Radio Communication

The Journal of the Radio Society of Great Britain

June 1994

Volume 70 No 6

THE VOICE OF AMATEUR RADIO FOR 81 YEARS

By Jupiter . . .

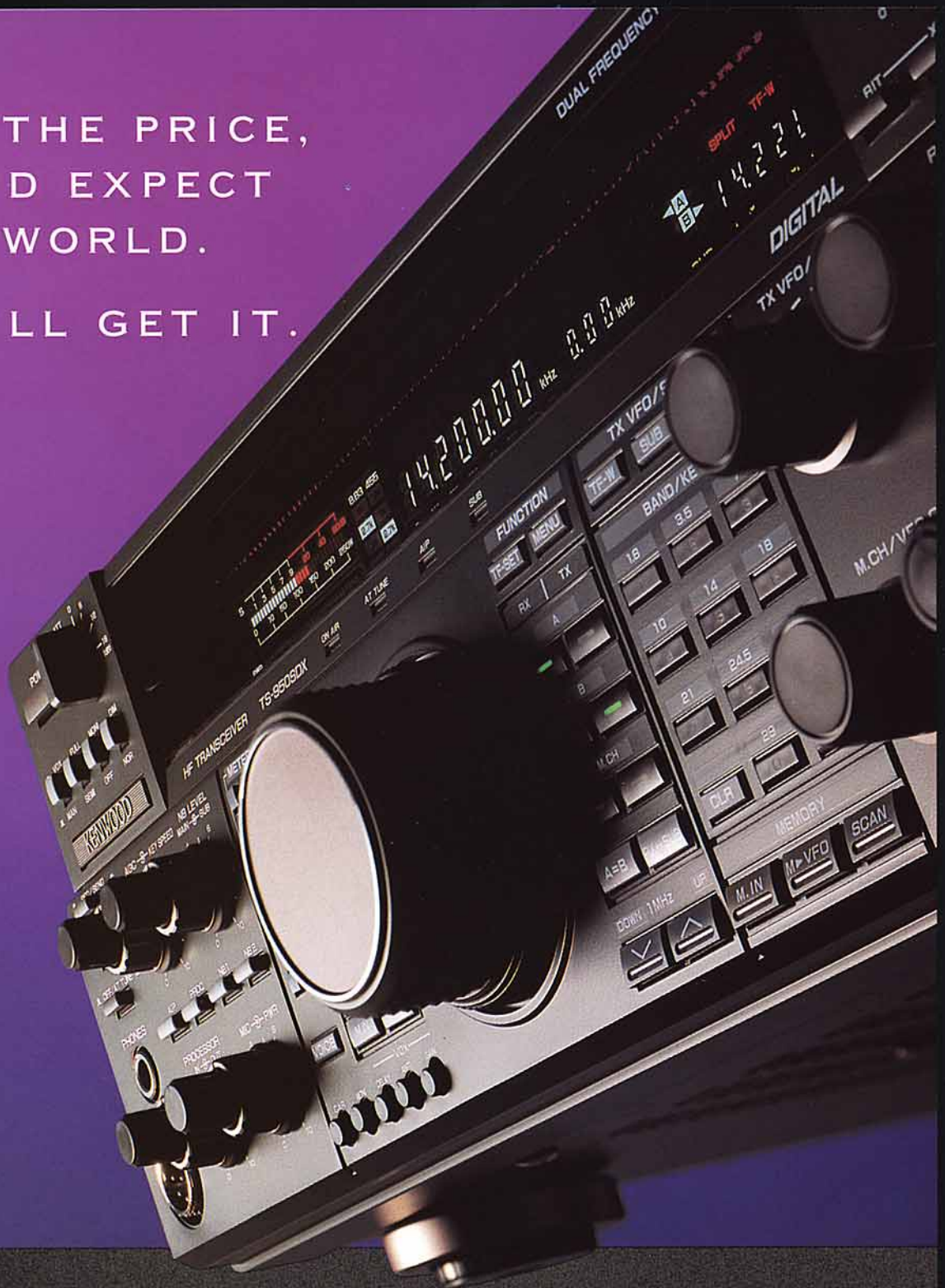
. . . it's on HF

How you can use your receiver to hear July's comet collision

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

FOR THE PRICE, YOU'D EXPECT THE WORLD.

YOU'LL GET IT.



The TS-950SDX is at the very pinnacle of the Kenwood HF transceiver range. And when you look at its specification, that's not surprising.

It boasts a number of highly advanced features like built-in digital signal processing, 50 Volt MOSFET finals, AIP (advanced intercept point), built-in sub-receiver and built-in automatic antenna tuner. To name but some of its world-leading technical tours-de-force.

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The TS-950SDX is part of a range of HF transceivers priced from around £1000 to £3500. And although quality is never cheap, it's still a small price to pay to have the world of radio communications at your command.

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Peter Dodd, G3LDO

Technical Illustrator
Bob Ryan

Editorial Assistant
John Davies, G3KZE

Production Assistant
Jennifer Preston

Editorial Secretary
Erica Fry

All contributions and correspondence concerning the content of *Radio Communication* should be posted to:

The Editor
Radio Communication
Lambda House, Cranborne Road
Potters Bar, Herts EN6 3JE

Tel: 0707 659015
Fax: (Editorial *only*) 0707 649503

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Radio Communication

COVER PICTURE:
Comet Shoemaker-Levy 9 will crash into Jupiter next month, and you could hear it on HF.
PHOTOGRAPH: NASA.

NEWS AND REPORTS

TECHNICAL FEATURES

REGULARS

REVIEWS

RADIO SOCIETY OF GREAT BRITAIN

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

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

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

Headquarters and registered office:
Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE
Telephone: 0707 659015 - Members Hotline and book orders
Fax: 0707 645105. Telex 9312 130923 (RSGB)
Electronic Mail Via Dialcom/Telecom Gold: 87 CQQ083

General Manager: Peter Kirby, MIMgt, MISM, G0TWW
Company Secretary: John C Hall, OBE, G3KVA

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Corporate (Concessionary): £27.00 over 65 or full time student under 25. (Applications should provide proof of age at last renewal date and/or include evidence of student status.)
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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

Pressures on the RF Spectrum

A SERIES OF REVIEWS OF THE Radio Spectrum have been carried out, following a recommendation by the Merriman Committee in July 1983. Stages 1 and 2 dealt with 470 - 3400MHz and 3.4 to 30GHz respectively. The Report of Stage 3, covering 28 to 470MHz, was published recently. We are pleased to see that it recommends no changes be made to amateur allocations in this part of the spectrum, despite the considerable pressures on the spectrum from commercial users. The RSGB submission to this review outlining and defending our use of these frequencies was prepared by the RSGB HF, VHF and Licensing Advisory Committees after seeking input from amateurs in *RadCom* in autumn 1992. We would like to thank all those who responded.

The report makes only one reference to the Amateur and Amateur Satellite Services as follows: *"Amateur Radio is a popular hobby with about 60,000 licensed operators in the UK. There are amateur radio allocations, mostly narrow and constrained, in some cases shared with other services, around 29, 52, 70, 145 and 435MHz. All or part of the 29, 145 and 435MHz allocations may also be used for accessing amateur satellites. We note the value of amateur radio to the community and propose that, for the foreseeable future, no change should be made to these allocations."*

This is a very encouraging outcome, but the general pressures on the spectrum are making themselves felt in shared bands where we have Secondary status. The Primary users are making greater use of their allocations, and this does result in further constraints being imposed on amateur usage; the various limitations on unattended operation being a good example.

RSGB has also been submitting papers to a similar series of reviews, called 'Detailed Spectrum Investigations', which are being conducted at a European level by the European Radiocommunications Office (ERO). A paper was input to a VHF/UHF review this January.

Interference Caused by Unattended Operation

IN THE PAST FEW MONTHS, THE RA HAS experienced a number of problems with unattended operation of amateur stations, and have asked us to publicise the following: *"ATV stations operating in the 1.3GHz band have been left running unattended on sites remote from the main station address, and have caused severe interference at distances of 30 - 40km away to air traffic control radars which are the primary users of this band. The Amateur Licence does not permit unattended operation of TV in this band (except where a Notice of Variation has been issued for a repeater, and these are subject to careful site clearance procedures). Operation outside of the terms of a licence is unlicensed use, and enforcement action (which could mean prosecution and/or revocation) can be expected in these cases. This is particularly so where a safety of life service, the security of which is the RIS's first priority, is at risk."*

The potential consequences of being unable to close down an unattended transmitter that is causing interference to such services are very serious. It is important that all amateurs behave in a responsible manner and adhere to the procedures in the licence for unattended operation.

The RA have also had to investigate interference from unattended operation of digital modes on 144/432MHz. The licence does not require notification to the local RIS for such operation under clause 2(4)c, but amateurs should perhaps give some thought as to how their station could be closed down in their absence if problems arise. It might be wise to inform the local RIS of such operation as a precaution. These matters are currently under discussion with the RA.

Conclusion

WE CAN BE GRATEFUL THAT THE VALUE of amateur radio does seem to be appreciated by the authorities, and that its facilities are generally being maintained. If this goodwill is to be maintained, we must all act in a responsible manner and consider the other users with whom we share the spectrum.

Julian Gannaway, G3YGF
Vice-Chairman, Licensing Advisory Committee

NEWS & REPORTS

● FOLLOWING LAST year's successful Sca Fell climb, Bishop Auckland Radio Amateur Club members are scaling Ben Nevis on 18 June. GB0NEV will be on 3.5, 7, 144 and 432MHz. The event will raise funds for the Children's Ward of Bishop Auckland Hospital.

● ON INTERNATIONAL QRP Day, 17 June, the Science Museum station GB2SM will run QRP 1000 – 1600UTC on 7 and 14MHz. More QRP activity follows on 18/19 June on 3.5, 21 and 432MHz to encourage Novice contacts.

● RAF SEALAND celebrates its 70th anniversary with a Fun Day on 26 June. The RAF Sealand RC will operate GB2RAF under canvas alongside other attractions including a flying display. HF and VHF stations will be active (including 6m).

● AN AMATEUR Radio Fete will take place on 10/11/12 June at Lac de Loire in the Central region of France. Overseas visitors are welcome and talk-in will be on 145.500MHz or via repeaters at Tours (145.375) or Orleans (145.625).

● GB0XXV, will be used until September to celebrate the 25th Anniversary of the Thornton Cleveleys ARS. Operation will be on HF, VHF and UHF, with G4ATH on 160 metres and G6GMW on VHF and UHF. Details from G8RDP, QTHR.

● THE WHEELS Extravaganza Transport Show is at Vauxhalls Show Ground, Ellesmere Port, South Wirral, 25/26 June. Wirral ARS will run GB4HP on HF, VHF/UHF and packet. This looks like a really good family day out.

● ACTIVITIES WEEK at South-East Essex Sixth-Form College sees GX7PRU on the air from 0900 to 1500UTC daily for a week from Monday, 6 June. VHF and UHF stations will be active on SSB, FM and packet.

● THE CTCSS tone allocations on the following repeaters have changed to 118.8Hz: GB3BS, GB3FN and GB3FM. See p110 of the *1994 RSGB Call Book* for details of the CTCSS scheme.

● PERMANENT SPECIAL Event callsign GB2SFL has been issued for operation at South Foreland Lighthouse, near Dover (see *News & Reports*, May 92).

● GRANTHAM RC members will use CW and Phone with the call EJ2SI from Saltee Island (IOTA EU 103), 10 – 14 June.

How a Multinational Team Bridged the Irish Sea With a New Packet Radio Network

Irish Radio Society Honour for UK Data Group

THE IRISH Radio Transmitters Society has awarded the Pat Conway Memorial Cup to a group of British amateurs: Tony Jones, GW4VEQ from Anglesey; Martin Vernon, GW6HVA of Llandudno; and the Chairman of the Gogledd Cymru Packet Group Dave Fernant, G4PGO.

The trophy is awarded for outstanding services to amateur radio in Ireland, and this is the first time the award has gone to non-Irish nationals. It was presented by Jim Ryan, EI3DP, President of the IRTS, at the society's AGM in Balleybofey, Co Donegal.

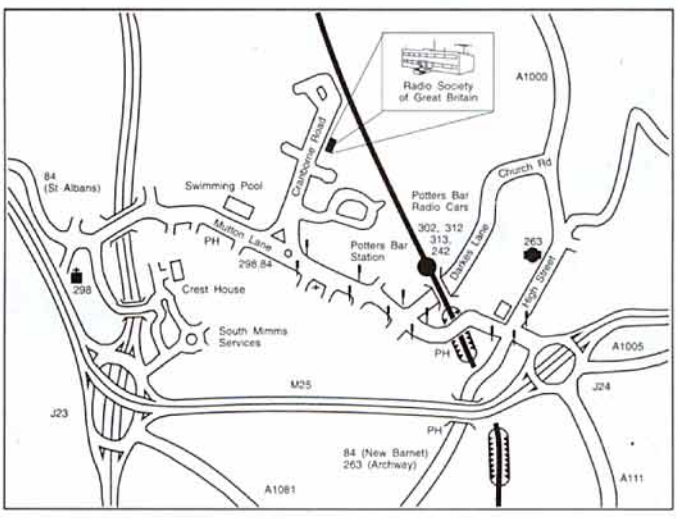
Receiving the Pat Conway Memorial Cup from IRTS President Jim Ryan, EI3DP (right) for their packet work are Tony, GW4VEQ (centre) and Martin, GW6HVA.

Packet Link

THE GROUP SPENT twelve months developing a packet radio link between Liverpool and Dublin via Anglesey, in conjunction with EI6FR, EI2GX, EI5ENB and members of the Dublin Digital Radio Group. The link, which has been operational for nearly a year now, has allowed amateurs in EI and GI to link into the European DX-Cluster network. The TCP/IP side of the link has also proved popular and is claimed to have strengthened cultural links across the Irish Sea.

Future plans for international cooperation were outlined at a meeting between packeteers from EI, GI and GW held at the IRTS AGM.

Visit Your Headquarters: Saturday 4 June



RSGB HQ is on the right hand side of Cranborne Road, (look for the aerials!). The map is not to scale.

OUR ANNUAL Open Day takes place on Saturday, 4 June. This year there will be several traders displaying their wares in addition to local club stands and refreshments.

- *Meet the staff*
- *See the QSL Bureau*
- *Use the shack*
- *Tour the Museum*
- *See how* RadCom *is produced*
- *Browse round the Bookshop*

Open 10.30 am to 4.30 pm

HOW TO GET THERE

D-Day Anniversary will be Commemorated on the Air

MANY SPECIAL Event stations will be commemorating the 50th anniversary of Operation Overlord, the D-Day Landings which marked the turning point of the Second World War. Some are described below. More callsigns can be found on page 89.

The first is GB0FYO which is on the air throughout May from the Portland Heights Hotel. It marks the anniversary of the visit to Portland by King George VI and Winston Churchill on 25 May 1944 in preparation for D-Day. The operators are from the Portland ARC, many of whom are serving and former members of the Royal Navy and Fleet Air Arm.

Ray Rowlett, G0EYM, and Richard Smith, G0RNM, in conjunction with the Bedford & Dist ARC will operate GB50OL from 3 to 7 June. The station will be in the control tower of the former RAF station of Little Staughton, the home of 'the Pathfinders'

GB5DD will be run by the Radio Club of Thanet from 4 to 12 June near to the site of *HMS Robinson*, a wartime base at Richborough, Sandwich, Kent.

Members of the Army, Navy and Air Force will operate GB2VE in Puckpool Park on the Isle of Wight, adjacent to the famous Wireless Museum. Other events in the park, include a dedication ceremony for a plaque to the Free French forces. Members of the French resistance are to be invited, and this may involve a French Warship and a detachment of marines.

The Horndean and District ARC will commemorate D-Day with GB50DD from the Military Vehicle Rally on Southsea Common, Portsmouth. HF and VHF stations will operate from 27 to 30 May. The club will also run GB6OL as part of the Portsmouth 800 year celebrations from 1 to 5 June.

In France, TM4HOC will be activated from Pointe du Hoc on the historic 'Omaha' landing beach, on the Normandy coast. HF, VHF and UHF stations will run CW and SSB over the weekend 4/5 June. Look for them on 3.514, 3.614, 7.014, 7.054, 140.14, 14.194, 21.014, 21.294, 28.014, 28.414, 144.014, 144.314, 432.014 and 432.214MHz.

Yeovil ARC members will put on a display of WWII radio equipment of all types in Digby Hall, Sherborne. GB4DD will be on 3.5, 7, 10 and 14MHz between 0900 and 1800UTC using vintage gear (B2, 19 Set, CR100, AR88).

GB50NL will be at the 'Carillon' War Memorial and Museum in Queens Park, Loughborough, 4 – 7 June. The Loughborough and Dist ARC station will use the 20, 40, 80 and 2m bands. Signed copies of *We Remember D-Day* by Frank and Joan Shaw will be available at the station; all proceeds go to Normandy veterans.

Maquis

Slightly later than the D-Day stations (11/12 June), the Dacorum Amateur Radio Transmitting Society celebrates Operation Maquis on the 50th anniversary of the WWII clandestine radio links between England and France with the call GB50CR. From Hemel Hempstead, the club will use a B2 Type 3 MkII 'spy' radio from 0900 to 1500UTC, 7020 – 7029kHz.

The Dacorum effort is only part of a large event involving 21 French stations using TM50 calls, ON4WAR, PA6JUN, GB2IWM (Duxford), GX4ARE (Exeter), GX3YRG/P (Gt Yarmouth), G0JNP (W Kirby) and GB4OCR (Ashbourne).

Air Signallers Reunion

GB1ASS MARKS the Reunion of Air Signallers trained at RAF Swanton Morley from 1947 to 1957. Over 300 former RAF personnel are expected to attend during the weekend of 10 – 12 June.

Among the displays there will be period radios such as the T1154/R1155, T1082/R1083 etc, and visiting airborne training aircraft: Anson, Percival Proctor and Prentice.

Propagation Papers

FROM TIME to time, members of the RSGB Propagation Studies Committee produce technical papers for presenting to professional conferences.

Anyone who would like copies of these papers should contact the Propagation Studies Committee chairman Charlie Newton, G2FKZ, by telephoning 0568 780614.

The construction competition of the Medway Amateur Receiving and Transmitting Society included a special section for builders of the ARRL Neophyte receiver. For an outlay of only £16 each, 27 members built the 80m radio. The winner was Cyril Atkins, G7MPZ, pictured with competition judge Ray Petri, G0OAT (left) and MARTS President Geoff Wooster, G3UNF (right).

EMC Coordinators

THREE NEW EMC Coordinators have been appointed by the EMC Committee. RSGB EMC Coordinators are available to advise members on their interference problems; a full list can be found on p91 of February's *RadCom*.

For the **Isle of Man**, Stan Ellis, GD3LSF, Ballahams, 43 Governors Hill, Douglas IM2 7AT; tel 0624 673303, and Sidney Dimmock, GD8COH, 13 Dumbells Terrace, Laxey IM4 7NY; tel 0624 862802.

For **Jersey**, Peter Bertram, GJ8PVL, Sandang, Fauvic, Grouville, Jersey JE3 9BA; 0534 855568.

The telephone number of **North Wales** EMC Coordinator Chris Barnes, GW3BZD, has been changed to 0248 353940.

HF Awards Manager

FOR SEVERAL years the RSGB's HF awards programme has been in the capable hands of Bill Ricalton, G4ADD. Bill now wishes to relinquish this post and a replacement is to be recommended to Council by the HF Committee who record a sincere vote of thanks to Bill for all the work he has done.

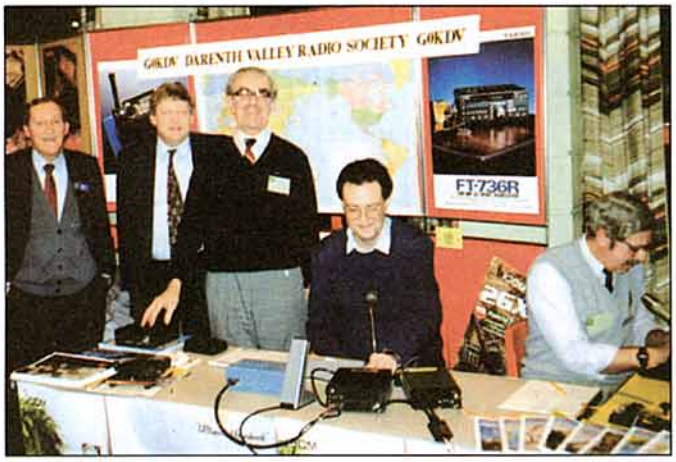
With immediate effect, HF Committee member Fred Hanscombe, G4BWP, will process all new applications for HF awards. His address is: 'Sandholme', Heath Farm Rd, Red Lodge, Bury St Edmunds, Suffolk IP28 8LG.

HF Committee Vacancy

THE SOCIETY'S HF Committee is responsible to Council for all HF matters. The committee is looking for an additional member who must be a keen HF operator. The HF Committee meets approximately every two months in the London area.

Applications for this voluntary position should be sent, together with a brief description of relevant qualifications, to the Chairman David Evans, G3OUF, PO Box 599, Hemel Hempstead, Herts HP3 0SR.

● RSGB MEMBER Donald Michael, GM0KCY, received the MBE in the New Year Honours List. He has been a lighthouse keeper for 30 years, and is expected to be on the air soon from his new posting on the Isle of Lewis (IOTA EU-10).



Members of the Darenth Valley RS promoting amateur radio at an engineering exhibition 'Shaping the Future' at Orpington's Priory School. Other exhibitors included the RAF, Navy, BAe, Eurotunnel, BT, BP and BBC Engineering. The GB2STF team were (l to r): G0LWV, G1UKH, G1XWV, G7GLW and G0FDU.

New RLOs

THE NEW RSGB Liaison Officer for **Tayside** is Alfred Low, GM4UZP, 21 Earn Crescent, Menzieshill, Dundee DD2 4BS; tel 0382 644597.

The new RLO for **Norfolk** is Bill Higgins, G3PNR, 65 Hayden Court, Eleanor Road, Norwich, Norfolk NR1 2RG; tel 0603 629150.

RLOs hold a wide range of information and they are available to help any RSGB member seeking advice. A full list of RLOs can be found on page 91 of the January and February *RadComs*.

Free RSGB Membership with Coastal

COASTAL COMMUNICATIONS of Clacton, Essex, are offering a year's free RSGB membership as one of the incentives to buy a TM251E or TM451E transceiver. They can be contacted by telephoning 0255 474292.

Ham Radio '94

EUROPE'S LARGEST amateur radio exhibition takes place at Friedrichshafen in southern Germany from 24 to 26 June. The 280 exhibitors from 24 countries cover radio and computers; an RSGB stand will be selling books and membership.

Corrections

IN THE May *HF News* column, we incorrectly gave Paul White's callsign as G0HBA. His call is actually G0BHA.

A similar error occured on p5: G3BDM should read G3DBM.

Apologies to all concerned.

Repeaters

SOUTH YORKSHIRE VHF repeater, **GB3NA** (R3), returned to service in May following an investigation by the Chairman of the RSGB Repeater Management Group (RMG) into allegations of misuse of the repeater.

After consultation between the UK FM Group (Northern), who manage the repeater, the Radiocommunications Agency and the Repeater Management Group, it has been agreed that a number of strategies will be adopted by the committee to combat abuse.

It has been agreed that the group should monitor the extent of misuse of the repeater with the aim of educating users how to respond in the face of provocation and misuse of the repeater. This will involve tape-recording repeater traffic, direction finding and informing the authorities via the RMG.

A number of other measures have been taken which are aimed at minimising the problems caused to legitimate users by persistent mis-users of the repeater. The committee of the UK FM Group (Northern) has been re-organised.

It is hoped that all users will act sensibly in using the repeater. The Chairman of the RMG would like to thank all amateurs in the area for their input which has proved most useful in reaching a conclusion.

● **GB3KN** (R4, Maidstone) changed site in May. Reports, please, to the repeater keeper G3YCN, QTHR.

● THE LATEST callsigns issued by SSL at 11 May were in the G*0UV*, G*7SI*, 2*0AH* and 2*1CY* series.

WACRAL Conference

LAST MONTH'S item about the Annual Conference of the World Association of Christian Radio Amateurs and Listeners was accurate in every respect – except it was about last year's event! Our apologies to WACRAL for this.

The correct information is as follows: The annual gathering of WACRAL members will take place over the weekend of 7 – 9 October 1994 at the Wirral Christian Conference Centre at Merton. A lively programme of Christian fellowship and amateur radio activities is planned, with members and their partners expected from all over the UK and Europe. The AGM will be held on Saturday morning.

For more information and bookings contact Geoff Peterson, G4EZU, on 0474 533686, or join the regular Sunday morning WACRAL net at 8am on 3762kHz.

● ATV REPEATER GB3WV came on the air on 6 March on Channel RT2R (1249MHz in; 1316MHz out). Reports to G4NTS, QTHR.

Courses

A **NOVICE course** starts at the Science Museum in **Newcastle upon Tyne** on Saturday mornings from 11 June. Call Michael Stott, G0NEE, on 0661 832020 for details.

For information on **Novice courses throughout the UK**, contact Sylvia Manco at RSGB HQ.

IF YOU CAN'T get to a local **RAE** training centre, a course is available by **correspondence** from the Rapid Results College. It costs £145 but there are no travel costs, no books to buy and you can study in your own time at your own pace – with tutor guidance. All instructors are both radio amateurs and qualified educators. The course is available worldwide. For more information call 081 947 7272.

Bristol Meeting

ANOTHER RSGB open meeting is planned. This time the location is Bristol and the date is 22 October. Further information can be obtained from Zone D Council Member Julian Gannaway, QTHR.

Scottish Trophies

TWO TROPHIES are awarded annually in Scotland: the Jack Wylie Trophy to the Scottish club, society or RSGB member thought to have done most for amateur radio in Scotland in general terms in the past year; and the Jock Kyle Trophy to the Scottish club, society, group or RSGB member thought to have done most in Scotland in the field of VHF in the past year.

In the case of an award being made to an individual, that person must have been resident in Scotland during the period the award refers to.

'93 Winner: Morag Howell, GM0MUV.

In 1993 the Jack Wylie trophy was awarded to Morag Howell, GM0MUV, for her work in providing communications for Polar Expeditions. The Jock Kyle trophy was awarded to Andy Steven, GM4IPK, for his work on the VHF bands.

Nominations

NOMINATIONS AND citations for each of the trophies in respect of the 1994 awards are required from at least five RSGB members resident in Scotland who should send them to the Zonal Council Member, Frank Hall, GM8BZX, by 13 August 1994.

