Emergency Rest Centre. BRCS and SJAB set up the rest centre to suit their own purposes, with a large seating area and several beds/treatment tables with blankets, pillows etc. A Casualty Logging and Registration table was also arranged in the main entrance to the large hall and, from there, details of all incoming casualties were transferred from BRCS Casualty Transportation Sheets to Ambulance Registration Sheets, ready for passing on to the County Ambulance Service and Police. Light refreshments were available in the Emergency Centre. East Gwynedd Raynet sited its main Control in an adjacent room and set about erecting an external 30ft pump-up mast for its aerials.

Raynet's pump-up mast and NATO military kit outside the Gwynedd County Council Response caravan.

At 1025UTC the exercise was launched with first reports of casualties being received from the Laing road construction site, venue of the rave music party.

Four ambulances with BRCS and SJAB teams were immediately despatched to the site, along with Raynet operators to maintain full radio contact with Raynet Control in the rest centre at all times. The situation at the Laing road construction site was already chaotic with some casualties in critical condition and others having suffered serious injuries (courtesy of the Casualties Union and frighteningly realistic make-up). Many attendees were found to be under the influence of unidentified substances and alcohol. Shouting and screaming was clearly audible in the background while Raynet operators struggled manfully to relay situation reports (SitReps) back to Raynet Control, whilst maintaining a radio link 'in the field' for the medical teams.

The Raynet Controller quickly established a Forward Control Point (FCP) close to the rave party, which had just ended. The FCP enabled local network management of all 'on-site' communications and facilitated the passing forward of collective SitReps to the main Raynet Control at the rest centre. Initial comms links between the FCP and Control were poor but Raynet managed to erect a GW1AEL-special telescopic mast with great haste and, within minutes, solid and clear links were established.

Medical teams accompanied by a BASICS Doctor quickly carried out a reconnaissance of the rave site and categorised all known casualties. Ambulances then had to be guided via radio to various strategic triage points (casualty assessment and prioritising points) to collect the injured and convey them to the temporary hospital set - up at the Emergency Rest Centre.

This proved to be a challenging time, particularly for the ambulance drivers, because the terrain at the construction site meant that they sometimes had to reverse their vehicles for long distances into very awkward positions in order to reach the triage loading bays.

Extra medical personnel were requested by the BRCS on-site controller, who was clearly visible as he was wearing a different coloured tabard and a blue safety helmet (all medical teams and Raynet personnel were obliged to wear hi-viz clothing and safety helmets whilst on the construction site).

Managing the rave site and controlling the casualties proved to be an interesting challenge for the other participants. Most ravers appeared to be under the influence of unknown substances and even those with extensive injuries frequently tended to rejoin the party mood, sometimes with disastrous results!

Ambulance convoys from the site were able to pass on details of their casualty payloads to the FCP at the site, for correlation and onward transmission to Raynet Control where the information was assessed by a doctor and appropriate resources prepared for the incoming casualties. In accordance with normal triage procedures, the more seriously injured casualties were moved first, followed by the walking wounded and then others who had entered the spirit - or been entered by the spirit - of the party.

In total, the four ambulances completed some 20 trips between the site and the Emergency Rest Centre, their transport capacity for each trip being largely dependent upon the polarization of their passengers. Horizontally polarized elements did not stack as tidily as their vertically polarized counterparts!

The rave site was cleared completely just before lunchtime. All Raynet, BRCS and SJAB teams had worked very well together under pressure. Meanwhile, Raynet Control was able to pass early SitReps, requests for special life-saving medical equipment, and coordinate ambulance Convoy Control with the triage collection points. It also carried out a myriad of other, less obvious but equally important tasks.

The Casualties Union did its usual, excellent job of preparing vivid and horribly realistic wounds for willing rave casualties and its attention to detail was obvious in every made-up volunteer.

The exercise concluded with a multi-agency de-brief at the Emergency Rest Centre, where participants were able to assess their performance and compare notes as well as discussing suggestions aimed at improving their respective responses. The de-brief revealed that the exercise had been a resounding success and that it had allowed a number of different organisations to test together their collective voluntary skills.

Many of those involved had taken part together in an exercise for the first time while for others it was an opportunity to see familiar faces from previous events. All concerned agreed that Exercise Rave had provided an excellent platform for the exchange of ideas and the practise of emergency procedures.

It is obviously important that participants enjoy such events as well as taking away new wisdom from the experience. Exercise Rave certainly achieved this resulting in a pleasant half-day for all, in the company of friends old and new.

IRISH SEA RESCUE TASK

NOT TO BE OUTDONE, Groups in Northern Ireland and Scotland came together recently to play an important role in an extensive air-sea rescue exercise mounted by HM Coastguard on the deepest part of the Irish Sea.

It had been my intention to include details of the exercise this month but the reports received are so interesting that, in justice to them, I could not condense them enough for the available space. Look out for Exercise Beaufort's Dyke in the next *Emergency* column. ♦

Microwaves

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

THE MARTLESHAM RADIO Society has arranged another VHF Round Table at the BT Research Laboratories, Martlesham Heath, near Ipswich on Sunday, 14 May starting at 10am. Although nominally a VHF forum, previous events have encompassed the lower microwave bands. This is because many of the participants are active on the microwave bands and most of the test gear allows measurements and alignment at frequencies well above VHF.

As usual, for security reasons, access will be by advanced booking only. If you apply for more than one ticket, the names and other details of each person will need to be known to the organisers in advance of the event. Tickets and further details are available from Roy Smith, G0RRC, 'Lykkebo', The Street, Burstall, Ipswich IP8 3DN.

The date of the next (second) Southern Microwave Round Table of 1995 has been set for Sunday, 18 June at the premises of the Crawley Amateur Radio Club, Pease Pottage, near Crawley, West Sussex, commencing at 10am. Further details from Mike Scott, G3LYP, The Magnolias, Marlow Rd, Ln End, High Wycombe, Bucks HP14 3JW or telephone 01494 881298 at any reasonable hour.

DUBUS MAGAZINE PRICE INCREASED

I MADE REFERENCE to *DUBUS* magazine in the January *Microwaves* column. At that time it seemed that the subscription would remain at £12.50 for the four, approximately quarterly issues. Regrettably, with an unfavourable exchange rate and other factors, I've been asked by Roger Blackwell, the UK agent, to correct my reminder; in common with many other essentials of life, the price has had to go up and the subscription is now £13.50. Cheques payable to *DUBUS* UK should be sent to Roger Blackwell, G4PMK, 57 Station Road, Scholes, Leeds LS15 4BY, as soon as possible. As I write, the first issue of 1995 has come through the post and contains a number of interesting microwave technical reports. These include details of a design for a 10W solid state linear amplifier for 10GHz, designs for PHEMT preamplifiers for the 2.3, 3.4 and 5.7GHz bands (with noise figures ranging from 0.35dB at 2.3GHz to 0.65dB at 5.7GHz). There is also news on the design of a modern dielectric resonator oscillator (DRO) for 10 - 12GHz using one of the latest Siemens grounded emitter (yes, bipolar) transistors as the active device. The issue also features an interesting theoretical analysis of the system requirements for 10GHz EME, as well as World-wide reports on activity and DX on all the bands from 50MHz up.

THE LADDERS

THE FINAL PLACINGS for the 1994 Operating Ladder which closed on 31 December are shown in **Table 1**. You may remember that it was not complete by the deadline for the March *Microwaves* column but the 1995 table is now well under way. Congratulations to G4FCD and G4KNZ/P for their respective achievements - and all the other operators who, every year, achieve scores and DX which would have been unthinkable 10 years ago.

The 10/24GHz All Time Squares table has not been included this time as there have been no significant changes since it was last published. However, keep your eyes on this spot! My thanks to the *RSGB Microwave Newsletter* editors for this information.

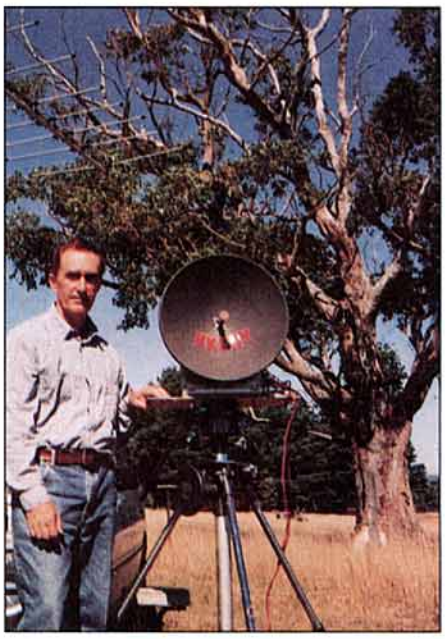
NEWS FROM THE IARU

THE MID - TERM (halfway between the IARU Region 1 Triennial meetings) VHF, UHF and Microwave Managers' meeting took place in Vienna over the weekend of 25 - 27 February, arranged by our hosts, the Austrian National Society, OVSV. Several topics of general microwave importance were discussed and a number of changes were made to 'officers' of IARU.

The VHF/UHF and Microwaves Committee (Committee C5 of Region 1) is chaired by Arie Dogterom, PA0EZ, who took over this position 18 months ago in De Haan, Belgium. Prior to this, Arie was the Region 1 Frequency Allocation Co-ordinator. Also at the De Haan meeting, Dave Butler, G4ASR, was appointed as VHF Beacon Co-ordinator.

At the Vienna meeting, Arie relinquished the frequency co-ordinator's position to John Morris, GM4ANB, in order to concentrate on the demanding task of running the C5 Committee. John was appointed Records Co-ordinator, in addition to his existing position of Committee secretary. Meanwhile, G4ASR (RSGB VHF Manager) relinquished beacon co-ordination to John Wilson, G3UUT. Both these new appointees are responsible for co-ordinating Region 1 matters right through the spectrum from 30MHz up! SM0TER was appointed Satellite Frequency Co-ordinator.

The job of Frequency Co-ordinator is viewed as crucial at a time when frequency allocations could undergo some dramatic changes. This prompts me to mention the CEPT/ERO Detailed Spectrum Investigations (DSIs). Phase One, covering 3.4GHz to 105GHz, was completed some two years ago and, as you may recall, raised a few controversial issues about amateur satellite allocations, not the least of which was the



Roger Bowman, VK5NY, proudly displays the antennas he used to set a new World terrestrial distance record in the 3cm band last December (see *Radcom*, March 1995, page 74). A path of 1912km was spanned between VK5NY/P, from near his home in Adelaide, and Walter Howse, VK6KZ/P near Albany in Western Australia. VK5NY/P used 180mW to a 400mm dish with diapole feed and FT290R for 144MHz IF.

G6XM/P on 24GHz in operation on Dartmoor.

apparent loss of quite a lot of 'our' allocations to other services. Phase Two, 30MHz to 3.4GHz, has just been completed and was due to be published by the end of March. [See this month's *Leader*, and *News* pages for details of the DRI Phase 2 recommendations, and a chance for you to comment - *Ed*]

SP5FM was able to report to the Vienna meeting that a number of points, which were raised during the consultation phase following the publication of the first version of Phase 1 DSI, had apparently been reconsidered and clarified. This was a result of much diligent work, lobbying, observing and advising at CEPT FM (Frequency Management) Group meetings.

Although the final version of the European bandplan has not yet been confirmed, it looks set to extend the shared 3.4GHz allocation within CEPT, widening the allocation by 25MHz and extending it to countries which, at present, have no allocation at all. This might prove to be some compensation for the ultimate loss of a major part of the 2.3GHz band, the possibility of which we have been aware of for some years. A company in the USA wants World-wide Mobile Satellite Service Exclusive status for frequencies up to 2.4GHz but amateurs still have time to contest this. 10.000 to 10.300GHz - Amateur Secondary - which had been omitted from the CEPT bandplans has been reinstated and there has been some clarification around the 5.6 to 5.7GHz area.

The status of the amateur 'weak signal' bands has not been improved, but will continue to be the subject of a footnote in the plans. This is the sort of case where persistent and co-ordinated lobbying across the whole of Region 1 might help the situation between now and the implementation date. The plan is not yet carved in tablets of stone, although it might be fast-setting concrete! With this in mind, it was unanimously decided to delete the word 'provisional' from the IARU bandplans as they appear in the latest edition of the *VHF Managers Handbook*. These include the disputed and hotly debated change of narrowband operation from 5.760GHz to 5.668GHz, 10.368GHz to 10.450GHz and 24.192GHz to 24.048GHz.

This is not to suggest that these changes will be brought in immediately however they will become inevitable once the CEPT plan is finalised and implemented, which seems possible after the 1996 World Radio Conference. This still allows us a little time to manoeuvre with the various administrations throughout the CEPT, which now represents virtually all of the fully developed nations in ITU Region 1. I would stress again, as I did two years ago, that your views on the future of amateur allocations in the microwave bands should be expressed to myself or any other member of the Microwave Committee and the Society's Licencing Advisory Committee. See the latest edition of either the *RSGB Call Book* or the frequent listings in *RadCom* for names, addresses and telephone numbers.

WEST COUNTRY ACTIVITY

BILL JAMES, G6XM, of Okehampton, Devon recently informed me: "After seeing all the OZ photos in *RadCom*, I thought it was about time to let you know that all is not dead (yet!) in the West Country."

Bill described his home location as almost impossible on 10 and 24GHz, leading to portable operation from Dartmoor or Exmoor. The photo (bottom left) shows him on 24GHz, in operation on Dartmoor in July last year which, he says, was "the only time the sun came out on the right day". Just one QSO resulted which amply illustrates that the level of microwave activity in the West Country leaves much to be desired. The photo below shows an array of different 10 and 24GHz dishes and some test gear at the QTH of G3GNR on the day that G6XM and G3GNR set up an antenna 'workshop' session. When you're away from the centres of high activity, getting together with your nearest microwave neighbour is about the only way to keep the motivation going! ♦

Band GHz	Pos	Callsign	Stations Worked	Best DX (km)	Multiplied score
10	1	G4FCD	106	1062	112583
	2	G4BRK	84	1115	93360
	3	G4BCH/P	76	1177	89452
	4	G4LDR	51	1118	57318
	5	G8APZ	54	1026	55404
	6	G3FYX/P	69	787	54303
	7	G3JMY	46	1137	52302
	8	G3KEU/P	66	787	51942
	9	G3FYX	44	1137	50028
	10	G4KNZ	47	1052	49444
	11	G3GNR	54	819	44226
	12	G4BRK/P	56	432	24192
	13	G8DKK	39	578	22542
	14	G3GRO	37	395	14615
	15	G3UKV	28	494	13832
	16	G4JNT	40	339	13560
	17	G3PHO/P	41	330	13530
	18	G3YKI/P	33	390	12870
	19	G4MAP	41	309	12669
	20	G8LSD/P	39	313	12207
	21	G3UKV/P	33	357	11781
	22	G3UYM/P	33	355	11717
	23	G3JMB/P	38	282	10716
	24	G3ZTR/P	26	417	10842
	25	G3FNQ/P	22	463	10186
	26	G1MPW/P	37	247	9139
	27	G4EQD/P	20	418	8360
	28	G4DDK	16	400	6400
	29	G4PMK/P	5	958	4790
	30	G3PHO	7	618	4326
	31	G3ATM/P	14	271	3794
	32	G8AYY/P	12	202	2424
	33	G8KMH	1	135	135
24	1	G4KNZ/P	20	137	2740
	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	5	86	430
	9	G3GNR/P	1	143	143
	10	G8KMH/P	1	126	126
	11	G4DDK/P	1	37	37

Table 1 : 1994 Operating Ladder - Final positions.

An array of 10 and 24GHz dishes and test gear at the QTH of G3GNR.

Satellites

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BY NOW MOST READERS of this column will know that AMSAT-UK's Ron Broadbent, G3AAJ, received the MBE in the New Year Honours List.

Richard Limebear, G3RWL, reported in the *AMSAT-UK News Bulletin* for the Satellite Net for 29 January, that: "Ronald J Broadbent, G3AAJ, has been awarded the MBE by the Queen in the New Year Honours List in recognition of his services to Amateur Radio.

"This award is most well-deserved and is an honour for both Ron and AMSAT-UK, recognising his many years of devoted service to AMSAT and its members World-wide as well as the contribution of the AMSATs to the technical advancement of space technology. AMSAT-UK, one of the World's most active amateur satellite groups, was born in the early 70s as an occasional newsletter. But this modest start created great interest and therefore more and more demand on the time of the handful of volunteers then involved. In 1978, the whole arrangement was swept up into a coherent whole by Ron Broadbent who took on the job of Honorary Secretary.

"During his first year it became apparent that AMSAT-UK had been blessed with a real worker. During the next 16 years (1978-1994) he steadily, and virtually single handedly, built the organisation up into a World respected body dedicated to fund-raising for amateur satellites."

Ron's investiture ceremony was held on 14 February at Buckingham Palace with Her Majesty Queen Elizabeth II presenting the decoration. Another honour was bestowed by the RSGB Council who elected Ron a Vice-President of the Society earlier this year.

AMSAT-UK COLLOQUIUM '95

PLANS ARE WELL underway for the 1995 Colloquium to be held from 27 - 30 July. Besides items of general interest, there will also be an emphasis on operating on the different spacecraft and helping beginners. A second stream will include workshop-style presentations in a fully functioning groundstation capable of operating all modes. This groundstation will also be available out-of-hours for general operating sessions with a certificate-style QSL card available. The Colloquium will also feature social events.

Douglas Loughmiller, G0SYX, shows visitors around the UoSat Command Station at Surrey University during the 1994 Amsat-UK Colloquium. The 1995 Colloquium will take place from 27 - 30 July.

SWIFT TRACE ON RS15

RS15, LAUNCHED AT 0300 UTC on Boxing Day was soon located thanks to its strong signals on 29.352MHz. Though the beacon signals were loud, those from the transponder were disappointingly poor, being low in signal strength and seriously affected by 'spin'. Intermittent on/off switching was also observed. This was apparently caused by insufficient battery holding capacity when the solar cells were in eclipse conditions.

Pat Gowen, G3IOR, reported that the Channel 1 telemetry indicated that the onboard power supply normally read around 16 to 17 volts in sunlight. When the satellite was in darkness on 10 February at 2236 UTC it had dropped to 14.4V. By 2237:30 it was 14V, by 2239 13.2V and by 22.40:30 to only 12.4V. At 2241 both transponder and TLM became intermittent preventing further readings until 2255:30 UTC when it rose to 15.5V and both beacon and transponder became fully operational again. Channel 7, the solar cell battery current normally around 880mA, had dropped to 400mA at 2256 UTC and then to 0mA from 2237:30 until full operation started again at 2255 UTC, by which time it was 880mA.

Its period is 127:27 minutes and the increment 32.05°, with a height above earth well over 2000km, non-sun-synchronous, so you will not hear it at the same time each day. On average, the group of passes will occur earlier with time. It has a 21 to 29MHz transponder as well as the Mode A transponder, but UA3CR reports that it will be kept in Mode A (145MHz up, 29MHz down).

Reports that RS15 is to be the last RS satellite, because funding for future RS satellites has dried up, have proven unfounded. RW3DZ, who is currently in this country, said that at least one more satellite is planned for 1996. Any reports on RS15 are welcome at RS3A, P O Box 59, Moscow 105122, Russia. It should be noted that the current Orbital Calendar, available from AMSAT-UK, gives the orbital data for RS15 giving times of passes etc and is very easy to read.

UPDATE ON OSCAR 27

THERE HAS BEEN A RISE in interest recently concerning OSCAR 27 - the amateur radio payload on board the commercial microsat EYESAT. It is switched on when this satellite is not being used for its primary mission. Its operations are controlled by an eclipse detector and timing program running a computer. The program divides the satellite orbit into six segments - three for the eclipse portion of the orbit and three for the 'in-sun' portion. The program turns the AO - 27's transmitter on or off for each segment, using segment duration and transmitter power setting set by the command station.

Shortly after its launch, interference problems were reported with conversations in Spanish heard on its downlink. It was launched from Kourou on 26 September 1993, along with several other microsats; small sized satellites of modular construction, developed by the satellite team at the University of Surrey. These satellites have set the pattern for future satellite development, being small and far cheaper to construct. Several can be launched from the same rocket launcher.

AO - 27 was launched along with ITAMSAT from Italy (AO - 26), POSAT -1 from Portugal and KITSAT-2 from the University of Surrey. It was built by Interferometrics Inc of Vienna, Virginia, and carries an amateur radio package built by AMRAD, an experimentally orientated radio club in Virginia, a suburb of Washington DC. It is available mostly at weekends in FM repeater mode during daylight passes over the Northern Hemisphere. The centre downlink frequency for stations that are corrected for doppler shift is 436.797MHz. The uplink is centred on 145.850MHz. Both uplink and downlink modes are FM. Output power is said to be between 2 and 3 watts, so signals will not be very strong.

Users are reminded that as with all FM-mode repeaters, AO - 27 is subject to FM 'capture effect' and can only transmit one signal at a time. Users are asked to co-operate, keep calls short, give breaks so as many stations possible can work a pass and, above all, listen before and while transmitting! The satellite has a very sensitive receiver and stations running approximately 25W to moderate-gain omni-directional antennas can get a good uplink signal into the satellite. A sensitive UHF FM receiver with a preamplifier and an omni-directional antenna can receive AO - 27's downlink with some fading, so moderate-gain directional arrays should provide a solid receive signal. Remember to correct for the +/-9kHz of doppler shift on the 436.797MHz downlink signal during a pass. No doppler correction is needed for the 145.850MHz uplink signal.

Users are asked not to transmit on 145.850MHz if they do not hear the satellite's downlink so as to avoid possible interference to other satellite uplinks and downlinks on adjacent frequencies.

LAUNCH DISASTER

MOST UNFORTUNATELY the two satellites we were all looking forward to came to grief at their launching. Israel's TECHSAT and the Mexican-built UNANSAT were both destroyed on 28 March when the launch vehicle exploded. This was a Russian SS25 rocket originally built to carry ballistic missiles and recently converted to launch satellites.

The first launch of a converted SS25 took place in November 1993 and was successful but with a lighter payload. TECHSAT was designed for packet radio repeater use and was intended for 9,600 bit/s store-and-forward use. UNANSAT was assembled by students at the Universidad National Autonona de Mexico and carried a unique meteor radar experiment. It is hoped to replace TECHSAT within a few months but there is not much hope of replacing UNANSAT as it was not insured. ♦

NUNSFIELD HOUSE AMATEUR RADIO GROUP PRESENT THE TWENTY-SIXTH

ELVASTON CASTLE

NATIONAL RADIO RALLY

SUNDAY 11th JUNE 1995

ATTRACTIONS INCLUDE: More than 150 Radio, Computer & Electronic Stands • Grand Bring & Buy Marquee • Crafts Marquee • Flea Market (for private vendors only) from 9.00am • Band Performances • Children's Entertainments • Full on-site Catering • Talk-in on 145.550MHz and 433.550MHz • Venue made available by permission of Derbyshire County Council. Parking (including entrance) Cars £2.00. Coaches £10.00.

A GREAT DAY OUT FOR THE WHOLE FAMILY

Further details: Ken Frankcom G30CA. Tel: Derby (01332) 662818.
Trade enquiries: Keith Ellis G1ZLQ. Tel: Derby (01332) 662896 (evenings) or club HQ on Derby (01332) 755900
Elvaston Castle is located on the B5010 which runs between the A6 and A52, 5 miles south-east of Derby.

HAM RADIO

International HAM RADIO exhibition including the 46th DARC Lake of Constance meeting.

23.-25.6.1995

Friedrichshafen Exhibition Grounds
Fri. and Sat., 9 a.m. – 6 p.m., Sun. 9 a.m. – 4 p.m.

Europe's top meeting place for HAM RADIO enthusiasts with the very best on offer from the radio, electronic and computer sectors. Over 200 exhibitors and visitors from over 30 countries.
HAM RADIO 95 – an experience not to be missed!

38th NORTHERN MOBILE RALLY

SUNDAY 21st MAY 1995
GREAT YORKSHIRE
SHOWGROUND
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DOORS OPEN 11AM
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44,000 SQ FEET OF SPACE
OVER 100 STANDS

ROOM TO MOVE !

ENQ'S MIKE G0MKK 01423 507653

CONTEST CLASSIFIED

All rules should be read in conjunction with the General Rules published in *Contest Classified*

VHF RULES

VHF NATIONAL FIELD DAY 1995 RULES

1. **Duration**. 1400UTC Saturday 1 July to 1400UTC Sunday 2 July 1995.

2. **Site Notification**. Each Group intending to compete must send two copies of a completed site registration form (available in the *Call Book* or from G4DHF) to: VHF Contests Committee, c/o D Johnson, 65 West Street, Bourne, Lincs PE10 9PA, to arrive no later than 10 June 1995. Each group may only register one site although changes can be made provided G4DHF is informed - tel: 01778 425367 12.10 - 12.40pm or 5.00 - 7.00pm.

3. **Bands.** Up to four separate stations may operate simultaneously on the 70, 144, 432, and 1296MHz bands. 70MHz will be CW only from 1400 - 2200UTC, and SSB only from 0600 - 1400UTC, with close down between 2200 - 0600UTC. Each station may be worked once on SSB and once on CW on 70MHz

4. **Operators.** Any RSGB member or group of members operating from the British Isles (excluding Eire) may enter. Also, affiliated RSGB societies may enter (operators *must* be members of the Affiliated Society [AFS], but not necessarily members of RSGB themselves). In this case, a declaration signed by an officer of the AFS that the operators are members of the society is required with the entry. RSGB members are allowed to operate in AFS groups whether or not they are actually members of that AFS group.

5. **Stations.** All the stations forming one entry must operate from within a circle of 1km radius centred on the operating position of any of the stations. All equipment, including antennas, must be installed on site not more than 24hrs before the contest. Only portable accommodation can be used to house the stations. Power for all equipment must be derived from an on-site generator or battery.

6. **Scoring.** Contacts will be scored by the radial ring system. The overall score will be determined as per general rule 10 using the final 70MHz, 144MHz, 432MHz and 1296MHz scores.

7. **Contest exchanges**.

(a) On each band report, serial number and locator must be exchanged.

(b) Additionally, on 70MHz only, QTH information must be exchanged (general rule 24). It must be given in a different form on each mode.

(c) Contacts with stations whose callsigns appear on any of the group's cover sheets will not count for points.

8. **Sections.**

Restricted section (R):

(i) The height of any antenna's highest driven element feed-point must not exceed 10m above ground level.

(ii) Only one antenna per band may be used (ie no stacked, bayed or collinear arrays or switching between two or more antennas). A slot-fed Yagi or Quad antenna is permitted. Dish or Backfire antennas must not exceed 2m diameter.

Low Power section (L):

(i) The power output of any band must not exceed 25W PEP at the transmitter.

(ii) The height of any antenna's highest driven element feed-point must not exceed 10m above ground level.

(iii) Only one antenna per band may be used (ie no stacked,bayed or collinear arrays or switching between two or more antennas). A slot-fed Yagi or Quad antenna is permitted. Dish or Backfire antennas must not exceed 2m diameter.

Open section (O): as per general rules.

SWL section (S): as per general rules.

9. **Inspections.** All stations are subject to inspection by members of the VHF Contests Committee or nominated representatives. Should the inspector be unable to locate the site due to inadequate or incorrect information, the entry will lose points or may be disallowed. In the event of a last minute site change it is the responsibility of the group to make suitable arrangements for the inspector to find the site. The inspector must be given immediate access to all parts of the site with the right to stay as long as desired, and the ability to return at any time during the contest.

10. **Entries.**

(a) All entries must be postmarked no later than 31 July 1995.

(b) Entries must be addressed to: VHF Contests Committee, PO Box 29, Bridgend, CF35 5YA.

(c) Please enclose a 427 cover sheet for each band, including separate ones for the 70MHz SSB and CW sections. Please don't forget QTH information on all 70MHz log sheets.

(d) Where available, copies of the logs on floppy disk (any IBM PC compatible or Macintosh format) would be appreciated. These can be in any plain ASCII format such as the .LOG from G3WGV or .VHF or band files from EI5DI, or of course the standard RSGB format. For this year, please also enclose paper copies of the log.

11. **Awards.** The Surrey, Martlesham, and Arthur Watts Trophies will be awarded to the overall winners of the Open, Restricted and Low Power sections respectively. The Tartan Trophy will be awarded to the leading resident Scottish entry in the Open section, and the Scottish Trophy to the leading Scottish entry in the Low Power section. Certificates will be awarded to the winners and runners-up on all bands in each section, and to the leading stations in each country.

If you have any queries as to how to enter, forms, changes of site etc, please write or telephone the VHFCC Chairman.

3RD BACKPACKERS 144MHZ CONTEST

2 July, 1100 - 1500UTC

See separate rules.

Adjudicator: D Johnson, 65 West Street, Bourne, Lincs PE10 9PA.

2ND 50MHZ BACKPACKERS

9 July, 1100 - 1500UTC

Rules as per 144MHz Backpackers. Rule 14a

144 MHZ LOW POWER / SWL

22 July, 1400 - 2200UTC

General rules apply, plus rule 14c. County / Country / QTH Locator Multipliers. 25W pep output from TX.

Sections: F single operator fixed, S single operator portable, O all others, L listeners.

Adjudicator: M J Platt, 451 Newcastle Rd, Shavington, Cheshire CW2 5JU.

432 MHZ LOW POWER / SWL

23 July, 0800 - 1400UTC

General rules apply, plus rule 14c. County / Country / QTH Locator Multipliers. 25 W pep output from TX.

Sections: F single operator fixed, S single operator portable, O all others, L listeners.

Adjudicator: M J Platt, 451 Newcastle Rd, Shavington, Cheshire CW2 5JU.

DIRECTION FINDING

RESULTS OF BANBURY TOP BAND QUALIFYING EVENT (1994)

Thirteen teams assembled on the banks of the River Thames at Culham, south of Oxford. At exactly 1320 two good signals were received from the hidden transmitters.

Station 'A', G4FBF, was located 18km west of the start within a long strip of open woodland. The transmitter was positioned about 2km from the nearest road but it was possible to arrive on site from all points of the compass. The transmitter was hidden beneath a fallen tree on the banks of a small stream. The 400metre-long aerial and nearby power line caused some confusion amongst competitors although most did not spend more than 20 minutes on site, and by 1500 nearly everyone had departed en route for station 'B'.

Station 'B', G0DLB, was located 25km north of the start, on a river bank 6km north of Kidlington in an area where the River Cherwell runs alongside the Oxford Canal. Dense woodland between river and canal made access nearly impossible by normal means. To prevent tell-tale tracks, the hidden transmitter, operator and remains of the aerial system were ferried in by rowing boat. 150m of wire had been fed along the canal towpath, giving plenty of opportunity for contestants to explore dark bushes and damp reed beds all to no avail. Eagle-eyed contestants soon discovered the wire aerial continued over the river to the far bank. Many swam the river, only to find the aerial continued still further, then crossed back over the river to the near bank. Having pin-pointed the hidden transmitter (and boat), teams now faced a dilemma - whether to take the painful journey through the woods or a more direct but wetter route along the riverbank. Most decided to brave the river and got soaked in the process.

Twenty four competitors and their team members met afterwards for tea in Banbury at the Hardwick Community Centre. The Banbury Shield was presented to winner Alan Simmons who then gave an account of how he had won.

Pos	Name	Club	Transmitter A	Transmitter B
1	Alan Simmons	Mid Thames	14.46	16.01
2	Bob Grey	Mid Thames	14.44	16.02
3	Dick Brocks	Chelmsford	14.45	16.05
4	Brian Bristow	Mid Thames	14.45	16.05.5
5	George Whenham	Coventry	14.45	16.06
6	Phil Cunningham	Colchester	14.39	16.07
7	Trevor Gage	Mid Thames	14.44	16.10
8	Chris Plummer	S Manchester	14.45	16.13
9	Andy Collett	Chelmsford	14.45	16.18
10	Colin Metcalf	S Manchester	14.46	16.19
11	Colin Merry	RSGB	16.07	-
12	Colin Boyce	Mid Thames	16.08	-

One competitor failed to find either transmitter

432 MHZ FIXED / SWL

20 August, 1700 - 2100UTC

General rules apply plus rule 14c. County / Country / QTH Locator Multipliers.

Sections: S single operator fixed, O other fixed, L listeners.

Adjudicator: I Cornes, 6 Haywood Heights, Little Haywood, Stafford ST18 0UR.

144 MHZ CW CUMULATIVES

29 August, 13 / 28 September, 13 / 30 October, 2030 - 2300 local time

General rules apply. Please use 4422 summary sheet to show scores for each day, best three days will be totalled, please send all logs. Single 427 cover sheet for entry. Rule 10 applies.

Sections: F Single operator fixed or portable, L Listeners

Adjudicator: D Johnson, 65 West Street, Bourne, Lincs. PE10 9PA.

VHF CONTESTS CALENDAR

6 May	10GHz Trophy (April 95)
6/7 May	432MHz to 24 GHz and 70cm Trophy (Mar 95)
20/21 May	144MHz and SWL, Single / All Others (Mar 95)
21 May	1st Back Packers 144MHz (April 95)
3 Jun	50MHz Trophy (April 95)
3/4 Jun	IARU 50MHz (April 95)
3 Jun	1st 50MHz Backpackers (April 95)
10 Jun	UKSMG Summer (April 95 p24)
18 Jun	70MHz CW (Mar 95)
18 Jun	2nd 144MHz Backpackers (April 95)
25 Jun	432MHz FM Fixed/Open (April 95)
1/2 July	VHF Field Day
2 July	3rd 144MHz Backpackers (April 95)
9 July	2nd 50MHz Backpackers (April 95)
22 July	144MHz Low Power / SWL (May 95)
23 July	432MHz Low Power / SWL (May 95)

SALISBURY QUALIFYING EVENT (TOPBAND)

Date: 21 May 1995

Map: 184 (Salisbury and the Plain)

Assembly: 1300 for start at 1320.

Location: Salisbury Race Course, 2 miles S of Wilton, NGR 092285.

Competitors requiring tea should notify G2FIX QTHR, tel: 01722 743837, by 14 May.

WALSALL AMATEUR RADIO CLUB NATIONAL VHF EVENT (2 METRES)

Date: 4 June 1995

Map: 128 (Derby and Burton upon Trent)

Boundaries: Area contained to the east of the A38 bounded at the south by SK130080 (A38) and at the north by the Derby outer ring road A5111(T) to SK400355, the A52(T).

Start location: The Greyhound public house car park, on A50 at boundary.

Start time: 1300, transmission times: 30 seconds every 5 minutes.

Foxes: 2.

For further details telephone 01922 473492 after 5.00pm.

HF CONTESTS CALENDAR

1 May	QRS Cumulative (Feb 95)
6 / 7 May	ARI DX (Mixed Mode)
13 / 14 May	CQ-M (RSF[Russia] Mixed Mode)
20 May	European Sprint Contest (CW) (Apr 95, p22)
26 / 27 May	CQ-WPX (CW)
3 / 4 Jun	National Field Day (CW) (Apr 95)
17 / 18 Jun	All Asia (CW)
24 / 25 Jun	Summer 1.8MHz CW(May 95)
8 / 9 Jul	IARU Radiosport (Mixed Mode)
8 / 9 Jul	RSGB SWL (Mixed Mode)
16 Jul	Low Power Field Day (CW) (May 95)
29 / 30 Jul	IOTA (Mixed Mode) (Mar 95)
6 Aug	RoPoCo 2 (CW) (Apr 95)
12 / 13 Aug	WAE-DX (CW)

HF RULES

SUMMER 1.8MHZ CONTEST 1995 RULES

1. The General Rules for RSGB HF Contests (RadCom January 1995) apply.

2. When: 2100UTC Saturday 24 June - 0100UTC Sunday 25 June 1995.

3. Sections: (a) UK (b) Overseas (including Eire). Single or multi-operator entries will be accepted in both sections.

4. Frequency and Mode: 1820 - 1870kHz, CW only.

5. Exchange: RST + serial number commencing with 001. UK stations must also send their County Code.

6. Scoring: Overseas stations work only UK stations for points. Section (a) Three points per QSO plus a bonus of five points for the first QSO with each UK County and the first QSO with each Country (outside the UK). Section (b) Three points per QSO plus a bonus of five points for the first QSO with each UK County.

7. Address and closing date for logs: RSGB HF Contests Committee, c/o S V Knowles, G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey CR7 7AF, England. Send within 15 days of end of contest.

8. Awards: Certificates of Merit to the winner and runner-up in each section.

LOW POWER FIELD DAY 1995 RULES

1. The General Rules for RSGB HF Contests (*RadCom* January 1995) apply.

2. When: 0900 - 1200 and 1300 1600UTC, Sunday 16 July 1995.

3. Sections: (A) 10W RF output maximum. (B) 3W RF output maximum.

Single or multi-operator entries will be accepted in both sections.

4. Mode & Frequencies: 3510 - 3560kHz and 7010 - 7040kHz CW only. Both bands may be used during each session. Any station (including Overseas) may be contacted once on each band.

5. Special conditions: (i) The power for all parts of the station must be derived from batteries, pre-charged accumulators or natural sources such as solar cells or wind driven generators. Float charging accumulators from petrol, gas or diesel driven generators is not permitted. (ii) The transmitter or outboard PA must not be capable of RF output power in excess of 15W. (iii) Antennas must not exceed 11m above ground and may have no more than 2 elevated supports. (iv) The station must be 'Portable' (Rule 10, General Rules).

6. Exchange: RST, serial number, county code and RF output power in Watts. Serial numbers commence at 001 and continue through both sessions. Output power should be expressed as one or two digits plus 'W' in place of the decimal point, eg '10W', '1W', '1W5' (1.5W), '0W1' (100mW). Participants using more than 10W may send 'QRO' instead (QRO stations are not eligible to enter the contest but are welcome to 'give away points').

7. Scoring: 15 points for each QSO with a QRP Portable or Mobile station; 10 points for a QRP Fixed station; 5 points for all other QSOs. For the purposes of scoring, 'QRP stations' are those using 10W RF output or less.

8. Address and closing date for logs: As in General Rules.

9. Awards: The Houston-Fergus and Southgate Trophies to the winners of sections A and B respectively. Certificates to the first 3 entrants in each section and to the QRP Fixed station submitting a checklog and giving the most points to entrants.