In the event of more than one nomination being received for either trophy the final decision on the award will be placed in the hands of the Scottish RLOs. In the event of no nominations being received, the trophies will pass to the safe keeping of the Zone G Council Member, Frank Hall, GM8BZX, until nominations are called for in 1995.

Teachers' Course was a Success

AS FIFTEEN teachers left Trio-Kenwood's HQ on 8 April, it was clear to all who had taken part, that the first RAE course organised by STELAR (Science and Technology Through Educational Links With Amateur Radio), in association with Trio-Kenwood UK, had been an outstanding success. The teachers were from a broad spectrum of schools and included English and Special Needs teachers as well as Physics and Technology specialists. The course began only four days previously and, as can be imagined, was intensive and pleasantly tiring for all concerned, culminating in a mock exam.

Frank Bell, G7CND, took responsibility for the teaching of basic electrical theory and of operating practices, procedures and safety. David Evans, G3OUF, and Hilary Claytonsmith, G4JKS, dealt with the rules and regulations of amateur radio in a most illuminating way, and Doug Loughmiller, G0SYX, presented an interesting treatise on propagation and antennas. Alan Wright, G0KRU, was a technical wizard on such diverse topics as solid state theory, receivers, transmitters and measurements, while David Lauder, G0SNO, gave an amusing series of lectures on the topic of interference.

Each evening was used to give the course participants practical experience in telephony, packet radio and satellite communication, and a special event station, GB2SR, was operative on these occasions. Richard Horton, G3XWH, Chairman of STELAR and Course Director, and Hilary Claytonsmith, can take much credit for the smooth way in which the course flowed and for the speed at which many individuals became one enthusiastic group. However, none of this would have been possible without the generous sponsorship of Trio-Kenwood UK who underwrote the full training and accommodation costs for the group.

Positive Youth

BASILDON IS the location for the Positive Youth festival of young people and the organisations that support them. Due to be opened by a member of the Royal Family, the event is sponsored by MK, British Gas, Eastern Electricity, Midland Bank and the District Bus Co. It involves scouts, guides, schools and colleges, and features the Duke of Edinburgh Award scheme, marching bands and all manner of sports, exhibitions and demonstrations.

The Vange Amateur Radio Society which will be using GB2PYB (Positive Youth Basildon) to promote the appeal of amateur radio to young people. The festival will be at Gloucester Park, Basildon, Essex, on 25/26 June.

Attention RAE Tutors and Students

FROM THE March 94 issue (Revision 3) the RA's booklet *How to Become a Radio Amateur* will no longer include the licence regulations. These are available in the *Amateur Radio Licence A (or B) Terms, Provisions and Limitations Booklet BR68* which is sent to all licence holders.

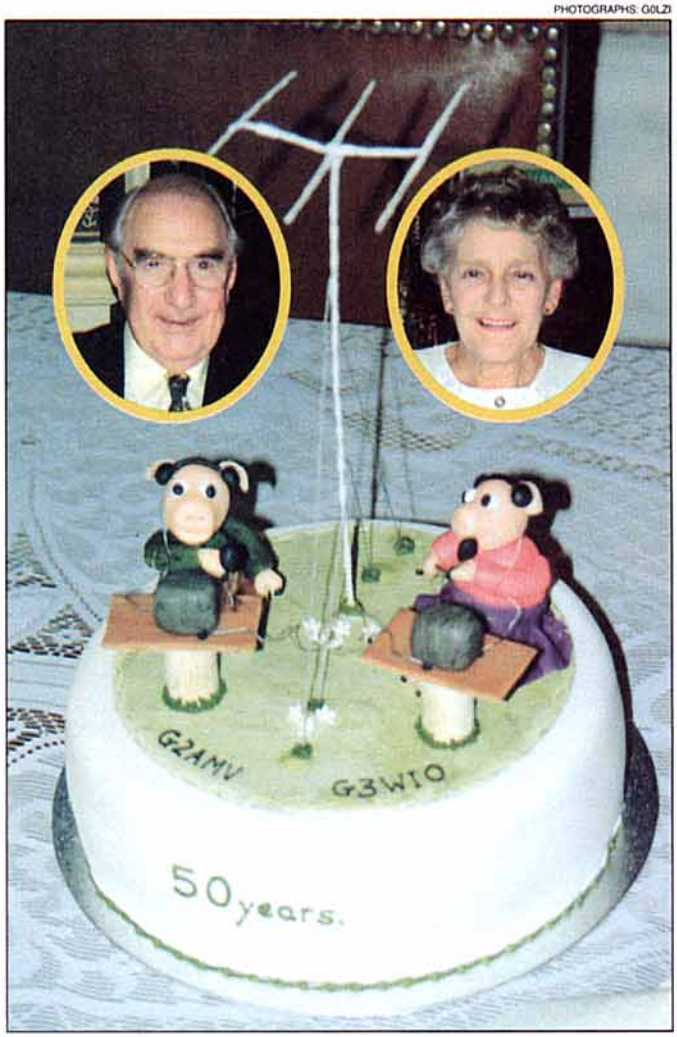
Radio Amateurs Examination candidates should obtain both booklets which are available free of charge from the Radiocommunications Agency on 071 215 2352.

Reading Club's 60th Year

1994 IS THE 60th year of the existence of the Reading and District Amateur Radio Club (RADARC). In addition to its diverse twice monthly meeting programme, the club features: an RAE course run every year, two Novice courses each year, a City and Guilds examination centre, Jamboree and Thinking Day on the Air, monthly DF competition, visits to places of technical interest, an award scheme for newly licensed members, trophies for excellence in amateur radio and a membership exceeding 100.

RADARC has a large number of young members. Its training activities and an informal 'Elmer' programme mean that the club is putting significant effort into tomorrow's amateur radio. Further information about RADARC is available from John Linford, G3WGV, QTHR; tel 0734 733745 (after 7pm).

PHOTOGRAPHS: G0LZI



For many years Basil O'Brien, G2AMV, represented the RSGB in the North of England, ably supported by his wife Eileen, G3WIQ. They recently celebrated their Golden Wedding as this unusual cake shows.

HUSTLER - HF VERTICALS - HF MOBILES

HF VERTICALS

Ground mounted HF base antennas that work!

Hustler has been producing HF vertical antennas of unusual electrical performance and mechanical integrity since 1959. Many of those original verticals are still in service after over 35 years of reliable operation.

This exclusive trap design offers the lowest loss possible. A special extrusion process allows Hustler to produce trap covers to an otherwise unattainable close tolerance, assuring accurate and permanent resonance. The highly accurate traps provide top signal reports and consistent contacts.

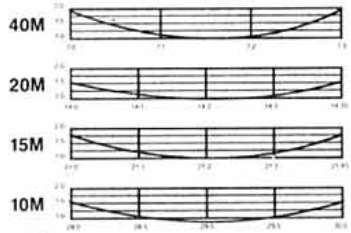
Accurate tuning is made possible by the wide range of tuning flexibility design into the verticals. Not only can you use the normal adjustable tubing to change resonance, but the traps themselves can be field tuned for an additional 2 Mhz shift. This flexibility will enable you to achieve a good vswr even if your installation is not ideal.

All Hustler verticals will easily handle the full legal limit of power and will cover 10-40 meters with a swr of 1.6:1 at band edges 80 meter bandwidth on the 5BTV and 6BTV is 80 Khz under 2 to 1.

A fixed station antenna is only as good as its ability to stay up, mechanical design of Hustler verticals is superior to any. Large diameter 1¼ inch corrosion-resistant aluminium tubing is used from top to bottom. The base assembly utilizes a centre tube with a .315 inch wall thickness, unequalled in the industry. The trap coils are wound around solid one inch diameter fibreglass cores and stainless steel clamps permit adjustment without damage to the aluminium tubing.

"I think the quality of the Hustler Antenna speaks for itself!".

Tom Rickward, G4ZZN



"WORKED VK"

Hustler's 6 Band Vertical Antenna assembled very easily and the SWR adjustments were simple and low figures obtained without too many problems. Compared to my previous vertical, it was simplicity itself.

The Antenna is mounted at ground level without any radials and performs well. Have worked mainland VKs and a VK7. Bearing in mind I am still working and the opportunity is not available to pursue more fully, I am more than happy with the results and again the quality, especially bearing in mind the price.

L.C. Duncan, G0OLK

HF MOBILE ANTENNAS

If you are serious about HF mobile operations now that the weather is getting better, the Hustler system is the obvious choice. This system offers a wide variety of components, which enable you to customise your mobile installation to fit your present and future requirements. A choice of four different support masts provides an installation solution for every vehicle. A selection of thirteen interchangeable resonators, in high and moderate power levels and varying bandwidth, are available.

"DXCC ON 20 WITH HUSTLER"

Just 100 watts SSB, no ATU worked 161 prefixes achieved 1978-81 all mobile! Often get better reports than other G's home based beams.

Paul Hurst G3PCT

"The best antenna there is for HF!"

I have tested the Hustler 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 have a band width of between 50 and 75 kcs compared with other mobiles which had only 10 to 15 kc band width. The best antenna there is for HF!

73, David Hudson, G4WOE

"RM 20 + TS 50 = PERFECTION!"

Delighted to find Hustler available again. Now I am sure to get the full benefit of my new TS 50 mobile! Congratulations from an old Hustler fan.

Tony Case G4ZVR

"ZS6 THOUGHT I WAS IN JO'BURG!"

Dave Hudson, G4WOE

Since using the Hustler I have contacted stations in "India VU2TTC", "Sri Lanka 457RO", "Trinidad 9Y4TD", Africa 9X5GC, KA1V/T5, 3DA0BM, Australia VK7OH, Barbados 3P9EM and the Falklands VP8CGH with signal reports ranging between 5/5 to 5/9, as for 9Y4TD who was surprised when I told him I was mobile due to my signal strength. A station in Johannesburg called me "ZS6BEW" as he thought I was in one of the Johannesburg suburbs, this was when I was in contact with KC9BI 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 mast which can be used as a ¼ wave on 6 mtr, 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 surprise me was the band width on 80 mtr as with other antennas. I could only move frequency of about 10 kcs 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 tri-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 will 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.

"Out-performs the competition!"

After using my Hustler 20m mobile antenna, I had to let you know the super duper results on the first day. Once set correctly, the SWR stayed below 1.8.1 over the whole of the voice section of the band. With the added advantage that the antenna does not sway at any speed, the performance didn't vary during my journey to work.

With 100W input, six different countries were worked, even with conditions being on the low side the first evening. After many years of trying different mobile HF antennas, the Hustler far out-performs the competition. With the low cost and versatility of changing bands, this is the HF mobile antenna of the future.

Tony, G0MBA

HUSTLER PRICES

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RM-20 20m Mobile resonator 80-100Khz bandwidth 400W	£23.95
RM-30 30m Mobile resonator 50-60Khz bandwidth 400W	£24.50
RM-40 40m Mobile resonator 40-50Khz bandwidth 400W	£24.95
RM-80 80m Mobile resonator 25-30Khz bandwidth 400W	£25.95
RM-10S 10m Mobile resonator 250-400Khz bandwidth 1.5KW	£24.95
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RM-20S 20m Mobile resonator 100-150Khz bandwidth 1.5KW	£29.95
RM-40S 40m Mobile resonator 50-80Khz bandwidth 1.5KW	£34.95
RM-80S 80m Mobile resonator 50-60Khz bandwidth 1.5KW	£45.95
MO-1 Mobile mast 54 inches long, tilts at 15 inches	£27.95
MO-2 Mobile mast 54 inches long, tilts at 27 inches	£27.95
MO-3 Mobile mast 54 inches long, solid rubbercoated	£22.95
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Operates on all HF bands *AND* 50MHz
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General coverage receiver
Range 100kHz to 30MHz and 48 to 54MHz.
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Designed for continuous transmission at full output power, with "silent" cooling system.
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The use of power MOSFETs in the output stages acheive excellent linearity, low distortion and quality transmission. Output power variable, 15 - 150W
Built-in automatic ATU
Electronic type with preset frequency memory for faster QSY. Matching range is approx 17 to 150 Ohms.
Multiple Antenna Selection
Three antenna connections are selectable from the front panel. Antenna selection can also be stored in memory.
And some other facilities you'd expect...
DDS, Full break-in, speech processor, all-modesquelch, electronic keyer and more!

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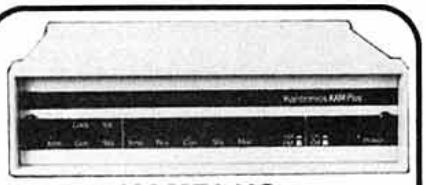

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And now the EP925 has got a little brother - the **EP815** ! Just right if you use your mobile rig in the shack, for other station accessories or use it to run your Packet station. Fixed voltage at 13.8V, current at 12A continuous, 15A surge and you should get change out of seventy quid! I can see our first shipment going very fast!

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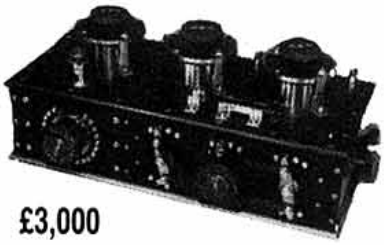

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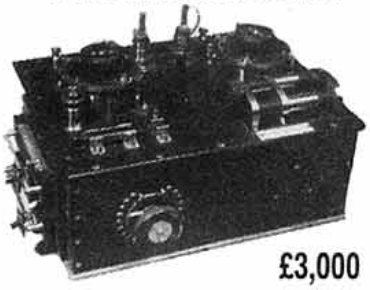

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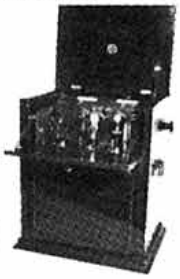

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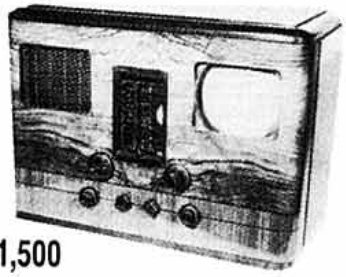

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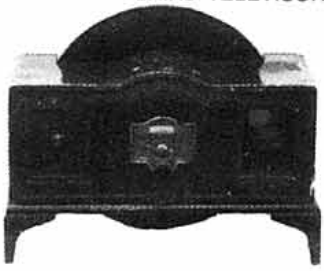

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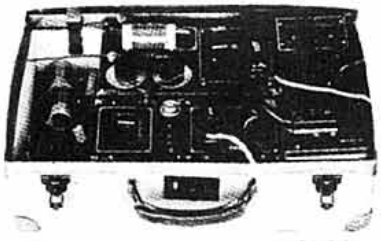

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THIS MONTH'S LEADING PROJECT

Tone Modulated HF Impedance Bridge

The first of a two part project by E Chicken, MBE, G3BIK

THIS UNIT PERFORMS well over the HF band 1-30MHz, is simple to construct and at low cost, yet is technically elegant and different from its predecessors in that it resurrects the super-regen principle to provide tone-modulated noise.

Similar circuits are usually called Noise Bridges, but that title fails to describe the real purpose of the bridge which is the measurement of low-value impedance at radio frequencies, typically the feed-point impedance of a dipole antenna.

The impedance measurement is made by means of a balanced bridge circuit based on the familiar Wheatstone Bridge, which is energised by a low-level RF voltage at the frequency of interest. When the bridge has been adjusted to electrical balance, the impedance value of the circuit under test can be obtained by referring to calibrated dials on the adjustment controls **(Fig 1)**.

Balance is indicated by a null in the audio level output from a detector connected to the bridge circuit, this detector being capable of converting the RF energising signal into an audible signal.

To be useful to an amateur radio transmitting or listening enthusiast, an impedance bridge must be usable over a broad range of frequencies such as the HF radio bands between 1-30MHz. So the impedance bridge needs a source of low-voltage radio-frequency signals covering the HF range, and a suitable broad-band detector. A simple RF diode could well fulfil the role of null detector, but the provision of a reasonably stable variable-frequency RF oscillator circuit might prove complex and costly.

It was reasoned by others many years ago, that both requirements could be simply and effectively met by energising the RF impedance bridge from a source of electronically generated random-noise, and using the amateur's radio receiver as a frequency-selection null-detector. Hence the name noise-bridge.

That was and still is a realistic hypothesis because the random-noise consists of countless short-duration electrical pulses or spikes occurring at random intervals of time and at random amplitudes, so it is in effect a very broad mix of radio frequency signals at low energy levels. The tuneable radio receiver then filters out the very narrow band of frequencies of immediate interest, and the bridge behaves as though only that frequency band is present. However, because random-noise spikes are amplitude-varying, it follows that the receiver must be capable of resolving AM or SSB rather than FM.

In recent years, the zener diode as a source of random-noise found favour in amateur circles, but the extremely low voltage-level of the noise envelope meant that it had to be amplified to make it usable.

Almost as standard, a two-stage capacitor-coupled transistor broad-band RF amplifier was used to boost the level of the noise signal to a few volts. Amplifier gain rather than fidelity of reproduction meant that a very simplistic amplifier circuit could be used.

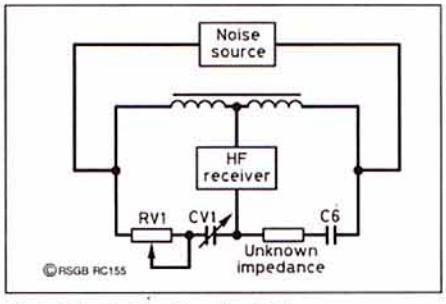

Fig 1. Noise bridge functional diagram.

Many noise bridge circuits have been published or marketed based on the principles just described, all very similar in concept and detail. One important development was a recognition that the ear does not respond too well in the determination of absolute null while listening to the steam-like sound of random-noise. It can discern more effectively the level-variations of a single audio-tone. The well-known 555 timer wired as a multivibrator was used in some designs to produce a tone signal, by repetitively switching on and off at an audio rate the voltage supply to the zener diode. This 100% amplitude-modulation of the random-noise envelope produces an audible tone from the receiver serving as the null-detector.

But close examination of the classical circuit of a multivibrator based on two transistors as in **Fig 2** will show that it is really a two stage capacitor-coupled amplifier, with its total output fed back to its input as in **Fig 3**.

And because the output signal of such an amplifier is in phase with a signal at its input, the amplifier behaves as an oscillator. The term multivibrator is merely an outmoded name for one type of oscillator, usually of low-frequency. In the absence of any form of voltage-amplitude control, the voltage level of the output signal at TR2 collector swings repetitively between zero volts and positive-supply voltage in the form of a pseudo-rectangular wave. The repetition rate or frequency is approximately f = 1/CR where C is the inter-stage coupling capacitor and R the base-bias resistor.

So why go to the expense and trouble of an additional 555 multivibrator IC as a tone-modulator for the random-noise signal, when the basis for a multivibrator circuit already exists in the two-stage random-noise amplifier?

Bearing in mind the fact that an oscillator is an amplifier with positive feedback, any small RF signal fed into the input stage of a low-frequency oscillating amplifier will still itself be amplified, but at repetitive intervals of time rather than continuously.

That of course was the principle of the extremely sensitive super-regen radio receiver of yester-year, and is herein resurrected.

CIRCUIT DESCRIPTION

THE HF IMPEDANCE BRIDGE circuit as shown in **Fig 4** provides the choice of random-noise or tone-modulated random-noise at the output of the bridge detector/radio receiver. It allows impedance measurements to be made over the HF band 1-30MHz, with resistance measurement in the range 10-270Ω and capacitive or inductive reactance from about 10Ω – 5Ω. The combined values of resistance R and reactance X values give the measured impedance in the form Z = R ± jX where the positive (+) sign refers to inductive reactance, and the negative (–) sign to capacitive reactance.

Power supply is from a 9 volt PP3 battery, at a current of about 8mA on tone and 15mA on noise. Sub-miniature toggle switch S1A is one section of a double pole change-over switch, with centre OFF and two locking ON positions. The battery is switched ON at either side of centre. The other section of the switch is used to select noise or tone-modulated noise. Capacitors C1 and C2 decouple the battery supply line at HF and LF respectively.

A 7.5 volt zener diode is used as the source of random-noise. It is fed from the DC supply via the series resistor R1 which limits the zener current to the low value needed for maximum noise output. Any zener voltage from 5.6 – 7.5 will function, but the chosen 7.5V zener and associated R1 gave maximum noise.

Capacitor C3 provides DC isolation whilst passing the noise signal from the zener diode to the amplifier input at the base of transistor TR1. The two amplifying stages TR1 and TR2 are identical. Connection of the base bias resistors R2 and R4 to their respective collectors is a simple way of providing high gain with automatic optimisation of base-bias for best amplifier performance. Almost any small-signal RF transistor would suffice. Type BC547 transistor was used in the prototype because it happened to be the lowest cost of that

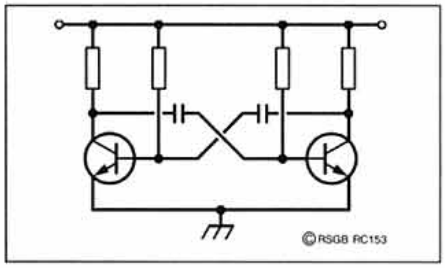

Fig 2: Classical multivibrator circuit.

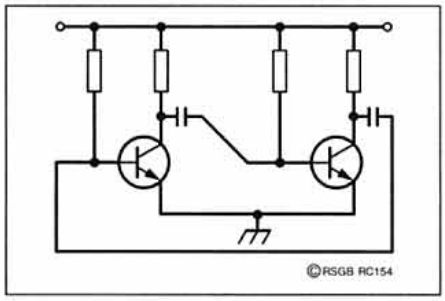

Fig 3: Two-stage amplifier modified as a multivibrator.

family, but BC109, BC184, BC237 and 2N2222A were tried and performed well.

Switch S1B connects the zener current-limiting resistor R1 to the DC positive rail for Noise only, or to the collector of TR2 for Tone-modulated Noise. When the switch is in the 'noise' position, transistors TR1 and TR2 act only as amplifiers of the noise signal. An amplified random-noise signal of about 4 volts peak to peak appears at the collector of TR2, from where it is passed by DC blocking capacitor C5 to the primary winding of transformer T1 to energise the impedance-measuring bridge. The bridge is described later.

With switch S1B in the 'tone' position, the zener series resistor R1 picks up its positive DC feed from the collector of TR2 instead of direct from the positive-supply rail. The collector of TR2 is thereby connected via the low value resistance of R1 to the amplifier input capacitor C3, so completing the oscillatory circuit. The amplifier then oscillates at a low frequency which is determined mainly by the values of C3/R2 or C4/R4, using the formula f kHz = 1000/CR where C is in nanofarads and R is in kilohms. The circuit values C4 =10nF and R4 = 100k give the pseudo-rectangular waveform at the collector of TR2 a frequency of about 1kHz. That waveform does of course also contain the amplified random-noise covering a broad RF spectrum.

The noise-signal is transferred into the balanced-bridge impedance measuring circuit by means of transformer T1 which consists of a primary winding of 8 turns, and a centre-tapped secondary winding of 16 turns, both wound onto a ferrite toroid/ring.

Toroid type number FT50-43 means that it is of ferrite with an outer diameter of 0.5in and inner diameter of 0.3in, and a permeability factor of about 900. There is nothing magical about the choice of toroid size which is solely for mechanical convenience of winding. Ferrite is chosen rather than iron-dust because of its much higher permeability, which allows fewer turns for a given value of inductance. Type 43 ferrite gives the 8-turn primary winding an inductance of about 33µH, and the 16 turn secondary winding about 130µH. Again, there is no technological mystique in the number of turns or inductance values, except that the reactance of the primary over the HF band 1 – 30MHz is high enough to avoid swamping the output impedance of the amplifier.

The noise-voltage is impressed across the outer ends of the secondary winding, hence across the bridge as a whole. The bridge as shown in Fig 3 comprises an electrically balanced upper branch formed by the centre-tapped secondary winding of the toroidal transformer T1, and a lower branch with two series RC impedance networks disposed one on each side of a central connection. These two RC networks consist of the unknown external impedance to be measured, and at the other side of centre, a calibrated variable-impedance circuit formed by variable resistor RV1 in series with variable capacitor VC1. The HF receiver connects between the upper and lower central connection points of the bridge, to act as null detector.

With the receiver tuned to a frequency of interest, and with nothing yet connected to

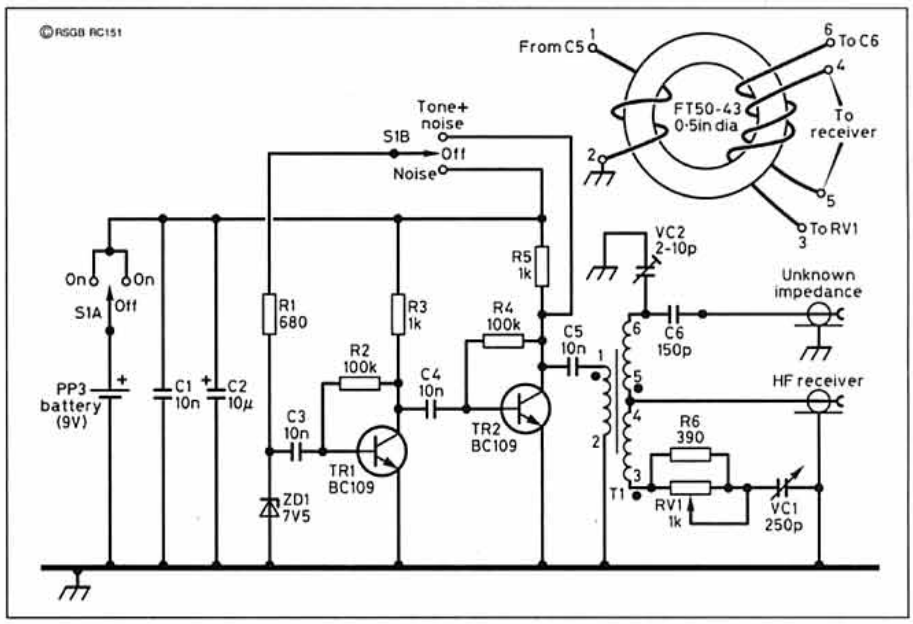

Fig 4. Noise impedance bridge, circuit diagram.