HF RESULTS - ISLANDS ON THE AIR CONTEST - JULY 1994

MULTI OPERATOR ISLAND

POS	CALL	REF	QSOs	MULT	SCORE
1	CS5C	EU145	2161	183	2776842
2	GJQOZF	EU099	1765	179	2191318
3	GW5LP/P	EU124	1628	175	1933925
4	GW8GT	EU005	1583	187	1819136
5	CT3EE	AF014	1806	119	1479765
6	EJ1D	EU121	1651	140	1445220
7	W4VEQ/P	EU106	1771	127	1393063
8	F5LRC/P	EU064	1630	96	1020576
9	SK7DX	EU138	1108	102	824568
10	DL0HRO/P	EU129	990	97	691707
11	CQ2I	EU150	1121	78	604500
12	ED1ONS	EU060	1213	72	583488
13	GM3USL/P	EU123	909	81	451332
14	OZ4HAM	EU030	643	83	418816
15	DJ0MW/P	EU128	716	77	395934
16	IT9HLC/IH9	AF018	1039	50	330950
17	GW0SDX/P	EU124	481	91	306306
18	EJ4GK	EU006	732	52	265928
19	OH5AD	EU140	819	50	262500
20	G3XMZ	EU005	499	79	262122
21	IG9/IT9KWF	AF019	790	54	234792
22	IL4/IK4HPU/HLU	EU155	699	53	234154
23	G4RFR	EU005	348	78	201942
24	TM7I	EU094	444	49	151312
25	EJ5CRC	EU121	311	51	139689
26	W4/XE1L	NA034	656	47	123751
27	SO1DX/P	EU132	288	47	115573
28	G4CRA/P	EU005	418	45	109800
29	G0OYQ	EU005	339	47	103259
30	WQ5Y/P	NA092	372	42	72828
31	G0PHN	EU005	162	52	67392
32	VE2CQ/P	NA128	247	31	63023
33	G4OBK	EU005	63	55	48510
34	AB5EA	NA143	329	37	39960
35	N2US/1M3	NA139	304	27	37827
36	GI4GTY/P	EU122	124	23	20562
37	G2XV	EU005	16	3	291

SINGLE OP MIXED ISLAND

POS	CALL	REF	QSOs	MULT	SCORE
1	OH1BBF	EU096	1093	100	813800
2	DL8OBC/P	EU127	776	83	430106
3	JF1SEK	AS007	574	83	318139
4	SM4DHF/2	EU135	599	63	285705
5	EI4DW	EU115	459	70	223020
6	VE1JS	NA127	542	63	217035
7	OZ5MJ	EU029	285	67	164954
8	G3YEC	EU005	158	78	121524
9	N6HR/7	NA065	264	24	22488

SINGLE OP MIXED ISLAND 12H

POS	CALL	REF	QSOs	MULT	SCORE
1	F9IE/P	EU064	883	64	526176
2	9A/DL5ARX	EU136	817	79	521321
3	VY2SS	NA029	930	51	303603
4	5B4WN	AS004	679	53	236645
5	SV9/SM7PKK	EU015	609	36	157680
6	SP5PB/1	EU129	331	52	138632
7	OH6MIL	EU101	285	39	83382
8	RA0FU	AS018	330	31	79732
9	G6QQ	EU005	133	61	75640
10	G4WYG	EU005	190	46	64170
11	EI7GY	EU115	111	40	33280
12	G4MVA	EU005	58	42	30450
13	ZL2VS	OC036	92	27	22680
14	WA3WJD	NA139	92	30	21180
15	G2BLA	EU005	90	28	20916
16	JN3SAC	AS007	97	18	12510
17	OZ4FF	EU030	109	12	12480
18	JE1GWO	AS007	15	14	3150
19	VP9MZ	NA005	43	6	1650
20	TK/IK2GWH	EU014	35	4	860
21	CT1EPV/P	EU145	10	10	200
22	JK2VOC	AS007	9	2	124

SINGLE OP SSB ISLAND

POS	CALL	REF	QSOs	MULT	SCORE
1	V73C	OC028	1373	94	949306
2	G3KMA	EU005	681	143	720005
3	JR5JAQ	AS076	733	110	524150
4	AA1BU/KP2	NA106	708	89	384925
5	G3XSV/P	EU120	810	66	319704
6	DU1SAN	OC042	298	57	142956
7	DL2BBR	EU047	378	46	117392
8	IS0LLJ	EU024	206	59	106495
9	OH1LLU/P	EU096	233	56	82264
10	KN6OU	NA187	254	32	30496

SINGLE OP SSB ISLAND 12H

POS	CALL	REF	QSOs	MULT	SCORE
1	V85PB	OC088	715	70	395500
2	GW0ARK	EU005	577	65	236275
3	GW0ANA	EU005	376	45	106200
4	BV2CD/7	AS020	133	133	97888
5	OZ1ACB	EU029	323	38	94962
6	G3PFS	EU005	239	52	88244
7	VE3ZZ/PA	EU146	256	42	75180
8	EA8CAL	AF004	251	30	59576
9	9H1DE	EU023	184	31	49879
10	G4JFS	EU005	94	48	46272
11	AK1L	NA055	422	25	44700
12	G4IUF	EU005	111	44	44088
13	JA7BEW	AS007	251	27	42309
14	EA8BWW	AF004	262	19	33269
15	G0KJW/M	EU120	172	28	31164
16	GW0MHK	EU124	90	38	30704
17	G3YCH	EU005	48	34	19890
18	EA6JN	EU004	58	27	16740
19	IT9ESZ	EU025	40	31	15407
20	DU1SSR	OC042	47	21	10269
21	8P6CV	NA021	58	10	4500
22	VE7XO	NA036	27	15	4380
23	OH1LEG	EU096	105	5	3095
24	IT9STX	EU025	16	8	1360
25	JR2THL	AS007	9	6	630
26	PS7AB	SA026	10	9	405
27	JH0HCN	AS007	8	4	320
28	OZ1FMO	EU029	8	2	160

SINGLE OP CW ISLAND

POS	CALL	REF	QSOs	MULT	SCORE
1	RZ1OA/A	EU153	692	74	364080
2	EA6ZY	EU004	691	40	220800
3	G3SWH	EU005	267	59	113575
4	SM0NJO	EU084	315	33	81873
5	G3GLL	EU005	218	52	75973
6	G3ESF	EU005	180	51	75072
7	FM5CW	NA107	283	21	41580
8	SK3BP	EU087	315	15	33750
9	LA8LA	EU036	101	27	24435
10	G3TXF	EU005	85	26	16510
11	IT9DEC	EU025	220	11	14971

SINGLE OP CW 12H ISLAND

POS	CALL	REF	QSOs	MULT	SCORE
1	DL3KUR	EU057	500	40	141680
2	OH6NVT	EU101	310	47	122482
3	G4BUO	EU005	258	53	98527
4	VP2EP	NA022	456	32	97760
5	V85BG	OC088	460	26	96330
6	W7SW/IL7	EU050	605	22	89270
7	G4PZQ	EU005	215	46	71300
8	G3RSD	EU005	213	41	65231
9	DL5KUD	EU057	167	45	64800
10	LA7DHA	EU076	309	32	59488
11	GM3CFS	EU005	176	38	46968
12	EA6/F6GIN	EU004	300	26	41900
13	JA2KVB	AS007	138	39	41067
14	EI6GF	EU115	147	40	40480
15	JH4RHF	AS007	231	24	35184
16	R1FJL	EU019	264	20	34540
17	OZ8SW	EU029	208	21	32277
18	SM7GCZ	EU137	75	30	24750
19	G0DEZ	EU005	132	26	23608
20	G5MY	EU005	74	30	21300
21	UA0KAH	AS038	163	17	20689
22	G3GMM	EU005	40	17	62923
23	JA1GTF	AS007	18	12	2184
24	UA0KDS	AS038	14	8	936
25	G4VPF	EU005	34	3	600
26	JL3SBE	AS007	11	5	460
27	SM0CNS	EU084	3	2	70

MULTI OPERATOR WORLD

POS	CALL	QSOs	MULT	SCORE
1	LZ1KDP	1092	209	1989680
2	DK7NP	1007	213	1650324
3	UT7WZA	774	170	1225530
4	DL5YYM/P	414	74	230362
5	3Z0IOA	170	53	89040
6	OM3KHU	151	56	88032
7	HA5KFV	23	10	2450
8	F6KLO/P	16	9	1503

SINGLE OP MIXED WORLD

POS	CALL	QSOs	MULT	SCORE
1	YL1XZ	786	167	1220269
2	UA4WGU	885	154	1072610
3	LY1FF	825	121	827277
4	CI3HO	732	145	809390
5	SP5CJQ	433	166	732890
6	S56A	341	109	367657
7	UV9OO	516	81	304155
8	SP6NIC	226	97	226010
9	OK1BLC	226	93	222270
10	KB8O	100	100	209400
11	SP2QCH	227	62	146072
12	RN3QO	247	66	143946
13	DL7VOG	109	62	84444
14	HA1DAE	133	48	66000
15	SP3IOE	101	36	39524
16	RW9QA	153	30	33570
17	IK8TPE	90	30	22080
18	SM3CER	46	34	21080

SINGLE OP 12H MIXED WORLD

POS	CALL	QSOs	MULT	SCORE
1	UR5LCV	346	94	305312
2	HA5AWH	179	85	181815
3	W9DC	157	89	168032
4	OM3CFY	221	68	149672
5	OZ4RT	172	78	145080
6	OM3MB	133	82	134890
7	OK1AD	107	83	121595
8	W3KH	125	79	120238
9	F5NBX	260	54	115128
10	N4UH	226	50	105650
11	OM3EA	98	74	104858
12	SP7GAQ	97	71	97625
13	DL3BRA	105	52	58188
14	OK2BGR	70	58	56550
15	K8JLF	81	54	54324
16	SP8GEY	84	47	53815
17	IK1GPG	68	57	51642
18	OK2BDI	64	52	45968
19	OK2BOB	82	42	45360
20	DL7VSN	55	53	41022
21	IK2WXQ	70	43	34314
22	OK1DH	51	46	33672
23	ON4ON	54	43	31175
24	N8FU	67	38	30172
25	F5TCN	48	44	29524
26	YL2EC	58	39	28080
27	4X6UF	55	39	27885
28	F5YJ	61	34	22270
29	N2LFO	73	29	19314
30	OK1AXB	39	31	16275
31	DL2GBB	48	28	16072
32	UT1WZ	56	24	15696
33	UA4YG	67	28	14280
34	IK3SCB	33	29	12441
35	S59ZZ	36	27	12339
36	OH5PA	30	27	12150
37	NA5F	33	22	8294
38	LU2DPW	16	14	3220
39	WX9E	17	12	2352

SINGLE OP SSB WORLD

POS	CALL	QSOs	MULT	SCORE
1	EA5OL	401	71	276474
2	EA5KB	351	65	216645
3	DL6KY	158	86	147490
4	SP2QCH	227	62	145452
5	CT1BY	205	67	131521
6	ER3ED	318	52	128440
7	EA5GMB	133	77	122815
8	OM3YK	178	65	120250
9	US4LAD	264	51	109191
10	EA5BD	264	41	99056
11	SP8OON	146	56	84672
12	I0FHL	256	41	79622
13	HA7SQ	137	64	67904
14	OM3TEG	115	51	60180
15	SP3IOE	101	36	34704

SINGLE OP SSB 12H WORLD

POS	CALL	QSOs	MULT	SCORE
1	HK3JH	456	67	222976
2	HB9BCK	281	79	203978
3	US7W	272	65	168090
4	I2OKW	122	98	161308
5	IK7EOT	256	72	151488
6	ON7ZM	170	63	101745
7	DF4TD/M	142	57	84588
8	EA1EXU	189	44	78716
9	SP9VFQ	121	61	78690
10	UR6F	211	44	73216
11	AA3DI	95	60	67320
12	EA3CZM	87	55	60610
13	I4CSP	77	54	59400
14	F5HNQ	80	55	57200
15	EA3LS	76	55	56485
16	W4BAA	100	56	54488
17	N8II	147	43	54094
18	PT2TF	141	41	53382
19	IK1TWC	79	53	53265
20	LA2IR	95	46	50830
21	YL2PJ	119	41	49815
22	IN3XUG	65	49	47775
23	OH6SU	64	49	45570
24	IK2ULV	107	44	44528
25	OZ1DYI	73	41	35055
26	SP2AHD/A	89	33	30426
27	OH1KAG	93	700	30100
28	HA3GN	70	34	27540
29	RA3LZ	66	34	26860
30	OZ6PI	122	28	26600
31	EA3GHQ	65	35	25375
32	W5ASP	155	30	23700
33	IK2XYI	62	33	23661
34	SP9LKS	61	32	23200
35	SP5DRE	58	30	21900
36	PY2DBU	70	31	21452
37	EA1EDF	40	37	20757
38	DK4IO	45	31	17825
39	EA1ACP	58	26	17082
40	EA1FCG	41	32	16704
41	VE4RP	48	32	16672
42	SP9ZKN/P	59	24	14520
43	SP6JZB	35	29	13920
44	WA1MKS	41	27	13635
45	EA3BT	28	27	10989
46	DL3SWA	64	18	9648
47	EA1CS	26	24	9360
48	IV3TYS	35	23	9269
49	EA5RC	31	21	8022
50	F5HWB	35	21	7770
51	LA2AD	73	23	6279
52	SM5BTX	20	18	5130
53	YO5BQ	23	11	2695
54	RX3RT	16	9	1773
55	KC4BVM	13	8	1240
56	SP6NVK	10	7	980
57	SP6FBD/3	10	5	550
58	XE3LMV	37	6	150
59	SM7HSP	3	3	135

SINGLE OP CW WORLD

POS	CALL	QSOs	MULT	SCORE
1	9A2AJ	350	72	229824
2	ER1OA	276	52	118040
3	SP4JWR	100	58	79460
4	UN7IO	162	51	73491
5	SP2BRZ	129	53	70876
6	EA8CM/SM3	83	25	44025
7	OK1FHI	103	36	34992

SINGLE OP CW 12H WORLD

POS	CALL	QSOs	MULT	SCORE
1	K2SX/1	541	60	235500
2	LY2FN	179	43	73917
3	HA8EK	258	31	66820
4	HA5LZ	117	45	59400
5	DL1ARU	156	47	57810
6	DL2DWA	103	49	53361
7	IK7NXX	117	48	50352
8	DL1DQY	92	41	35301
9	UN6T	66	38	26980
10	YU70SB	76	28	26040
11	SP4GFG	83	26	25060
12	IV3FSG	68	26	19162
13	F/3FDZ/P	101	23	18630
14	SP8BAB	66	26	17680
15	SP3FAR	35	31	15035
16	OH2/SM3JBE/P	32	28	12600
17	YU7SF	69	19	11305
18	DL4FDM	29	21	8232
19	OM3CCC	56	17	8109
20	W9HE	51	16	6992
21	OK2KDS	32	18	6840
22	SP5FLA	24	20	6800
23	PA3BEJ	35	15	5925
24	DL5SVB	36	14	5040
25	UU2JA	28	13	3601
26	N4JEO	25	13	2990
27	DL2VLA/P	25	10	2850
28	DJ0SH	25	8	1960
29	SP6FER	13	10	1650
30	DL7URH	11	10	1550
31	UT1ZZ	17	3	345
32	WD0AFD	11	3	255

RADCOM OPERATING FEATURE

RSGB IOTA Contest 1994

By Ian Buffham, G3TMA*

THE 1994 EVENT was the second IOTA Contest of modern times and certainly was successful in bringing pleasure to very many amateurs and short wave listeners across the world. It should be remembered that IOTA contests were first organised by IOTA founder Geoff Watts between 1966 and 1972. Sadly Geoff died in May 1994 shortly before the 1994 event but he would without a doubt have been proud to have heard all the news of the latest contest.

So how did the 1994 event compare with that held in 1993? Many comments have been received from the competitors about poor HF conditions and terrible QRN on the lower bands. Typical is that from Dave, G4BUO: "Conditions way down on last year, high QRN at times". Others provided more forceful comments on the QRN, having suffered near lightning strikes! Despite these problems, the number of entries received was 400, up by 48% compared with the 1993 event. Obviously IOTA contesters are not easily deterred by minor inconveniences! The IOTA Contest has clearly caught the imagination of a great many amateurs worldwide. It is not difficult to believe that it will continue to grow until it eventually becomes one of the greatest contests on the world scene.

Wide Appeal

THE STRENGTH of the contest undoubtedly lies in its appeal to a broad spectrum of amateurs. It has obvious appeal to IOTA enthusiasts who wish to plan an expedition especially for the contest weekend and who wish to be sure of a good audience from the Deserving (of course the beauty of such expeditions is that they need not be too expensive to organise). The contest is also of great interest to IOTA chasers who welcome the opportunity to increase their island scores but who would not normally be involved in HF contests; and the event also attracts regular HF contesters who had probably not had much previous involvement with IOTA. We must of course not forget a fourth category: those not familiar with either IOTA or contesting at all. The IOTA Contest is certainly a great opportunity to gain experience of both IOTA and contesting. In particular it is worth pointing out to British newcomers to this contest that they all count as island stations, thereby ensuring they are in great demand for contacts.

1994 saw the introduction of CW operation to the contest. This proved to be a great success and will undoubtedly become a future growth area with a number of operators promising to improve their scores in 1995.

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St Tudwal's Island, EU-106, was the location for GW4VEQ/P.

1994 Results

THE RESULTS OF the 1994 IOTA Contest are printed opposite, and a results booklet with the 1995 rules is being sent out to all participants. A number of awards were available this year and it is perhaps fitting to begin with the Geoff Watts Memorial Trophy sponsored by the Chiltern DX Club. This award was made available for the highest non-DXpedition Island station and goes to the GW8GT Contest Group operated by G4IFB, GW3KYA, GW4JBQ, G4VXE, G3SQX, GW6ZVQ and GW0MAW. The GW8GT score of 1,819,136 points was compiled with the help of 1583 QSOs and 187 multipliers.

The IOTA Trophy awarded by the IOTA Committee to the highest-scoring single or multi-operator Island station went to the Portuguese group CS5C operating from Culatra Island (EU-145) off the coast of the Algarve. Their score of 2,776,842 points was compiled from 2161 QSOs and 183 multipliers. Operators were CT1AHU, CT1BOH, CT1BOP, CT1DIZ, CT1EGW and CT4NH. This team were also winners of the same trophy in 1993 with their efforts from Bugio Island (EU-040). Will they do it again in 1995? It seems that Portuguese islands are the place to go to win IOTA contests, just as the Caribbean is for USA contests! Runners-up for this trophy were the GJ3OZF team operated by G3OZF and G4JVG from Maitresse Ile, Les Minquiers (EU-099). Their score was a very creditable 2,191,318 points from 1765 QSOs and 179 multipliers, despite the loss of a couple of operating hours due to thunderstorms.

GJ3OZF, Les Minquiers (EU-099), demonstrated what could be done with modest antennas when they are advantageously mounted with a view to the sea: a Mustang beam at 26ft, trap dipole at 35ft and HF6V vertical.

The RSGB DX News Sheet Trophy for the leading UK single operator SSB station was won by IOTA Director Roger Balister, G3KMA, with 720,005 points from 681 QSOs and 143 multipliers.

Another trophy in memory of Geoff Watts is the David King, G3PFS, Trophy awarded to the leading British station in the 12-hour section. This trophy goes to GW0ARK with a score of 236,275 points from 577 QSOs, all made on SSB. The runner-up for the trophy was another Welsh station, GW0ANA.

The Portuguese DX Group (of CS5C fame!) has provided a trophy for the leading non-Island station who is also a non IOTA award holder. This trophy goes to LZ1KDP who compiled a score of 1,989,680 points from 1092 QSOs and 209 multipliers. Operators were LZ3SM, LZ1IM and LZ-F-195.

The Portuguese IOTA CT Group provided the Willy Weise, HB9CZW, Memorial Trophy for the leading non-Island entry holding the basic IOTA 100 Award. Success this year went to YL1XZ who achieved a score of 1,220,269 points from 786 QSOs and 167 multipliers.

The Rest Of The Scores

PACIFIC STATION V73C on Kwajalein Atoll in the Marshall Islands (OC-028) came top of the pile in the Single Operator SSB Island category with a score of 949,306 from 1373 QSOs. In the 12-hour SSB Island category the winner was V85PB, on Brunei (OC-088) with 715 QSOs and 395,500 points. In the Mixed Mode Single Operator World category the leader was YL1XZ with 1.2M points. Close at his heels was UA4WGU.

In the Single Operator 12-hour SSB category a South American station was successful: South American activity was fairly low in the contest, so it was good to see HK3JJH come top of a popular group. HK3JJH was well ahead of his nearest European rival with 222,976 points from 456 QSOs. Runner up in this section was HB9BCK with 203,978 points.

CW Report

1994 SAW THE introduction of CW for the first time and what a success it proved to be. A good number of entries were received in the 12-hour Islands section including several from some of the well-known contesters from the United Kingdom. Maybe someone can offer a Trophy to make this particular pot really boil in 1995!

Top of the section was DL3KUR with 500 QSOs and 141,680 points. The leading UK entrant was Dave, G4BUO, with 258 QSOs and 98,527 points.

In the 24-hour Island section, RZ1OA/A on EU-153 amassed 364,080 points from 692 QSOs. K2SX/1 emerged as the clear winner of the 12-hour CW World event with 235,500 points. 9A2AJ finished top of the unlimited section with 229,824 points.

SWL

THE 1994 CONTEST saw a good crop of SWL logs with a total of 25 entries received. Top of the pile was I1-21171 who logged a very creditable 473 QSOs for a total of 595,470 points. Runner-up was UA3-147-421 with a score of 444,600 points. Disappointingly, there was only one British entry, from BRS 20249 with a score of 38,012. IOTA was started by the most famous British short wave listener of all. So come on British listeners - show us what you can do in 1995! [The full SWL results are contained in the results booklet but were not provided for publication in *Contest Classified* - *Ed*]

Logs

SINCE THE IOTA Contest attracts a broad spectrum of entrants, many of whom are not regular contesters, the logs were not subjected to the same degree of points deductions that would be the case for some RSGB contests, such as HF National Field Day and AFS, which are entered by a high proportion of regular contesters. However, as time progresses and the rules become more universally distributed, then we will be looking for a higher standard of logkeeping. Clearly many of the stations using computer logging programmes such as 'Super Duper' have no problem in turning in accurate records with all the dupes discounted. Others still persist in calculating their multiplier as the sum of the IOTA reference numbers. This technique produces spectacular scores from just a handful of QSOs but is fortunately easily detectable! Congratulations are due to V73C and CQ2I for a couple of wonderfully-produced logs.

One slightly disturbing feature was the high percentage of checklogs received this year (15%). Checklogs are of course always very welcome and aid in the checking process, but we would always prefer to see the logs as actual entries. The high number of checklogs is almost certainly due to the fact that the IOTA Contest is still a young one and the rules have yet to make their way through to all parts of the globe. This situation should improve with time: all major national radio societies are being provided with the 1995 rules. UK checklogs received included those from G2HLU, G3WRR, G4UOL and GW4BLE. Steve, GW4BLE, reports that "It was just a fun run whilst testing out new antennas". Well Steve, now you have tested the antennas we hope you will show us what they will really do in the 1995 event!

The Rules

MANY COMMENTS were received with the logs with regard to possible rule changes in the future. A common complaint is that there are far too many different sections in the contest. In getting the contest established on the annual contest scene it has been HF Contest Committee policy to change the rules as little as possible, especially for the first few events. Therefore the 1995 rules are virtually unchanged from 1994. After the 1995 contest both participants and organisers will have had experience of three events. In the light of that experience it should then be possible to carry out an informed rules revision in time for the 1996 event.

Gossip From The Islands

"WE HAD A wonderful time. A father and two sons DXpedition" - AB5EA, Galveston Island (NA-143). "A serious generator malfunction kept us off the air for a long time, propagation was terrible but it was great to give out EU-150 to the needy" - CQ2I, Insua Island. "High winds and blowing surf forced us to go QRT at 0900. However, I still can't think of a more relaxing way to contest than on a beach with the sea 30 yards away and a *modest* breeze blowing!" - WQ5Y/P, Mustang Island (NA-092). "Operated from picnic area in National State Park. Set up transceiver on picnic bench next to automobile" - N2US/1, Assateague Island (NA-139). "Flat conditions, unexpectedly high QRN, tough conditions for our level of equipment" - GI4GTY/P, Light House Island (EU-122). "100km / hour winds for 3 hours, the group is very happy for this operation and contest!" - ED1ONS, Batea DX Team, Ons Island (EU-080). "Roll on next year and we'll really give them a run for their money!" - GW4VEQ/P operated by the Westnet DX Group, St Tudwal's Islands (EU-106). "Contest thoroughly enjoyed by all except for GM0TAE's dog Mitzi who despised the boat trip" -GM3USL/P, Isle of Cumbrae (EU-123). "The contest starts (Marshall Islands) at midnight, now I understand how my European friends feel at the start of *CQ* World Wide!" - V73C, (OC-028). "My first entry for IOTA but sadly blighted by succession of terrific thunderstorms" - G3GMM (EU-005).

The 1995 Contest

THIS YEAR the contest will be held over the weekend of 29 / 30 July. There will again be a number of attractive non-returnable trophies to be awarded for this event. These have to be well worth competing for! See you all in '95 and let's hope the hurricanes, thunderstorms and bad propagation all stay well away! Finally, a word of thanks to the adjudicators: G3LZQ, G0AEV, GW6ZVQ and G3TMA, for all of the hard work put in on the 1994 event. ♦

Westnet DX Club operators and equipment on St Tudwal's Island.

GW4VEQ/P from left to right: EI7DSB, EI6FR, GI0KOW.

Members' Advertisements

RSGB Members wishing to place an advertisement in this section must use the official form incorporated on the label carrier of Radio Communication. This will prove membership and must be for the current month. No acknowledgment will be sent. Ads not clearly worded, or which do not comply with these conditions will be returned. If an ad is cancelled no refund will be due. An advertisement longer than 60 words will be charged pro rata. Trade or business ads, even from members, will not be accepted. Traders who wish to use this facility must send a signed declaration that the items for sale are part of, or intended for, their own personal amateur station. The RSGB reserves the right to refuse ads, and accepts no responsibility for errors or omissions, or for the quality of goods for sale or exchange. Ads for CB equipment will not be accepted. Each advertisement must be accompanied by the correct remittance, as a credit card payment, cheque or postal order made payable to the Radio Society of Great Britain. Please note that because this is a subsidised service to members, no correspondence can be entered into. Licensed members are asked to use their callsign and QTHR, provided their address in the current edition of the RSGB Amateur Callbook is correct. RS members will have to provide their name and address or telephone number. Please include your town and phone number in the free boxes provided to assist readers. Advertisements will be placed in the first available edition of *RadCom*.

Warning: *Members are advised to ensure that the equipment they intend to purchase is not subject to a current hire purchase agreement. The 'purchase' of goods legally owned by a finance company could result in the 'purchaser' losing both the goods and the cash paid.*

FOR SALE

CAPCO 1KW ATU SPC300: £175 + £10 carr. PW Meon 6m transvert board, complete, not tested: £10. Altron AQ620 loading coils + spokes for 3el, needs cleaning: £30. Philips 12" green screen monitor: £25 inc del. Epson P40 mini thermal serial printer: £10. Datong AD270 antenna: £20. Kent keyer built PCB + instructions, needs box: £20. Minimitter 10-80 converter 4-6IF: £30. Novice Antenna Notebook W1FB: £3. G0KTN QTHR (Melksham, Wilts) 01225 703726.

KENWOOD TS850SAT tcvr with PS31 power supply and SP-23 external spkr, to incl diamond CP5 vertical m/band antenna. All under 6 mths old, immac and bxd. Cost new £2500 will sell for £1500 for the lot. ono or might split. (Pontyclun) 01443 228461.

OSCILLOSCOPE 50MHz dual beam telequipment D75 (D755) complete with service man & operating instrctns: £110 ono. Ian Liston-Smith (Reading) 01734 596 806.

REDIFON R408 receiver s/state: £140. Siemans rainbow receiver: £100, no case. Sait 10kc-30 megs. Digital synthesizer 5 filters £250 eddystone 888A with speaker & 5 meter needs restringing: £70. Korting East German copy HRO some coil packs matching PSU/spkr, offers. Swops on all W/J colins W.H.Y all have paper work. RS96013 (London) 0171 736 6581.

TWO anemometers (a) naval 10lbs 18" overall with 6" readout meter: £25. (b) Maplin, ex kit, made complete: speed, direction, hardware, readout out console. Needs Maplin service hence: £50 (cost £150). Collect, 15m off M25 on M2. G0POS, (Gillingham, Kent) 01634 379140.

TWO vdus: 28cm, green, Plessey: £15. Phillips ironclad: £25. Autotrans, 1kw: £20. Commodore 64 keyboard: £20. all above to collect. Also signal generator 100khz-450kHz, plus audio modulation mains: £30 + p&p. SEM eliminator: £20 + p&p. Call book world exc N.America: £5 + p&p. 15m off M25 on M2. G0POS (Gillingham, Kent) 01634 379140.

VALVES new: £1.00 ea. EB41/91 EBC81, ECC82/84, ECL84/85, EF80/90, EF91/95, EF183/84, EH90, EL32/36, EL85/86, EL91/360, EL821, EZ35, PL33/36, PL504, PZ30, R19, 6C4, 6H6, 12AE6, also at: £3.00 ea. ECC83, 6CH6, 6CL6, 6CB6, 5Y3GT, 6AC7, 6J7, 6V4GT, 125C7, 35Z5GT, EF50, EF55, V50/52, GZ37, A2900, ECC81, 6F33, 150B3, ECC91, 6V6G: £6.00 ea. 6L6G/GT, many more available, please enquire (postage=£2.00) RS92852, (Birmingham), 0121 472 3688.

YAESU FT101E, narrow CW filter, WARC bands, remote VFO, spkr: £280ovno. FRG1 GC Rx, with FM and other mods: £90ovno. FT-230 2m Tx/Rx, dual VFO, 5/25W, superb audio, with fist mic. Ideal first 2m rig: £130ovno. All with handbooks. G0OPL, QTHR (NB recent change). (Telford) 01952 404251

20M high lattice tower. Approx 3m square at base, 2m square at top. With platform & ladder. Aluminium. Buyer to safely dismantle & remove: £420. RS33099 (Southampton) 01703 891 879.

50' mobile trailer tower combined with 7kva diesel generator. GWO ideal club/contest grp £750. ono. Chris G0HFX, QTHR (Trowbridge) Tel (eves): 01225 764874.

500MB SCSI tape backup unit: £250ono adapted SCSI card: £75 ono or £300 for both 2mb 72pin simms 7ons 40 ukp telereader CWR685\e: £300 CW/RTTY baudot integral display TX/RX green aenith composite video monitor: £25 dec PDP11/23 mini computer offers? 20mb MFM HD: £10 Apple lasewriter one: £250 ono. Nuvistors £2 ea. RS95942, (London, NW6) 0171 431 1204.

AEA PK-64 Pakratt multimode data controller work HF/UFH packet, Amtor, RTTY, ASCII, maudot & morse using commodore 64. Complete with HFM-64 enhanced HF modem bxd with operating man & leads. As new: £60 ono. Call Chirs, G4UZE, (Ruislip) 0181 868 7051.

ALINCO DJ580 with spare nicad & case: £300. 'C' programming course, 10 videos man & compiler £50 supa-tuta plus: £40 two CBM64 computers, one fully working + tape + (faulty) disk: £50 buyers inspect & collect. Ron, G6BMY (Manchester) 0161 902 9546.

ALTRON AT-42 3-section telescopic tower with head unit, 2 winches ground hinge, wall brackets. Down 21ft up 44ft £400 Yaesu FC902 atu, mint in box: £100. Tet HB33 SP 3 element tribander 101520: £100. Tellurometer 10GHz duplex tcvr, service record, manpack built in dish, 12 volts, headset: £80. (Hayes, Bromley) 0181 462 2837 (eves/w/ends).

AMSTRAD PC1512 Amstrad printer DMP3160 mouse PK232 programmes Amtor packet rtty little used: £150 ono. BNK pactor module program: £35ono. (Bletchley) 01908 642398.

ARGONAUT 515 QRP tcvr no mods vgc matching ten-tec atu desk mike circuit. man: £325 carr extra. G4FMH, QTHR (Highbridge, Som) 01278 784812.

BNOS 6m linear amplifier, 10w input 50w output: £80. Zetagi HP201 SWR/power metre: £15. Both as new. G0PQO, QTHR, (Shefford) 01462 814827.

COLLECTORS item 52 set remote rx, mains PSU added internally otherwise unmodified, wrkng, some data: £75 FT2, test set for A40/A41/A42, complete with leads & man & ces (copy): £20. BC221 frequency meter with calibration chart: £30. Prefer buyer collects/inspects, otherwise carr extra. Richard (after 7pm/w/ends), (Ross-on-Wye) 01989 769 654.

COMPLETE HF station. Kenwood TS450S Tx/Rx, 1.8KHz SSB filter fitted, matching Kenwood PS-53 PSU, matching Kenwood SP-23 spkr, Kenwood LF-30 low pass filter, VCI VC-300-DLP ATU, all bxd, new condx, hardly used. No split. Offers!. Carr if required. (Llandudno) 01492 878107.

COMPUTER hard disk drives (SCSI) excllnt condX, H/H 640MB: £150. H/H 330MB: £120. all micropolis. David, G0FYQ (Halifax) 01422 842243.

DAIWA DK210 electronic keyer: £45 Paccom pactor controller new condx: £180 Commodore 64 computer: £40 MSP 803 printer: £25 PC Pakratt software RTTY/Amtor/packet: £40 RS 232 & monitor free with computer morse key: £25 another morse key: £20 Postage, carr extra. G0SJQ (Weobley) 01544 318875.

DATONG audio filter FL2: £60. Cadenza ribbon mic in presentation case (collectors item): £35. 6m/2m trnsvrtr by RN: £70. (Tewksbury) 01684 299420.

DATONG filter FL3 plus PSU & handbook vgc: £75. G2FKP (Shepperton) 01932 784971.

DATONG FL3 multi-mode audio filter for SSB, CW, and RTTY. New condx, bxd with man & leads: £95. G0EXY, (Hull) 01482 351836.

DATONG speech processor ASP2: £50, ERA microreader mark II revision 3.2: £100 & Daiwa all-mode active filter: £45 all with man. G0VQD, QTHR (Redhill) 01737 762753.

EQUIPMENT sale Kenwood TR751E 2m multimode bxd: £450 BNOS 2m 100w linear: £100 Icom PZE mini handy charger bxd: £180 FT102 recent overhaul manual CW filter: £450 MFJ DSP filter bxd: £195. Alan, G0VKI (Stoke-on-Trent) 01782 410563, eves , w/ends.

FL2100B HF linear good condx with manual: £250. Buyer collects. G3LBA, (Abingdon) 01865 821503.

FOR sale Icom IC-R70 Rx excllnt condx, original box, packaging, instrctns etc: £325. Silent key sale. G7DXC (Bracknell) 01344 426161.

FREE to RTTY enthusiasts: creed teleprinters models 7E & 444 (with tape & reader) collect from Birmingham or Bristol. Ross, G6GVI (Bristol) 0117 973 6675.

FRG7 communications Rx with 2m conversion 0-30MHz, fair condx: £125. John (Wombourne) 01902 897839. Buyer to collect.

FT 75 HF mobile tcvr xtal controlled 5 bands 80 to 10m 30 watts RF output: £100, also one pair of Motorola hand helds. GP 300 on UHF both on 438 megs in VGO + fast charger: £100 will sell separate or swap for 286 or 386 with cash adjustment. 2E1AUD (Hatfield) 01707 275920.

FT101 just serviced. CW filter, fan, man, mic used daily. Bargain first rig: £185. Heathkit HW7 QRP rig, 15/20/40m with HWA-7-1 PSU. Spot/rit mod carried out: £85. CW filter for Heathkit 101 tcvr. New from usa: £20. All collect. G0TCM, QTHR (Bedford) 01234 342332 (eves only please).

FT101E 160/10m mic CW filter handbook full realignment into reconditioned Holdings Amateur Radio January, good first rig: £250. & carr delivered if within 50 miles Cleveland. G0GKY (Redcar) 01642 476127.

FT101ZD with MFJ-948 atu mint condx also spare new matched bottles: £400. (Runcorn) 01928 561341.

FT102/FC102 little used mans, morse key, mic: £590. G3GMF, QTHR, (Cobham) 01932 866818

FT23R 2m hand-held tcvr with FNB-10 battery bxd. VGC: £140. SMC-29 fast charger (1/2 hour) for FNB series batteries £40. KLM PA15-160BL 2m linear amplifier 5-15w in, 160w out: £120. G0DZU (Romsey) 01794 884286.

FT290R 144MHz multimode portable mobile mount nicads: £225. Microwave modules 2m to 10m transverter £25. Mike (Guildford) 01483 223060.

FT470 dual bander extended coverage. Two batteries, recelled. Soft case, man, bxd: £270. Yaesu BC29 fast charger, bxd: £40. Sony AIR 7 scanner 150-2194kHz 76-174 MHz manual: £120 pye F412 UHF base station: £70 F9U UHF base station: £45. M294 mobile: £40 R402 VHF Rx: £40 R412 UHF Rx multichannel: £45 5kw petrol generator: £390 renoun telephone exchange, 4 phones: £200. GW6MWG, (Milford Haven), 01646 697437.

FT690 RII nicad & charger +10 watt clip on amplifier. Portable antenna + 3 EL MET 50MHz beam free to buyer. Absolutely as new: £400. G1ORJ, QTHR,(Tamworth), 01827 897205.

GEC BRT 400 this is an original BBC set of around 1948. Good am reception 0 to 30 m/cs with BFO: £150. (Bolton) 01204 595151.

HEATHKIT HW9 deluxe QRP tcvr, 8 bands 3.5-28Mhz inc WARC. Perfect, never used: £250. Graeme, G3GGL, QTHR (Bewdley) 01299 403372.

HF linear amp 3-500Z tube 1kw continuous duty. Make Amp Supply co prefer buyer inspect & collect: £500. G0OHQ (Sidcup) 0181 309 7023.

HOKUSHIN HF5V 5 band trap vertical antenna C/W HF5R radial kit. S/Hand 1989 but preserved with homemade h/dipole: £35. You collect. G0DIC (Boston) 01205 360044.

IBM compatable computer 286/12, 5mb ram 80mb hard disk 51/4/31/2 floppies, ega colour monitor, mouse msdos v6.0 windows v3.1: £175. G0CAD, (Oxford), 01865 890066.

ICOM 751A with high stability CR64 unit fitted RC10 pad frequency controller IC PS 15 power supply at 500 ATV £950 ono. Alan, G4YYD, QTHR (Bury, Lancs) 0161 797 7893.

ICOM IC-471e 60cm m/mode: £450. Mutek TVVF50C 144/50 Hz trnsvrtr: £175. Tim, GI4OPH (N. Ireland), 01247 468442.

ICOM IC-RI scanner. BP-84 100mah battery pack. BP-02 7.2V charger. Hardly used: £325. ono.(Southampton) 01703 404649.

ICOM IC2KL HF linear amplifier with power supply excellent condx no tuning reqrd offers around: £800. (Devon) 01803 835393 (eves).

ICOM IC701 + RM3 controller & handbook: £320. Buyer collects. G3LBA (Abingdon) 01865 821503).

ICOM IC701 HF tcvr & PSU £295 tait VHF h1-band T198 tcvr: £30 T286 PSU: £25 IC24SE: £180 GWO Honda EMI500 portable petrol generator 240V 120V 12V £285 buyer to collect & inspect. HP 400FL ac volt meter: £20, wanted Bird thruline elements. G4AJE, (Cambs) 01354 741168.

ICOM IC725, matching PS55 P.S.V gem. Coverage Rx. 160-10 Tx, mint condx, bxd, manuals: £595. BBC computer with colour monitor, 51/4" D.D fitted with eprom for kamtromms TMC. Excllnt for packet: £95. Phil, (Chessington), 0181 391 4494.

ICOM IC735 HF tcvr general Rx CW filter 100W output mint bxd user & service mans. Used listening: £575. G1VMT,(Broadstairs) 01843 63445.

ICOM IC737 with ATV PS15 power supply external matching speaker, mic bxd man immac. Best offer secures. G3RCQ (Romford) 01708 374043.

ICOM IC740 bxd. exc condx: £500ono. Kenwood R 1000 comms. Rx manual good condx: £275ono. Icom IC240 2m FM £130 ono good condx. Alinco DJ120 h/held many accessories oiro: £175 manual .(Enniskiwen) 01365 328681 (after 6pm, or w/ends).

JST-100 Handbook mc43.5 excint condx: £375. W9GR DSP2 audio filter: £155. Kent single paddle key: £24. Johnson matchbox 300, needs respray: £125. Nevada SPC, new condtx, no balun: £75. HB VK single coil tuner, wide spaced capacitors, slow motion drives. Works well: £60. Prices inc carriage UK. 250-250 Nevada wide capacitor, never used: £20. HD1250 Dip meter, mint: £60. G3RHM (W London) 0181 423 2329.

KAMPLUS dual port tnc with software: £265 MFJ-931 artificial ground: £60. MFJ-1272 tnc/mic interface switch for KAM HF port: £35 Comm-Pakratt C64/128 for PK232 £15. All in good condition. (Portrush) 01265 824009.

KENWOOD HF tcvr 4405 auto atu 20amp pwr supply. Man, bxd as new: £895. Ted (Winsford) 01606 592207.

KENWOOD R600 communication Rx Yaesu FRT7700 AT unit: £165. Wood & Douglas 144FM2RS Rx & 144FM2T3 Tx: £50 carr extra. G6USG (Stoke on Trent) 01782 782873.

KENWOOD TH26E 144MHz h/held tcvr. Good condx , bxd with man. chrgr & SMC33 spkr, mic: £130. Graham, G1ULB (Manchester). 0161 747 5764.

KENWOOD TH78E 2m/70cms handie complete: £375 case: £8 PB13: £25 BC15A charger: £60 as new, warranties, bxs, mans. G0EOL, QTHR, (Winsford) 01606 554857.

KENWOOD TH78E dual band h/held tcvr with bttry chrgr, CTCSS module, mic, bxd, mans. Perfect condx: £325ono. Richard, G7TSK (Beckenham) 0181 650 0022.

KENWOOD TM251E 50w mobile. VHF: 118-174MHz AM/FM UHF receive only. Digital voice recorder, as new only: £259. G4CUI (Sheffield) 0114 2630704.

KENWOOD TR75IE 2 mtr multimode. Bxd with mobile bracket, mic, operating and service mans, vgc, not used mobile. £460. Tonna 9 ele. 2 mtr antenna unused. £30. accept £475 both. Peter, G0NDL, QTHR. (Nr Bristol) 01275 852216

KENWOOD trio TS8305 CW filter mic h/book: £520. AT230: £140. Spkr SP230: £40. Kenwood world clock HC10: £25. Katsumi EK150 keyer: £50. Navy straight key: £20. Yaesu FT480R 2m m/mode tcvr £250. Drae 13.8v 6A PSU £35. BC221 wavemeter m.o.d psu charts handbook: £45. all above well cared for & perfect. G4JFU, QTHR, (St Austell) 01726 812571.