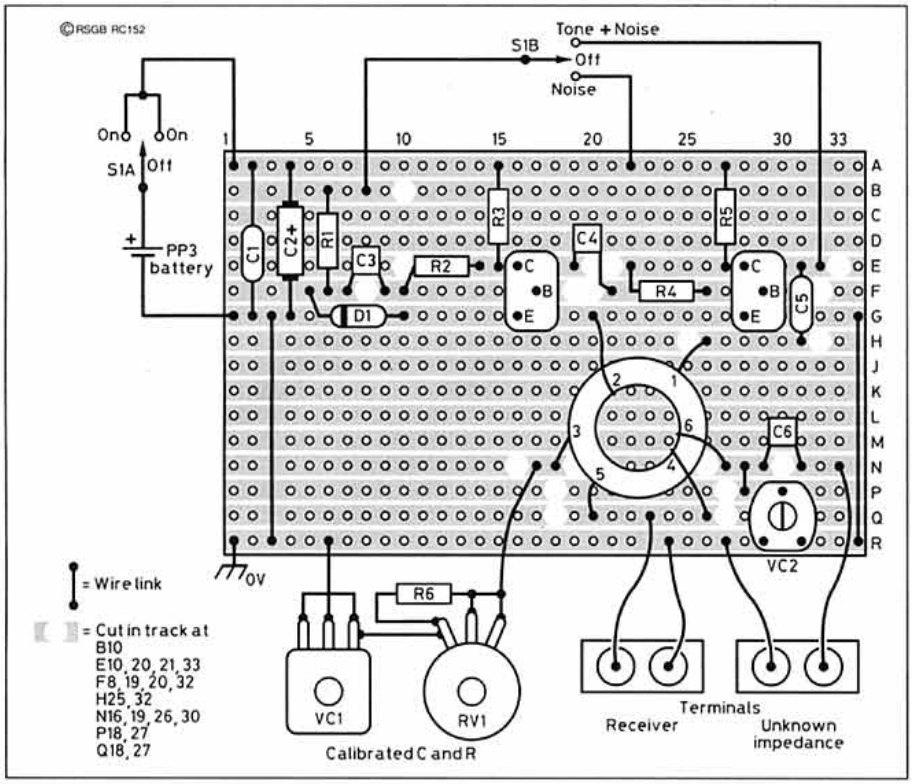

Fig 5: Noise bridge PCB, component layout.

the unknown impedance terminals, random-noise or tone-modulated noise is present at the audio output of the receiver, the level of which is more or less unaffected by adjustment of either RV1 or VC1. But with an unknown impedance connected to the bridge, adjustment of RV1 and VC1 produces a distinct dip/null in the level of audio, indicating that the bridge is at electrical balance. This occurs when the impedance produced by the combined resistance of RV1 and reactance of VC1 is equal to that of the Unknown Impedance at the frequency selected by the receiver, bearing in mind that the upper arm of the bridge is always at balance. The measured impedance takes the form R ± jX.

The small value trimmer-capacitor VC2 may not be needed in practice, so its initial inclusion is optional. Its sole purpose is to provide compensation for stray circuit capacitances that might possibly affect accuracy of measurement at the upper end of the frequency range, and once adjusted plays no active role. Calibration of RV1 and VC1 and adjustment of trimmer capacitor VC2 are covered later.

IMPEDANCE-MEASUREMENT BRIDGE

THE HEART OF THE IMPEDANCE measuring circuit is the modified Wheatstone bridge as shown in Fig 4. The upper branch is the centre-tapped secondary winding of ferrite toroid transformer T1, and that branch is permanently at electrical balance about its centre tap. As the noise signal is transferred by T1 to the outer ends of its secondary winding which forms the upper branch of the bridge, and with the upper and lower branches being in parallel, it follows that the noise signal is also connected across the lower branch of the bridge. And because the upper branch is always balanced about its centre, there will be zero potential difference between the upper and lower branch centre-points when the lower branch is adjusted to electrical balance.

A detector connected between the upper and lower central points will therefore indicate Null when the lower branch is at balance, because it is connected between two points of equal potential.

As accuracy of impedance measurement depends upon true equivalence on either side of the bridge centre-taps, it is important that the two halves of the centre-tapped secondary winding are electrically identical. It is also important that their direction of winding is as shown in Fig 4, for optimum transfer of noise voltage from primary to secondary to energise the bridge.

The lower branch consists of two separate impedance circuits with a common central connection. On the left of centre is a variable resistor RV1 in series with a variable capacitor VC1. A 390Ω resistor R6 connected directly in parallel with the 1kΩ RV1 effectively converts it into a 280Ω variable resistor. This is done because a low-cost carbon potentiometer of less than 1k is not commercially available. The dial of RV1 is calibrated 0-270Ω. It could be calibrated 0-300Ω by changing R6 to 470Ω instead of 390Ω.

To the right of centre in the lower branch of the bridge, is the fixed value 150pF capacitor C6 which is permanently in series with the unknown impedance to measured. It plays an important role in the calibration of the bridge, and its value is taken into account when determining the reactance component of the unknown impedance. The presence of C6 ensures that when the unknown impedance is purely resistive (such as with a properly tuned dipole antenna) and the bridge is at balance, the variable capacitor VC1 is at about half-mesh. VC1 can thus be calibrated on either side of its mid-way mark, to yield the capacitive or inductive reactance of any unknown impedance within measuring range.

VC1 uses the two 125pF sections of an AM/FM miniature tuning capacitor connected in parallel to give 250pF maximum capacitance, and its dial is calibrated in pF about a mid-mark as described in part two under Calibration.

The bridge can be used to measure low-value resistance by setting VC1 dial to its mid-mark, and adjusting only RV1.

At bridge-balance, the values of resistance and capacitance indicated by the two calibrated dials, in association with the frequency in use, yield an impedance value in the form R ± jX ohms for the external circuit connected to the unknown impedance terminals.

CONSTRUCTION

FOR THOSE FORTUNATE ENOUGH already to own a noise bridge supplied for example by a well-known kit supplier, the tone facility might be very simply added by either re-routing the zener resistor from its positive supply rail connection and connecting it instead to the collector of TR2, or by leaving the zener resistor untouched and connecting an extra capacitor of 10nF between TR2 collector and TR1 base. But the use of low-cost components allows this impedance-bridge to be constructed from new components at a cost of about £7.00 at 1994 prices.

To keep costs down without seriously detracting from performance, this useful test-instrument is housed in a plastic container rather than one of metal or RF shielded plastic, the variable capacitor is of the solid-dielectric type used in transistor radios rather than air-spaced, the potentiometer is of carbon rather than cermet, and screw-terminal strips are proposed for connection of the unknown impedance and receiver.

Fig 5 offers a component layout using 0.1 inch copper-strip board, with all off-board components being mounted directly onto the removable panel of the plastic container. It should be noted that for clarity of drawing, the strip-board as shown is much larger than it need be. A piece of board 39 holes by 10 strips costing approximately £0.50 would be adequate, by mounting the resistors and toroid vertically. The cost for the next size up of 39 holes by 29 strips is about £1.50.

Wire from the telephone cable mentioned in the Components List is used for the interlinks such as from the zero-volt rail of the strip-board to the metal-screen of the potentiometer, the middle-tag of the 250pF variable capacitor VC1, and the 'earthy' tag of the receiver and unknown impedance connectors.

The finished circuit-board being small and of light weight, can be mounted in free space behind the panel and supported by three or four short lengths of tinned copper wire. These wires are soldered into holes in the zero-volt rails of the strip-board and onto the earthy terminals of the panel-mounted components. The copper track side of the board should face the panel, to leave access to the 10pF trimmer capacitor CV2. This means that the entire circuit is housed on the removable panel.

The toroidal transformer T1 is wound using

three 250mm lengths of wire of different colours from the telephone cable. One colour is used to wind the 8-turn primary covering half of the core circumference, leaving equal-length tails of about 25mm (1 inch).

Before winding the secondary, the other two wires are twisted together along their length then the twisted pair is wound as 8 turns to fill the vacant half of the core's circumference, leaving 25mm tails of two colours at each end of the 8-turn winding. One colour tail from one end of the twisted pair must then be connected electrically to the tail of the different colour at the other end of the winding, to become in effect the centre-tap of the 16-turn secondary winding. Suppose for example the colours are blue and orange. An orange from one end connects to the blue at the other end, to form the centre-tap of blue/orange, leaving a free blue tail at one end and a free orange tail at the other end.

In practice, the centre-connection is made by soldering the two selected colour-tails into the TR20 and TR26 holes in the strip-board, with TR23 going to the receiver terminal, as shown in Fig 5.

Other than that, which way round the two tails of the primary or of the secondary connect into the circuit is not important. But for consistency, if when looking at the toroid the undergoing tail of the primary is connected to signal-feed capacitor C5, then the undergoing tail of the secondary should connect to RV1.

The choice of connector for the receiver and unknown impedance is optional. the author's unit has terminal posts for general purpose use in parallel with a BNC 50Ω socket for other applications, but that is a bit of an overkill. Maplin's low-cost 2-way screw-terminal strips are electrically suitable and are easy to install and use.

Great care must be taken whilst mounting the variable capacitor to the panel, because the small M2.5 fixing bolts must be of thread-length no greater than 3mm otherwise they will foul the internal vanes of the capacitor. The fixing holes are at 14mm centres. The hole for the spindle is of 6mm diameter clearance, midway between the two fixing holes. The maximum capacitance from the two AM sections in parallel of the AM/FM tuning-capacitor is 250pF as compared with only 200pF from the AM-only type. Either can be used, but if the AM type is chosen, the value of C6 should be 100pF rather than 150pF to keep the mid-mark near centre of VC1 movement.

With the AM/FM tuning capacitor, the two FM 26pF sections are not used and their tags are left free but folded. The two outer tags marked C3 and C4 being the AM sections are electrically bridged to connect the two sections in parallel, and a wire-link is made from there to RV1/R6. The middle tag between terminals C3 and C4 of the variable capacitor and also the short independent tag, must be connected to the 0V rail.

The specified variable capacitor has a 6mm diameter control spindle that is in two sections. It can be either 3mm long, or with the extender supplied 9mm long. An M2.5 bolt of length not greater than 10mm is needed to join the two spindle-sections together. The extended spindle allows the use of a standard low-cost pointer-knob to match that used on the variable resistor.

Each control has a dial made from a 35mm circle of self-adhesive white label stuck to the panel beneath the knob. A 15mm circular hole is first cut from the centre of the dial-label to clear the control fixings.

Using small pieces of self-adhesive label, identify the two screw-terminal strips as RX and Z, as appropriate, and mark the earthy terminal of each pair with an earth/chassis symbol. Similarly, identify the toggle switch positions Tone, Off, Noise.

. . . to be continued

COMPONENTS LIST

Specific type numbers refer to Maplin catalogue

Resistors

All fixed resistors are 1/3W, 5% carbon film types, unless otherwise stated.

R1	680
R2, 4	100k
R3, 5	1k
R6	390
RV1	1k linear carbon, plastic spindle
For calibration	10, 33, 51, 75, 100, 150, 200, 240, 270

Capacitors

All capacitors are ceramic disc, 100V, unless otherwise stated.

C1, 3, 4, 5	10nF
C2	10µF 25V electrolytic, axial lead
C6	150pF
VC1	variable tuning AM/FM Miniature FT79L
VC2	10pF trimmer, miniature film dielectric, WL69A

Semiconductors

TR1, 2	Transistor BC109
ZD1	Zener diode 7.5V 500mW type BZY88C/BZX55C

Additional Items

Switch, sub-miniature toggle FH05F, DPDT, ON-OFF-ON, locking ON

Toroid, ferrite FT50-43 Mainline Electronics

Box, plastic, 114x76x38mm LF14Q

Battery PP3 9V

Battery clip PP3 type, dual miniature

Screw-Terminal strip, 2-way FK16S

Screw M2.5 x 3mm

Screw M2.5 x 10mm

Pointer knob BK12, RW75S

One-metre length 4-wire telephone cable XR66W or similar

Strip-board 0.1 inch 29strips x 39holes JP47B.

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TA-33-JR-N	3 EL 10/15/20M
TA-33-JR-N-WARC	4 EL 10/12/15/17/20M
TA-33-M	3 EL 10/15/20M
TA-33-M-WARC	4 EL 10/12/15/17/20M
TA-34-M	4 EL 10/15/20M
TA-34-XL-WARC	5 EL 10/12/15/17/20M
TA-53-M-WARC	4 EL 10/12/15/17/20M
PRO-57-B	7 EL 10/12/15/17/20M
PRO-67-B	7 EL 10/12/15/17/20/40M
PRO-77-A	7 EL 10/12/15/17/20/30/40M
PRO-95	9 EL 10/12/15/17/20M
PRO-96	9 EL 10/12/15/17/20/40M
TW-33-M	3 EL 12/17/30M

VERTICALS

RV-7-30-C-WARC	10/12/15/17/20/30/40M
RV-7-80-C-WARC	10/12/15/17/20/40/80M
RV-8-C-WARC	10/12/15/17/20/30/40/80M

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Access VISA

HF NEWS

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham B17 8QB

BOOKINGS FOR the residential packages, the IOTA Birthday Party and the DX Dinner have been arriving at a very healthy rate so if you have not yet booked you are encouraged to do so as soon as possible. Booking forms are available from Neville Cheadle, G3NUG, QTHR; tel 0442 62929.

Neville has asked me to stress that although the programme is shown as provisional all but one of the talks have been confirmed. Timings may vary however. Another point to stress is that *both* days are devoted to HF topics and all three lecture streams start at 9.30am on Saturday 8 October. Very few of the Saturday lectures will be repeated on Sunday. This is different from earlier years when Sunday was regarded as the 'HF Day'.

RUSSIAN CALLSIGNS

MY VERY good friend Boris, RU3AX (ex-UW3AX), has given me the latest information on the confusing changes affecting callsigns in the former USSR. A decision was taken by the CIS Ministers of Telecommunication and without consultation to change callsigns in April 1993. This led to the alteration of callsigns of about 25% of stations in Russia, about 95% in Ukraine, and nearly all in the other countries. In general it was agreed not to reissue callsigns which had been used elsewhere before the end of the century (e.g not to use UB in Russia or UW in Ukraine).

In Russia itself most UW, UV, UZ, and UN stations changed their first two letters only – so that UW, UV, UZ, and UN stations became RU, RX, RK, and RN respectively. But a choice was given to choose callsigns not issued in the last ten years which may be used in particular oblasts with normal prefixes – UA, RA, RW, RV, RZ, RX, RU, RN, RK – so UV3HD is now RU3HD and UW3EF now RA3BF. RN may be used for any oblast of Russia and not only in Karelia as previously.

Repeaters now use RR prefixes (eg RR3AA in Moscow). **Malyj Vysockij Is** (ex 4J1 stations) now use **R1MVA – R1MVZ**. It is also permitted to use personal callsigns with the suffix /MVI.

Franz Josef Land (formerly 4K2) will use **R1FJA – R1FJZ**, and stations in the **Antarctic** (formerly 4K1) **R1ANA – R1ANZ**. The designators for personal callsigns are /FJL and /ANT respectively. The other **Arctic Islands** now use the old 'continental' prefixes like UA, RA etc.

The **R1 – R0** callsigns are used by special stations and only a few will be on a permanent basis. These include the SRR HQ station R3SRR, the Alexandr Stepanovich Popov museum in St Petersburg R1ASP, and *Radio* magazine station R3RDO. Others will be issued for temporary use only. **UE** callsigns (eg UE1AAA – UE1AZZ for St Petersburg) will be used for local events much as GB is used in the UK. Boris says that mobile and maritime mobile operation is now allowed with the usual designators /M and /MM. If there is a change of QTH inside his oblast he uses the same callsign, if moving to another oblast in the same region or another region he adds as a suffix the number of the region (RU3AX/3 or RU3AX/1).

Visitors may now obtain a guest licence by sending an application and a copy of their licence to the Russian Telecommunication Authority at least 45 days in advance together with a supporting letter from the applicant's own national radio society. Copies of all papers should also be sent to the SRR to speed up the process. Callsigns in this case will be similar to R3/G3FKM (for operation from the Russian 3rd region).

Ukraine UB3 – UB0 has now changed to **UR3 – UR0**, RB2 – RB9 = **US1 – US0**, RT1 – RT0 = **UX1 – UX0**, and UB1 – UB2 to **UX1** and **UX2**. Stations in **Crimea** use **UU1 – UU0**. 'Non system' callsigns where the first letter of the suffix does not indicate the oblast, all with UB5 prefixes, are now **UX5**. UT and UY have not been changed. **EM, EN** and **EO** will be used as special calls and **EM1** is reserved for stations in **Antarctica.** Repeaters are **UR0**. WWII veterans still use U5 but had to change U7 to UN in order to avoid confusion in **Kazahstan** which uses **UN** but not **UN1** which is still used by **Karelia** and reserved until 2000. **Uzbekistan** has changed to the **UK** block, **Tadjikstan** to **EX**, **Turkmenistan** to **EY** and **EZ**, **Moldova** to **ER**, **Belarus** to **EU/EW/EV** (figures 1 – 7 indicate different oblasts and 8 – 0 special stations), **Georgia** to **4L**, **Armenia** to **EK**, and **Azerbaidjan** to **4K**. Finally, **4L** callsigns with the first suffix letters O, Q, and V were reserved for Abhazia, Yugo-Osetia, and Adjaria.

BAND REPORTS

Very lean pickings this month I'm afraid! Thanks go to G2HKU, G3s GVV, YRM, GW4KGR, G4OBK, and G0UIH. Stations using CW are listed in italics:

14MHz

0700 BZ5HAN, C49C, KL7Y, T33CS, VR6DB, YI1BGD.
0800 DX1DBT, YI1HXH.
0900 AH8A, KH8BB, T33KK.
1500 A61AF, *A71AN,* BV7GA, BV9P, D3C, *J6/DJ6SI,* SU1CS, *TA2BD,* V83BG, 9F6LS, 9K2ZZ, 9N1KY.
1600 A71A, FR5ZU/E, JT1BG, S21B, V63SD, *VP5P,* 5R8KH, 9M6JC, 9M8BL, 9N1AA, 9N1HA.
1700 BV6ER, ET3SID, XU7VX, 9M2HB, 9M6LS.
1800 AH8A, ZD9BV, 7O1AA.
1900 *C53HG, FY5YE,* HS0AC, *XX9TZ,* 4S7/ON4IPA, *4S7WP,* 5Z4BP, *9G1SQ.*
2100 *C91J,* D2EGH, HS0ZBL, S01M, VQ9FM, 5X1C.

18MHz

0700 *JT1BV, T33KK.*
1000 T33CS, *XX9TZ.*
1100 PY0FM, VP2EKM, ZB2JI.
1300 A61AD.
1600 A22CT, A92BE, *BV2OO, ET3YZ, HK0DPA,* JW5NM, TL8NG, TU5DX, ZS8MI, *3B8CF.*
1800 A45ZZ, C53HG, D2EV, VP8GAV, 9Y4NW.

21MHz

1000 D3C, D44BC, *YA/RW6AC.*
1100 BV9P, D44AB, VS6WO, *XX9TZ,* 5V7GL, 9G1SD, 9I2M.
1300 A71AC, *FR5ZQ/J, P29VH,* 9V1ZB.
1600 FR5ZQ/J, HC8A, *P49V,* 4S7/JA4FM, 6D2X.
2000 P40V, 8R/N4VA.

NINE BAND TABLE NO 10

Call	1.8	3.5	7	10	14	18	21	24	28	Total
G3KMA	180	277	322	259	328	299	328	288	321	2602
G4BWP	151	276	309	251	327	294	323	265	312	2508
G4GIR	134	264	305	235	328	282	324	250	312	2434
G3XTT	183	243	296	209	325	268	319	242	295	2380
G3GIQ	77	221	285	136	328	264	328	231	314	2184
G4OBK	132	177	228	165	300	237	276	199	251	1965
G3TXF	96	197	256	162	309	189	306	140	274	1929
GM3PPE	68	163	210	206	279	236	255	184	222	1823
G3WGV	77	150	203	207	251	232	254	186	226	1786
G3SXW	79	177	220	172	288	172	278	134	238	1758 (CW)
G3IGW	122	179	298	170	274	211	227	19	198	1698
G3NOF	5	112	113	–	327	231	327	220	297	1632
G4ODV	88	184	306	157	253	119	241	69	200	1617
G3JJG	52	105	201	169	235	189	260	148	206	1565 (CW)
G3VJP	17	135	212	80	311	114	289	43	238	1439
GW3JXN	57	138	180	124	229	191	229	132	156	1436
G3IAR	69	102	130	133	244	166	217	122	147	1330
G4XRX	3	48	91	105	260	147	283	149	228	1314
G4NXG/M	6	42	96	–	237	128	256	137	238	1140
AVERAGE	84	168	224	155	286	209	280	166	246	1818

NEXT DEADLINE – to reach G3GIQ by 8 July 1994. Please note entry level is 600 total. No need to work all bands. Prepared by G3GIQ 7 April 1994

1994 WARC BANDS TABLE

	10MHz	18MHz	24MHz	Total
G4OBK	**59**	91	**79**	229
EA5DQE	–	**92**	49	141
G0MHC	29	36	14	79
GJ4GG	26	34	12	72
G3IAR	26	11	1	38
G0TMZ	21	11	–	32

DX NEWS

A *DXAC News Release* from ARRL dated 19 April 1994 and titled 'Pratas back on DXAC Agenda' said that: "ARRL DXAC chairman Robert Beatty, W4VQ, has announced that the question of new country status for **Pratas Is** (BV9) is back on the DXAC agenda. Dr Bolon Lin, BF5AF, of the Chinese Taipei Amateur Radio League (CTARL) is now in contact with the DXAC. Dr Lin is providing answers to committee questions. A vote on the question of DXCC country status for Pratas has not been scheduled at this time." This follows an operation by some apparently rather inexperienced operators in the middle of March as BV9P. According to *RSGB DX News Sheet* F6EXV recently told G3HTA that 7O1AA in **Yemen** is genuine and is associated with the Yemen Telecommunications Authority. He also said that 7O7AA will be the callsign of the club station. This bears out some information which I had from A41JT that there is progress in amateur licensing in Yemen. According to the *Long Island DX Bulletin* S21ZG, in **Bangladesh**, is often in the 'Family Hour DX Net' on 14.226MHz at

The QSL card of the new Ethiopian Amateur RS station in Addis Ababa.

about 1400. He will arrange schedules.

There will be much activity this month by special stations celebrating the 50th anniversary of 'D-Day'. Three mentioned by *DXpress* are TM4HOC, TM4JUN, and TM6JUN.

According to *RSGB DX News Sheet* DL9GMM/5N0 will be on the air until the end of 1994 from **Nigeria**. He is on 3.5 to 28MHz CW running barefoot to wire antennas. The same source says that the new prefix for stations on the **Penguin Is** following their incorporation into Namibia will be V59. Patrick Crepelliere, TU5DX, was due to leave **Ivory Coast** at the end of April and should by now be on the air from the Lagos area of **Nigeria**. Callsign not known at the time of writing but his new QSL manager for this operation will be F6EXQ. DL9GMM/5N0 is (according to the *Long Island DX Bulletin*) there on a long assignment and willing to make CW contacts on any band. The same news source says that ZS9A and ZS9Z are regularly active on 14, 21, and 28MHz with SSB and RTTY between 1500 and 2000.

John Layton, G4AAL, left on 7 April for a tour of duty in Angola which is probably already finished. He was then due to go to **Mozambique** for a further few weeks and he may still be there. If so he will be mainly active on SSB. D68TM on the **Comoro Is** has been reported on 14.235 and 21.305MHz.

Peter Wilson, G0RYH, is now in **Singapore** and hoping to have a licence by June or July. He will be taking packet equipment with him but no HF gear and is hoping to be able to find a local who will allow him to use his equipment. He will be looking for UK contacts. *DXPRESS* says that FT5YF is now on from Petrel Is (AN-017) in **Antarctica**.

PP5LL has announced that there will be an expedition to **Arvoredo Is** in Santa Cruz state (IOTA SA 026, DIB 46) from 1 to 4 June, and another to **Mel Is** in Parana state (IOTA SA 047, DIB 24) from 3 to 7 August. Callsigns will be ZZ5AM on CW and ZZ5LL on SSB, and frequencies to be used include 3.570, 3.760, 7.040, 7.060, 14.020, 14.260, 21.040, 21.260, 28.040, and 28.260MHz. PY1UP should be on the air from **Trindade Is** as PY0TUP until August on all bands CW and SSB.

DXCC

BILL KENNAMER, K5FUV, of the ARRL DXCC desk will be at the ARRL stand at Ham Radio '94 in Friedrichshafen between 24 and 26 June and will be available to check DXCC cards for amateurs reluctant to mail them to ARRL HQ. Individuals should limit the number of cards to no more than 110. The newest DXCC form should be used; the older ones are considered obsolete. Forms may be requested by mail from ARRL HQ in advance or may be obtained at Friedrichshafen. I hope to have a few copies available – SASE please.

A *DXCC News Release* dated 5 April said that the number of unprocessed applications at the end of March was 620 (61,937 QSLs). The DXCC desk received 1,127 applications (84,275 QSLs) for endorsements and new awards during the month and applications being sent out at the end of March had been received three/four weeks earlier. Some applications received prior to that time were waiting for paper records to be converted, and so had not been completed. Applications and QSLs received continue to exceed last year's figures – for the first three months of 1994 applications were up by 18% and QSLs by 48%. A truly impressive performance by ARRL!

A further *DXAC News Release* dated 19 April gave the news that the DXAC had voted unanimously to delete Walvis Bay (ZS9) and Penguin Islands (ZS0,1) and that the recommendation has been sent to the Awards Committee with a suggested effective date of 1 March 1994. In another ballot the DXAC voted against the idea of single band DXCC and a proposal to add a 28MHz DXCC Honor Roll by a 15 to 1 margin.

EXPEDITION

DENNIS, GM3NIG, says that there will be an expedition to the **Shiant Is** (EU112/WAB 49) between 27 May and 31 May – depending on sea conditions. Operation will be on all bands 1.8 to 28MHz with special emphasis on IOTA and WAB frequencies. Over the past eight years the group has activated Benbecula, Berneray, Coll, Colonsay, Eriskay, North Uist, Oronsay, South Uist, the Summer Isles, Tiree, and the Treshnish isles and GM3NIG and GM4YMA have taken part in all. Other operators have included GM3COB, GM3NEQ, and GM3UTQ.