KENWOOD TS1303: £400. Clarks WTS pneumatic mast 55' extended plus landrover tilt/mount plus compressor £475 CDE Ham 2

rotator & controller: £160 AT230: £100 hygain TH3MK3 tribander £175 KWM2A in samsonite case: £250 C520 2m/70cm scanner tcvr: £250 all mint. G3BZU, (Blandford) 01258 830688.

KENWOOD TS1405 HF tcvr, in VGC comes with CP5 antenna: £680ono. + Kenwood AT250 £250 also Datong FL3 filter system: £100 as new. Les Cartwright (Wigan) G0UVL, 01942 700762.

KENWOOD TS850SAT both 500HZ CW filters plus 1.8kHz SSB filter bxd: £1200. Arrival of TS950 forces sale. Jim, GM0NAI, QTHR (Bridge of Weir) 01505 613176.

KENWOOD TS9505 tcvr with handbook bxd as new & kuranishi KEISOKUKI dummy load model RP 120 £1950 AOR 2000 scanner: £180 G0TOX, (Redditch) 01527 543598

M8000 universal decoder with VOA video monitor all leads manual. Original box, cost: £1300 accept: £600. GWOHYC (Ferryside), 01267 267649.

MFJ 949D deluxe versatuner: £100. Diawa 606k all mode active filter: £45. both good condtn. Keith G0ROF, QTHR (Hereford). 01432 275545.

MOVING house & the gear has got to go. Test equipment, EX-PMR radio's, motorola, PYE, storno, tait, communique VHF & UHF pagers etc. A transit van full would suit a car booter:£650 or may split phone for list. G1VRA (Cambridge) 01954 782271

MUTEK 6 metre transverter: £100, m/modules 2m transverter 144/28R: £100, Philips tape recorders for MS: £20 & £15, 13-ELE DL6WU for 2 m: £30, LDF 4-50 60ft with connectors: £30, 35ft telescopic mast with winch & head unit: £60, 10 channel PRO-38 scanner: £45, Yoko DX-TV 5" screen: £50. (Rotherham) 01709 815447.

P.M.R bosh VHF repeater using KF453 units 25W Tx461.350 Rx467.850 complete with stripline filters, power supply etc. Donated to Grampian repeater group. Surplus to requirmnts as new in steel cabinet, offers. GM4NHI, (Aberdeen), 01224 883614 (Day).

PACKET? sperry monochrome computer, 21mb hardrive, 51/4" floppy. All complete 286 PC: £100. G4VVQ, QTHR (Nr Chelmsford & Essex),(eves)(answerphone) 01245 233566.

PC-XT 42mb h/d 3.5 & 5.25 floppies, colour monitor, progs for radio, packet, word processor: £175ono. Yaesu FC902 ATU 500w: £90 ono. H/B frequency counter, 200Mhz, needs attn: offers. Various mobile bases & cables, whips for 144MHz: offers: Ray, G0GXJ, QTHR, (Sheffield). 0114 246 5713.

PK232MBX, leads, PK pakratt software, man: £275 ono. G4RGA (Taunton) QTHR, 01823 664911.

PROFESSIONAL PSU variable volts/amps max 150 amps. Brand new with instrns. Genuine sale, prefer buyer collects. G7FPM (Swindon) 01793 538235.

PSION organiser 2 model LZ64 plus 128k datapack, comms link, mains PSU. All manuals: £100. Mike, G0UGR (Berkeley, Glos) 01453 811 631.

PYE T401, T414 transmitters R401 R414 receivers: £15 each. 2 mtr 7.8 & gutter mount: £15. 401's on 70mhz, 414's on 440MHz. G8TVT (Beverley, Yorks) 01964 543757.

RACAL 17L in first class condx both electronically & cosmetically. Recently & properly aligned. Could probably deliver: £120. GCHQ operating maintenance & repair man available & is much more comprehensive than standard Racal issue. John, (Oxford) 01295 721511 (answerphone).

RACAL RA 1771 prof. Rx decade counter type in mint condx: £750ono. Drake R4B plus MS4: £275. G3OAY QTHR (Stratford-Upon-Tyne) 01789 841219.

RADAR Furuno 30" dome fair cond can be seen wrkng. Also SEM transmatch good condx. Wntd 2m handheld with or without 70cm. Datong FL3. HF beam W.H.Y. G0KRH (Kent) 01797 364139.

ROTATOR Kenpro 600: £120. Icom U101 UHF programmable 12ch £120. Near new! Yaesu FT740 4m mobile. Tuned: £75. Epson LX850 printer: £65. Pace linnet modem 1200 baud £30. Spectrum 137MHz WXRX 5 channel xtal scanning:£65. Yaesu YS60 pwr/SWR meter: £40. (Teignmouth) 01626 773301.

SANDPIPER 10-40m HF vertical. Used 6mth only: £95. Trio TS520SE HF rig. Spare set valves, ideal first HF rig: £350. Haydn, GW0KQZ (Cardiff) 01222 596344.

SHACK clear out. Create 730v rotary dipole 10-40 £100. Racal RA218 sideband converter: £60. Sperry PCXT CGA colour 512K 20meg HDD keyboard 5 1/4 floppy: £75. IBM PCAT EGA colour 1.1meg 30meg & 20meg HDD 31/2 & 51/4 floppies, mouse keyboard: £175 CCTV camera, lens, monitor: £100. IBM PCXT turbo card: £15. Geoff, G0OTF (Birmingham), 0121 789 9037.

SHACK clearance ICOM IC24ET 2m/70cm dual band handie: £200. Two Kenwood TM22IES mobiles 5/45w: £125 each. BNOS 2m wow linear: £50. Kenwood SW200 SWR/power meter: £40. Adonis desk mic AM303G £20. WX2 2m/70cm colinear: £20 G0HWQ, QTHR,(Crowborough) 01892 663061.

SILENT key G4VNJ Yaesu FC902 antenna tuner: £140 KWEZEE match: £30 PM2000A watt meter: £45 AC/DC converter 6-9 12v amp: £10 sigma RF2000 swr/power meter: £40 EPU500 pwr supply: £50 Bremi pwr supply 13.8v 3A £10 Alinco tcvr hvt/fm DR112: £140 G4ZPY twin paddle morse key D/L19: £25 azden external speaker: £10 sem tranz match £80 telereader CW/RTTY CWR80: £45 steeple tone marine/air band SAB9 radio: £15. MFJ949 300w HFATV load: £90 G3KHZ twin paddle electronic keyer: £20 Tenna mast Adapta mast with Cobweb antenna: £170 buyer to remove. All items ono. Reasonable offers accepted assistance with postage costs appreciated offers to G0GPO, QTHR, (Canterbury) 01227 711261.

SILENT Key: G8CVU: IC3200E 2m/70 tcvr: £270. FDK3000 2m tcvr: £180 Yaesu 6MFT690: £250. RX1000: £200. GEC valve YL1550 C/W data: £50. BNOS 50MHz 50W pa: £95. BNOS LPFF50-LU: £15. 2x AVO 8: £50 each. AES 50A SWRMTR: £10 ea 12 £75; 888 £50: Gresham PSU15V2A, PSU 15V2A, PSU 5V4A: £15 ea, PYETX/RX FM10BV6: £25. Farnell PSUET/30: £30. Heathkit siegen: £10. Yaesu rotator & controller G400 RC:£120. Buyer removes. Also 2m & 6m antennas: £10 each. Heavy engineered tower: £100 BRV. G3UTC (Ashford). 01233 663835.

SISKIN multi-cat RS 232 interface controls Icom Yaesu Kenwood TX/RX fitted cat sockets C/W cables hardware software windows/dos: £50. G3RDG (London) 0181 455 8831.

SOMMERKAMP FTDX505 same as Yaesu FTDX401 HF tcvr 80-10mtr mic plus spares: £200. Steve G0BIY (Sheffield) 0114 2657657.

STRUMECH versatower mobile mast 10m high 4 sections inc head unit winches, detachable base plate cost new £1991 offers around £995. Yaesu FT736R inc 6m, 23cm, SP767, MDI. £1475. BNOS 6m linear LPM-50-10-100 £90. G8FAK (Nr Milton Keynes). 01296 720 161.

SWAN astro 102BX 160-10m HF tcvr 100w solid state, vgc £300. G3JZW, QTHR, (Dunstable) 01525 221161.

SYSTRON donner frequency counter type 6054B 20Hz to 18GHz including man & case: £1000: Cushcraft radio test station (2 off one ok one fault) with watt meters: £100 Marconi frequency counter type 2431A 200MHz: £150. Hewlett packard distortion analyser 334 a no manual: £50.(Burton Upon Trent) 01283 542198.

TEN TEC scout, as new, 40m & 160m modules: £400 buyer collects. G3TXQ, QTHR (Northampton) 01604 85890 (after 7.30pm).

TEST equipment. Marconi TF2002B am/fm signal generator 10kHz-88MHz £125. Philips PM2522 digital V/A ohmeter 1kv dc: £40. Philips PE1644 40v/10a variable laboratory PSU fully protected: £125. Polar T1200 transistor fet curve tracer & component analyser: £75. Buyer collect, carr extra. (Hornsham) 01403 864222.

TINY 2 Mk2 complete with cables for TM24IE 2m fm with s/ware for Apple mac, spare plugs sockets, never used: £75.00. Please collect. G4JIZ, QTHR, (Bakewell) 01629 812398.

TR 2300 trio 2m FM portable full wrkng order, bxd with all original accessories plus rubber duck antenna: £95. G3KGB (Taunton) 01823 421578.

TRANSFORMER 2.5 0 2.5 KV AT 1 amp with 3 KVA variac £100 ivor. G0PCQ (Bristol) 01761 221 604.

TRIO TR9000 2m Multimode vgc bxd with 2 mobile brackets & service man: £275. G0RAU, QTHR (Gerrards Cross) 01753 883299.

TRIO TS-830S 9 HF bands, 220w o/put, excellent condx, with matching at-230 tuner, mic, bxd, mans: £650 lot. GM0UIN (Glasgow). 0141 942 7872.

TS 530S narrow CW filter MC50 mic immaculate: £375. 2 pairs 6146B valves RCA made: £20 per pair 1 12BY7A: £10. (Bristol), 01179 642867.

TS-850S HF tcvr; as new: £925. IC-2SRE 2m handheld, as new: £275. FL-2100Z HF linear, vgc: £350. G0CKP (Tonbridge) 01732 350153.

TS790 PC31, 23cm module, bxd: £1600 TL922 linear: £1300 both still under warranty, brand new with man etc. Drake MN2000 atu: £150 autotraker antenna tracker/doppler correction £80 5-band 88 ele loop yagi: £50 timestep 137MHz preamp: £20 all immac condx. G4JBH, (Yeovil), 01935 28341.

TWO for price of one? Two top name, 'compaq', XT-PC's (quite adequate for RTTY/PKT) plus wealth of spares for about the price of a 286-PC: £250. Too much to post COLLECT! Clearance sale continues, examples:-textronix 190B SIG/GEN, FT202 R XTALS, P.S.U's, scopes, counters, organ bits, components + 30yrs cross-section junk. Ask for rare items, SASE for full lists. G0OZK, QTHR (Stockport) 0161 477 5303, messages only.

VALVES octal B7B B9G quantity 170 unboxed many unused types include KT66 6L6G. 6V6G 6K8M 6BX6 6SN7G offers lot lists. G3ACB (Seaford) 01323 897157.

VERSATOWER mobile 60ft: £750. Cushcraft A3S 3 band yagi, orig packing, instructions: £170. Emotator 747SRX rotator 451 universal coupling plus double bearing ready aligned on head unit, 50mtrs rotator cable handbook complete. Exclint order £180. G4FKR, (Winchester) 01962 880411.

WIRELESS sets 18, 19, 33, 36, 38, B44, 52, 62, 1154, 1155, R107 as new, mains tranny AR88 new bxd, national 1-10 RX, AR88, RV 19 coils, WS12, radar IFF units, W546 C13 ATV complete, Collins type war Marconi RX 3V TRF 394G (admiralty) class D wavemeter unused, gecophone 3244 (console). Please write (SASE). G4CNK, QTHR (Durham).

WW2 EX-WD HF Rx No 88 (part of R1475) c/w PSU, R1475 am handbook, cct diags, vgc, unmodified. Prefer collection: £80. G7RGI, QTHR. (Crewkerne) 01308 868598

YAESU 757 GX TNCVR with FC707 ATU complete with mic, man MFJ 1270c TNC with mans, cables: £600. G3KNU (Scunthorpe) 01724 842896.

YAESU 757 GX Yaesu FC757AT mint condx. G0IBF,QHTR (Birmingham) 0121 730 2954.

YAESU 757 GXII tcvr inc Yaesu FP757HD PSU, fist mic, Yaesu FC757AT auto tuner: £750. G0GWZ, QTHR. (Birmingham). 0121 360 5062.

YAESU equipment in immac. condx, all with handbooks, mics. FT707 HF mobile; £350 FT7 HF mobile: £250. FT221R 2m all mode:£350. Plus complete H/B 813 linear (G2DAF) with built in PSU. Abandoned project: £100. G4FYY, QTHR (Crawley) 01293 514788.

YAESU FL 2100z linear amplifier. Easy full legal power 160m - 10m with manual & spare pair unused valves: £450 ono. G0EVS (Hemel Hempstead) 01442 251679.

YAESU FRDX400 RX/Sommerkamp FLDX500 TX 10-80m, spkr, mic, h/book. Operate seperately or as tcvr. Working but needs attntn: £100. Plessey PR155 RX 50kHz - 30MHz, h/book: £75. G3GII, QTHR (Southampton) 01703 693191.

YAESU FT1017D mk111 WARC FM CW narrow exlint condx. Rig well cared for from new: £395 FT707 HF mobile exclint condx. Original packing: £375 FC707 ATU: £100 FC902 ATU: £120 both exclint condx. Prefer buyer collect. GW4UVN (Swansea) 01792 817957.

YAESU FT102 FV102DM FC102 SP102 VGC: £850 ono. Amiga 600 with KCS PC. powerboard 24 copies amiga shopper wordworth Dos 5: £250. (Berwick) 01289 382 464.

YAESU FT277ZD (101ZD) look alike plus filters WARC bands: Offers nr £250. G4LQO (Poole) 01202 631603.

YAESU FT470 bxd, manual: £240. MFJ16010 ATV: £15. Hansen FS210 pwr/swr: £25. Reace LB-1 transistor checker: £25. Era MkII microreader: £70. SEM qrm eliminator: £35. Psion xp organiser with extras: £40. Printer for above: £40. Microtan 65 8 bit computer in 19 inch vero rack with 12 slot MB, tanex, tanram, manuals, wking order. £40. GM0OPX. (Aberdeen). 01224 734 085.

YAESU FT4700RH 2m/70cm mobile 50w 40w, bxd, manual: £350. Yaesu FT76R 70cm handie CTCSS fitted, soft case, dry cell box, bxd, manual: £280. Dymar lynx PMR converted, full coverage 2m fm mobile, tone burst fitted: £75. Postage extra all items. G0TCX (Telford) 01952 596147.

YAESU FT69OR mk2 case nicads charger manual good condx.: £320 microwave modules 144/28 transverter bit deaf: £30 roller coaster 2kw power handling 30uH inductance £20 30 feet steel lattice tower. Buyer collects: £80 ono. Heatsinks 3 off. 9x13x2 inch £10 ea. GM4WJA (Elgin) 01343 541806.

YAESU silent key sale (G1RCR) Yaesu FT221r: £300 ono. Yaesu FT208R: £150 ono. R.N. elextromics transverter 144/6m: £75. (Worcester) 01905 29545.

WANTED

AP1086 Issue 1 (RAF radio stores ref no's) also AP1186A B-C-D-E all sections & AP's relating to radio, radar equipmt. Would purchase post-war to current magnetrons, klystrons, T/R cells, ignitrons, thyratrons, microwave planar tubes, TWT's & special CV types. Reqd R1355 10D/13032 IFF RX's R3002, R3067, R3121 control unit type 17 all unmodified exclint price offrd. RS91943. (London). Tel or fax: 0171 511 4786.

AVOCT38 electronic multimeter. Leads/prods accessories wanted. KW2000A seperates & eqpt. Review Radcom July 1967. (Stafford) 01785 223249.

FOLLOWING valves reqrd to keep my old rigs heating the shack. 6AZ8. 6BN8. 6CL6. 6DC6. 6EB8. 6U8A. 6146. Please look in your redundant spares. Your help is appreciated & reasonable prices paid. Please write; Terry, 7, Cavendish Drive, Clowne, Chesterfield, Derbyshire.

QUAD, leak, radford, etc valve hi-fi equipment working or not. Will pay cash & collect. (Chelmsford) 01245 381961.

ALL early wireless & television items, crystal sets, Rx, Tx, horn speakers, pre-1925 valves, early hi-fi, pre-war television, spy sets, any clandestine equipment, early radio, television books; Pay cash & collect; G4ERU. 5, Luther Road, Winton, Bournemouth, Dorset, BH91LH. 01202 510400.

COIL formers. Neosid or aladdin 0.3" with cans. IFT11 or similar valve I.F transformers. 1.5" cord drive pulleys. Abandoned, failed or old valve projects especially G2DAF designs. Scrap KW equipment. Have Philips stereo tape deck & 8mm cine projector with sound. Would exchange for W.H.Y?. Phone or write, G3WCE, QTHR (Norwich) 01603 250910.

EDDYSTONE items wanted. EC10, EC10 mkII EB35 series 960. Diecast speakers wartime civilian. Any Eddystone considered. Peter Lepino (Great Bookham) 01374 128170.

FT-107M Must be in gd condx, also FTV-107R wntd. Frank (St Albans) 01504 382495 (any time).

FT708R, must be in A1 condx. Also req spare nicads for FT207R, will collect northwest. David, G4XNV, QTHR (Warrington) 01942 722981.

HALLICRAFTER skybuddy or manuals. Other early models considerd. Also Eddystone short wave 2 for nostalgic reasons. G3ASE, QTHR, (Huntingdon) 01480 463129.

HEATHKIT HW-8 or HW-9 QRP tcvr in gd wking order plus instruction manual. Write to Mr C E Pearmain, 47 Alton Street, Nelson South Island, New Zealand.

I.F transformers. Denco, Maxi-Q, electroniques or similar 450/460 kHz. Neosid or aladdin 0.3" coil formers & cans. 1.5" cord drive pulleys. Old valve receiver projects by G2DAF or G3DPM, any condx. Tel or write (Norwich) G3WCE, QTHR, 01603 250910.

ICOM 505 FM board to plug in 6 meter rig. GM4NBZ (Dundee) 01382 779487 (eves).

ICOM IC970H all mod; tcvr must be in good condx. 2W1AZU, (Bangor) 01248 352002, (after 5pm).

KENWOOD TS50 & accessories, cash awaiting. (Staffs) 01543 503532.

KW2000 B with ACPSU, spkr, mic, manual. Must be gd condx and wking order. No mods. GM3LVA ,QTHR(Tomatin) 0108 511317.

MARCONI wavemeter TF643 please tel John as I could collect thanks. (Oxford) 01295 721511.

MARK II micro reader, must be in gd condx, sensible price. Please tel: G0RPC (Margate) 01843 863750.

R109, R206, Murphy, type 618 HF TX (AP100333A) with power unit AP100336. CT423 xtal calibrator. Peter, G4FUY, QTHR, (Wokingham) 01734 733633.

RACAL MA282 frequency changer please also MA144 ATV man rqrd. Could possibly collect. John (Oxford) 01295 721511 (answerphone).

TS 940S+ATV perfect condx wantd or very late model TS930S. Prefer with spkr. Desk mic, manual. Write to G0KGD, QTHR.(SW Cheshire).

TS VFO230 External VFO for TS830S. G0UFI QTHR (Thirsk) 01765 640229.

VALVES: DA-30, DA-60, DA-100 STC4300A/B; 4212E; 4242A; 4274A; PX-4; PX25; DO-26; P27-500; PP4-250; PP4-500; EL-34; KT-66. H. Jakobi, Cambridge House, Cherry Lane, Bolney, W. Sussex, RH175PR. 01444 881184.

WANTED in good condtn jaybeam tribander 2 or 3 el. G0BDF (Lutterworth) 01455 557263.

YAESU FT730R 70cms mobile, Kenwood TM 741E dual band 2m, 70cms. Good condx complete. Mike G8CPH (Ipswich) 01473 831448.

CLUB NEWS

DEADLINE - Items for inclusion in the July 1995 issue must be sent to HQ marked "Club News - DIARY", to be received by 23 May 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 - 4, Computers; 11, Talk 'Radio Control Models' by Dave, G7BYN; 18, Contests & VHF Field Day; 25, Shack clearance; June 1, Longleat activities; 8, Further projects discussion. Details 0117 9654886.

BEDFORDSHIRE

SHEFFORD & DARS - 4, Talk 'Four Metres Portable' by Bryan, G8EIK; 11, Club radio contest equipment check; 18, Talk 'Antenna Farm' by Dick, G3WLM; June 1, Visit to a radio emporium in Ealing. Details 01462 700618.

BERKSHIRE

READING & DARC - 11, Talk 'EME the Ultimate DX' by Peter Blair, G3LTF, technical director of Racal Research; 20, Christian Aid walk; 25, HFNFD Planning; June 3/4, HFNFD; 8, HFNFD results and VHFNFD planning. Details 01734 698274 (eves).

BUCKINGHAMSHIRE

AYLESBURY VALE RS - 3, Discussion evening; 17, Talk 'Cellular Radio Technology' by M Knight; June 7, Talk 'Packet Radio and DX Cluster' by A Ralph. Details 01296 437720.

CHESHAM & DARS - 3, General meeting; 10, Boot sale planning meeting; 17, VHF contest planning meeting; 24, Talk 'WAB' by Sue, G0NLX; 31, Inter-club quiz night challenge. Details 01494 676391.

MAIDENHEAD & DARC - 4, ARDF RX construction; 16, Field day preparation. Details 01628 486554.

CHESHIRE

CHESTER & DARS - 9, 'FAX' by Mike Tyrrell, G6GAK; 16, Talk 'Mad About Radio' by Carl, GW0TQM; 23, Video night; 30, Surplus equipment sale. Details 051 608 3229.

CORNWALL

SALTASH & DARC - 5, VHF fox hunt with Kevin, G0AKH; June 2, Barbecue. Details 01752 844321.

CO DOWN

MID ULSTER ARC - 21, Bring & buy sale. Details 01693 61298.

DERBYSHIRE

BUXTON RA - 9, Night on the air; 23, Field day discussion; June 13, Talk 'Treasure Hunt' by Peter, G0KLR. Details 0129825506.

DERBY & DARC - 3, Junk sale; 10, Talk 'Weather Instruments' by Kevin Jones, G4FPY; 17, Talk 'The Islands on the Air Award' by Ken Francom, G3OCA; 24, Aerials - the weak link?; 31, Computer shareware swap evening; June 7, Junk sale; 14, DX TV reception - a demonstration by Paul Hamer of H S Publications. Details 01773 856904.

SOUTH NORMANTON, ALFRETON AND DARC - 1, 70cm Fox hunt; 15, Talk about Walter Dowsing by Charles Holderness; 22, Talk by a mountain rescue team. Details 01773 521456.

DEVON

APPLEDORE & DARC - ***New Secretary*** David K Brierley, G3YGJ, 4 Waterloo Terrace, Bideford, Devon EX39 3DJ, tel: 01237 476124.

TORBAY ARS - 19, Junk sale. Details 01803 526762.

EAST SUSSEX

CROWBOROUGH ARS - The club meets on 4th Thursday each month. For details contact Pauline, G7SPT on 01892 653782.

HASTINGS E & RC - 17, Talk 'Using Computers' by Dr John Craig, G3SGR. Details 01424 830454.

SOUTHDOWN ARS - 1, Talk 'Behind the Scenes in Radio and Sound Recording' by Alan Heather, G0PQA; June 3 / 4; National Field Day; 5, Talk 'QRP - See It, Buy It, Build It' by Chris Rees, G3TUX. Details 01825 763022.

ESSEX

CHELMSFORD ARS - 2, Talk 'Competing for the D/F Trophies' by Dick, G3WHR and Andrew, G4KOE. Details 01245 256654.

DENGIE HUNDRED ARS - 15, RLO. Details 01621 776237.

GLOUCESTERSHIRE

GLOUCESTER ARS - 3, QRP by G4CIB or a visit to the BBC at Woodnorton; 31, NFD briefing; June 3 / 4, NFD. Details 01452 421510.

GRAMPIAN

ABERDEEN ARS - 5, Junk sale; 12, Talk 'Two Meter PA Project' by Steve Gould, GM0ULK; 19, VHF / UHF Field Day planning; 26, Talk 'DIY Spectrum Analysis' by Bill Wilson; June 2, Junk sale. Details 01569 731177.

GREATER LONDON

ACTON, BRENTFORD & CHISWICK RC - 16, Planning - low power field day. Details 0181 992 3778.

BROMLEY & DARS - 16, Talk 'Slow Scan TV' by Alan Messenger, G0TLK. Details 0181 777 0420.

COULSDON ATS - 8, Skittles evening; June 12, Two metre DF hunt. Details 0181 684 0610.

CRYSTAL PALACE & DRC - Talk 'Baldock and the Radio Interference Service' by Colin Richards, G3YCR. Details 0181 699 5732 or 01737 552170.

DARENTH VALLEY - 10, Video night; June 14, Colour TV - What's it all About? Details 01689 826846.

FARNBOROUGH & DRS - 10, 'The Information Superhighway'; 24, Bring and buy evening. Details 01344 761184.

GRAFTON RS - 10, On air with HF and CW instruction; 24, Talk 'Explaining Receiver Specifications' by Nick, G4WQX. Details 0171 272 2328.

SOUTHGATE ARC - 11, Talk 'Meanwhile, What were the Germans Doing?' by Stan Wood; 25, ROTA; June 8, Talk 'History of Royal Navy Signals' by Ted Ball, G4NLR. Details 0181 360 2453.

SURREY RCC - 1, Construction contest; June 5, 'Digital Broadcasting' by BBC Research and Development. Details 0181 660 7517.

SUTTON & CHEAM RS - 18, Annual General Meeting. Details 0181 644 9945.

WIMBLEDON & DARS - 12, Book bring and buy; 26, Equipment workshop with G6DPS; June 9, On air. Details 0737 351313.

GREATER MANCHESTER

BURY RS - 9, Talk 'Life on the Ocean Waves' by G0PNL; 16, RSGB video; 23, Technical forum and beginners CW class; 20, Inter-club quiz; June 13, Talk 'Equipment Specifications' by G4KLT. Details 0161 881 1850.

ECCLES & DARS - 2, Talk 'When and How to Use Valves' by G8VF; June 6, Discussion '432MHz. Low Power Contest'. Details 0161 773 7899.

SOUTH MANCHESTER RC - 5, Talk 'QRP Developments' by G0KJK; 12, Talk 'History of SMRC' by G3HZM; 19, Homebrew contest; 26, Annual General Meeting. Details 0161 969 1964.

GWYNEDD

DRAGON ARC - 1, Amateur radio videos; 15 Talk 'Creatures from the Deep' by Dr David Last, GW3MZY; June 5, Talk 'Uganda' by Ted Evans. Details 01248 600963.

HAMPSHIRE

BASINGSTOKE ARC - 1, Training and practice for the 1995 VHF Field Day; 28, Two Metre direction finding competition. Details 01256 25517.

HORNDEAN & DARC - 23, Talk 'EMC' by Nigel Gerdes, G7CAW. Details 01705 472846.

ITCHEN VALLEY ARC - ***New Secretary*** Sheila Williams, G0VNI. 12, Construction evening; 26, Talk 'A Disaster Waiting to Happen' by Derek, G0BXI from Hampshire Ambulance Service. Details 01703 813827.

WATERSIDE ARS - 6-8, SS Shieldhall - VE Day Anniversary; 23, Junk sale. Details 01703 783170 (eves and weekends).

WINCHESTER ARC - 19, Talk 'HF Receiver Design' by Chris Cory, G3MEV. Details 01962 860807.

HEREFORD AND WORCESTER

BROMSGROVE ARS - 9, AGM; 23, RSGB Night - regional rep and LO. Details 01527 542266.

DROITWICH ARC - 2, Surplus sale; June 6, Talk 'History of the BBC part two' by Peter Mellors. Details 01905 778794.

VALE OF EVESHAM RAC - 4, Visit to the MEB Training Centre. Details 01386 41508.

HERTFORDSHIRE

CHESHUNT & DARC - 3, Darts match; 31, NFD preparation; June 3 / 4, RSGB NFD CW contest weekend. Details 01992 464795.

HARPENDEN ARC - 4, Abbey Tower. Details 01707 372044.

HODDESDON RC - 3, Inter-club darts match; 11, Planning permission talk by Clr John Jackson, G3TZZ; 25, Visit to Hertfordshire Display company with John Watkins, G4VMR. Details 01992 460841.

WELWYN - HATFIELD ARC - 1, Radio software; 8, Lemsford village fete; 15, Talk 'Antenna Measurements' by G3LDO; June 3 / 4, HF Field Day; 5, Talk on the RSGB QSL Bureau by John Hall, G3KVA. Details 01920 462241 (eves) or 0181 982 7298 (day).

HUMBERSIDE

GOOLE R & ES - 12, Talk 'Six Metres' by Colin Niles, G0SWL; 19, Contest equipment check; June 2, ARDF practice; 4, ARDF competition; 9, Junk sale. Details 01405 769968.

KENT

MAIDSTONE YMCA ARS - 5, RAE Morse tuition; 6, RSGB Morse test; 26 / 27, Rally preparation; 28, Rally; June 2, Nominations for AGM; 9, AGM. Details 01622 832259.

MEDWAY ARTS - 8, VE Day special station; 19, Talk 'Getting Started in Contests' by Dave, G4BUO; June 9 Junk sale. Details 01634 710023.

SEVENOAKS & DARS - 15, Talk 'Musical Electronics' by George Mills. Details 0181 304 3950.

LANCASHIRE

PRESTON ARS - 11, RSGB video evening; June 8, 'Maplin Kit' - A construction competition. Details 01772 686708.

THORNTON CLEVELEYS ARS - 1, Talk on radio amateurs relief expedition; 15, Talk by Peter, VE7AHX; 22, Talk 'My Homebrew Station' by Fred, G4HWK. Details 01253 853554.

LEICESTERSHIRE

LEICESTER RS - ***New Secretary*** G0TNI. 1, Talk 'AOR Wideband Receivers' by Richard Hillier, G4NAD; 8, B / H HF / VHF night on the air; 22, Constructors' competition; 29, B / H HF / VHF night on the air; June 5, Talk 'Japanese Morse' by Norman Kendrick, G3CSG; 12, HF / VHF night on the air. Details 0116 2917250.

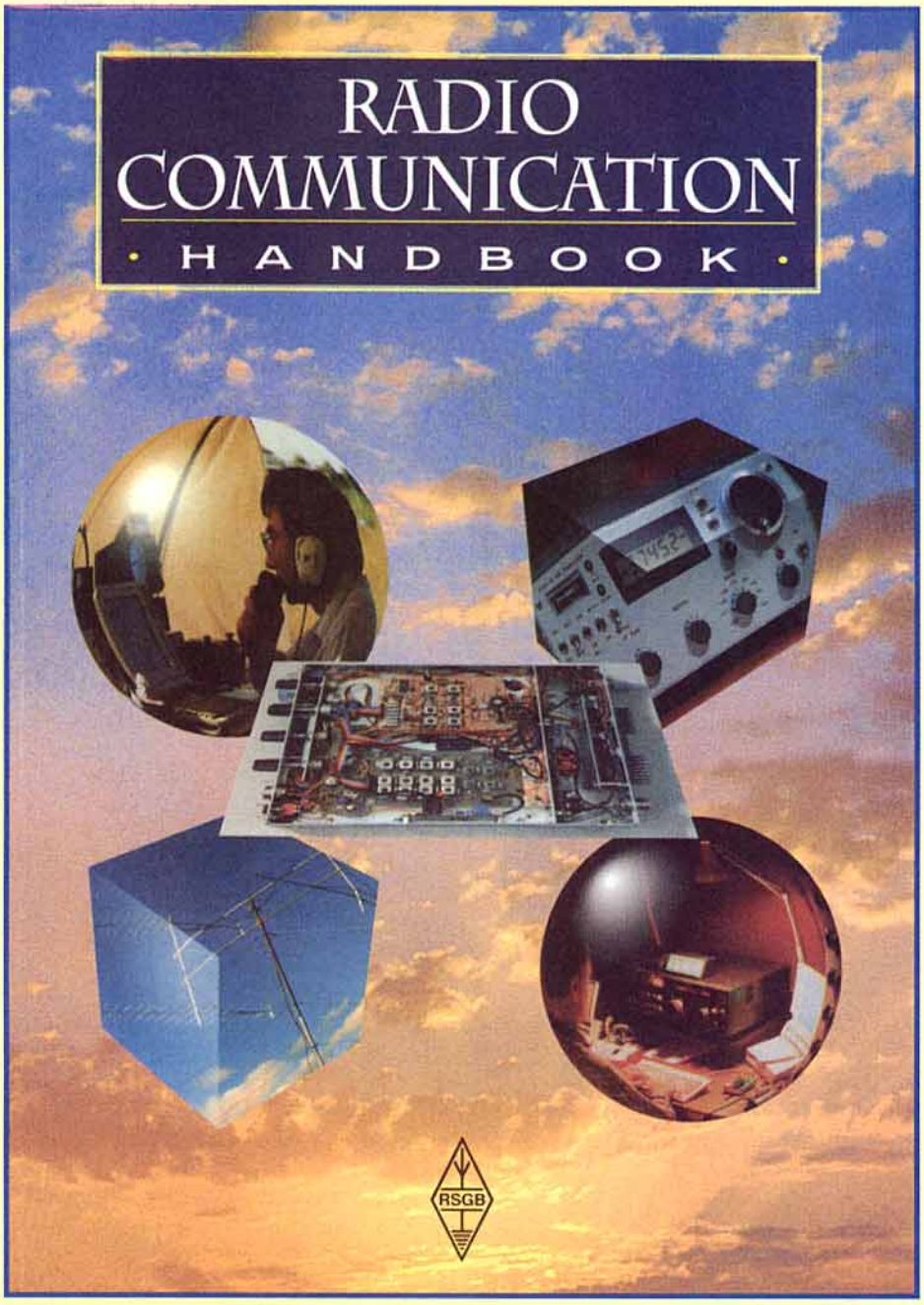
CONTINUES ON P92

CONGRATULATIONS

To the following who our records show as having reached fifty years continuous RSGB membership this month:

Mr A C Lees, RS10128

Radio Communication Handbook



Members' Price: £17.00 +P&P

(See over for postage rates and how to order)

See RadCom, Dec 94, P44 for full details

RSGB's Book Shop — Everything

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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
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K1BV DX Awards Directory	(K1BV)	£17.06	£14.50
Islands On The Air Directory (2nd Ed) POST FREE	**(RSGB)**	**£6.90**	**£6.00**
IOTA Anniversary Booklet POST FREE	**(RSGB)**	**£6.90**	**£6.00**
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Amateur Radio For Beginners	**(RSGB)**	**£3.50**	**£3.50**
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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**
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New Callbook Information/Directory 1995 (See SOFTWARE for disk version)	**(RSGB)**	**SOLD**	**OUT**
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Locator Map Of Europe (wall)	**(RSGB)**	**£1.50**	**£1.28**
Amateur Radio Map of the World.	**(ARRL)**	**£11.00**	**£9.56**
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Meteor Scatter Data Sheets	**(RSGB)**	**£2.50**	**£2.13**
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World Map of Islands (Please specify folded or rolled)	(HM)	£20.00	£17.00
Prefix Guide - NEW (Post Free)	(RSGB)	£4.75	£4.75
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THE RSGB PREFIX GUIDE

FOR MANY YEARS until his death last year, Geoff Watts produced his *Prefix - Country - Zone List* which was the definitive guide to identifying those tricky callsigns so often used by special event and contest stations, not to mention the new countries that pop up from time to time.

Now the RSGB has taken on this task and has produced the *RSGB Prefix Guide*, which will be regularly reprinted to ensure that it contains the very latest information.

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CONTINUED FROM P88

LINCOLNSHIRE

LINCOLN SHORT WAVE CLUB - 10, AGM; 17, Visit to RAF Waddington. Details 01427 788356.

LOTHIAN

LOTHIANS RS - 10, DF hunt receiver tune-up; 24, Top band DF hunt; June 14, AGM. Details 031 337 7311 (eves) or 031 343 5423 (daytime).

MERSEYSIDE

LIVERPOOL & DARS - 2, Quiz; 16, Talk 'Military Equipment of the Former Soviet Bloc' by G4WWX; Talk on DF hunts; 30, Surplus sale; June 6, QSL discussion; 13, GX3AHD on the air. Details 0151 722 1178.

WIRRAL & DARS - 10, demonstration of Massage and reflexology; 31, Practice DF hunt. Details 0151 606 8989.

MID-GLAMORGAN

MID-GLAMORGAN ARG - 4, Talk on 'Electronic Signalling on Modern Locomotives'; June 6, RSGB film. Details 01656 733729 or 0656 736954.

NORFOLK

ARC OF FAKENHAM - 2, Talk 'Precious and Rare Metals in Electronics' by Brian, G8DLM; 27 - 29, GB4OH Oxborough Hall Special Event Station; June 6, AGM. Details 01485 528633.

NORFOLK ARC - 3, GB3NB Repeater Group AGM; 17, Talk 'Radio Navigation' by Dr Philip Lawrence, G8MRQ; 31, Final briefing for the CW NFD. Details 01603 789792.

YARMOUTH RADIO CLUB - 11, Van Maintenance party; 25, Contest preparations; June 3 / 4, NFD. Details 01493 721173.

NOTTINGHAMSHIRE

ARC of NOTTINGHAM - 11, ARCON junk sale; 18, Fox hunt number 2; 25, Construction evening; June 1, Talk 'Radio and Electronic Beams'; 8, Night on the air. Details 0115 950 1733.

MANSFIELD ARS - 1, AGM. Details 01623 792243 or 01623 423697.

WORKSOP ARS - 14, Drayton Manor Trip; 23, Project night - Keith Gudgin on power supplies. Details 01909 487741.

SHROPSHIRE

SALOP ARS - 4, Junk sale; 11, Telford Rally Group night; 18, Second fox hunt. Details G7SBD QTHR or @ GB7PMB.

TELFORD & DARS - 3, Equipment night & G3ZME; 10, RSGB videos. Details 01952 588878.

SOMERSET

TAUNTON & DARC - 5, Visit Portishead Radio; 19, Talk 'Flying Kites and Operating A Kite Aerial' by Paul Foulds and Bill Lindsay-Smith, G3WNI. Details 0823 680778.

YEOVIL ARC - 8, Display of vintage and WWII radio equipment plus the operation of a special event station to celebrate the 50th anniversary of VE Day; 20, Dinner with RSGB president Clive Trotman, GW4YKL. Details 01935 813054.

SOUTH YORKSHIRE

BARNSLEY & DARC - ***New Secretary*** Ernie Bailey, G4LUE, 8 Hild Avenue, Cudworth, Barnsley, South Yorkshire S72 8RN.

SHEFFIELD ARC - 2, Raynet meeting; 15, Quiz in preparation for interclub competition; 16, Swimming; 22, Committee meeting; June 6, Raynet meeting; 12, Annual DF hunt for the club trophy. Details 0114 244 6282 or G0JJR @ GB7CWS.

SUFFOLK

FELIXSTOWE & DARS - 15, Visit to Colchester Signal Box; 28, 19th Annual East Suffolk Wireless Revival. Details 01394 273507.

SUDBURY & DRA - 2, Talk 'Starting in contesting' by Alan, G0EGX; June 6, Talk 'Using Thermionic Valves' by Mike, G4GGC. Details 01787 313212 (before 10pm).

SURREY

SURREY RADIO CONTACT CLUB - 1, Construction contest; June 5, Talk, 'Digital Broadcasting' by BBC Research and Development. Details 0181 668 7517.

TAYSIDE

DUNDEE ARC Club - 4,11, College closed; 18, Local commercial radio; 25, Construction evening. Details Allan, GM7ONJ, QTHR.

WARWICKSHIRE

MID WARWICKSHIRE ARS - 9, Talk 'Microphones' by Jack Cluley, G4YIG; Talk 'PMR' by Clive Palmer, G8IXE. Details 01926 424465.

STRATFORD Upon AVON & DARS - 8, Digital Broadcasting; 22, two metre fox hunt; June 12, Night on the air. Details 01789 740073.

WEST MIDLANDS

STOURBRIDGE & DARS - 1, On the air; June 5, Portable on the air night. Details G7HEZ @ GB7PZT or 01384 374354.