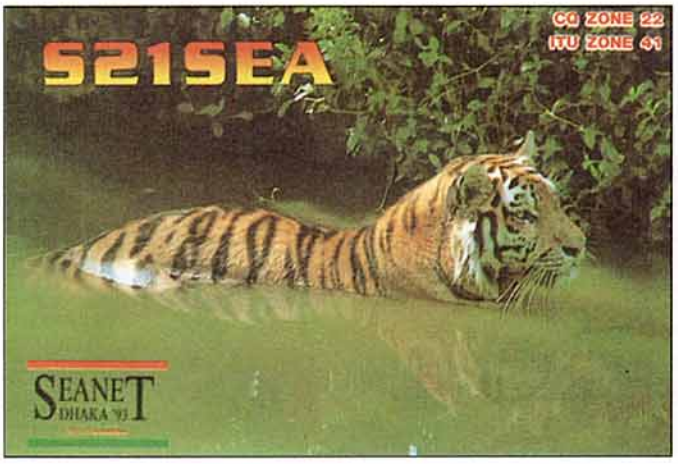
CONTESTS

WORLD WIDE SOUTH AMERICA CW CONTEST

1500 11 June – 1500 12 June

Sponsored by *Antenna-Electronica* magazine in Brazil. 3.5 to 28MHz, CW only, no WARC bands. Call 'SA Test'. Exchange RST plus serial number from 001. QSO with own country for multiplier credit only. QSOs with own continent two points, with others four. S American contacts count eight points. Multiplier is one for each DXCC country worked (including S American) and one for each S American prefix contacted. Separate logs for each band and logs have to be submitted before 31 July 1994 to WWSA Contest Committee, P O Box 282, 200001-970 Rio de Janeiro, RJ-Brazil. I can supply photocopies of rules (SASE please).

Results of the **1993 CQ WW WPX SSB Contest** have now been published. On 14MHz **GW4BLE** came eighth in the world, and in the multi-operator single transmitter section **GB6BT** was twelfth in the world listing. UK scores were as follows:- (QRP/P section, 21MHz) **G4MET** 49,609. (All bands) **GM3BCL** 278,100, ***G4ENZ*** 868,500, *G0KTN* 156,860, ***GW4RTO/M*** 78,568, **G3ICG** 42,284, *G4NXG/M* 7,905. (28MHz) **G4PKP** 42,874. (21MHz) **G4CNY** 103,934. (14MHz) **GW4BLE** 2,992,041, ***G0NIF*** 1,120. (3.7MHz) **G0PMQ** 44,888. Stations listed in italics were in the Low Power section and those in bold type won certificates. In the Multi-operator single transmitter class **GB6BT** was fourth in Europe with 11,313,840 points and GB2MM and **GU6YB/P** eighth and ninth respectively with 6,726,945 and 6,372,939 points respectively. G3OZF scored 4,634,132, GX0OBS 3,661,767, **GI0KOW** 3,145,242, **GW6GW** 2,298,046, GX5QK 2,053,056, GX0FDX 1,610,573, G0MIN 1,058,616, G6CW 970,748, and GX6OI 187,824.



A QSL from the 1993 SEANET Convention station.

ALL ASIAN DX CONTEST (CW)

0000 18 June – 2400 19 June

1.8 to 28MHz (no WARC bands). Single-operator single and multi-band and multi-operator multi-band categories. Exchange RST plus two figures indicating operator's age (ladies send '00'). QSOs with Asian stations (other than US auxiliary military stations in the Far East and Japan which do not count) count three points on 1.8MHz, two on 3.5MHz, and one on other bands. The multipliers are the number of different Asian *prefixes* worked on each band. Note that JD1 (Minamitori Shima) is in Oceania. Entries for the CW section must be sent to JARL, All Asia DX Contest, PO Box 377, Tokyo Central, Japan, postmarked no later than 30 July 1994. I can supply copies of the rules etc (SASE please).

CANADA DAY CONTEST

0000 – 2359 1 July

Yes – the date *is* correct! 1.8 to 28MHz CW and SSB. Suggested areas of activity are 25kHz up from low band edge on CW and near 1.850, 3.775, 7.225, 14.175, 21.250, and 28.500MHz. Work everyone and you may work the same station once on each band and mode. QSOs with non-Canadians count two points, with Canadians ten, and with Canadian stations with RAC, VCA, or QST suffixes 20 points. Send RS/T plus serial number from 001. Canadians send RS/T and province/territory. Multipliers are the 12 provinces and territories on each band. Entries must be re-

ceived no later than 31 July by: RAC, P O Box 356, Kingston, Ontario, K7L 4W2, Canada. I can supply photocopies of the rules (SASE please).

RUSSIAN DX CONTEST

1200 25 June – 1200 26 June

3.5 to 28MHz (no WARC bands). Observing IARU band plans. CW and SSB. Single operator single and all bands (CW, SSB, and mixed), multi-operator multi-band single or multi-transmitter. For multi-operator single transmitter the 'ten minute rule' applies and this also applies in other sections if you wish to work a station again on the same band but with a different mode. Exchange RS/T plus serial QSO number (from 001). Russian stations will send RS/T and and two letters indicating their oblast (there are now 88). QSOs with own country count two points, with other countries on same continent three and on different continent five. QSOs with Russia count seven points. The multipliers are the total of oblasts worked on each band added together. Log by bands and include the usual summary sheet and send to Andrej Melanin, UA3DPX, SRR Contest Manager, PO Box 9, Himki-7, 14100 Moscow oblast, Russia. The winner in each DXCC country will receive a certificate – the runner-up will also receive one if there was high activity. Continental winners in single-operator all bands section will receive prizes.

AWARDS

ICELANDIC RADIO AMATEURS AWARD

For licensed amateurs and listeners. Only QSOs with Icelandic citizens are valid. Stations in ITU zones 5, 9, 18-20, 27-29 (that includes the UK) need 98 points. QSOs with Novice TF stations on 3.5MHz count 32 points, on 7MHz 24MHz, and on 21MHz 16 points. (They may be identified by a three letter suffix ending with 'N' and are allowed to use 3.5 – 3.6, 7 – 7.04, and 21 – 21.15MHz). Points allocation on other bands depend on mode and I can supply a copy of the table and the complete rules (SASE please).

PROPAGATION

THE G8KG report this month confirms what we have all been experiencing and it goes as follows:- "HF band conditions continued to be dominated by a very one-sided sun during the latter part of March and the first three weeks of April. A pattern seems to have become established over recent rotations in which more than half the 27 day period is marked by disturbed geo-magnetic conditions. In the period under review the 27-day average of the Boulder A index again topped the 20 mark with a peak daily value of 62 on 17 April during which the higher bands were more or less blacked out. At the same time the 27-day average solar flux continued its long decline which had lasted 80 days but was showing signs of levelling off at 81 sfu with daily figures having fallen to the low 70s at the end of the first week in April. As cautiously predicted last month, band conditions perked up in the last week of March but the improvement did not last long into early April though there were again signs of improvement by the end of the third week."

THANKS

GO TO all who wrote to me and to the authors of the *Lynx DX Bulletin* (EA2QL), the *Long Island DX Bulletin* (W2IYX), the *RSGB DX News Sheet* (G4DYO), and *DXpress* (PA3FQA). Please send everything for the **August** issue to reach me **no later than 21 June – slightly earlier than usual**.

QTH CORNER

EU/EW QSL Bureau	BFRR, P O Box 469, Minsk-50, 22050, Belarus. CIS.
EX	QSL bureau, Union of Radioamateurs of Kirghizstan, PO Box 1100, Bishkek-20, 720020 Kirghizstan, CIS.
FR5ZU/E	FR5ZU, Jacques Quillet, 1 Cite Meteo Chaudron BP 347-1, F-97494 St Clotilde, via France.
FR5ZQ/J	FR5ZQ, Henri Namtameco, Rampe de St Francois, 5052 Tour La Chaumiere, F-97400 St Dennis, via France.
J6/OZ7SM	G0/OZ7SM, Herb Asmussen, Park Farm, Gorcott Hill, Beoley, Warwicks, B98 9EN.
Russian QSL Bureau	SRR, PO Box 59, Moscow 105122, Russia.
TR8LT	Box 8000, Libreville, Gabon.
V85BG	P O Box 373, MPC 3703, Brunei.
VE8RAF	G0BHA, 11 Dudley Crescent, Hooton, South Wirral, Cheshire, L65 1AW.
ZZ5AM, ZZ5LL	via PP5LL, LIRA, PO Box 08, 88010-970 Florianopolis-SC, Brazil.
5U7K	via 7N1PFQ, Koichi Yonekawa, Kamihongo-hights #202, 30-1 Nakaicyo 2, Matsudo 271, Japan.

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

WHILE THE Sporadic-E season on 50MHz got un-derway in April, there were no significant tropospheric openings to report. Solar activity – sunspots and solar flux – remained low, but magnetic activity was high with numerous auroras noted by more northerly stations.

REPEATERS

THE LEICESTERSHIRE Repeater Group's AGM was scheduled for 28 April. An undated *LENS News Sheet* mentioned that only one member of the previous committee was standing for re-election and that: ". . . . there has been a great feeling of apathy within the group for some time . . .".

For similar reasons the GB3HZ Repeater Group was unable to elect a new committee in January. Neil Savin, G0SVN, wrote that, following a subsequent EGM, enough support was forthcoming to allow a new committee to be formed. Alan Butcher, G3FSN, is the chairman, Steve Timms, G7OST, the Secretary and Neil the treasurer. He is QTHR (tel: Maidenhead (0628) 25952) if you want further information. GB3HZ is located near High Wycombe (BUX) and is on channel RB7.

The South Yorkshire VHF repeater GB3NA on R3 was due to return to service on 1 May. It had been off air while consultations between the RSGB Repeater Management Group (RMG), UK FM Group (Northern), who manage it, and the Radiocommunications Agency (RA) took place. A strategy has been agreed for the group to monitor misuse of the relay, including tape-recording traffic through it.

PUBLICATIONS

THE MARCH issue of *The VHF-UHF DXer* features part 2 of Sam Jewell's, G4DDK, notes on the Hewlett-Packard 8620C solid-state sweeper and an article on computer control of the Icom IC735 transceiver by Dave Robinson, G4FRE. The rest of this issue is devoted to band reports. Contact editor/publisher Dave Hardy, G8ROU, for subscription details. He is QTHR, on packet G8ROU@GB7HMZ. #23.GBR.EU and on Internet g8rou@g4klx.demon.co.uk.

The Spring issue of *FM News*, the publication of the Central Scotland FM Group, includes reprints of two articles from the May 1976 issue of *Ham Radio*. One deals with the merits of quarter and five-eighths wave vertical antennas for 2m. Technical Coordinator Jack Hood, GM4COX, writes about on-going CSFMG projects. The secretary of the group is Alasdair Fraser, GM3AXX (QTHR).

The April issue of *Six News*, the journal of the UKSMG, contains an excellent mix of articles on aspects of 6m operating. There are details of the UKSMG Worked all Europe award, the starting date for which is 1 January 1989. This seems to be an entirely separate award from the long-established WAE programme sponsored by the DARC, the German national society. There is plenty of DX and

During the 144/432MHz contest Clive O'Henessey operated as GM4VVX/P in Scotland – once the aerials were up!

contest news, and a useful list of European Band 1 TV transmitters. Contact secretary Chris Gare, G3WOS, for details of the UKSMG. He is QTHR.

Many owners of *The VHF/UHF DX Book* have built some of the excellent designs featured in the construction sections. Printed circuit boards for some of these projects are available. Contact DIR Publishing at PO Box 771, Buckingham, England, MK18 4HH for the current price list. Their CompuServe ID is 100010,2355. the book is available from RSGB Sales [see pages 94/95 – *Ed*].

FIRSTS

DAVID ANDERSON, GM4JJJ (FFE), claims the following 144MHz 'firsts' from Scotland: YO6AFP 7/6/81 1840 Es; K1WHS 18/5/83 2330 EME (also first GM to N America); JA6DR 22/12/83 2000 EME; WA1JXN/C6A 25/2/85 2008 EME; YV5ZZ 22/6/85 2200 EME (also first GM to S America); LZ2US 23/3/86 2100 EME; LU7DZ 18/10//92 1200 EME; ZL1BVU 13/11/92 1010 EME; CN8ST 18/7/93 2009 Es and FR5DN 10/10/93 0550 EME.

Next month I will make a start on the claimed 70cm firsts. The band was released on 1 October 1948 but Pat Allely's, GW3KJW, list only shows four firsts in the 1948-9 period. Meantime, Richard Newstead, G3CWI (CHS), asks if anyone knows which G station first worked ZL on 70cm and when? His CompuServe message read: "Our EME group did this many years ago with our 42ft dish . . . ." Any claims?

PROPAGATION

THE MARCH report of the *Six and Ten Reporting Club*, edited by Ray Cracknell, G2AHU (HWR), records the solar indices data for that month; the mean sunspot number was 31.7 and the Ottawa solar flux mean was 90.5. The daily geomagnetic K-indices at three hourly intervals at Eskdalemuir (DGL) reveal 20 disturbed days when the planetary K-indices rose above 5.

The back cover is a Hydrogen Alpha (Hα) synoptic chart of the Sun for Carrington rotation 1880, the period 6 March to 2 April. This resembles a terrestrial Mercator projection map of Earth and shows areas of filaments, filament channels, plage corridors, coronal holes, strong active regions, etc. From this chart, it is easy to see the most active and relatively quieter regions of the Sun.

It illustrates the brief information given in the weekly GB2RS news broadcasts. An explanation of the terms used in these broadcasts is given on pages 96-98 in the RSGB *1994 Amateur Radio Call Book and Information Directory*. By the way, R Carrington began numbering solar rotations on 9 November 1853.

Dick Bird, G4ZU/F6IDC, sent a copy of part of the January issue of the SARL's journal *Radio ZS*. Under the heading, 'A Third Radiation Belt Discovered' reference is made to a US-German satellite, SAMPEX, which has detected a third radiation belt around Earth. It is located within the Van Allen belt at 8000km altitude and is more concentrated over part of the South Atlantic between South Africa and South America. While the editor seemed quite excited about this, it seems doubtful its existence could upset HF or VHF propagation. However, spacecraft in highly elliptical orbits, such as OSCAR-10 and OSCAR-13 might be affected.

CONTESTS

THE 12TH annual *Practical Wireless* 144MHz QRP Contest is scheduled for 19 June, 0900-1700UTC. Tx output is limited to 3W and rules are similar to previous years; they appear in the June issue of *PW*. The adjudicator is Neil Taylor, G4HLX.

There are several 50MHz events in the next few weeks. The IARU contest is on HF NFD weekend, 4/5 June, 1400-1400 with the RSGB Trophy event on the 4th, 1400-2200. The rules for these contests are on page 83 of the February *RadCom*. Also on the 4th, the UKSMG is running its Sporadic-E Contest, 0000-2400UTC; contest manager is Cliff Ibell, G1IOV, QTHR.

From Italy, the Como Division of the SSB and RTTY Club (ARI) is promoting a contest on 9/10 July, 1400-1400UTC. Inter-Europe QSOs must be outside the 50.100-50.130MHz DX window. Exchange callsigns, reports and locator, eg IO91, JO02, etc. Italians will give their province. Scoring is one point per contact with multipliers for: "Each DXCC country, each square and each Italian Province. Final score is contact points total times multipliers total." Send logs to ARI Contest Lario Committee, PO Box 144, I-22100 Como, Italy, postmarked 25 July at the latest.

METEOR SCATTER

THE THREE most active 'daylight' meteor streams of the year occur in June. The Arietids should peak on the 7th at a solar longitude (LS) of 76.7°. The Zenithal Hourly Rate (ZHR) is 60 and best times are: NE/SW 0400-1000 and around 1430; E/W 0700-1200; NW/SE around 0430 and 0900-1500 and N/S 0300-0800 and 1100-1600.

The Zeta Perseids should peak on the 9th, LS 78.6°, ZHR 40. NE/SW 0600-1100 and 1430-1730; E/W 0830-1330; NW/SE 0430-0730 and 1100-1600; N/S 0430-0930 and 1200-1730. The Beta Taurids should peak on the 28th, LS 96.7°, ZHR 25. For best times, when reflection efficiency is over 50%, add two hours to the Arietids times. These data are derived from the *1994 Meteor Shower Calendar* compiled by Alastair McBeath, vice president of the International Meteor Organization (IMO).

MOONBOUNCE

SOFTWARE

Doug McArthur, VK3UM, sent me a copy of version 7.02 of his definitive EME Planner software, dated November 1993. He said to distribute the files to any EME enthusiasts. I posted a message to VHF Reflector on Internet and a copy is in CompuServe's Hamnet Forum, in Library #6 as VK3UMEME.ZIP. Also on the disk is version 5.10 of EMETRAK, dated November 1993. This is Doug's autotrack antenna program, for which he has developed a PCB for the serial interface controller. There is a 26-page .DOC file plus a Boardfix file.

This is very high quality software, developed over many years and offered to other amateurs provided only they do not sell it for their own gain. The files are not compressed and occupy every single byte of a 1.44Mb disk. If you want a copy, send me an IBM-formatted 3.5 inch HD disk in a Jiffy bag with self-addressed label and return postage. Please note, there is no CP/M version of these programs.

NEWS

Billy Lunt, KR1R, contest manager of the ARRL, has confirmed the dates of the League's EME Competition. They are 29/30 October and 26/27 November and so avoid European VHF/UHF contest fixtures. The complete rules will appear in the September issue of *QST*. ARRL contest logs now can be submitted via Internet to contest@arrl.org.

My apologies to Peter Burt, G3NBQ (IO83), for reporting his working several stations in the April issue. In fact, he heard them and doesn't think 100W and a single 9-ele Yagi would get him through. John Hunter, G3IMV (IO91), has completed with 144 different stations on 2m in 33 countries. He uses two 17-ele F9FT Yagis.

Brian Underdown, G7LIJ (JO01), is assembling a 2m EME station and proposes to start with two 9-ele OZ5HF Yagis with preamp and LDF4-50 cable. If site noise at his business QTH is not too high, he has plans for a PA with a pair of 4CX250Bs and four OZ5HF antennas.

The 11/12 June weekend looks to be reasonable with the Moon's declination at +17°, Sun offset –40° and the 144/432MHz sky temperatures 391/28° K respectively; signal degradation is –1.2dB. The next sked weekend is 2/3 July, which coincides with VHF NFD. It is also an apogee period with –1.9dB degradation, Sun offset –60° and 355/27° K sky temperatures.

50MHZ

NEWS

The Papua New Guinea ARS publishes a Newsletter called *Garamut* edited by Barney Wallis, P29AS. In the March issue there is a lot of 6m news including details of 'wrong' beam headings during Es openings in the 5-10 January period. VK8RH has built a beacon to be operated from Jakarta in Indonesia; callsign YB0ZZ, frequency 50.042MHz, locator not stated. It should be QRV by now.

The UKSMG's Jordan expedition was due to commence on 29 May, using the call JY7SIX. The operating frequency will be chosen when local reception conditions have been assessed. When there are no operators in the 'shack' – a room on the top floor of the Amman Marriott Hotel – listen for their beacon on 50.075MHz sending 'JY7SIX KM71'. Beacons 5B4CY on 50.498MHz and OD5SIX on 50.078MHz could indicate openings to Jordan.

They will be QRV on 10-80m and 2m. Individual licences have

been issued; JY8IC (GJ4ICD), JY8ZC (G4CCZ), JY8JH (G0JHL), JY8OS (G3WOS), JY8ED (G3SED) and JY8OX (G3KOX). The last planned full day of operation is 26 June. QSLs may go via Paul Simons, G4CCZ (QTHR), with SASE or SAE plus IRCs.

From Internet, LA0BY and LA5TFA notified activity from KQ00BC in northern Norway from the evening of 10 June to the afternoon of the 12th. They will use LA5TFA/P on 6m running 20W and a 4-ele Yagi and hope for Es or Auroral-E propagation.

SP4CHY wrote to Ted Collins, G4UPS (DVN), to say he plans to operate from KO04, KO13 and KO14 in June. QSL via the bureau or direct to Mr W Mlynarczyk, Ul. Zolnierska 20/64, PL-10561, Poland. SP5XML's (JO92UN) QTH is Mr M Wisniewski, Ul. Chopina 63/1, PL-09402, Poland. ES5MC wrote that beacon ES6SIX (KO37MT) is now on 50.073MHz running 10W to a ground plane antenna. Estonian Class A and B licensees, and visitors with a CEPT Class A licence, can use 50-54MHz, all modes, on a no interference to TV basis. 100W CW, 50W FM, 400W PEP SSB output with no ERP or antenna restrictions.

Since 1 January, Class 1 operators in Latvia may use 50-52MHz. The band allocation is 50-52MHz CW, 50.1-52.0MHz SSB, 51.0-52.0MHz FM and AM and 50.6-51.0MHz digital modes. Output limit is 50W with special permission required to operate in the Kuldiga region in NW Latvia. YL2MB and YL2DX hope to be QRV in the Es season. OZ1DJJ plans Greenland operation as follows: till 20 June GP44, 20-29 June GP35, 10 August to 1 September GP34, 35 and 44.

Next some items from the April issue of *Six News*. C31HK, the only 6m permit holder QRV in Andorra, can use 50-52MHz; previously Fred couldn't operate below 50.2MHz. RC2WBH (KO45) is one to look for via Es this summer. SP8MNZ and SP8UFT are a father and son pair from KO11. Beacon 7Q7SIX on 50.003MHz is at the QTH of 7Q7JL (KH75). Look for LA3EDA/P in JP55 in the first week of July; QSL to Roar Jegtvolden, Asliv 22, N-3525 Hallingby, Norway.

According to Pierre Pasteur, HB9QQ, new 50MHz Swiss permits, valid till the end of 1995, allow some stations to operate 24 hours a day with 10W ERP. Permitted regions are around Lake Leman in western HB, valleys in Valais canton, and some valleys in Tessin and Grison cantons.

ACTIVITY

Some stations in NW England had a very selective Es opening to I0 and I3 on 18 April; stations worked included IK0FTA, IK0SME and IK3IWX, 1733-1800. G4UPS heard nothing of it in Devon but on the 25th at 1230, IK2GSO (JN45) heard Ted's CW and they worked at 1254. Other contacts were with IK2QDX and I2WSG (JN45), IK0RWX (JN61), S57A, 9A3HZ (JN86), S59F (JN65), YU1NW (KN04), S57AC (JN76) and IK5OEA (JN52) up to 1400.

Ron Adam, GM4ILS (IO87IP), operated in six auroras in March and April. In March, on the 6th he worked GM4OBD in his own square at 1932; 7th G0DJA (IO91) at 1927; 9th EI8HZ (IO64) at 2130 and 21st GM3XOQ (IO88) at 1625. Beam headings (QTE) were 30-40°. In April, on the 2nd PA0OOS (JO33) 30° at 1715 and G4IFX (IO94) 30° at 2322; 3rd GW3LDH (IO83), G3ISL (IO94) and G4IFX at 48-60° between 1627 and 1708.

70MHZ

THE ONLY news this month came from G4UPS. Ted received a telephone call from Dave Court, G3SDL/OZ3SDL, to say he has permission to operate in Cyprus from 29 June to 12 July in KM65. The QRG is 70.200 ±6.25kHz. Dave will be QRV on 28.885MHz for crossband liaison.

144MHZ

IN ADDITION to their 6m operation, LA0BY and LA5TFA plan operation on 2m from KQ00BC, 10-12 June. On 2m the call will be LA0BY/P using 200W and two 17-ele F9FT Yagis. Preferred modes will be CW MS and Auroral-E, with 144.155MHz the random and sked MS frequency. 2.5min periods on CW (1000LPM) and 1min on SSB with LA0BY/P starting first. The zero will be sent as 'T' and a nine as 'N' with the '/' omitted.

Random calls will be encouraged after reception of CQ calls. The E-QTH square may be transmitted, eg: CQ ME LATBY. Skeds may be arranged on the 20m VHF net on 14.345MHz or in advance via E-mail to stefan@eiscat.no. QSL via DF9PY or to Stefan Heck, Floyvegen 25, N-9020 Tromsdalen, Norway.

G3IMV is now up to 513 squares with 501 confirmed. John says he has never known the VHF bands to have been so uninteresting as they have in recent months. If it wasn't for EME, he reckons he would have migrated to top band! G7LIJ has not had much time for operating recently, but did catch southerly openings on 5 March, working stations in IN87, JN16 and JN36 and on the 8th, EA1DKV, EB1GTP and EA1TA (IN53), F5GHP (IN96) and EA1DHG (IN63).

G3NBQ concludes that tropo has been very flat, best recent DX being GM8LFB (IO88) and GM3WOJ (IO77). Peter reports that GM0HTT (OKE) 'lost' his PA and preamp due to an electrical storm in January. On the auroral scene from NW Lancashire he copied GB3LER on 7, 8, 11, 12, 14-16 March and 2, 3, 6, 9, 11-15 April. On 7 March he worked LA, OZ, ON and DL and on 2 April SM, GI, YL, DL, GM and LA and next day GM and SM.

GM4ILS operated in auroras on 2, 3, 9, 10, 11, 16 and 17 April but Ron found activity low, even though several beacons were copied. On 2 April, 1814-1910 he worked DL, G, GI, ON and PA stations and at 2348 LA3EQ; QTEs were 70-90°. Next day, 1638-1710, he contacted DL, G and OZ at 60-80°. On the 9th, 1747 G4KUX (IO94), 10th 2040 DK1KO (JO53), 17th 0823-0834 PA and DLs at 65°.

Edward Allely, GW0PZT (GDD), reports lots of Els on 4 April in their contest, but few Gs took advantage of it. On the 11th, EA1VHF was S9+20dB all evening and for part of the next day, but no Spanish stations were worked despite repeated CQ calls. In the morning aurora on the 17th, he contacted G and GM and heard a DL in JO44. At 0820, F6HPP/P was RST579 at 80 degrees but when Edward turned the beam to 135°, he dropped to S1.

FINALE

NO UHF REPORTS this time. Copy deadline for August is 30 June and for September it is 28 July. The telephone answer/fax machine is on 081 763 9457, my CompuServe ID is 70630,603, the Internet route is 70630.603@compuserve.com and the BT Gold mailbox is 76:MSX021.