WEST SUSSEX

WORTHING & DARC - 3, Discussion evening; 10, G8DHE amateur television; 17, G3WOR on the air; 24, GSLQI on printing QSL cards; 31, Discussion evening; June 7, Talk 'Ron's Travels in the USA' by G8VEH; 14, Talk 'Playing Aerials' by G3NDJ.

WEST YORKSHIRE

DENBY DALE & DARS - 3, Talk 'Simple ATV 10 GHz' by John, G6GSV; 14, Drayton Manor rally coach trip; 17 Talk 'Sky Update' by Phil, G4FSQ; 24, Fox hunt; June 7, Rally meeting. Details 01484 547553.

HALIFAX & DARS - 16, Junk sale. Details 01422 202306.

KEIGHLEY ARS - 11, Fox hunt; 25, Amateur TV demo by G3TQA; June 1, Night on the air; 8, Treasure hunt. Details 01274 496222.

WILTSHIRE

TROWBRIDGE & DARC - 3, Talk 'Kits and Modules' by Ben Spencer Consultants. Details 01225 864698 (evenings).

RALLIES AND EVENTS

This is a list of all rallies, hamfests, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact callsign and telephone numbers direct to HQ and marked 'Rally News - DIARY'.

5-8 MAY

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Weston, Northants. Details G4LWA QTHR, tel: 01494 531755.

6 MAY

DARTMOOR Radio Rally - Yelverton Memorial Village Hall, Meavy Lane, Yelverton, Devon. Parking for 600 cars. Access for disabled. Playground for children. Trades stands, bring & buy etc. Refreshments. Doors open at 10.30am. Talk-in on S22. Details Ron on 01822 852586.

8 MAY

EXHIBITION OF WARTIME equipment from all three services and Special Event Station at Puckpool Park Wireless Museum, Seaview, Ryde, IOW. Details Douglas, G3KPO 01983 567665.

MID CHESHIRE ARS Rally - Please note this event has been cancelled.

14 MAY

DUNSTABLE DOWNS Radio Club 12th Annual National Amateur Radio Car Boot Sale - Stockwood Country Park, Luton, Nr junction 10 M1. 10am until 5pm. Talk-in on 2m. Attractions include open day, environmental exhibits, side stalls, free entry to the Mossman Collection of Horse Drawn Vehicles, craft museum, train and carriage rides. Plot details on 01582 451057. Pre-booking for plots until 11 May. Plots can be purchased on the day.

MARS/DRAYTON MANOR Radio and Computer Rally - Drayton Manor Park Nr Tamworth, Staffs - on A4091. Doors open 10am. Usual traders, bring and buy. Details Norman, G8BHE 0121 422 9787(evenings).

MARTLESHAM RS VHF Roundtable 1995 - BT Laboratories, Martelsham Heath, Ipswich, Suffolk. Doors open 10am. The event will include round table sessions, test facilities and bring and buy facilities. For BT Labs security requirements, all access is by advance booking only. Please give the names and details of all persons attending in a group. For tickets send an SASE to Roy Smith, G0RRC, Lykkeboo, The Street, Burstall, Ipswich, Suffolk, IP8 3DN.

21 MAY

11th YEOVIL QRP & Construction Convention - Preston School/Centre, off Preston Rd, Yeovil. Details G3CQR, 01935 813054.

26-29 MAY

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - North Scarle, Lincs. Details G4LWA QTHR, tel: 01494 531755.

28 MAY

EAST SUFFOLK Wireless Revival - Ipswich Rally - Maidenhall Sports Centre, Stoke Park High School, Maidenhall Approach, Ipswich. Open 10am-4pm. Admission £1.50 (open to car boots from 8.30am). Attractions include trade stands, car boot sale, bring and buy, drive in antenna test facility, radio check facility, RNARS RAFARS RAOTA ISWL, local club stands, novice licence City & Guilds entry, vintage wireless show, non-radio traders, large traders hall, improved disabled access, refreshments and bar available, free parking, talk-in on S22 GB4SWR. Details Bob, G7HZV on 01394 271257 or 01473 645885.

MAIDSTONE YMCA Mobile Rally - Off Cripple St, Loose (South of Maidstone), 300 yds South of Maidstone Fire Stn. Opens at 10.30am (Free entry at 10am for severely disabled). Admission £1.50 per adult. Features include amateur radio, CB and computing stands plus snack bar, all day video, and free brunch and afternoon tea for traders. Telephone YMCA desk 01622 743317 for free pre-rally camping and caravan facilities. Trade bookings (£2 per foot of table) Ian, 01622 630000 before 9.30pm.

PLYMOUTH Radio Club Annual Radio Electronics Fair - Plymstock Secondary School, Church road, Plymstock, Plymouth. Doors open at 10.30am. More than 25 stalls with electronic, computer and radio components. Also features bring and buy stall, bookstall, grand raffle and refreshments plus talk-in on S22. Details Frank, G7LUL on 01752 563222.

TRAFFORD Rally (The Great Northern Rally) at G-Mex - Greater Manchester Exhibition and Events Centre, City Centre, Manchester. All usual traders and attractions including RSGB information and book stand, bring and buy, new traders, free cash draw, licensed bar, refreshments, hot and cold food and car parking (both free and paid for). Doors open at 10.30am (with disabled persons priority queue) and close at 5pm. Admission £1.50. Talk-in on S22 - via GB1GMX. Trade and further enquiries Graham, G1IJK on 0161 748 9804.

4 JUNE

SPALDING Amateur Radio and Computer Rally - Springfield Gardens, Spalding. Details G4TWR, 01775 722940.

9-11 JUNE

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Elvaston, Derbyshire. (Full Members only). Information and booking details from G4LWA, QTHR, tel: 01494 531755.

11 JUNE

THE 26th ELVASTON CASTLE National Radio Rally - Elvaston Castle Country Park near Derby. Parking, including entrance to the rally site, is £2 - £10 for coaches. More than 150 radio, computer and electronic stands will be on display. Other attractions include a flea market (for private vendors only), a crafts marquee and children's entertainment. Full on-site catering. Details from Ken, G3OCA, 01332 662818. Trade enquiries, Keith, G1ZLQ 01332 662896 after 7pm, please.

THE 6th ANNUAL BELFAST RALLY - The Chimney Corner Hotel, Antrim Road, Glengormley, Belfast. Doors open at 12pm. For details, including information about booking a free stand, contact David Caldwell 01232 471370.

ROYAL NAVAL Amateur Radio Society (RNARS) Annual Mobile Rally - Sports Field,. Event will take place between 10am and 5pm on the sports field, HMS Collingwood, Fareham, Hants Details Clive, G3YTQ on 01329 234143.

17/18 JUNE

BLETCHLEY PARK Amateur Radio and Computer Rally - Bletchley Park, Bletchley, Milton Keynes, Bucks. 10am to 5pm both days. Large trade presence with special interest groups, Morse tests, displays, a working Y station, talk-in and bring and buy. One price admission to rally and museum. Details 0923 893929.

18 JUNE

DENBY DALE & DARS Rally - Shelley High School, Skelmanthorpe, Huddersfield, West Yorkshire. Includes a bring and buy sale, Morse tests, refreshments, bar, single-level talk-in on S22 and SU22. Details Kevin, G1FYS on 01484 547553.

NEWBURY Boot Sale - Acland Hall, Cold Ash, Nr Thatcham, Nr Newbury. 9am to 3pm (set up after 8am). Plots £8. No advance bookings. Free admission and parking, Talk-in GB4NBS on S22. Details George 01488 682814.

THE GORDON Rally (North of Scotland AR Convention) - Please note this event has been cancelled.

23 - 25 JUNE

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Tutbury, Staff. Information and booking details from G4LWA QTHR, tel: 01494 531755.

23 - 25 JUNE

FRIEDRICHSHAFEN HAMFEST, S Germany - Features 280 exhibitors from 30 countries. Details Wilfred Spreen or Heinz Kamper on 010 49561 949880.

25 JUNE

38th LONGLEAT Amateur Radio Rally - Details Gordon, G0KGL 0117 940 2950.

2 JULY

The 6th YORK Radio Rally - Tattersall Building, York Racecourse, York. Doors open at 10am. Admission £1.50. Children accompanied with adult free. Ample Free parking. Amateur radio, electronics and computers, Morse tests and repeater groups plus refreshments and a licensed bar. Talk-in on S22. Details Dave, G7FGA 01904 790079.

7 - 9 JULY

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Brooksby Agricultural College, Leics. Details G4LWA QTHR, tel: 01494 531755.

8 JULY

CORNISH Radio Rally and Computer Fair - Penair School, Truro. Doors open at 10.30am. Large hall with trade stands, bring and buy, official Morse test, free parking, talk-in on S22. Information & booking Ken, G0FIC 01209 821073.

9 JULY

SUSSEX Amateur Radio & Computer Fair - Brighton Racecourse, Sussex. Open 10.30am to 4pm. Admission £1.50. Features include trade stands, giant bring and buy, free parking, bar and picnic areas. Talk-in assistance available on S22. Information and booking Ron, G8VEH 01903 763978 or 0273 417756 office hours.

16 JULY

RAIBC Romsey Picnic - Broadlands, Romsey. All members, families, friends and supporters welcome. With grand draw, junk sale and refreshments. Talk-in on S22. Details John, G4COM, 01703 693017.

12TH McMICHAEL RALLY - Haymill Youth and Community Centre, Burnham Lane, Slough, near Burnham Railway Station. Doors open at 10.30am. Admission £1.50. Includes car boot sale (no advance bookings) at £7 per pitch on the day. Also talk-in on S22. For trade bookings contact Chris, G0MZN 01734 874870 or Ed, G7PRS 01734 411117. General details from Dave, G3SET on 01628 486554.

22 JULY

AIR FORMATION Open Day - Colerne Airfield. The 12th, 15th and 18th Air Formation Signals Regiments Association will be exhibiting a caravan/awning display about the Bar-None Motorcycle Club as well as the association's activities in the Middle east during 1945 - 47. GB4AFS will be active on various bands. All applications etc to Geoff Baldry on 01225 743240 x5256.

23 JULY

COLCHESTER Radio & Computer Rally - Details Richard, G7BIV, 01376 571239.

2nd HUMBER BRIDGE Amateur Radio Rally - The Exhibition Centre, Freightliner Road, Off Clive Sullivan Way, Hull, East Yorkshire. Opens 11am (10.30am for disabled visitors). Easy access one mile from the bridge with on site parking 700 cars. The event will centre of two large halls with a bring and buy sale plus full disabled access, talk-in, bar and cafe. Details or bookings Roly, G0UKS 01482 837042.

THE OUTDOOR BOAT AND LEISURE SHOW - Powderham Castle, Nr Exeter, Devon. The event will feature a large amateur radio section of new and used equipment. More than 2,000 exhibitor spaces are available on the 25 acre show ground with an additional 25 acres of parking. Details 01626 890243.

28 JULY - 5 AUG

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Lytchett Matravers, Dorset. Details G4LWA QTHR, tel: 01494 531755.

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.

FLIGHT REFUELLING ARS Hamfest'95 - Dorset. Overnight camping facilities avail-

EVENTS DIARY

able for Saturday 12th. Details Richard Hogan, G4VCQ 01202 691021.

18 AUGUST

COCKENZIE & PORT SETON ARC Radio Junk Night - Details Bob, GM4UYZ on 01875 811723 or via GB7EDN.

19 - 20 AUGUST

STAFFORD Amateur Radio and Computer Show (incorporating RSGB National Convention - Details 01923 893929.

20 AUGUST

6th GREAT EASTERN Rally - Details Ian, G0BMS 01553 765614 or at GB7OPC.

WEST MANCHESTER Radio Clubs 'Red Rose' Rally - Details Albert, G7RZW 01204 62980.

25 - 28 AUGUST

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Stratford upon Avon, Warwickshire. Details G4LWA QTHR, tel: 01494 531755.

27 AUGUST

TORBAY ARS ANNUAL Mobile Rally - Details John, G3YCH, QTHR; 01803 842178.

EAST COAST Amateur Radio & Computer Rally - Details 01473 272002.

28 AUGUST

HUNTINGDONSHIRE AMATEUR RADIO SOCIETY Seventh Annual Bank Holiday Monday Rally - Details David, G7DIU 01480 431333.

2 SEPTEMBER

ANNUAL WIGHT WIRELESS Rally - National Wireless Museum, Arreton Manor, Newport, IOW. Details Douglas, G3KPO 01983 567665.

3 SEPTEMBER

BRISTOL RADIO RALLY - Details Muriel, G4YZR 01275 834282 (24 hour answerphone.)

18th TELFORD Rally - Details 01952 588878 or 01743 249943. Traders only contact Jim on 01952 684173.

VANGE ARS Rally - Details Stuart, G1VWB 01375 859632.

8 - 10 SEPTEMBER

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Lincoln Hamfest. Details G4LWA, QTHR, tel: 01494 531755.

9 / 10 SEPTEMBER

RSGB 1995 International HF Convention - A full Convention Prospectus will be available shortly, which will include an advance booking form. Send and SAE to: Marcia Brimson, RSGB HQ, Lambda House, Cranborne Road, Potters Bar, Hertfordshire EN6 3JE, UK.

10 SEPTEMBER

BARTG Rally - Details Peter Nichol, 38 Mitten Ave., Rubery, Rednal, Birmingham. B45 0JB tel: 0121 680 5963.

SOUTHEND & DRS 75th Anniversary Radio & Computer Rally - ***New Venue***Cliffs Pavilion, Southend-on-Sea. Details Ron, G0UAW on 01702 353676 or Fax Martin, G0OQR on 01702 602271.

17 SEPTEMBER

PETERBOROUGH RADIO & ELECTRONICS SOCIETY East of England Rally - Details Vince, G8NGZ on 01733 331211.

23 SEPTEMBER

RADIO AMATEUR TABLE TOP SALE - Details John, G4ILA on 0161 477 6702.

24 SEPTEMBER

HARLOW AR AND COMPUTER SHOW - Details Mike, G7BNF on 01850 487863.

NORTH WAKEFIELD Radio Club Rally - Details John, G4RCG on 01924 362144 or John, G0EVT 01924 825443.

THE THREE COUNTIES Radio Rally, Malvern Worcs - Details & bookings Eddie, G4PQZ on 01905 773181.

29 SEPTEMBER-1 OCTOBER

WACRAL 1995 CONFERENCE - Details G4EZU, 124 Darnley Road, Gravesend, DA11 0SN.

AMATEUR RADIO CARAVAN & CAMPING CLUB Rally - Thurlaston, Leics. (AGM). Details G4LWA QTHR, tel: 01494 531755.

1 OCTOBER

THE GREAT LUMLEY Amateur Radio Rally - Details G1JQT on 0207 237927.

8 OCTOBER

COMPUTERCATIONS 95 Computer & Radio Rally - Details 01803 522216.

KIDDERMINSTER & DARS Rally - Details G8JTL on 01384 894019.

13-15 OCTOBER

AR CARAVAN & CAMPING CLUB Rally - Elkington, Nr Welford, Northants. Details G4LWA QTHR, tel: 01494 531755.

20/21 OCTOBER

LEICESTER AR Exhibition - Details Frank, G4PDZ on 0116 287 1086.

29 OCTOBER

HORNSEA ARC Rally - Details Duncan, G3TLI on 01964 532588.

4 / 5 NOVEMBER

NORTH WALES Radio/Computer Rally - Details Barry Mee, GW7EXH on 01745 591704.

12 NOVEMBER

MARS-STOCKLAND Radio/Computer Rally - Details Norman, G8BHE on 0121 422 9787.

19 NOVEMBER

BISHOP AUCKLAND RAC rally - Details Mike Shield 01388 766264.

26 NOVEMBER

BRIDGEND & DARC Radio Rally - Details Mike, GW7NIS on 01656 722199.

WEST MANCHESTER Radio Clubs 'Winter' Rally - Details Albert, G7RZW 01204 62980.

3 DECEMBER

THAMES VALLEY Electronics Rally - Details 01494 450504.

VERULAM ARC Rally - Details Ian, G0PAU on 01923 222284.

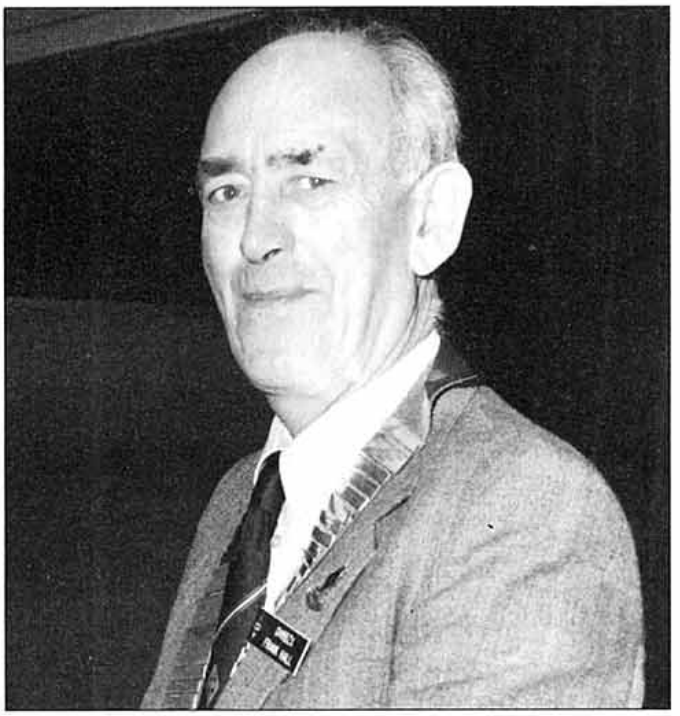
4 FEBRUARY

SOUTH ESSEX ARS Radio Rally - Details David, G4UVJ on 01268 697978.

17 MARCH

TIVERTON SOUTH RADIO's 10th Rally - Details 5 Butter Leigh Drive, Tiverton, Devon EX16 4PN.

SILENT KEYS



Frank Hall, GM8BZX

RSGB COUNCIL Member and Past President Frank Hall, GM8BZX, died in London on Sunday 2 April at the age of 66, having been taken ill the previous day.

Frank was born on 20 October 1928 and following service with the Royal Air Force he moved to the police force and worked for Tayside Constabulary for many years.

GM8BZX was one of the early class B licensees, and was a long-time keeper of the three GB3ANG beacons. Frank was the RSGB Region 12 representative for a number of years before being elected to RSGB Council as member for Zone G (Scotland) in 1982. He served continuously until 1991, having unusually been Executive Vice-President no fewer than three times. He was installed as RSGB President in 1990. Despite his many years of service, Frank was still keen to put more back into amateur radio and last year put himself forward for election to Council once again. He was duly elected as member for Zone G in 1994, and was a serving member of Council at the time of his death.

GM8BZX was active on the 50MHz band and gave many amateurs their first contact with Scotland. He was also a member of the International Police Association radio club.

Since his retirement from the police force he worked as a Precognition Officer under the Scottish legal system. He carried out a vast amount of community work, but always modestly maintained a low profile. He was a private individual, but with a wry sense of humour.

Frank's knowledge of legal procedures and long experience of Council affairs made him one of the elder statesmen of amateur radio in this country, frequently consulted by successive Presidents.

His death was sudden and untimely and he will be greatly missed. He leaves a widow, Beth, who was always very supportive of Frank's amateur radio work; and a son, Philip, who is also interested in amateur radio.

WE REGRET to record the passing of the following radio amateurs:

DK1YZ	Mr F Boersch	06.09.94
G0CQA	Mr J A Roberts	12.01.95
G0UGL	Mr R Goodrum	31.01.95
G2DPA	Mr R C Parnaby	14.02.95
G3AFX	Mr N Barnes	
G3AGT	Mr D A Corrick	04.12.95
G3AOE	Mr J L Freeman	24.02.95
G3DAH	Mr A H Dormer	04.03.95
G3ITV	Mr A J Bryant	03.03.95
G3OPN	Mr P Nelson	08.03.95
G4IXZ	Mr F W Ford	Feb 95
G4BSF	Mr R Small	28.01.95
G4JWS	Mr J W Selwood	03.03.95
G4NJO	Mr D R Collingwood	Dec 94
G4SCT	Mr B A Hawkins	20.02.95
G4UZ	Mr H Leonard	18.12.95
G4VNJ	Mr R Jackson	26.02.95
G6WSP	Mr J Watts	17.02.95
GD5UG	Mr J Etherington	14.01.95
GI3BIL	Mr W G Dickson, MBE	28.02.95
GM3UZA	Mr A Leiper	12.02.95
GU2ASO	Mr G Henry	05.03.95
RS18032	Mr J North	24.02.95
RS44155	Mr P J Willars	04.02.95
RS93986	Mr W T Longworth	28.01.95
RS95114	Mr A H Swain	Nov 94
RS95651	Mr J S Snowball	

GB CALLS

The list below shows special event stations licensed for operation during this month and up to 30 May. It was taken from the HQ computer on 7 April. These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days.