LOCATOR SQUARES TABLE
Starting date: 1-1-1979

Callsign	50MHz	70MHz	144MHz	430MHz	1.3GHz	Total
G3IMV	434	15	513	125	52	1139
GJ4ICD	611	1	264	121	68	1065
GW4LXO	475	34	261	109	48	927
G6HKM	456	–	243	118	61	878
G4IGO	565	–	250	–	–	815
G4RGK	183	–	328	203	67	781
G6HCV	468	–	250	–	–	718
G4TIF	339	28	209	112	–	688
G0CUZ	139	–	389	80	–	608
G0EVT	251	12	261	65	1	590
G4DEZ	201	–	255	71	62	589
G8LHT	225	20	210	95	20	570
G4SSO	191	–	279	100	–	570
G0JHC	512	–	48	–	–	560
G1SWH	245	33	179	63	9	529
GW6VZW	377	–	143	6	–	526
G4MUT	200	26	159	97	34	516
GU7DHI	363	–	111	5	–	479
G3XDY	–	–	224	153	100	477
G0FIG	200	–	192	53	–	445
G0GMB	106	–	225	108	–	439
G4SWX	–	–	404	–	–	404
G0HVQ	310	–	71	–	–	381
G1UGH	234	–	122	–	–	356
G1GEY	–	–	179	125	35	339
GW8JLY	–	–	277	36	–	313
G0EHV	–	35	191	82	–	308
G8XTJ	182	–	126	–	–	308
G4YTL	–	43	182	38	–	263
G3FPK	–	–	246	–	–	246
GW4FRX	–	–	236	–	–	236
G0ISW	147	–	64	20	–	231
G4DOL	–	–	226	–	–	226
G1AWF	46	–	162	–	–	208
G7LIJ	24	–	171	–	–	195
GM1XOG	181	–	–	–	–	181
G3FIJ	35	24	83	27	3	172
GI1CET	97	–	67	6	–	170
GW0PZT	–	–	169	–	–	169
G7EWL	54	2	79	6	–	141
G7CLY	70	–	60	2	–	132
G1JDU	93	–	39	–	–	132
G6ODT	–	3	62	66	–	131
G4OUT	–	22	103	–	–	125
GM0GDL	–	–	122	–	–	122
GU4HUY	–	–	84	–	–	84
GM0NXP	–	–	69	–	–	69
G4OBK	21	1	45	–	–	67
G3UOL	4	–	47	–	–	51

No satellite, repeater or packet radio QSOs. If no updates are received for a year entries will be deleted. Next deadline is **30 June**.

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Contest Exchange

ANDY COOK, G4PIQ
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HAVING JUST experienced a very pleasant sunny, warm bank holiday weekend (yes – such things do seem to exist!), and with this reminding me that a number of portable contests are now approaching, my mind turns to a letter I received from Alex, G3ZBE, while we were still in the depths of winter. Particularly at VHF, the quality of a station's location is a major factor in that station's success, or lack of it. So, how do you go about choosing a good site?

SITE SELECTION

AT VHF there is something of a myth that height above sea level is everything, but this is far from being the complete story. What is more important than plain elevation is whether the site has a clear unobstructed take-off in the important directions. This can mean that even a small rise of a few tens of metres can be a very good location if the surrounding land for a good number of miles is essentially flat. If you happen to live near to the sea, a site on, or very close to the coast can be excellent, particularly on 70cm and higher since you will be able to take advantage of the fragile marine ducts which sometimes form over water and break up very quickly when they hit land. This said, nothing is ever hard and fast, and these sorts of conditions are not present for very much of the time, so under normal circumstances you could well be better off on a site which is further inland but higher. If, like many people, you are planning to use a site which is some distance from the sea, then height certainly seems to become more important and you ideally want to be a good few hundred feet above the surrounding terrain. However, even away from the coastal plains of the country there are many flattish parts of the UK where sitting on top of a relatively small 'pimple' will pay big dividends.

Since there is no 5,000ft mountain in the UK which has a clear shot for 360°, and which is only 10km from the coast in all directions – and even if there were it would already be well and truly booked by a major contest group – it is very important to try and decide what directions are important to you, and these may vary from contest to contest.

For a major Europe-wide contest, the bulk of activity is likely to be in Central and Southern England and of course in the rest of Europe – for this sort of event you will want to pick a site with a good take-off in those directions. However, a UK-only contest with county multipliers will lead you to wanting a different site with a good take-off to most of the UK, and you may be prepared to sacrifice some performance into Europe. If you are planning to travel any distance, you will probably make your initial choice of site from looking at the OS maps; however you cannot rely on this alone, and you really need to go and take a look at your proposed site before the contest to check out how to get access etc. At this point a good hint is to take a small station with you – perhaps even just a mobile – and make sure that the beacons or even repeaters are as loud or louder at your proposed site than in the rest of the surrounding area. Failing having any amateur station with you, you can get a fair idea from just using ordinary broadcast VHF stations on the car radio!

At HF, the site is perhaps less critical but it can still be a significant factor. If you can find a site with a long (several hundred metres) slope downwards in an important direction – say to the US or to Japan, this can help to artificially lower the angle of radiation from the antennas. Equally, ground conductivity can be a big factor, particularly on the low bands, and soil with good conductivity can considerably help performance on the low bands, particularly with ground mounted verticals – even better if you can get the vertical out over the sea (a bit specialised this) or perhaps in a damp marshy area. To a large extent site selection is something of a black art, and you may need to be prepared to try a number of different sites until you find the best.

PERMISSION TO OPERATE

SO – WE'VE talked about how to find your ideal site – now how do you go about getting it? Unfortunately, the obvious technique of just driving to the site on the day of the contest and setting up is the wrong one! First you need to check that the site does not have anyone who regularly uses it for contests – contesting etiquette and common sense says that you do not just turn up and use someone else's site without first making contact with them to see if they are planning to use it. Just turning up very early at a site and claiming it on the basis that "I was here first" is a guaranteed technique for not winning friends! Equally, don't pick a site that is only a few kilometres down the road from a site which is likely to be used by another group – you are only going to cause both of you a lot of heartache and shortened tempers with all the mutual QRM which will be present during the contest no matter (within sensible practical limits) how clean your transmitters are or how good your receivers are. The sensible exclusion zone around the big gun portable stations is probably a few tens of kilometres in directions where they are likely to spend a lot of time beaming – even at 20km these guys can be well in excess of 100dB above noise with you and almost no VHF receiver will take kindly to this level of abuse!

While on this subject, if you are going somewhere new, you should also be conscious of the locals who live in the 'death zone' around your station. Particularly if you are travelling somewhere remote, many of them may not be accustomed to big signals on the band and may not have engineered their stations to cope with this much RF. Equally, the attitude "Well, it's not my fault – get yourself a decent receiver" will do nothing to aid the general cause of contesting, or indeed your or anybody else's ability to use the site in the future! Some pre-contest planning, perhaps by contacting the locals, maybe via the local club, in order to explain to them what you are planning to do could go a long way to turning a potentially unpleasant situation around. They will then feel more involved in the situation and also if you understand the potential problems, you may be able to avoid beaming your 'death-ray' of eight yagis over the top of a particular local station's house more than absolutely necessary.

In all likelihood, the site you have chosen to use will be on private land – obviously you need to obtain permission from the land owner to use it. Even if the site is public land, be sensible – don't obstruct gateways, and paths, and don't damage any of the surroundings – basically, observe the Country Code.

ON A SMALLER SCALE . . .

IN ADDITION to the normal big VHF contests, there are a number of smaller contests coming up where you can try out a little portable contesting without having to transport the Sizewell B nuclear power station, the BBC Daventry antenna farm, and 2cwt of neat caffeine to the site. There are three remaining RSGB Backpackers contests on 12 June, 4 July, and 4 September. Full rules appear in the January 1994 *RadCom*, but essentially these are four-hour 144MHz low power portable events which are intended as relatively low pressure contests. A very useful information pack is also available to prospective entrants.

In a similar vein is the *Practical Wireless* 2m QRP contest on 19 June between 0900 and 1700.

On HF, CW field-day is the major event of the month and although entrants had to pre-register for this event in order to enable inspections, if you have not done so you can still go on and give some points away to the bevy of stations who will be active. If you are planning to enter the IARU 50MHz contest concurrent with HF NFD please see an erratum in *Contest Classified*. Also at the end of June is the 160m Summer Contest which continues to attract new entrants every year.

Andrew Kissack, GD0TEP/P, overall winner of the '93 50MHz Trophy Contest.

IARU

JOHN ALLAWAY, G3FKM
and
TIM HUGHES, G3GVV

WE HAVE discovered that some members would like a simpler description of the general background information about IARU and what it stands for! Please forgive any repetition of facts given at an earlier date.

Created in Paris in 1925 the International Amateur Radio Union has been the guardian and spokesman for the world amateur radio community for sixty nine years. Its objectives are the protection, promotion and advancement of the Amateur and Amateur Satellite Services, especially within the framework of regulations established by the International Telecommunication Union, and the provision of support to Member Societies in the pursuit of these objectives at the national level. The IARU structure is as follows: (a) the Member Societies; (b) the Administrative Council (AC); (c) the Regional Organisations; (d) the International Secretariat (IS).

(a) The highest authority of the IARU resides collectively with the **Member Societies**, who exercise this authority by voting in accordance with the Constitution. There can only be one Member Society in each country or separate territory and there are at present 135 of these.

(b) The *policy and management* of the IARU is carried out by the **Administrative Council** which consists of the President, Vice-President, Secretary, and two members from each Regional Organisation.

(c) The **Regional Organisations** are formed by Member Societies representing the countries in the following areas:

Region 1: Africa, Europe, the former USSR countries, Mongolia, and the Middle East (except Iran). At latest count there were 72 Member Societies in the Region.

Region 2: North and South America and Hawaii, Johnston and Midway Islands. It contains 40 Member Societies

Region 3: The rest of Asia and Oceania. This has 23 societies.

(d) The **International Secretariat** serves all Member Societies and it is operated by one of their number elected by the other societies. Most of the cost of this operation is borne by that society (at present the ARRL) but the Regional Organisations also help out by contributing a percentage of their annual membership receipts. The income of the Regional Organisations is provided by their Societies which each pay an annual contribution. The way in which this is worked out varies throughout the Regions. Region 1 has a flat rate per licensed member, Region 2 Member Societies pay according to the *total* number of licensed amateurs in their country regardless of the size of their own membership (this encourages membership drives!), and Region 3 has a sliding scale of fees per licensed member which get less per capita the more members they have.

POSITIVE INFLUENCE

ONE OF THE most important tasks of the IARU – which is not seen by the average radio amateur – is to try to influence positively both administrations and the ITU about the technological and social value of amateur radio. Positions affecting amateur radio are closely monitored and hopefully resolved well in advance of Conferences by Member Societies. Coordination between Member Societies is absolutely vital in their approach to regulatory bodies and good rapport with their own administration a 'must' in every case. Fortunately we in the United Kingdom have an administration which appreciates the value of the Amateur Services.

The recent first World Telecommunications Development Conference which took place in Buenos Aires between 21 and 29 March seems to have been a real success. It was attended by about 1800 delegates representing almost all ITU countries, and the IARU observer team in attendance was led by Larry Price, W4RA, and consisted of Max Raicha, 5Z4MR, Ron Szama, LU2AH, and Hans Welens, ON6WQ. The Conference was inaugurated by His Excellency Dr Carlos Menem (LU1SM), the President of Argentina, and was also addressed by Mr Al Gore, the US Vice-President, and a host of other dignitaries. Amateur radio was directly mentioned in a favourable way in two documents. One of these originated from a Disaster Communications conference which took place in Finland in 1991 and in which IARU participated, and the other came from the United Nations Department of Humanitarian Affairs.

The IARU is only too aware of the need for spreading the gospel about the benefits of amateur radio more widely particularly in the less developed countries. The STARS working group in Region 1 is specifically for this purpose and the two members of the team in Argentina who came from Region 1 were part of this group. Many societies encourage the development of the Amateur services on an individual basis – the RSGB often provides books and training materials and REF-Union (the French national society) is setting aside 14,000 FF in each of the years 1994, 1995, and 1996 to support the 'Burkina Faso' project as well as making special payments of 10,000 FF to the STARS projects in each of the years 1994, 1995, 1996, and 1997.

Pictured at the recent World Telecommunications Development Conference in Buenos Aires: (l to r) His Excellency Dr Carlos Menem, LU1SM, President of Argentina; Max Raicha, 5Z4MR, IARU Region 1, Africa; Luis Gomez, LU1BR; Dr Larry Price, W4RA, and Hans Welens, ON6WQ, Chairman Region 1 STARS WG.

LATEST NEWS

THE 1994 meeting of the Executive Committee of Region 1 took place in March. A wide range of topics was discussed and there was encouraging news about the work being done within the IARU Monitoring System, and good news about the development of amateur radio in Southern Africa, very largely the result of efforts by the South African Radio League and the STARS group. The new Russian Society SRR's application for membership was approved and a recent development is news of the formation of the Ethiopian Amateur Radio Society. A copy of a complaint sent to the President of ARRL by the Cyprus Amateur Radio Society concerning the possible recognition of 'Northern Cyprus' by the ARRL for DXCC status was discussed and it was noted that the stations operating from there had not been using callsigns issued by the ITU for use in Cyprus and should therefore not be contacted.

WHAT DO YOU THINK?

THIS COLUMN has now appeared in *RadCom* since June 1993. We are anxious to know whether it contains the kind of information that *you* find interesting and informative. Have we explained how the International Amateur Radio Union protects and supports *all* amateur radio activities and services? Are you clear as to how the IARU works with the professional services? Why does it function on a Regional basis, with an International Secretariat in the USA? What is the purpose of band plans, and why are these not mandatory? How would we all suffer if there were no IARU? Send us your comments. We will do our best to ensure that we give the background and news which is both relevant and readable!

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HF F-LAYER PROPAGATION PREDICTIONS FOR JUNE 1994

The time is represented vertically at two-hour intervals GMT 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	.....	.....	...1121.1231	..1334323563	435666656897	876544445689	753211112467	42.....35
MALTA	.....	.....11.	...1211113 41	1..344333673	523776667898	977655455789	886322223478	++3.....4+
GIBRALTAR	.....	.....	.....12.	22111352	3.1465555787	965765555789	987532223578	++42.....24+
ICELAND	.....	.....	.....	.....1...21	2.1134333465	755555555678	776432223356	4432.....23
** ASIA								
OSAKA	.....	.....	....111.1...	..1122222122	2112432245 64	....21..2463	.....13.	.....
HONGKONG	.....	.....1..	...1221123 1.	..1233224532	3112332346 76	2.....2465	142	.....
BANGKOK	.....	...11..1..	..1223213421	1.2334334643	3211232357 87	4.....2477	1.....145	2
SINGAPORE	.....	...111.....	..1233211...	1.2344333 21.	4211332345 52	4.....2467	1.....146	3
NEW DELHI	.....	...111..121.	..1233223 53.	1133343357 62	4322122357 87	63.....2478	3.....146	3
TEHERAN	.....11.	...1121.132.	..2334324662	1144443367 85	6452222357 88	852.....2478	63.....146	3.....3
COLOMBO	.....	...1121.1...	..1334324...	.1344544622 1	4322132355 65	73.....2478	4.....146	2.....3
BAHRAIN	....1..111.	...1121123 3.	..2434335663	2144444468 86	7552212357 89	862.....2478	73.....146	4.....23
CYPRUS	....1..121.	...2221124 41	1.2455445774	3146676678 97	8676555668 99	985332233588	8631....1357	53.....24
ADEN	....11.12..	...1122235 11	1.1434446744	3144344568 77	8663112357 89	873.....2478	751.....146	42.....23
** OCEANIA								
SUVA/S	.....	.....	.....1.	..1111111.121	1134332214 52	..2321..1331	...1....11.	.....
SUVA/L	.....	11	2..1.....43	3213.....65	2246 1...164	..342...341	..11....11.	.....
WELLINGTON/S	.....	.....	.....1.	..111.....32	2244 3111..64	124321..1253	..11....13.	.....
WELLINGTON/L	.....	1	2.....4	421.....6	5453.....36	23441...153	..21....131	.....
SYDNEY/S	.....	.....	..1221....1	..2442....2	2245 4311 2215	21232...2454	...1....142	.....
SYDNEY/L	.....	2	3.....5	51.2.....7	5335 1.....27	21242...154	...1....131	.....
PERTH	.....	...112.....	..2344.....	1135551....	5334 4321 111.	52111...1351	2.....145	3
HONOLULU	.....	.....	.....	....111.2211	1133 3221 3421	.1332 1..12..	..11.....	.....
** AFRICA								
SEYCHELLES	.....111...	...211223...	..1433446 3..	..3544557 52.	4353222356 64	863.....2478	741.....146	4.....23
MAURITIUS	....11121..	...2122243..	..1445546 621	..3545557 743	4.642323578 8	8341....2478	751.....146	42.....24
NAIROBI	.....1122..	...1233 45..	..1434557 721	2.3544557 853	7364222347 87	8751....1478	762.....146	43.....24
HARARE	.....1234..	...1123456 11	2..4445678 44	5.1654557 877	9346322347 89	8763....1478	7631....146	43.....24
CAPETOWN	.....121...	....2134 3...	...3445662..	...5655565 1.	1..6532346 52	64.32...1477	7621....146	44.....3
LAGOS	.....12352.	....2134574.	1..3434678 711	3215644568 94	8756422246 88	9863 1...1478	7741....146	44.....3
ASCENSION Is	....1..1242.	....2112464.	....5334687 1	....6444689 3	3...5322468 8	8512 2...1468	7731....146	44.....3
DAKAR	....1..1243.	....2113365 1	2..2533558 84	5214644458 97	9756532226 89	8864 2....368	7741....146	44.....3
LAS PALMAS	.....12.	....2111134 1	2..1543446 74	5114765668 97	9657766667 99	9976433335 89	88532 1..1257	+52.....24
** S. AMERICA								
Sth SHETLAND	.....121..	.....333..	.....2566 1.	.....3567 3.	....1224 672	323.1...1367	7641....146	44.....3
FALKLAND IS	.....1133.	.....13355.	.....3558 8.	.....1456 891	3.1..2224 686	8552 1...1368	7741....136	44.....3
R DE JANEIRO	.....1123.	1123552	1....3355 785	42...5455 788	863.1322 3589	8862 2....258	7741.....36	44.....3
BUENOS AIRES	.....1123.	.....1224 52	3....1345 685	621..3455 788	9752.3223 579	8864....1248	7741.....26	44.....3
LIMA	11	11132	3...1.233355	61.1313 44467	9634 5222 247	8864 21....14	7641.....2	44.....
BOGOTA	.....1.	.....1..22	3...2222 245	61.1233 43357	8634 4322 2136	8864 21....4	6641.....1	33.....
** N. AMERICA								
BARBADOS	.....1.	.....1.11132	3...1323 2355	61.1243 33367	9634 4322 1257	8864 21....25	7641.....2	44.....
JAMAICA	.....	11	2....1121 134	51...2332 246	8533 1322 1126	7864 21....3	4641.....	.3.....
BERMUDA	.....	11	2....2121 134	51...3332 256	8532 3322 1246	7863 21....14	5641.....1	23.....
NEW YORK	.....	1	1....1111 13	41...2222 235	7521 1322 2236	6853 21....13	3631.....1	.3.....
MEXICO	.....	1	1.....1112 3	31....1221 34	6422..2221 13	4753 11.....	1531.....	.2.....
MONTREAL	.....	.....	1....111.13	3....1222 135	7421 1322 2236	6753 21....13	3631.....1	.3.....
DENVER	.....	.....	.....	2.....1112	4431..1221 23	3653 11.....	.331.....	.....
LOS ANGELES	.....	.....	.....	1.....11111	3332...2211 2	1453 2...1...	.231.....	.....
VANCOUVER	.....	.....	.....	1.....111	3332 2111 2222	1353 21...1...	.131.....	.....
FAIRBANKS	.....	.....	.....	....11.....	2233 2112 2222	1233 21..1211	..11.....	.....

The provisional mean sunspot number for April 1994 issued by the Sunspot Data Centre, Brussels was 16.7. The maximum daily sunspot number was 40 on 24 April and the minimum was 0 on 3, 6, 7 April. The predicted smoothed sunspot numbers for June, July and August, are respectively: (classical method) 29, 27, 24 (±6); (SIDC adjusted values) 19, 17, 14 (±4).

QSL

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

QSL Sub-Manager for the GM0AAA-LZZ series is now G W A Spiers, GM0AGN, 43 Sheuchan View, Stranraer, Dumfries and Galloway DG9 7TA.

Shown opposite is another QSL card from YO0RAR. The call is issued by RARE, an organisation involved in providing radio support for relief expeditions to other countries. The design is by a Romanian child and the station will be active from the end of June to the end of August this year. My thanks to Robin Dellbridge, G0PMG, for the information.

Joe Glover, G3FIC, wrote asking whether there is any truth in the rumour that we hang on to cards at the Bureau for various reasons before sending them out to the Sub-Managers. Well, the simple answer is we don't. What we do is wait until a box is full for the busy call series, which in some cases is about four/five weeks, and try to send those boxes for the less energetic suffixes out at reasonable intervals regardless of how full they are.

I haven't been able to think up a better method that is compatible with the bureau sorters' sanity as yet, but we are always open to sensible suggestions! The Sub-Managers sort them as soon as they can but the biggest problem we have is non-collection by some customers. Deryck Buckley, G3VLX, who is Sub Manager for the G3R and G4R series, told me about a card he spotted which was destined for one of his customers. It read: "I know you said you didn't collect cards from the bureau" but I'm sending you one anyway'. The logic of that escapes me just at the moment!

I am reliably informed that the new club station in Brunei is: V85BG, PO Box 373, MPC 3703, Brunei, SE Asia. I am also told that the QSL bureau in Brunei has closed for the time being and the only safe way to QSL to that destination is by direct mail.

I have received a plea from Ian Batley, G0IID, who is one of our long-suffering QSL Sub-Managers. Ian says he recently received a batch of envelopes measuring 16" x 10". The weight of each empty envelope was 20 grams! They each had one first-class stamp on them. Another punter sent Ian a 9" x 5" x 1/2" Jiffy bag – we do serve some strange people don't we? Ideally, envelopes should be A5 size – this will hold about ten cards for a first-class stamp. Or if you want your Sub-Manager to wait until there are more cards to send out to you, send in an A4 envelope – but remember to put an extra first-class stamp on the outside to cover the extra weight.

Envelopes should be sent in batches; the final envelope of the batch should be marked "last envelope". When you receive this you will realise that it is time to send your Sub-Manager another batch. If you wish to receive less than the maximum weight for each envelope – mark "wait 6" etc on the front corner. More information can be found in the *RSGB Call Book and Information Directory* [see RSGB *Book Case* p94 – *Ed*]

John Purvess, G0FWP, is the G8AAA-ZZZ QSL Sub-Manager and he has a large quantity of cards for C31PA (Andorra) routed via G8DAY. However, G8DAY has not been to C31 – ever! Could be a pirate I suppose, but can anyone suggest any other solution?

John Redmond, RS95112, sent me a card – shown on this page – he sends to stations as a thank you 'for giving him so much pleasure in the hobby'. Nice thought. He also sends a card on which is a poem in commemoration of the Normandy Landings which is also a nice thought.

A Makowski, SP5DIR, tells me that any amateur that still requires a QSL card for AR5N (WPX Contest CW 1993) or AP5N (CQ WW DX Contest 1993) should contact him at PO Box 36, 00-976 Warszawa 13, Poland. He is leaving Pakistan very shortly, has had the cards printed for his AP operation and foresees no problems in despatching them.

ADVICE FROM A DX CALL

ROGER WESTERN, G3SXW, of Tristan da Cunha fame, has written with some worthwhile tips for those DX punters who want to receive cards from rare call areas. Roger says he has QSLd about 12,500 for ZD9SXW so far and is still writing! However, he says his life, and that of others like him, would be made a lot easier if some customers would observe a few simple rules. They are:

(a) Put your own call prominently on the front and back of your card.

(b) Avoid using QSL cards with over-fancy deigns especially those that make it difficult to decipher your call. Design your card so that the QSO details stand out from the rest of the text.

(c) Always enclose an addressed reply envelope of a size that will comfortably accommodate a QSL card. You don't know how difficult it is to open an envelope containing a card that fits it exactly!

(d) If you can, use pre-stamped envelopes rather than sending IRCs or Dollar bills.

(e) ***Do write clearly and give accurate QSO details!***

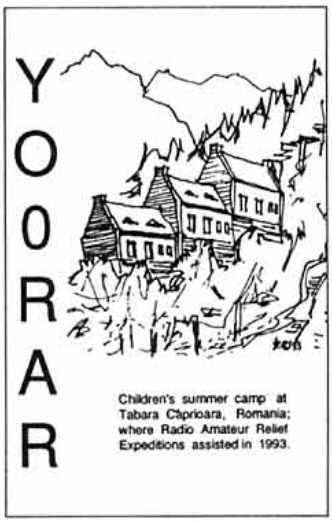
(f) If you had a contact that was a little uncertain (and who hasn't?) then enclose a note that lists the callsigns worked immediately before and after your own contact. This helps track your contact down and identify your call if logged incorrectly at the DX end. [But surely that invalidates the QSO, so no QSL should be returned – *Ed.*]

(g) Do not fold IRCs or dollar bills. Just slip them in between the return envelope and your own card. If they are going to get nicked, folding them up will not stop a thief and it wastes enormous amounts of time at the DX end just unravelling and flattening them!

(h) Finally, if you do QSL direct then do not send a duplicate via the Bureau. That is just a waste of time and money.

Roger says that every QSL manager and DXpeditioner will be eternally grateful if customers will just observe these minor requests. Remember that Roger made 23,300 CW QSOs from ZD9. He is just about half way through QSLing them!

QSL card commemorating the 75th anniversary of first powered sustained flight on 16 October, 1908, by Col Samuel Franklin Cody at Farnborough.



A RARE QSL card from Romania.

John Redmond's, RS95112, QSL card.

AWARDS

THE WORKED All Britain award is 25 years old this year. To commemorate that milestone there is, amongst other things, an expedition to N W Scotland and the Western Isles by G7BXA in June 1994. Activity will be between 10 and 24 June on 144.222, 50.122 and 50.22MHz. Lots of rare WAB areas and locator squares will be activated and a special QSL card and award will be available.

ICS

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Just the best paddle driven keyer in the world. Nothing comes close. All the features for the experienced contester. Interactive training modes to delight the beginner. Even offers live QSO practice before going on the air!

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Hardware and software for automatic tracking of satellites. Automatically controls the Yaesu 5400/5600 Azimuth-Elevation rotors

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VISA

SWL NEWS

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

AS WE head into the summer months, the time comes around again when those SWLs who take an interest in the VHF bands are rubbing their hands with glee at the prospect of decent tropho-spheric conditions on 144 and 432MHz and good Sporadic-E propagation on 50Mhz (and 144MHz).

On the 50MHz Sporadic-E front the exciting news at the time of writing was the DXpedition by some members of the UK Six Metre Group Committee to Jordan (JY). Favourable conditions to the near East allowed the log-ging of 5B4, 4X4, OD5 and ZC4 in the past, so we are hopeful of adding an extremely rare country to those which have already been heard from England on 50MHz.

Because few listeners swop HF for VHF in the summer, I will not dwell to long on the possibil-ities on those bands over the com-ing months. Instead, it is time to reprise my 1993 CQ World-Wide SWL Challenge which took place in January of this year.

CQ WW CHALLENGE

THE RESULTS had been delib-erately delayed in the hope that logs from our friends in the USSR would be received. I am aware that postal services are poor, but as no logs had arrived by Easter I assumed that none was com-ing. However, 42 logs were re-ceived.

This represents the best re-sponse to an SWL event in this country for as long as I can re-member – perhaps ever. Logs arrived from 11 countries – ON, G, I, PA0, F, OE, HB9, DL, SP, EI and SM.

The challenge saw surprising-ly good propagation conditions, especially in view of the state of the sunspot cycle. Indeed, 141 countries were heard on 28MHz. There were 149 logged on 21MHz, 133 on 14MHz, 139 on 7MHz, 104 on 3.5MHz and 57 on 1.8MHz.

193 countries were heard in all. It would be interesting to know how this compares with the coun-tries total worked by one of the big European contest groups, for example, G0KPW.

As the event took place a while ago, I do not intend to look at what individual band conditions were like, or what the best DX was. However, I have produced a 12-page results booklet, which can be obtained by sending 1 IRC and a large SASE to me at the above address.

Needless to say, the event was won by Jean-Jacques Yerganian, ONL383, a regular participant to listener events. He amassed 900,000 points and finished well clear of second-placed Robert Small, BRS8841, who had been inconvenienced by a three-hour power cut.

Francesco Fucelli, I0-8941-PG came home in third spot, with another British listener, Philip Davies, RS95258, finishing fourth. Several excellent check logs were received, especially from Arthur Miller, an ex-BRS listener who, if he had had time before an excursion to the Far East, would have managed sec-ond place with a score of over 780,000 points. I make no apolo-gies for publishing the full results as it makes a wonderful change to see so many listeners listed in a contest results table.

HF REVIEW

AS I WROTE this shortly after the Easter holiday, it was fresh in my mind how bad conditions were.

My 10-year-old daughter Clare used my station and came 16th in the challenge.

Unfortunately, they were so bad that I could not hear T33CS on 14MHz on any of the four days that I listened. A real pity because it would have been my 328th and final DXCC country. Also inaudi-ble with me was BO0K (from Kinmen Is, Taiwan), although the 9M0A trip to Spratly Is was weak, but audible. The other DXpedition of any note over the Easter peri-od was XX9TZ, which was 5x9 on several occasions.

I was also alerted to the pres-ence of a station signing 7O1AA on 14MHz. This was Ahmed, ex-HZ1FM, who is apparently a Yemeni subject – but again, sig-nals were weak. Koh Samui Is-land was active again in early April, E28DX being a particularly good signal on 14MHz at 1630 on 9 April. In fact, conditions to the Far East were good at that time with good signals also heard from XX9AS and 9M8BL. At the end of March, GM4SXU/P activated Rockall for four-and-a-half hours. The first time there had been amateur radio operation from the island.

Looking back a little, 3Y0PI gave Albert Tideswell, BRS48462, his 302nd DXCC country on the 3.5MHz band. In CQ WPX, Philip Davies, RS95258, reports that the 'hard luck' story of the month was an Italian calling ". . . . CQ, listening 7.195", whilst VS6WO was call-ing CQ on the Italian's transmit frequency!

Looking forward, those listen-ers who like to monitor special event stations might like to look for GB50OL from 3 to 7 June. The station celebrates the 50th Anni-versary of Operation Overlord – the D-Day landings and will be active from the control tower of RAF Little Staughton, home of 'The Pathfinders'. QSL via G0EYM.

CQ WW SSB SWL CHALLENGE
30/31 October 1993

Posn	SWL Mults	Total	28	21	14	7	3.5	1.8	Checked Score
1	ONL383	544	113	111	104	103	71	42	900,864
2	BRS8841	415	84	79	67	75	65	45	485,965
3	IO-8941PG	325	70	90	46	54	39	26	320,450
4	RS95258	335	54	85	57	57	49	33	309,205
5	BRS94761	317	48	53	61	66	48	41	242,505
6	NL-10175	298	60	64	55	64	56	–	230,950
7	F-10255	302	63	68	45	59	40	27	221,366
8	F-13145	239	41	46	38	52	31	31	135,752
9	OE1-0140	236	56	59	46	40	28	7	131,452
10	RS88887	225	37	47	39	47	36	19	117,225
11	HE9JAT	229	39	42	46	42	37	23	110,149
12	G-20048	216	33	38	35	45	38	27	104,976
13	REF 51089	208	35	54	49	25	28	17	103,584
14	F5JBR/SWL	217	35	52	44	48	23	18	98,084
15	RS95145	187	26	47	46	46	22	–	84,524
16	G-SWL/Clare	148	44	57	30	17	–	–	62,308
17	F-10370	149	21	35	35	32	20	6	60,643
18	DL-SWL-Kropf	154	–	55	40	27	22	10	57,596
19	SP4-208	157	20	50	31	30	26	–	51,182
20	IO-7080AN	130	26	20	35	17	32	0	46,930
21	SP2-0189-GD	134	5	56	28	15	30	–	38,994
22	NL-10704	115	19	41	23	26	6	–	38,525
23	IO-67307	131	21	41	20	14	21	14	37,990
24	EI-20449	129	–	29	29	45	26	–	33,153
25	SMO-7730	116	26	30	28	17	15	–	29,232
26	IO-8939PG	101	9	13	19	20	36	4	26,361
27	SP-0356-WA	116	–	35	28	27	26	–	23,896
28	F-11556	107	–	16	24	24	27	16	20,437
29	NL-290	98	–	13	26	24	35	–	19,796
30	G-20637	95	–	19	26	28	22	–	16,435
31	I7-1237/BA	90	–	26	30	14	20	–	13,500
32	SP2-0601-BY	75	–	–	22	25	28	–	9,750
33	BRS95103	56	9	15	–	29	–	3	8,960
34	BRS62088	55	–	–	55	–	–	–	8,085
35	NL-11553	54	–	26	28	–	–	–	5,076
36	F-12487	49	–	11	33	2	3	–	3,969
37	F11AJB	38	–	18	18	2	–	–	2,812

WHITE ROSE AWARD

TO PROVE yet again their will-ingness to support the SWL movement, the White Rose ARS have asked me to mention their Award, which is available to lis-teners who amass fifty points hearing stations in Yorkshire (which count three points) and one of G3XEP, GB2WRR, G8LVQ, G8WRS or GB8WRR (which count ten points).

It seems there have been no SWL claims for sometime. QSL cards are not required – simply send a list of the stations heard, together with £3 for the Award, to the WRARS Awards Manager, 57 Green Lane, Harrogate, North Yorkshire HG2 9LP.

FAXIMILE

NEWS, ETC for the **August** col-umn must be received no later than **16 June**. In the meantime – happy listening!

NOVICE NEWS

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

I HAVE BEEN ASKED to correct two items in the April issue. First, the Marconi station GB2IMD was manned by the Cornish Radio Amateur Club at Penair School. GB2GM is the permanent special event callsign of the Poldhu Amateur Radio Club who manned that station. The GB2GM callsign can only be used by club members – and only at Poldhu itself.

Wally, G4NBF, told me the history of the very first signal received from Poldhu to St Johns in Newfoundland in 1901. It consisted of three dots (S) and I think it can truly be said that this represented the birth of amateur radio.

Second, Richard and Christopher were correctly identified in the photograph but the text had them the wrong way round. Richard is now G7RVV and Christopher (who was fourteen in December) is now G7RVQ. The race is on for the next step. Christopher is interested in Packet and is looking at satellite working which may slow him down as he also has the Duke of Edinburgh Bronze award in his sights – using his amateur radio achievements.

Both Richard and Chris took part in JOTA (GB4PSD and GB2PSD) over the last two years. With help from some of the other local amateurs, the Torfaen Scouts Amateur Radio Club, GW0UKT, has been formed; this meets on the second and fourth Wednesday of each month, operating mainly on 80 metres. With fourteen Scouts and eleven leaders in the Club, a secretary and a QSL manager were needed so Richard and Chris volunteered. In May one leader and a scout will sit the RAE and one scout will sit the NRAE with another scout booked for the next course.

One final point. Richard and Chris have asked me to express their gratitude to Con, GW0FJH, for the help and encouragement he has given to all the students he has brought to exam standard. Other 2W Novices, please note – Richard and Chris are looking for you – but so far they haven't found any of you.

PROFILES

IT IS SOME time since this item was featured – so here it is. First from Enfield in Middlesex Robert, G4OBE, tells me that Beth (2E0AEC) and Mary (2E0AEF) passed the RAE exam in December and Beth is now G2XG (her father's old callsign) and Mary is G0UMF. George (2E1AQQ) is now 2E0AHI, Alex (2E1CIS) is now 2E0AHF and John (2E1CIS) is awaiting his new callsign following his success in the Morse test. Margaret (Robert's Mum, 2E1AQS) will hopefully be the next. With Robert a keen participant in the VHF NFD event and the WAB VHF contests to come, he can count on help and support.

The April course is up and running with the next one in September fully booked. He is now Senior Instructor for Greater London and asks if there is anyone out there who would like to become an Instructor – especially in the Inner London Area and South London. If you can help, he would be pleased to hear from you. And so, I am sure, would many would-be Novices.

Young Amateurs In Scotland (YAGIS) report that all four of the Novices who took the December RAE passed. 2M1ARL became GM7RTH, 2M1ATQ became GM7SBB and 2M1CGL has not yet applied for the new callsign. 2M0ABX still holds the Novice Class A callsign and also GM7RQH. Congratulations to you all. I believe their record of 100% success still stands. Thirteen candidates will sit the June exam – they are hoping to prove that it is not an unlucky number!

Hugh, GM0HCS, sent in the information adding that Glasgow Caledonian University is their new exam centre with Barry, GM3YEH, the new exam secretary. Because of this Hugh has taken over as Chief Instructor for Strathclyde. He is hoping to recruit more Instructors – so if you interested get it touch with him.

EXAM REPORT

OUT OF 262 candidates taking the December NRAE, there were 216 successes – giving a pass rate of 82.4%. I sincerely hope that the 46 unlucky ones will try again. These figures were given along with the breakdown of the March exam.

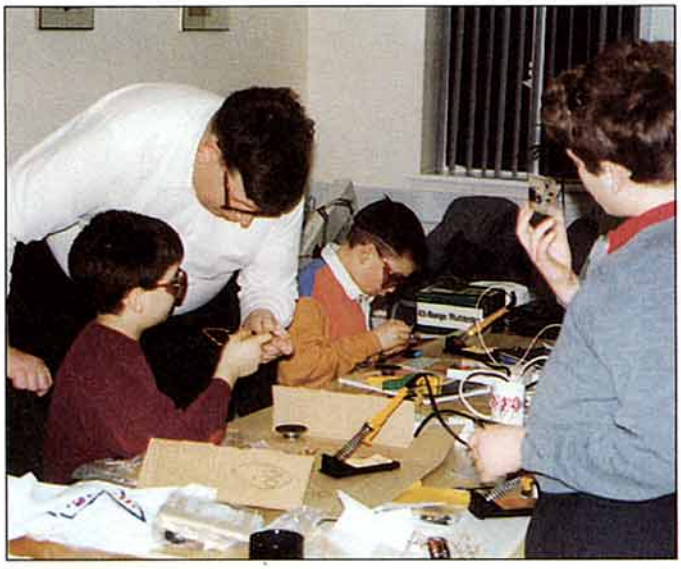
There are still broad areas where candidates have problems. 84% of candidates answered correctly a question about the colours of a three-wire mains lead which is encouraging – but 52 wrong answers were given – with five believing that the yellow/green wire should be connected to line. Exam nerves may account for some of these but only 100% correct answers to this could prevent future accidents.

Licensing conditions were well answered generally although the suffix when operating at a temporary location caused problems – as it does to many amateurs!

Out of four questions on measurement, three caused some problems. The position of meters in the circuit to measure voltage and current, and the meter range to use – only a third knew how to measure the DC input of a transmitter's power amplifier stage.

Although the pass-rate was in the usual range, City & Guilds' general comments are disappointing: ". . . . several instances of incorrectly answered questions . . . . considering the candidates had followed a practical course on instruction. Better preparation would have been appropriate in some cases" This is not to imply that Instructors are doing a poor job – but perhaps some students are not relating correctly to the questions being asked in the exam room.

This report is issued after each exam, when all papers have been marked – and would make good reading for anyone involved in student training. To get a copy, send to RSGB Headquarters marking the envelope 'C & G Novice Report' and enclose an SASE.



Senior Instructor for Greater London, Robert, G4OBE, with a Novice class.

HELP!

SPECIAL EVENT stations often raise a great deal of money in one way or another for various charities. I am telling you about this one early to give you the chance to get into shape – and get a team together to tackle the Krypton Factor Assault course at Bury in Lancashire.

The Children's Hospital Appeal aims to raise money to provide intensive care equipment at Booth Hall and the Royal Manchester Children's Hospitals. Teams of four are needed. Minimum age is seventeen – there is no maximum if you feel up to the challenge! The individual team raising the highest amount of money will win a dream holiday to Orlando, Florida which should prove a good incentive!

The event will take place over the weekend 27/28/29 August. If you would like more information now about the team event so that you can decide to compete – and find sponsors, contact Kevin Hudson, G0TOG, 20 Claude Street, Manchester M8 5AW, or a send a message on Packet to Keith, G3RTU, at GB7CHS. Advance entries only please, entries cannot be accepted on the day.

AND FINALLY

PETE, G3ICH wrote to express concern that the item 'Fists' (April) may have implied that "do not waste time correcting errors that are obvious" meant that this referred to badly sent characters leading to declining standards. This is not so.

George, G3ZQS, meant the sort of spelling error that does not alter the meaning of the text. He makes this clear in the latest Newsletter citing the example "my fiend Fred" having the "r" missing. I apologise if I gave the wrong impression – and I am grateful to Pete for pointing it out and giving me the chance to set the record straight.

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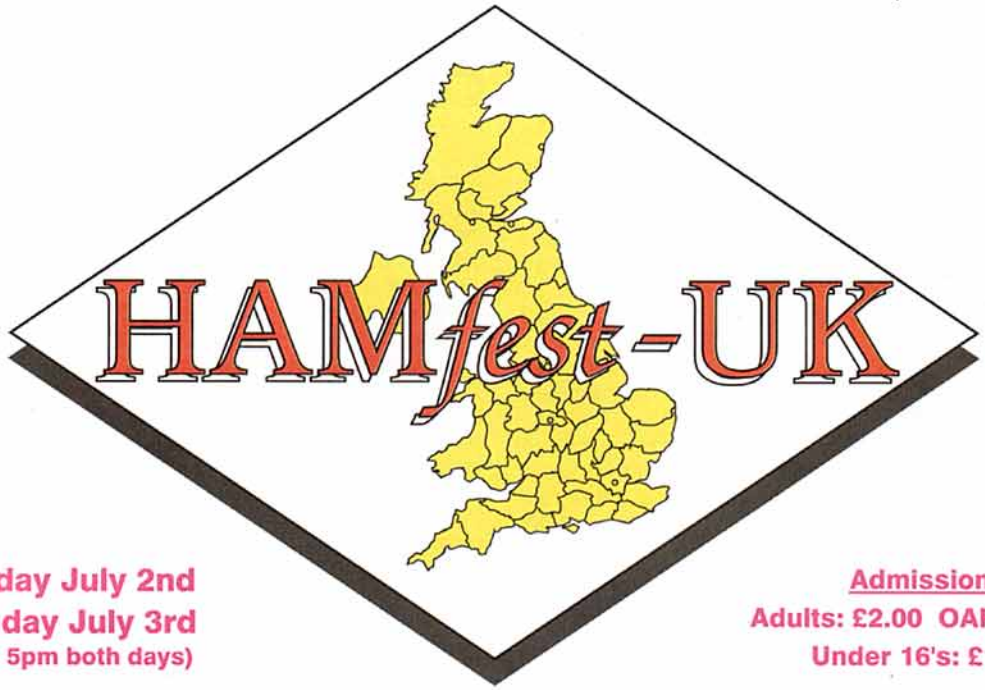

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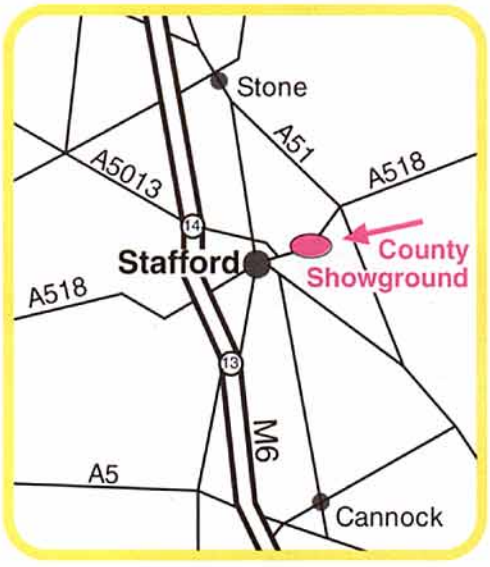

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Novice Note Book

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

IN THE APRIL EDITION of Novice Notebook I described a versatile construction and test console. I will now describe the power supply which forms part of this useful addition to your shack.

POWER SUPPLY

THE BASIC POWER SUPPLY unit (PSU) provides variable DC voltage of 1.4 to 30 volts at 1 ampere. An additional circuit can be added to extend the lower voltage range so that the total voltage range is from approximately 0.2 to 30 volts.

The mains transformer for this PSU should have a secondary winding of 24V AC at 1A. The transformer I used in this project had two 24V AC windings at 0.5A, which I connected in parallel, see **Fig 1.** You could use a transformer with two secondary windings of 12V AC at 1A connected in series.

The toroidal mains transformer is the most practical because you can wind additional turns for a negative DC volts source for the additional range circuit described above.

The PSU is designed around the LM317 voltage regulator chip. It carries out the complete control functions of the PSU with a handful of extra components. With the exception of the transformer and the optional metering all the components are mounted on a PCB, see **Figs 2 and 3.**

A bridge rectifier comprising D1, 2, 3 and 4 rectifies the 24V output from the transformer and C1 and C2 are used as reservoir capacitors. Two pins adjacent to D1 and D2 can be used to connect additional reservoir capacitors 'off board' if they are considered necessary, however the onboard capacitors will be adequate for normal use. The resulting 34V developed across the capacitors (Vrms x 1.414) is regulated by the LM317 to give a variable voltage supply. The LM317 is controlled by a variable resistor connected between pins A and B.

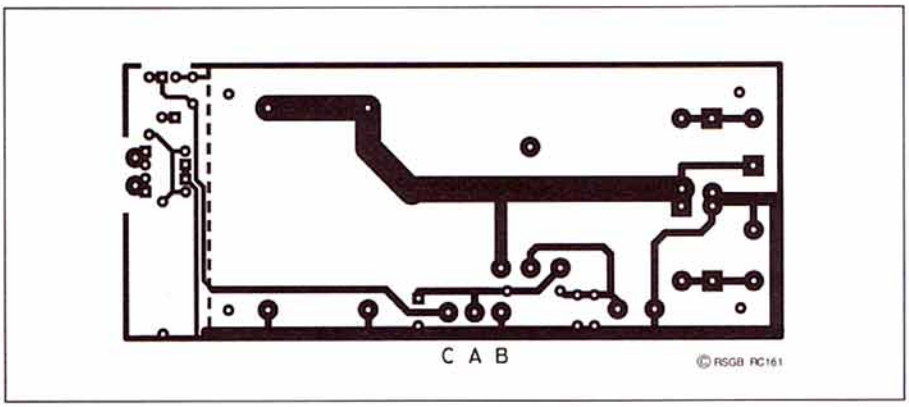


Fig 2: Power supply PCB foil pattern.

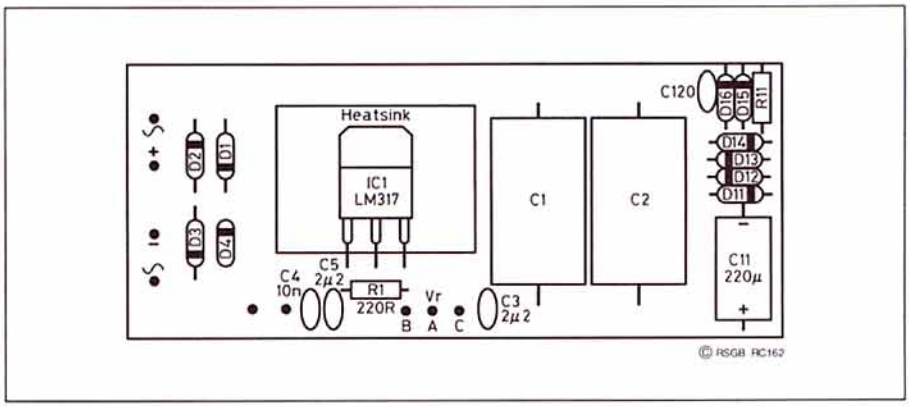


Fig 3: Power supply PCB component layout.

The voltage cannot be reduced below 1.4V even when the control pin is at earth potential. The reason is that the LM317 requires a differential of about 1.4V between the output pin and the control pin to function. However, if the control pin is taken to a negative voltage then the output can be reduced to around zero volts.

The additional circuit to produce the negative voltage is shown in Fig 1. I used a toroidal mains transformer on which I added a 25-turn additional secondary winding. When the AC voltage is rectified by D11 to D14 and smoothed by C12 it produces 3 volts.

The negative voltage must be stable; any slight variation will be amplified by the LM317 to cause fluctuations in the PSU output. I found it more practical to use –1.2V supply because it is easy to obtain this stable negative voltage using two silicon diodes as voltage stabilisers. When current flows through a silicon diode about 0.6V is developed across it; two diodes in series will develop 1.2V, very near to the voltage we require. With the positive side of this supply connected to ground, R11, D15 and D16 gives the required –1.2V. The output of the supply can now be varied from about 0.2 to 30V with a variable resistor connected between A and C.

METERING

YOU MAY LIKE TO ADD metering to your PSU. This is not essential; the variable resistor could be calibrated in output volts. However, a voltmeter gives some assurance that the output voltage is correct and a current meter can be used to monitor the current being drawn from the PSU.

The circuit I am going to describe uses a meter that can be switched to measure voltage or current.

Choose a meter that is calibrated in milliamps or microamps. A meter calibrated in volts or amps will normally have internal multiplier resistors or current shunts respectively. I would suggest that a meter calibrated

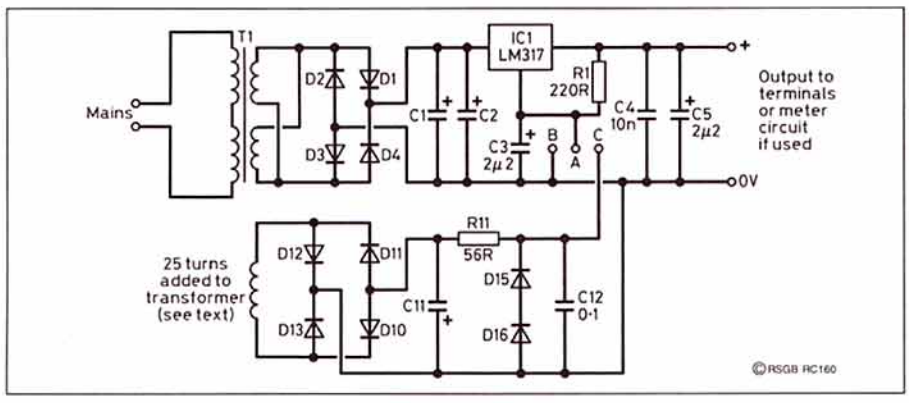
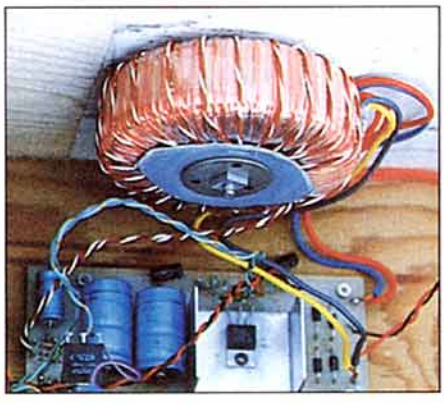
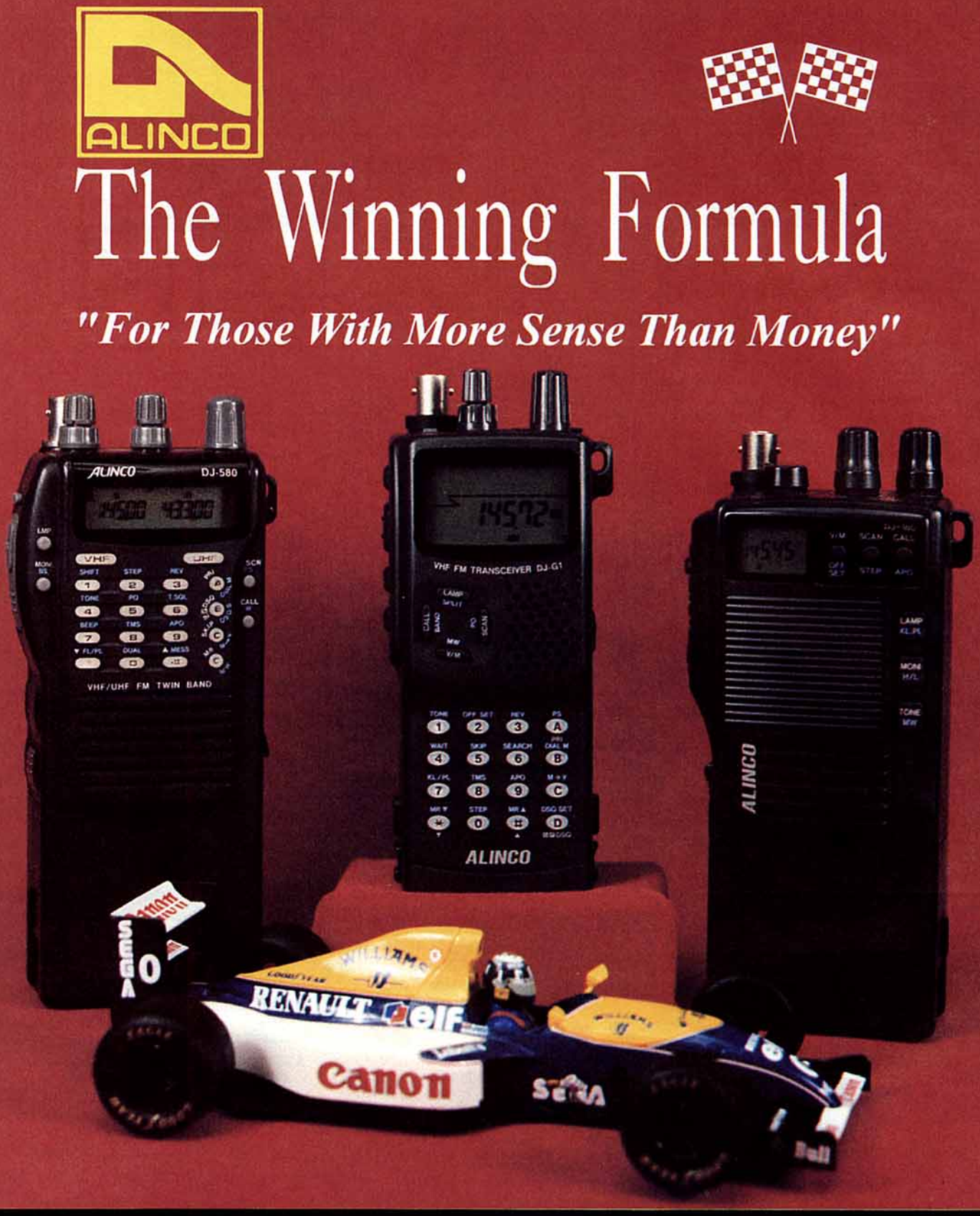


Fig 1: Power supply PCB circuit diagram.