MAY

1	GB0EKR	East Kent Radio
	GB0PRI	Priory School (Kidlink)
	GB0TJI	Thornhill Junior & Infants
	GB0XRC	Exmouth Radio Club
	GB2SI	Southampton Institute
	GB4MEW	Mew Island
2	GB2RNC	Royal Naval College
	GB2OAY	Old Anniversary Year
4	GB0KLD	Kid Link Dollar
	GB2RCC	Radio & Caravan Club
5	GB0CIS	Crynallt Infant School
	GB0PSG	Pwllheli Scout Group
	GB2AMW	Astley Miners Welfare
	GB2LL	Langford Lodge
	GB8AFK	Action for Kids
6	GB0CHF	Coalhouse Fort
	GB0ESP	Esperanto Weekend
	GB2CDY	Coastal Defence Yarmouth
7	GB0IRC	Ilkeston Rugby Club
8	GB20AY	Old Anniversary Year
	GB4HPS	Holmfield Primary School
9	GB0EUR	Europe for European Week
	GB2LOW	Low Power
	GB4HPS	Holmfield Primary School
	GB0LSC	Longridge Scout Centre
12	GB2AVC	Ashworth Valley Camp
	GB2SEM	Southern Electric Museum
13	GB5SR	Stelar Radio Net
14	GB4YCS	York Cub Scouts
17	GB2EMG	English Martyrs' Guides
	GB8EMG	English Martyrs' Guides
	GB80STD	St Dunstan's 80th Anniversary
18	GB0CDA	Coastal Defence 'A'
19	GB0ASC	Rankins Farm
20	GB2BCC	Bilston Community College
	GB2LOW	Low Power
	GB2WH	Worms Head WAB SS38
21	GB2IMD	International Marconi Day
	GB4WFA	Wells For Africa
22	GB0RJS	Ravensthorpe Junior School
24	GB2TAM	Tangmere Air Museum
25	GB2RCC	Radio & Caravan Club
	GB8RN	Royal Navy
26	GB2SAS	Shorham Airport Society
27	GB1GMX	G-Mex Exhibition Centre
	GB2SR	Stelar Radio
	GB4DX	DX
	GB4OH	Oxburgh Hall
29	GB2ASF	Allington Summer Fete

CABLES & CONNECTORS

Westflex 103, low loss air spaced 50 ohm	95p/m
RG213U, (UR67), Mil spec, 50 ohm low loss	70p/m
UR43, 5mm dia, 50 ohm, single centre	30p/m
RG58CU, 5mm dia, 50 ohm, stranded centre	30p/m
RG174U, 2.3mm, 50 ohm, miniature coax	35p/m
UR95, 2.3mm, 50 ohm, mini nylon coax	30p/m
UR111, 2.3mm, 75 ohm PTFE mini coax	40p/m
UR57, 10.3mm, 75 ohm low loss coax	70p/m
UR70, 6mm dia, 75 ohm transmitting coax	30p/m
Double screened, 75 ohm coax, 8mm dia	40p/m
UHF low loss TV downlead, 75 ohm	25p/m
75 ohm twin balanced feeder, 400 w PEP	25p/m
300 ohm standard ribbon	25p/m
RG62AU, 6mm dia, 95 ohm coax	50p/m
Single core screened cable, 2.3mm dia	12p/m
Two core screened cable, 5mm	30p/m
3 core mains, 5 amp, cable	25p/m
6 core rotator cable, heavy duty	45p/m
8 core rotator cable, heavy duty	65p/m
14 SWG HD copper 25p/m 16 SWG HD copper	20p/m
PVC coated AE wire, light duty	8p/m
Red/black DC power cable, 8 amp	30p/m
Red/black DC power cable, 15 amp	45p/m
PVC coated AE wire, heavy duty	12p/m
NEW UR67 50 ohm HD with robust outer sheath	90p/m
NEW 75 ohm heavy duty twin balanced feeder	60p/m
NEW 300 ohm heavy duty slotted feeder	60p/m
NEW 16swg stranded copper aerial wire	30p/min
NEW 450 ohm ladder ribbon feeder	65p/m

Postage on cables up to 20m £3.00, over 20m £5.00

CONNECTORS

Self amalgamating tape £3.80 Polyprop egg insulators 50p
Dipole centre boxes £2.50 4in dog bone insulators 70p
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The LAST WORD

NOVICE EXPANSION?

There are currently nearly 3000 class 'B' Novices but still under 200 class 'A' Novices, and I feel this is a problem that needs to be looked at urgently. I feel there are a number of reasons for this, but the main one is undoubtedly the lack of HF allocations.

Just look at the VHF and UHF allocations: all of 6m, most of 70cm, all of 23cms and now a likelihood [*sic*] of an allocation on 2m [see *RadCom* December 94 page 6 - *Ed*]. Then look at the HF allocations and ask yourself, where is the incentive? The only phone allocations on 160m and 10m are fine but at this time in the sunspot cycle 10m is dead for long periods of time (and I am a 10m addict). As for 160m, very few people have the space for an effective antenna.

The only other allocations are CW only and very small, eg 10kHz on 30m. I have nothing against CW and would say that most of my operating uses this mode, as it is the most effective when using QRP, but sometimes it's nice to talk as well. As with the full 'A' licence, many people use phone first and when they feel confident they take up the challenge of CW. I feel this would happen if Novices had more phone allocations.

The 20m band is without a doubt the best band for DX and is big enough to take a phone allocation for Novices, then there is the much under-used 17m band. I am not asking for whole bands or even allocations on all bands, as I understand there has to be an incentive to go for the full licence, but at the moment I feel the balance is not right.

Thank you for an excellent magazine and all the good work you do for the UK hams.

John Purcell, 2E0AHU

...I wish to comment on the recent publication of the Amateur Radio band plan issued both in the 1995 *Call Book* and April 1995 *RadCom*. Firstly, the band plan gives most emphasis to Novice licensees with little regard to the faithful amateurs. Do Novices think they own the world, because there are still some very competent amateur licensees who are just as eager to further the cause of communications and to engender collective spirit.

I would like to see this table re-written so as not to alienate most of the long suffering radio amateurs in this country.

R Pritchard

2M SSB ACTIVITY

I sympathise with Keith, G7LPW, (*The Last Word*, March 1995) about the apparent inactivity on 2m SSB and have experienced identical problems. The lack of response cannot, I feel, be totally blamed on all amateurs concentrating on packet.

It's my privilege to run a 2m SSB net for WACRAL (the World Association of Christian Radio Amateurs and Listeners). The apparent lack of response over the last three months has been surprising. I have made enquiries and have been assured that people have been listening, but have been unable to hear me. I run 400W into a pair of 8-element slot Yagis.

I believe that winter conditions are usually inferior to summer: the constant arrival of depressions across the Atlantic doesn't help. During the 2m contest last weekend (4 March) I listened carefully to give out a point or two, but I have never heard the band so dead during a contest. Of twelve stations contacted, four were in JO square - a very strange situation. One JO station could be heard for most of the day, yet the rest of the band was virtually dead.

It is vital that we maintain our enthusiasm for 2m SSB and don't let it degenerate to DX openings only, as seems to have happened in many locations with 6m. So keep trying, Keith! Beam south towards me - I monitor most evenings on 144.300 - but if I don't come back to you, it doesn't meant that I - and many other amateurs - are not listening intently. It's just conditions.

Stephen Nicholls, G0JFM

...May I reply to the letter from G7LPW? I suggest he spends a little more time listening. I had a similar problem some years ago (not on 2m) but discovered that my receiver was faulty.

Ray Wilson, G3APV

WHAT'S IN A NAME?

There has been some communication about whether radio *amateur* is a good description for our activities in the public mind. In Spain one is known as a radio *aficionado* which *may* be an improvement. In Italian-speaking Switzerland one is known as a radio *dilletante* which I think perhaps is *not* an improvement.

Ned Rew, G8GZZ

[Any suggestions? - Ed]

TOP TRANSMITTER

In the introduction to his article *80 - 30m Switchmode PA CW Transmitter* (*Radio Communication* March 1995), Chas Fletcher, G3DXZ, states that when heard on the air it is indistinguishable from the best you can buy. This is far from the truth.

I spend around a thousand hours a year on the bands using CW only and operating a TS-950SD at present, and pay particular attention to the quality of the transmitted signal of those stations I am in contact with. I have had one QSO with Chas, this being about a month before the article appeared. His signal had caught my attention as I have never heard one of such quality and clarity and so I called him to find out what was this extraordinary transmitter he was using. He told me about it briefly and mentioned that his article was to appear in *RadCom*.

Believe me, Chas is seriously understating the case, and the signal from his design is far superior to the best you can buy. I would suggest that this is not just another article to skim through and then forget but represents a significant development.

Mike Birch, G0KDX

APATHETIC AMATEURS

Following the recent proposal by Dave McQue, G4NJU, concerning 12.5kHz spacing on 2m, which was published in the amateur radio press, I was appalled to learn that he only received a total of 41 opinions, including 25 individual responses (of which I was one). This out of an RSGB membership of over 30,000 and a total of approximately 60,000 UK amateurs. Assuming that all his responses were from members, this represents less than 0.15% of members responding to an important issue.

Amateurs complain when important decisions are taken without their views being sought. However, when someone takes the time and trouble to consult us on something and finishes up with such a low response rate, then we should be ashamed. As a result of this apathy or the 'plenty of others will reply, there is no need for me to bother' attitude, we will find ourselves in the situation where change has come about which we oppose, but find that it is too late to do anything about it.

We must all play our part in decision-making on the future of amateur radio, not just leave it to the very few and hope that they get the right result for the rest of us. After all, at the end of the day we all benefit or otherwise from these decisions.

R A Connolly, GI7IVX

[The matter of 2m channel spacing is still under active consideration by the VHF Committee. Any comments should be addressed to the Chairman of VHF Committee - Ed]

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.

IMPLIED CRITICISM

In November last year I received a letter from the Radiocommunications Agency, stating among other matters that there had been complaints about its appointed contractor SSL, and that they were to be reappointed for three years.

More recently my renewal notice came from SSL, stating that it was "for information purposes only", and no payment was required. All quite correct, for I pay by direct debit. The information value was scant, however, as the one really interesting detail - the sum to be debited - was missing. The renewal fee box contained a line of asterisks and so I had to search my records to find the fee.

This was followed by a letter from RA which, among other matters, reminded me that the renewal notice was "for information purposes only", a line which had already worn thin with me. It also mentioned the difficulties SSL had to face, and how RA was tightening up on service standards.

Someone should inform RA that it is in poor style to imply criticism of its own contractor to others, and that this can reflect back to the client. Furthermore, any problems properly belong to RA, which should sort them out with its contractor as necessary, without parading them to the amateur community. Licence renewal is a single closed event, not requiring three letters. Cut the bureaucracy, save money, and reduce the fee.

A R Churchley, G4EAQ

LETTERS OF JOY

It is infrequent to say the least that reading the letter pages of any magazine can give one cause to smile with genuine joy, but two letters published in *RadCom* recently have done just that. The first from Mirek (*The Last Word* March 1995), confirming the replacement of his stolen handheld was great, but the second, written by Emma Wills, 2E0AAX (*The Last Word* April 1995), was superb.

Ms Wills has in her few lines finally put to rest the idea that Novices are in some (never defined) way too immature or irresponsible to be let loose on our airspace. She carefully outlined how she fully deserved the DXCC she now holds, but it was the measured words about the (now infamous) G6** and G4** stations that demonstrated she is in possession of a maturity that they clearly lack. If Emma's example is widespread (and I'm sure it is) then the day on which we allocate a Novice sub-band on 2m cannot arrive too quickly.

I wish Emma every success in the future and I sincerely hope that one day my own daughter will emulate her exploits, though since she is not yet a year old, this will have to wait a little while!

R Brickley, G6VVC

BACK FROM BRUNEI

I have recently returned from 3 years in Brunei. I would like to put on record my pleasure at receiving the excellent *RadCom* regularly and on time, and with the QSL bureau which works so well. These membership assets alone were easily worth the more than double annual sub we ex-pats pay for airmail service.

May I also, through the columns of *The Last Word*, apologise to and thank all those UK amateurs whose callsigns are similar to, or have been mistaken for, mine. These persons have kindly redirected V85KX QSLs sent to them in error on to me. The combinations misheard have been legion! Some errors I know are due to incorrect info printed in foreign amateur radio magazines and QSL manager sheets. I am manager for V85KX and VP8BNW cards *only*. QSL requests will be dealt with instantly as usual.

J Street, G3JKX, ex-V85KX, ex-VP8BNW

59 YEARS "A REAL HAM"

I have been meaning to write for ages, to ask you if you could please let me know when I first joined the RSGB; and, in due course became a Life Member - it is so long ago that I have forgotten; but the congratulations to four members having now reached fifty years continuous membership (*RadCom* February 1995) interested me. I was actually licensed in 1936, and am still a real ham, but not so active as I would like to be - my 84th birthday is only a few months away!

Please, all of you, keep *RadCom* going; you do a super job, and seem to get more and more into it.

Constance Hall, G8LY

[Constance joined the RSGB in December 1935 and so we are looking forward to congratulating her on not 50 but 60 years of membership very soon - Ed]

EUROTEK

CONTINUED FROM PAGE 65

Starting at 28MHz, the coil tap and capacitor setting for best SWR was established. The tuning capacitor was then removed and measured; many modern digital multimeters have a picofarad range. A permanent wire from the coil tap just found to its relay was then soldered in.

A fixed capacitor, of roughly the value just measured but not necessarily of adequate rating, was then soldered in where the tuning capacitor had been unclipped. This must be done because the capacity of this wiring and the open relay will affect the 24MHz band which is set up next. And so on.

As the search time and price of capacitors adequate for 100W was expected to be considerable, it was found best to complete the whole set-up at low power with junkbox capacitors; in the end, two capacitors could be used on three bands each, and those could be made of RG58/U.

If it turns out that an exact capacitor value is hard to get, the next lower value may be shunted by a small capacitor made of coax, or moving the coil tap a bit will effect an adequately low SWR with a standard-value capacitor.

After all bands work satisfactorily on low power, capacitors with the proper ratings are installed and the SWR is checked again, first at the ATU and then at the shack-end of the cable. The SWR in the shack should be the same or a little lower than at the ATU. If all is well, increase power and verify that the automatic ATU can reduce the SWR on all frequencies to where the transceiver will deliver its rated output.

NOTES

[1] If top-band is of interest, two articles are recommended:

'Bring back the end-fed' by G3UCE, RadCom 2/89 (but beware of the underrated capacitors mentioned!)

'160-m DX from suburban sites' by G3XAP, *RadCom* 12/73.

[2] In the UK, weatherproof plastic cabinets are very expensive. G4LQI's ATU used a wooden platform for the components and an upside-down 2-litre icecream container (held down by a brick) overhanging that platform on all four sides. It survived the 1987 hurricane intact!

[3] Some radios have a band-data output which can be used to select relays in the pre-match ATU through a bought or built interface. The same applies to the antenna selection provisions in some linear amplifiers and automatic ATUs. HB9GBB decodes the BCD band output of his Yaesu transceiver with an SN74LS145 IC, which can sink relay coil currents up to 80mA.

If solid-state devices are used to drive relays, place diodes across their coils to prevent destruction of the switching transistor upon release of the relay.

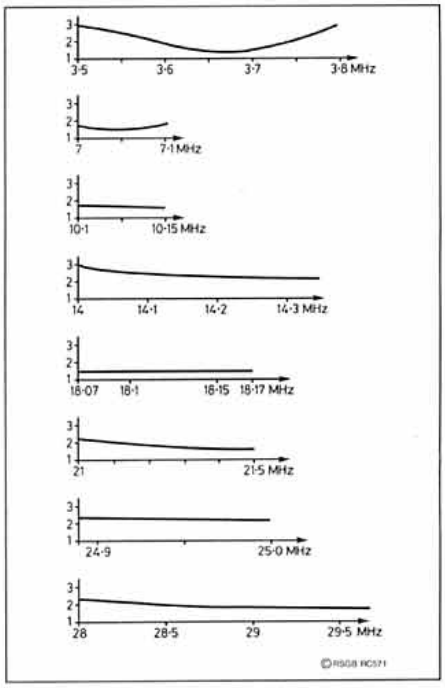

Fig 3: SWR vs frequency in the cable between the remote pre-match ATU and in the shack.

[4] Models with other than 12V coils are inexpensive as surplus and at rallies. The voltage ahead of the regulator in 13.8V linear transceiver power supplies will operate most 24V relays.

[5] 'A real QRPp SWR meter' by DJ1ZB, *Sprat* nr. 69 & 71. ♦

A BOX TO MEASURE RF IMPEDANCES

CONTINUED FROM PAGE 39

ESTIMATING THE RESIDUAL OUTPUT CAPACITANCE

THE MOST CONVENIENT way to do this is to use a capacitor of about 18pF as 'S', and leave the output open circuit. 'Z' is then almost entirely due to the residual output capacitance which can be found in the usual way.

Use a frequency of at least 14MHz. The residual capacitance is typically 4 or 5pF with the coax socket disconnected, and it does not seem to vary much if measured under different conditions.

HARMONICS

THE ONE DISADVANTAGE in the method is that it is susceptible to errors due to harmonic frequencies in the input. If any harmonic present coincides with a resonance of a feeder/antenna system disproportionately large errors could result.

The input should be fed via a simple filter for instance a 1:1 p section filter. Such a filter for 14MHz was made by trial and error using two 470pF capacitors and a self supporting coil of 8 turns, about 2.3cm long and 1.3cm diameter. The filter could be tuned using a dip oscillator and squeezing turns together to obtain the correct filter resonance.

For a frequency 'f' MHz the capacitance should be multiplied by (14/f) though the exact value of the capacitors is not critical.

GENERAL COMMENTS

ACCURACY

It depends upon what is being measured. In general, greatest accuracy is obtained when 'Z' and 'S' are of similar value, when accuracies of 2% or even better can be obtained. In the case of complex impedances where one component is larger than the other.

The most significant component can be obtained to a good accuracy, but the value of the other component may be very approximate. If one of the components is more than 4 times greater than the other, the value of the less significant component is unlikely to be very reliable, and should this figure be 10 or more, the less significant component will probably remain undetected.

VOLTMETER CORRECTIONS

As mentioned before, adding 0.15V to all readings is a reasonable compromise. For readings between 0.5V and 1.0V the correction should be less, and it decreases still more at lower voltages.

The correction is much more significant at lower voltages being a much greater percentage of the reading and therefore having a much greater effect on the final answer. 'S' should be chosen to be roughly equal to 'Z' which means that low voltmeter readings will be avoided. It is probably worthwhile measuring the voltages to the nearest 0.01 volt, even though the last digit will be unreliable.

COMPONENTS

Resistors	
R1	22R
R2, R3	180R, 1W
R4, R5, R6	330K
R7	22K
Capacitors	
C1, C2, C3	1000pF
C4, C5, C6	10nF
Semiconductors	
D1, D2, D3	BAR28. Maplin QQ13P
Additional Items	
Connecting block. Maplin JX38R or JY93B	
Components are available from Maplin Electronic Products, Tel 01702 554161	

ACKNOWLEDGEMENTS

THIS IS A METHOD BASED on similar principles to the Three Meter Method, which gave me some ideas. The technique was first described in QST [1] and by Peter Dodd, G3LDO. [2] [3].

REFERENCES

[1] 'Measurement of R+Xj',D Strandlund, W8CGD, *QST*, June 1965.

[2] 'Measurement of antenna impedance', P Dodd and T Lloyd, *QEX*, Nov 1987.

[3] *The Antenna Experimenters Guide*, available from RSGB Sales, see page 90. ♦

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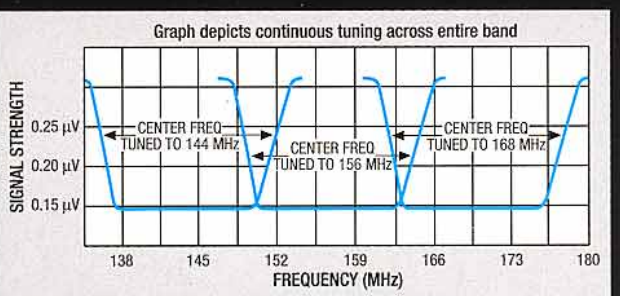

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