The power supply unit in position.



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between 1 and 10 milliamps (mA) would be ideal.

METER CALIBRATION

LET US FIRST CONSIDER a meter having a full scale deflection (FSD) of 10mA, used to measure a current of 1A (1000mA). What is required is a bypass circuit on the meter to shunt 990mA so that only 10mA flows through the meter.

To make the meter current shunt, start by fitting two solder tags to each terminal of the meter. The shunt resistor has a very low value and is made from a length of 22SWG enamelled copper wire. Start with a length of about 30cm (12 inches). Scrape the enamel insulation off the ends and solder to the two spare terminals on the meter.

The meter and shunt can now be calibrated using the variable voltage PSU and a multimeter set to the current range. Connect the test set up, using a 12V 12W bulb as a load, as shown in **Fig 4.**

Set the variable resistor to minimum voltage and switch on the PSU. Note the deflection on the meter being calibrated and adjust the PSU voltage until it reads FSD. Now read the current on the multimeter. Let us assume that the new meter is reading FSD and the multimeter is reading 300mA. This tells us that the shunt is passing 290mA, which is not enough.

We need to more than triple the current through the shunt to bring it up to 990mA. Although the change in length of the shunt could be calculated it is more practical and quicker to do the job by trial and error. For example, three times the current requires one third of the resistance. All that is required is that the length of the shunt wire is reduced so that it is one third of the original length. Remove one end of the shunt wire, cut off two thirds of its length and reconnect.

Reduce the PSU voltage control to zero and turn on. Increase the voltage until the meter being calibrated reads FSD and check the multimeter. The current on the multimeter might now read 925mA and the cut an try procedure would have to be repeated until the meter under calibration FSD and the multimeter reading of 1A coincide.

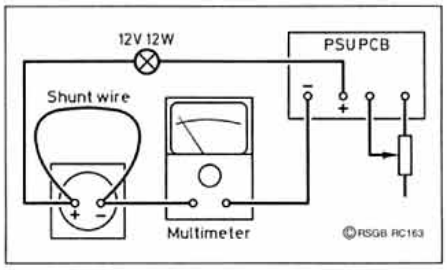


Fig 4: Meter current calibration.

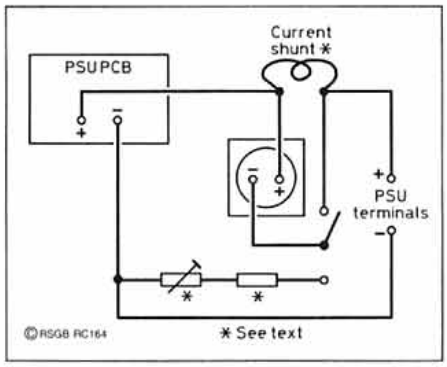


Fig 5: Power supply meter switching.

To physically shorten the shunt, wind it as a spring on the shaft of a screwdriver then slide it off. It can then be fitted to the circuit, as shown in **Fig 5** quite easily.

Unsolder the wires from the test circuit to the meter.

As our meter is required to have a second function of measuring the output voltage of the PSU a switch is required on the panel to switch between volts and current. The meter shunt is left in the PSU circuit all the time and the meter is switched across the shunt; this means that the switch has to carry only the meter current and not the high current of the PSU. A resistor must be connected in series with the PSU 10mA FSD meter to enable it to read volts. In this instance we require a FSD voltage of 30V and the meter requires 10mA for FSD. By Ohms law R = V divided by I = 30 divided by .01A (10mA) = 3000Ω.

The meter itself has an internal resistance. In the case of our milliamp meter it is certainly going to be small, say 1Ω. Theoretically this should be subtracted from the series resistor but in practice it takes a very sharp eye and a highly precise meter to be able to read better than 2%.

3000Ω is not a standard value. It can be made up from a 2k7 in series with a 270Ω in series with a 27Ω which would give 2997Ω, which is probably close enough for a voltmeter used in this application.

You could use a 2k7 in series with a 470Ω preset and calibrate the meter with a multimeter. The 470Ω preset would have to be adjusted so that the meter FSD and the multimeter reading of 30V coincided.

COMPONENT LIST

Resistors

R1	220 R 1/4 watt
R11	56 R 1/4 watt

Capacitors

C1,2	1000µF 40Vwkg
C3,5'	2µ2 30Vwkg minimum
C4	10n ceramic disc 60Vwkg
C5	0.1µf 60Vwkg
C11	47µf 25Vwkg

Semiconductors

IC1	LM317
D1,2,3,4	1N4003 (any of 4000 series)
D10,11,12,13,15,16	1N4148

Additional Items

T1	Mains transformer, see text

RADCOM NEWS FEATURE

Inside the RSGB Intruder Watch

by Chris Cummings, G4BOH, Coordinator

THE RSGB Monitoring System, more popularly known as the Intruder Watch, is part of the IARU Monitoring System and is the main method by which we defend our exclusive bands from illegal intruders. Many IARU countries have similarly based groups and coordinate their activities in each of the three world ITU regions.

The Intruder Watch was first established in the early 1970s and operated successfully up to the mid 80s. Activity faded at around that time but the group was then re-started several years ago and became operational again thanks to much hard work by David Owen, G0OES, who handed over to the current Coordinator, in July 1993.

There seems to be a certain amount of confusion regarding the role and methods employed by the Intruder Watch. There is a tendency to confuse our activities with those of the Amateur Radio Observation Service (AROS), which is currently being reorganised and whose role includes reporting on licence infringements and bad operating practice by licensed amateurs.

The job of the Intruder Watch monitor is to send in a log of all non-amateur transmissions heard in the exclusive amateur bands. A small number of monitors report regularly to the Coordinator and a number of others send in reports on an occasional basis. Once the Coordinator receives the logs for the month, a report is prepared and details of the various intruding stations are sent to the Radiocommunications Agency Monitoring Station at Baldock in Hertfordshire.

Baldock Liaison

THERE IS normally discussion between the IW Coordinator and the Liaison Officer at Baldock at this point and further details of the more persistent intruders are provided. These can include operating times, mode of transmission and occasionally message content, along with positive identification of the offender in some cases. This enables confirmatory observations to be made by Baldock so that official action can be taken. Often a telex message to an administration which 'owns' an intruding station can get it moved, particularly if the use of the frequency is a mistake as is sometimes the case. It should be said at this stage that the cooperation and assistance which we receive from Baldock are outstanding. Their international profile as a leading monitoring station enables them to achieve results by means of personal contact with overseas and UK administrations which would be all but impossible without their involvement. [See *RadCom*, June 92 for a full description of the work of Baldock- *Ed*]

It should not be thought that informing an administration that one of its transmitters is using an unauthorised frequency is going to have an immediate and satisfactory effect. Radio amateurs tend to be very much aware of the rules and keep to them as our licences depend on us doing so; this is not the case outside our hobby and repeated action may be necessary by our authorities before some transmissions are moved. The reasons intruders use our frequencies are various.

One is that many administrations have simply not informed their military, diplomatic, and utility users that bands such as ours at 18MHz are no longer available to stations outside the amateur service; there are several cases on file where this has happened. Each time it has been pointed out to the appropriate administration that they were using a frequency which was no longer available to them, they have acknowledged the error and left the band, often within hours.

Worst Offenders

THE VERY worst offenders are military data stations from the former Soviet Union, it is thought that about 70% of the intruders on our exclusive frequencies are of this type. They are usually 81 Baud encrypted data or 3.3kHz wide encrypted voice transmissions using phaseshift keying. The latter can be identified by the distinctive rushing noise which it makes, along with the rather bad tempered female operator who seems to take part in setting up these links in the clear before the encryption is enabled.

Another persistent user of our frequencies is the Egyptian Diplomatic service. Their Sitor A signals are found almost daily on 18MHz and are easily recognised by their habit of operating on frequencies 1.7kHz above a 5 or 0kHz point. Other persistent offenders include the French Military and the Indonesian Diplomatic service; both are receiving attention from Baldock on our behalf at the time of writing.

Good Results

THE RESULTS obtained over the last year or so have involved the removal of a number of regular occupants of our frequencies, they include an Argentinian weather fax on 18093kHz, the Polish Embassy in Delhi on 18116kHz, a Belgian military station on 18152kHz and a 3-channel data system run by the Russian PTT which tended to appear on 14125 and 14325kHz for months at a time. A major source of complaints from amateurs was the second harmonic of a Russian broadcast station which appeared daily on 14240kHz. This was referred to Baldock who confirmed the details and contacted the appropriate Ministry in Moscow, within three weeks the problem had disappeared and the frequency has remained clear ever since. This is a significant improvement in cooperation with the Russian authorities and bodes well for the future.

The RSGB Intruder watch performs an effective self defence role which is vital if we are to retain full use of our exclusive HF allocations. We welcome details of intruders on our bands and all information will be gratefully acknowledged. We still require monitors who have access to data decoders and specialist knowledge of some of the data systems used at HF. If you feel that you can help, either as a regular monitor or as an occasional reporter of what you find on the bands in the normal course of operating, please contact Chris Cummings, G4BOH, QTHR, or on packet at @GB7CHS for further details.

RADCOM TECHNICAL FEATURE

Getting Ready For Jupiter's Big Bang!

by Geoffrey H Grayer BSc PhD, G3NAQ

THOUGH IT CANNOT be described strictly as amateur radio communication, amateur radio astronomy is a fascinating subject, and many schools have built small radio telescopes. However, professional radio telescopes have grown to enormous sizes, so normally there isn't much the amateur can contribute at a professional level.

The truly extraordinary astronomical event occurring this July will give us a chance! The impact of the fragmented Comet Shoemaker-Levy 9[1] with the planet Jupiter will occur in July, and will produce catastrophic effects which will probably be visible in amateur-sized optical telescopes.

In addition, changes in the radio emission of Jupiter are expected, and the impact of the fragments may actually be heard by radio [1]! Amateur observations have been called for, so you can participate not only in observing the event, but also recording it for posterity if you so wish. More of this later; let's first review the normal radio emissions given out by Jupiter.

JUPITER: A SPORADIC HF TX

THE GIANT PLANET Jupiter is a magnificent object in the night sky, and good binoculars will show a disc, with the four large (Galilean) satellites in a row about the equator[2]. With a small telescope you may also be able to discern the cloud belts, and the Great Red Spot at times when this feature is prominent.

The planet has a strong magnetic field, which traps charged particles forming a magnetosphere extending to many times the diameter of Jupiter. It has been known since 1955 [2] to emit radio waves in the short-wave spectrum, between about 0.6 and 30MHz (the lower limit due to screening by the earth's ionosphere). The emissions peak strongly around 20MHz, at which frequencies Jupiter is one of the strongest sources in the sky. Together with the sporadic nature of the emissions, this makes it very suitable for amateur observing.

Existing equipment designed for the 18 and 21MHz amateur bands can be used for observing this decametric emission, or a general coverage receiver. Obviously the directivity of a rotatable beam could be useful, provided the planet is also within the vertical radiation pattern; if you can make your beam tiltable, this would be ideal. Use your radio on the AM position if it has one, otherwise on SSB, and if it has a variable bandwidth, open this as wide as possible. This is a wide-band phenomenon; you don't get a signal-to-noise advantage by reducing the bandwidth, and you will lose some information.

To observe regular noise on these wavelengths, firstly you must check whether Jupiter is above the horizon, and determine its position in order to point your beam at it. The easiest way to do this is to use one of the many astronomical programs available for home computers but there are many other sources of information, such as the sky maps given monthly in newspapers, or an amateur astronomical magazine [3] – but beware of ones originating from abroad, such as *Astronomy* or *Sky and Telescope*, as these examples will show the night sky in North America, which will not be the same as in the UK!

As an aid to recognition, you may find it useful to note the constellation in which Jupiter happens to be at the time. The great thing about radio observing is that it can be done in the daytime when you can't see the planet! **Table 1** gives, for one day for each of the next three months, the azimuth and time of the rise and set of Jupiter, and also its maximum altitude, which occurs when it is due south (AZ = 180°), known astronomically as its *culmination*. The position is given as the azimuth angle AZ (measured clockwise from true north), and the altitude ALT (sometimes known as the elevation angle) which is measured vertically from the horizontal plane.

Secondly, you must find a clear frequency! This is made much easier if the MUF is below the frequency you are listening on, ie the band is 'dead'; if it's not, then try moving to a higher frequency. Indeed, if the MUF is above the frequency you are listening on, the signals from Jupiter could also be screened by our ionosphere (though this is not necessarily the case, depending on the position of the planet). High MUF is likely to be a problem for us, as short-skip (E-layer) propagation often occurs during these mid-summer months during daylight hours.

WHAT JUPITER SOUNDS LIKE ON HF

SO WHAT SHOULD YOU expect to hear? The emissions "sound like ocean waves coming in one to three times a second. Their emissions swells to a maximum which lasts for seconds – sometimes minutes – and then fades away" [4]. The radio energy emerges in three distinct beams – as if from a lighthouse – which sweeps round with Jupiter's magnetosphere in the incredibly fast time for such a large system of just under ten hours per revolution[3]. Hence the noise is only audible when these beams sweep over the vicinity of the earth. However, these beams are not present all the time, but occur in 'storms', which are triggered by the position of the innermost of the Galilean satellites. So how long do you have to listen before you hear Jupiter? "Experience has shown about a one in six chance of hearing something over a 20-minute period" [4].

JUPITER ON EME SYSTEMS

THIS IS, HOWEVER, not the whole story. Apart from these decametric (HF) emissions, there are also emissions on UHF, SHF, and LF. Of these, only the decimetric (UHF) interest us. These emissions (discovered in 1958) originate from synchrotron radiation[4] in the inner radiation belts of Jupiter. Occurring between 10cm and several metres in wavelength, they are relatively constant, though they have shown some variation over the period since they were first detected. They

Date 1994		Rises At		Due South At		Sets At	
Month	Day	UTC	AZ (deg)	UTC	ALT (deg)	UTC	AZ (deg)
June	4	1637	104	2134	25	0230*	250
July	2	1442	109	1940	26	0038*	251
August	6	1233	110	1727	25	2221	249

Table 1. Times and position of Jupiter at rise, culmination (due south, AZ = 180°), and set, as calculated by the author. * indicates that the event occurs on the following day.

could well be disrupted by the massive cometary invasion, and since many fewer people can observe these frequencies, observations are all the more useful. Moon bouncers should find this an interesting challenge – 432 and 1296MHz are popular EME frequencies, and it will be interesting to see if you can detect this radiation. Synchrotron radiation is polarised, so if you can measure the intensity in perpendicular planes (or equivalent, eg left and right handed polarisation), then the observations become even more valuable.

MORE ABOUT THE COLLISION

COMET SHOEMAKER-LEVY 9 is unusual in that it orbits the planet Jupiter rather than the sun, as do most of the comets and only a few other examples are known; most comets orbit the sun. Like sun-orbiting comets, its orbit is very eccentric, so that at one point it approaches very close to the planet. Moreover each orbit will be slightly different due to the disturbance ('perturbation') of other astronomical objects, such as Jupiter's moons. Its last approach was very close to Jupiter (estimated to be within 1.3 Jupiter radii) at which point the tidal forces broke it into the fragments shown in the photograph. Moreover the next nearest approach will be its last – its remains will actually hit the planet.

The fragments will enter the planet's atmosphere at a speed of about 60km/s (130,000MPH), and will rapidly disintegrate. Five seconds later the energy released between about 100 and 150km below the visible cloud layers will be enormous[5] – for an average fragment, equivalent to about 200,000 megatons of TNT! The heavier fragments will release even more energy and go deeper. The resulting hot gas will create a visible red fireball some 3000-4000°C (similar to an atomic bomb, but much, much larger), which will be equally as bright as the rest of the planet for some 45 seconds. This will rise to some 100km above the cloud layer, at which point it will become transparent due to the drop in density, but the hot gas will go on rising before falling back, spreading several thousand kilometres around the point of impact.

The shock wave generated by the impact will propagate upwards, temporarily ejecting mass outwards, while the downward-going wave will release heat and cause the cloud belts to rise locally in a 'bubble'.

These shock waves will travel throughout the planet as seismic waves, and also give rise to oscillations of the atmosphere ('gravity waves'); both effects are expected to be detectable by earth-based telescopes. In addition to these spectacular collisions, the main fragments of the comet are surrounded by 'wings' and a 'tail' formed of gas and dust, which will begin to impact a week before and for several months after the main fragments. This accumulation of dust may form a visible planetary ring around Jupiter.

The above predictions are based on the simulations carried out by experts applying the laws of physics [5], but since nothing like this has ever been observed before, the extrapolations are extreme, so don't rule out some surprises!

Fragment	Collision Day/hrs UTC	Jupiter AZ (deg)	Jupiter ALT (deg)	Comments
A = 21	16 19	184	25	Daylight
B = 20	17 03			Below horizon
C = 19	17 06			Below horizon
D = 18	17 12			Below horizon
E = 17	17 15	125	10	Daylight
F = 16	18 00			Below horizon
G = 15	18 07			Below horizon
H = 14	18 19	186	25	Daylight
J = 13				Disappeared
K = 12	19 10			Below horizon
L = 11	19 21	218	18	Twilight
M = 10				Disappeared
N = 9	20 10			Below horizon
P = 8	20 15	127	11	Daylight
Q = 7	20 19	188	25	Daylight
R = 6	21 07			Below horizon
S = 5	21 15	128	12	Daylight
T = 4	21 18	173	25	Daylight
U = 3	21 21	220	17	Twilight
V = 2	22 04			Below horizon
W = 1	22 08			Below horizon

Table 2. Impact date/time and position of Jupiter.

WHEN WILL IT HAPPEN

TABLE 2 GIVES the results of the most recent computations of the dates and times[6] of the expected impacts available to me as going to press [6], and where to find Jupiter in the sky at the time. It must be stressed however that the comet is continuously evolving as it approaches, and this is likely to accelerate as the tidal forces exerted by the huge planet increase. Look out for updates in the next issue of *RadCom*, in the *RSGB GB2RS News Bulletins*, and in the astronomical and general press as the dates approach. Our optical astronomer friends in the UK are not well favoured; half of the impacts occur when Jupiter is below the horizon, or in daylight or twilight. Also the planet is low down at this time; it reaches a maximum of 25° elevation, which is bad news for an optical observer, but is ideal for pointing our horizontal beams at it. Indeed, it may well be worth listening at impact even if the planet is below the horizon, because it is possible that the radio waves could penetrate the ionosphere and then get reflected round to our location.

The point of impact will in each case be just behind the limb[7], by between 4 and 9°. The rapid rotation of Jupiter will soon bring the impact zone into our field of view however, since Jupiter rotates 9° in 15 minutes. When the impact point becomes visible from earth, that part of the limb is still dark (like all planets, Jupiter shines due to reflected light from the sun). The terminator (the line where night changes to day) is about 15° from the limb, similar to the photograph, so the impact point remains in the dark for another 20 minutes.

WHAT WE MIGHT HEAR

SO WHAT EFFECT is the impact of the cometary fragments going to have on the radio emission? ". . . . the dust will absorb many of the energetic particles that currently produce radio emissions in the Jovian magnetosphere. The expected decline and recovery of the radio emission may occur over as long as several years, and yield more information on the nature and origin of the energetic particles . . . . The cut-off of radio emissions due to the entry of cometary dust into the Jovian magnetosphere during the weeks around impact with Jupiter may be clear enough to be detected by small radio telescopes. Furthermore, impacts may be directly detectable in radio frequencies" [1]. What will these sound like? I have no idea, but presumably the shock wave will produce a sudden intense burst of radiation. If you wish to make useful observations which are useful scientifically, you are going to require a lot of patience and dedication over an extended period. But for those who have no such aspirations, imagine the thrill of hearing such a cosmic cataclysm on your shack radio!

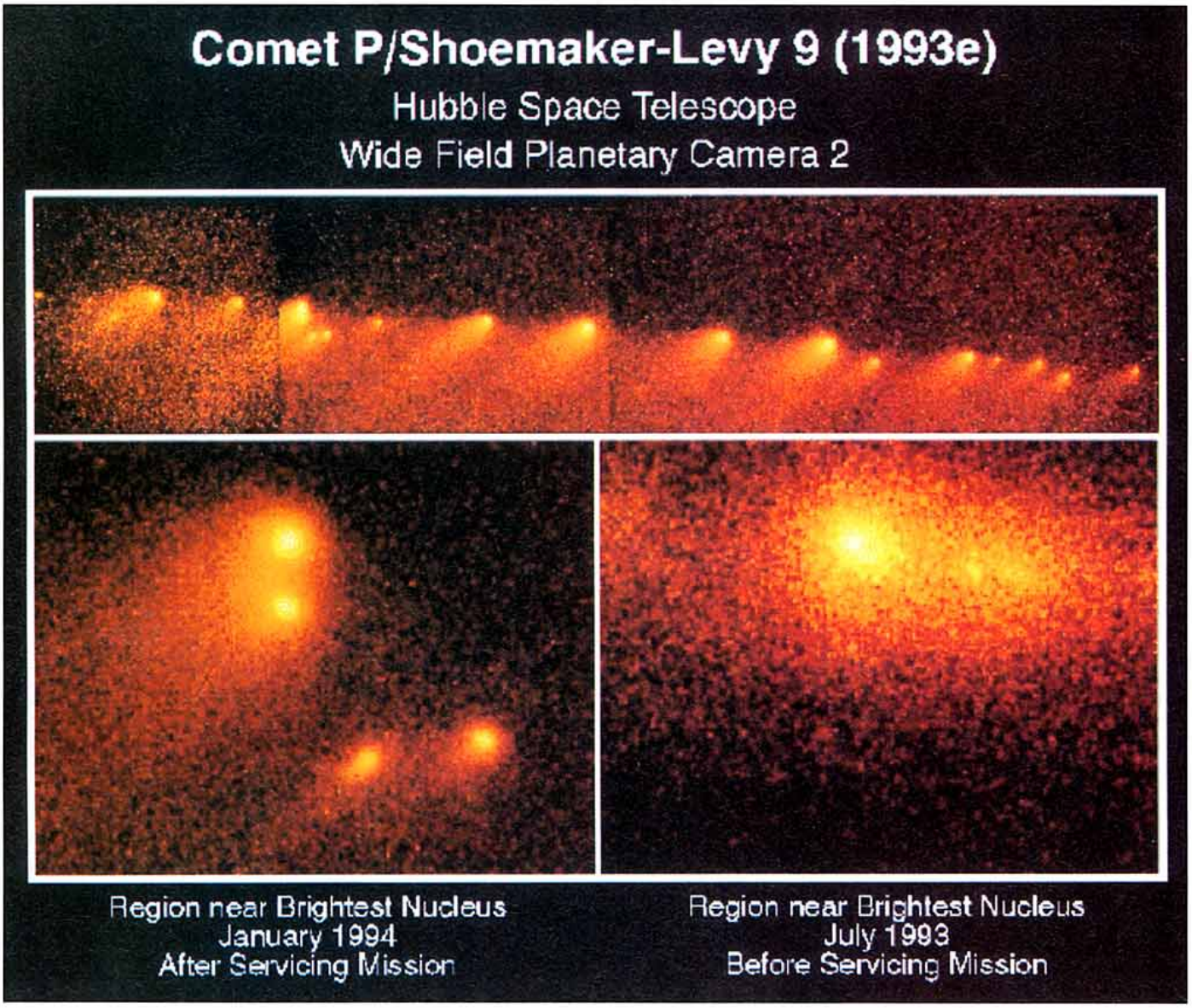
RECORDING OBSERVATIONS

FOR THOSE WHO are serious about making useful observations, *it is imperative* that you start listening and recording straight away, to establish the normal Jupiter activity. Of course, all relevant details should be carefully logged – date, time, frequency, equipment used and settings – and some sort of recording made. The recommendations of SARA[8] is to use a stereo tape recorder, with the second channel recording exact time signals (MSF, WWV, or even the BT speaking clock!).

How these will be later analysed will depend largely on the changes observed, and it should not deter the observer that this is not yet fully determined. I am co-ordinating the effort on behalf of the Propagation Studies Committee of the RSGB, and am in contact with the Jupiter Section of the BAA and other interested organisations. I hope to be able to report a summary of what people heard of the impact, and I can only do this if you send me your observations via RSGB HQ. If you listen, please let me know how you get on – if you hear nothing at all, this is also useful information! I wish everyone good reception from the Giant Planet!

ACKNOWLEDGEMENTS

I HAVE DONE my best to credit all major sources for this article, my sincere apologies if I have omitted anyone. I thank especially John Rogers (Director of the BAA Jupiter Section) who kindly sent me a preview of Chapter 18, 'The Magnetosphere And Radiation Belts' [7], from which much of the background information given is derived. The pho-



Comet Shoemaker-Levy 9 as it appeared in the Hubble space telescope in January 1994. (Photo courtesy of NASA).

tographs are from the repaired Hubble Space Telescope courtesy of NASA, and courtesy of the Roussel collection at the University of Rennes.

REFERENCES

[1] ALPO Conference, August 1993.

[2] B F Burke and F L Franklin, 1955.

[3] *Astronomy Now* is published monthly by Intra Press (London), and is obtainable from newsagents, price £1.95.

[4] D Rosenthal, *Jupiter on Your Shortwave*, Sky and Telescope, December 1989 p628.

[5] D Bruton *Frequently asked questions about the collision of Comet Shoemaker-Levy 9 with Jupiter*, Texas A & M University, Internet Newsgroup sci.astro.

[6] Predictions of the collisions are by P W Chodas, D K Yeomans, and Z Sekinina of Caltech/JPL dated 23 February 1994; the position of Jupiter was calculated by the author for Lat. 52°N, Long. 2°W.

[7] For further reading: *The Giant Planet Jupiter* by John H Rogers (Cambridge University Press). This book is presently in press.

NOTES

1 Comets are named after their discoverers; the honour is shared if independent observations are made before it is possible for the discovery to be circulated. However, in this case the discovery was made by three astronomers jointly, Eugene and Carolyn Shoemaker and David Levy. The 9 means it is their ninth discovery!

2 But don't be surprised if you only see three or even fewer; one or more might be eclipsed by the planet. There are in fact 16 satellites listed for Jupiter, some of these being fragmented, though the other 12 are minute compared with the Galilean moons.

3 The magnetosphere is known as Jupiter System III, the exact period of rotation is 9 hrs 55 min 29.7 sec. Systems I and II refer to the visible equatorial and polar cloud belts respectively; all three systems have slightly different periods of just under 10 hours.

4 Synchrotron Radiation is emitted by electrons spiralling in a magnetic field, as a result of the magnetic force changing their direction. It is named after the particle accelerator which constrains charged particles to move in a circular orbit while an RF field is used to accelerate them.

5 About 10**28 ERGS.

6 The position is worked out for an observer in central England (Lat. 52 deg N, Long. 2 deg W), but should be accurate enough for any observer within the UK.

7 Limb: the astronomical term for the visible edge of a planet.

8 The Society of Amateur Radio Astronomers (USA).

RADCOM USER REVIEW

Programmable VHF Scanner PRO-44

Reviewed by RSGB HQ staff.

THE PRO-44 IS A budget-priced hand-held scanner. It is a synthesized VHF/UHF receiver capable of automatically tuning through more than 23,000 channels in the ranges 66 to 88MHz, 108 to 174MHz and 380 to 512MHz. This includes three amateur bands: 70, 144 and 430MHz. Tuning is by direct selection (simply type in the frequency you want), by scanning the whole range available, by scanning the 50 memory channels, or by manually stepping from one channel to another.

Whilst scanning, the receiver will stop on the first occupied channel it finds and will resume scanning once the channel becomes free. This is a convenient mode for monitoring amateur band activity in the shack. Any channel can be locked out so you don't have to manually step past beacons, birdies or a repeater you don't want to hear.

DESCRIPTION

THE SCANNER IS VERY SMALL at 5.75 x 2.375 x 1.675in (145 x 58 x 42mm) and light at 12.9oz (365gm including batteries). On the front is the frequency display, a 36mm loudspeaker, and a 20-button keypad. On the top is a BNC socket for the aerial supplied, or for connecting to an outdoor aerial. Also controls for volume and squelch and an earpiece socket. A belt clip is fixed to the back and power sockets are on the side. Power is from six AA size (preferably Duracell) batteries, or you can buy re-chargeable batteries and a mains power supply/charger. Current taken when squelched is 40mA.

A 32-page pocket-sized manual comes with the scanner. This explains the many facilities and how to program the radio. Advice is given on connecting an outdoor aerial, using headphones, connecting power sources and various safety items. A troubleshooting guide aims to help you out if you have problems. A budget-priced scanner covering a wide frequency range is bound to have the odd birdie and these are listed in the manual in case you want to lock them out. These include: 70.400MHz and 144.405 MHz.

MANUFACTURER'S SPECIFICATION

Frequencies	Step size	Sensitivity
66 - 88MHz	5kHz	1μV
108 - 136.975MHz	25kHz	2μV
137 - 174MHz	5kHz	1μV
380 - 512MHz	12.5kHz	1μV

Spurious rejection (VHF)	50dB
Selectivity	± 10kHz @ 6dB ± 20kHz @ 50dB
Scan rate	16 ch/sec
IF frequencies	10.7MHz, 455kHz
AF output	200mW

BELLS AND WHISTLES

THERE IS A WIDE RANGE OF facilities, including: Memory backup - stores information for up to an hour without batteries; Battery saver - scanner listens for 0.25s and switches off for 1s when not receiving a signal; Monitor memory - to store the last used frequency; a switch to disable the number pad and an optional two-second delay before scanning resumes,

The clear liquid crystal display shows frequency, channel number, a flat battery indicator, and the mode of operation eg 'search', 'scan' etc. The display is backlit on the press of a button.

IN USE

THE PRO-44 WAS EASY to program and proved very useful in monitoring the amateur bands; the fifty memories enabled most of the useful FM channels on all three bands to be programmed in. It was also a handy device for checking VHF local oscillator chains etc.

Whilst not quite as sensitive as the receiver in a typical hand-held transceiver, the scanner was very much cheaper and more convenient than buying separate hand-helds to cover the 4m, 2m and 70cm bands. Its small size and lightness made it ideal to carry around.

The PRO-44 is available from any Tandy high street store. The normal price is £149.99, which makes it one of the lowest priced hand-held scanners available. But Tandy are offering it to *RadCom* readers at **£50 off!** Just take this copy along to your local Tandy shop, cut off the corner flash from this page and hand it in to get your PRO-44 scanner at only £99.99. But you must hurry because the offer finishes on 30 June.

WARNING

Although anyone may listen to amateur radio, citizens band or broadcast signals, it is an offence to 'eavesdrop' on other types of transmission. RA leaflet RA 169 *Receive only*—scanners etc can be obtained free of charge from the RA Information and Library Service. Telephone 071 215 2072, fax 071 918 4309.

RADCOM REVIEW £50 OFF PRO-44

OFFER EXPIRES 30 JUNE 1994

Radio Communication • RSGB

This Month's Book Choice

PASSPORT TO WORLD BAND RADIO

Reviewed by Bob Treacher, BRS32525

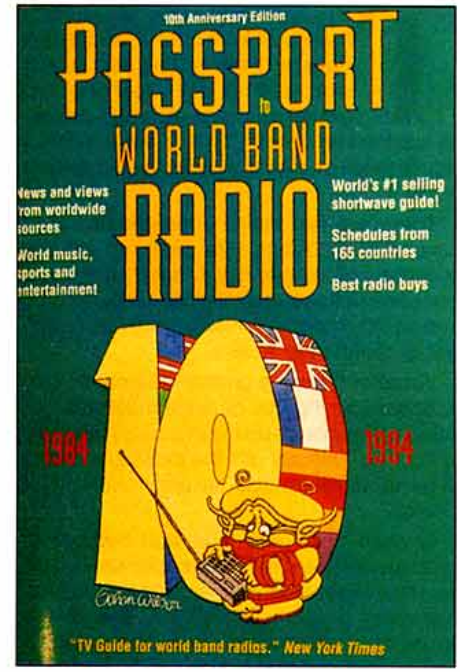
(ISBN 0-914941-30-5)

VERY MUCH FOR THE Broadcast Listener, the book also provides details of over 120 receivers. There is a good guide to 'tabletop' receivers: Icom IC-R9000, Drake R8, Kenwood R-5000, Yaesu FRG-100. As more and more listeners turn to the more affordable digital 'mini-portables', there is a section covering radios such as the Sangean ATS606, Sony ICF range and the Grundig Yacht Boy 400. So, those looking for a new receiver will find this part of the book of great interest.

The majority of the book's 400 pages concentrate, on getting the best out of Broadcast listening. There is a section which attracts the newcomer to hear the '10 easiest catches' – Voice Of America, Radio Japan, Radio Canada International, Radio Moscow and BBC World Service, etc. The book then concentrates on 'WorldScan', which is an extremely interesting and useful insight into the broadcasts which the various BC stations provide, split into 15 minute segments from 0000 to 2345. As an example, Radio Prague transmits news and short feature programmes daily at 0730 on 6.055, 11.990, 13.600, 17.535, 17.725 and 21.705MHz. This is followed by a country-by-country analysis of broadcasts in English, plus virtually every address that you will ever need to secure a QSL card.

Listeners will find invaluable 200 pages which show graphically, stations, times, languages, target areas, transmitter power, etc, and if any of the abbreviations which are used are unclear, there is a glossary at the back of the book. With this book by your side, you will, at any time of the day be able to ascertain what station is broadcasting on what frequency to which part of the World – for example, 11.620MHz is used by both All India Radio in Bangalore and the Vatican State Radio. The guide tells you that the best transmission for Western Europe from All India Radio is likely to be between 1945 and 2230 and that it will not spoil your reception of Vatican Radio as that station does not use that frequency at that time of day.

Lastly, the guide gives the listener the 'Best times and frequencies for 1994'. It explains that rare stations from the Tropics are most likely to be found at 12MHz, while winter nights will provide similar propagation at 3MHz. It says that the Spring is best for night-time DX from the Tropics on 5MHz, and so on, up to 25MHz. I started my SWLing as a BC SWL in the Sixties and craved for such a publication that told me where the best places were to listen and at what time of day. There is unlikely to be a better guidebook for the Broadcast listener on the market. Copies can be obtained, price £14.99 from Gazelle Book Services Ltd, Falcon House, Queen Square, Lancaster LA1 1RN.



IDEAS FROM ABROAD

TRANSLATED AND EDITED BY ERWIN DAVID, G4LQI

Dip meters have been favourite amateur tools for so long that many doubt that there is much room for improvement. **Claude Trassaert, F5YC**, thinks otherwise. His instrument incorporates several novel ideas, especially for UHF. From *Radio REF* 1/94.

THE SEVERAL DIP METERS I have built from published designs have not satisfied me; they did not work well at UHF, had unsharp and/or spurious dips and provided inadequate sensitivity as a wave meter. I solved these problems with the system shown in **Fig 1**.

There are five interchangeable heads to cover 0.65-520MHz, with plenty of overlap between coil ranges. Each head contains a complete voltage controlled oscillator (VCO) and an RF detector. A mains-powered bench unit is common to all five.

Varactor tuning is preferred because one calibrated tuning dial of substantial size, located on the bench unit, can tune all frequency ranges. This permits the individual heads to be of minimum size for easy use in tight places.

In each head, the type and number of varicaps and the choke and capacitor values, are matched to the frequency range covered. Assuming proper construction, this is the secret of eliminating spurious dips. Heads 1 and 2 use a total of six plug-in coils. Heads 3, 4 and 5 use one fixed coil each. See **Table 1**.

The heads plug into a bench unit which contains the VCO-drive-voltage board, an indicator module and a power supply.

The novel VHF/UHF heads and the VCO voltage drive will be described in some detail; space limitations permit a description of only the most essential features of the other modules.

THE HEADS

DETAILS OF THE THREE VHF/UHF heads are shown in **Fig 2**. The dual-gate FET Colpitts oscillator is tuned by pairs of varicaps, 'split-stator' fashion; the ranges of Table 1 require one pair in heads 4 and 5, two pairs in head 3. (In head 2, four pairs are used; in head 1, one pair of BB112 varicaps operate on a reduced tuning voltage range). The table within Fig 2 also shows how the coupling and by-pass components are matched to the frequency range of each head.

The voltage on gate 2, Vg2, can be adjusted between +6 and –2.4V by RV2 in the power supply. +6V provides strongest oscillation; at –2.4V there is no oscillation and the instrument becomes a wave-meter.

The AA119 diode is the RF detector. In the dip-meter mode, the RF voltage at the oscillator drain is reduced when the oscillator is coupled to, ie loaded by, an external tuned circuit or antenna resonating at the oscillator frequency. In the wave-meter mode, the same diode will detect RF from an external source if the instrument is tuned to its frequency.

Construction of the heads on double-sided PCBs is shown in **Fig 3 and Fig 4** [1]. The earth planes of the two sides are tied together through holes at points X. The finished PCBs are mounted in short lengths of 28mm OD x 26mm ID plastic tubing. Dressing of the components should allow for that. The flexible cable carries nothing but DC, so any convenient length will do; the Vd lead must be shielded, however.

Head	Coil	Freq (MHz)
1	1	0.64-3.15
1	2	1.22-6.04
2	3	3.72-11.8
2	4	7.83-23
2	5	16-45
2	6	33-92
3	a	65-190
4	b	110-317
5	c	196-526

Table 1: Heads, coils and their frequency ranges.

THE VCO DRIVE

THE TUNING VOLTAGE is obtained from the circuit of **Fig 5**. Zener-stabilized 29.7V are applied to the tuning potentiometer RV1. To make the frequency calibration of the RV1 dial as linear as possible, a compensation network of six diodes and two resistors is inserted between RV1 and the voltage-follower-connected op-amp CA3040. The latter applies a stiff tuning voltage to the varicaps without loading the compensating network.

THE DIP INDICATOR

DC AMPLIFICATION OF THE detected voltage is required for best sensitivity, especially in the wave-meter mode; it is provided by a CA3140 op-amp. RV3 sets its gain.

For the actual indicator there then are several options.

F5RPQ, of the REF Technical Publications Committee, likes the indicator to be right on the head so one can simultaneously watch the indication and the position of the head to the circuit to be 'dipped'.

Moving coil meters, the most common indicators, are bulky and have inertia. The 'tuning eyes' fitted to many 1950s broadcast receivers have no inertia but require an HT of 200V, though the 'pencil' version, if one still can be found, would be small enough to clip to a head.

Here, a row of 30 LEDs was used with three LM3914 IC drivers [2] (expensive!). They are located in the bench unit [but a handy constructor could find ways to fit the indicator unit into a push-on extension/handle for the tubular head housings – *G4LQI*].

The slickest indicator of all, however, costs near to nothing. Apply the output of the indicator op-amp to the RIT line of the station receiver, tune to a 'birdie', and *listen* for the dip! [*G4LQ*].

THE POWER SUPPLY

THE INSTRUMENT USES +34V for the varicap driver and the op-amps, +6V for the oscillator and the LED drivers, and –2.4V for the op-amps and to kill oscillation in the wave

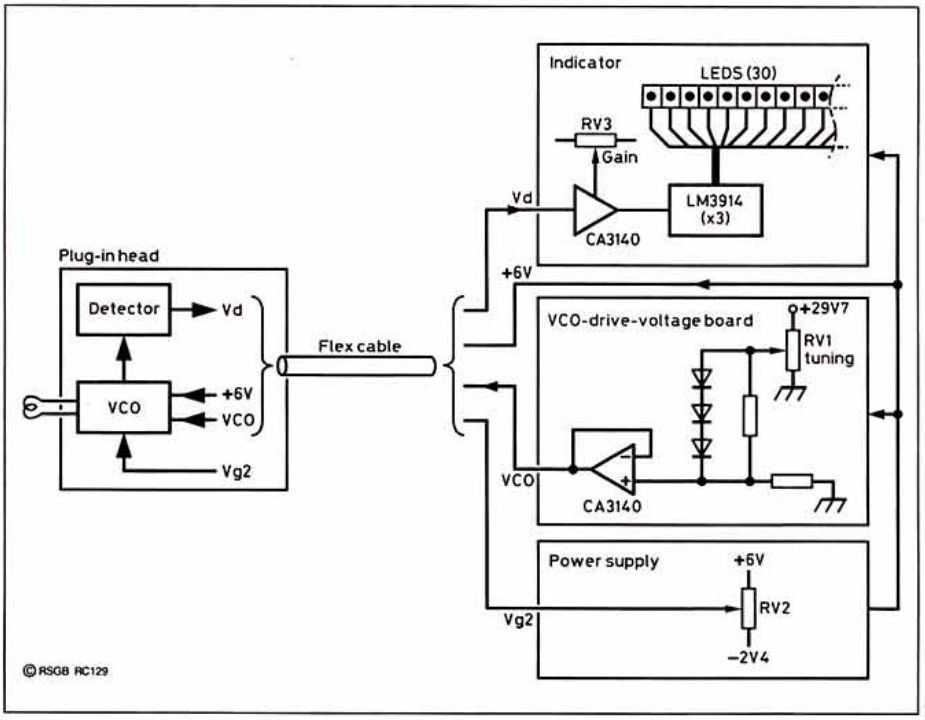


Fig 1: The F5YC dip meter system. Separate oscillator/detector heads for each frequency range plug into a common mains-powered bench unit.

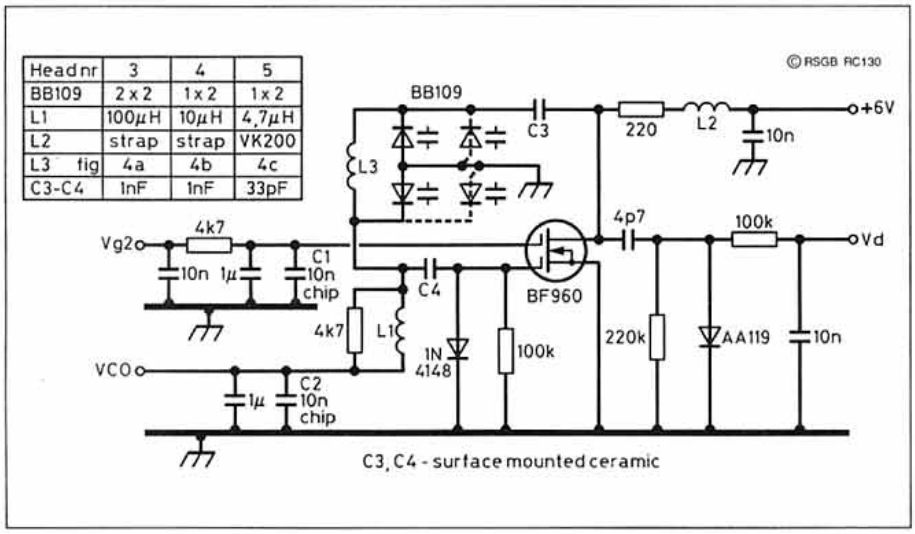


Fig 2: This diagram applies to heads 3, 4 & 5, but component values differ (see table).

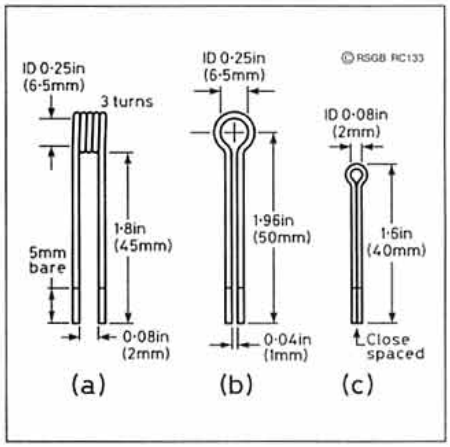


Fig 4: These coils are made of 1.5mm diameter enamelled copper wire and soldered to their respective heads. With an extra turn on coil (a) and a larger ID on coils (a) and (b) it should be possible to cover 45-520MHz with these three heads.

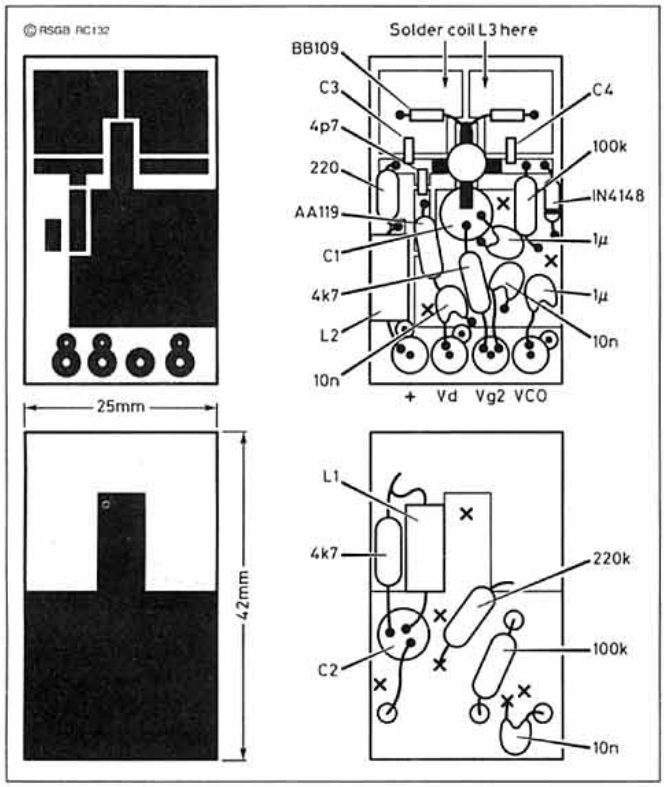


Fig 3: The double-sided PCB, and component placement, are the same for heads 3, 4 & 5, but component values differ.

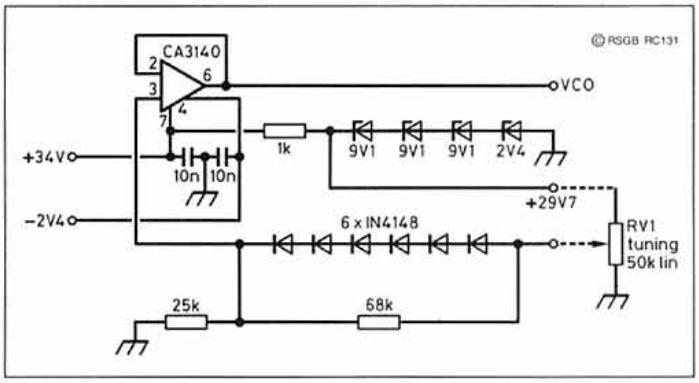


Fig 5: The frequency of the instrument is set with the tuning potentiometer RV1. The diode-resistor network makes the varicap tuning nearly frequency-linear. The op-amp voltage follower buffers the varicap drive voltage.

meter mode. All these are derived from a single 2 x 9V 8VA transformer.

34V obtained from a quadrupler circuit (9VAC–45VDC) and an LM317 regulator. 6V comes from a full-wave rectifier and an LM7806 regulator. For –2.4V, the –11VDC from a full wave rectifier is applied to a 2.4V Zener diode through a 470Ω dropping resistor.

CALIBRATION

A BIG KNOB WITH a dial for the 270 degrees tuning potentiometer could not be found. Graduations had to be added to a 180 degrees scale.

Calibration is done in the wave-meter mode. A signal generator with an output of a milliwatt or more is used. A coil, similar to that on the head to be calibrated, is connected to the generator output and the head under test is positioned so that there is some coupling between the two coils. RV3 is set for maximum gain and RV2 is set to just below the onset of oscillation; at that point, the FET acts as a 'Q-multiplier' to obtain the sharpest peak when the signal generator is tuned through the wave meter frequency.

Calibration points are established throughout each range, eg every 15 degrees on the RV1 dial. From these data, frequency vs dial reading graphs can be drawn.

REFERENCES

[1] Ideas for 'dipping' straight antenna element can be found in G6XN's *HF Antennas for all Locations*, 2nd ed. p273 (RSGB).

[2] A 30-segment bar array, and drivers, are in the *RS Catalogue*.

80M ANTENNA IN A 25FT GARDEN

I LIVE IN A TERRACED house with a garden only 25ft long, and presently use a four-band vertical for 7–28MHz. How can I get on 3.5MHz? Can I do anything using mobile whip antennas?

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

IT'S CERTAINLY POSSIBLE, though it depends what you're after. For UK short-skip you require a near-vertical angle of radiation so there's probably little substitute for a horizontal wire, whereas a vertical will give you much better performance on DX. Let's explore some of the alternatives.

A base-loaded vertical antenna such as the 26ft Butternut HF6V-X [1] is a definite possibility, and will also cover the bands you already use. The GAP Challenger is also well-respected [2], but at 35ft it may be too tall for your location because the guy angles would become rather steep. RAIBC have installed several commercial verticals for their members (who often have small gardens), for although the angle of radiation is theoretically all wrong for UK short-skip, a vertical will at least get you on 80m in some fashion.

For the antenna to radiate efficiently it will need a very good ground, especially on 80m. If you just happen to be taking the lawn up, think in terms of laying an earth mat of chicken-wire rather than plain wire radials. Otherwise, it's a matter of laying as many radials as possible. Don't bother about any special lengths – just get as much metal as possible into the ground. Peter Hart's review of the Butternut vertical [1] gives some idea of what you can expect with various radial systems.

As an alternative to a commercial antenna, you could try something like a top-loaded vertical (**Fig 1**). A 30ft vertical based on a 20ft alloy scaffold pole with a lighter, thinner extension could be self-supporting with a stout mounting post extending to perhaps 6ft above ground. This is where the 3.5MHz mobile loaded whip might come in: if you mount the whip on top of the mast, you will be able to resonate the whole system in the desired portion of the band. To achieve resonance you will need to take several turns off a standard 80m loading coil or alternatively shorten the whip, reducing the inductance being the better option because it will give a greater bandwidth. The VSWR bandwidth and radiation efficiency will be better than for a plain mobile whip, though obviously not as good as a full-size quarter-wave. On the higher bands, the loading coil will act increasingly as an RF choke, isolating the whip section above it. Thus the antenna will perform very well as a near-quarter-wave on 7MHz, something like a 3λ/8 on 10MHz, and so on up to about a 5λ/8 on 21MHz. Above this band the vertical radiation pattern will start to break up and the DX performance will deteriorate, although of course it will still be usable on 24 and 28MHz. On 3.5, 7 and 10MHz the feedpoint impedance will be quite low and you could probably manage with a short run of high-quality coax (eg RG213) to an indoor ATU, but on 14MHz and some of the higher bands the impedance at the base of the mast will be high and would probably require a local matching unit.

Needless to say, the same basic set-up would work quite well on 160m with the appropriate loading coil. For further details, G4LQI's *HF Antenna Collection* (RSGB) contains reprints of several years of good ideas from *RadCom*, notably G3TSO's article on designing and constructing mobile whips and G3VMW's article on constructing and feeding roughly-30ft verticals for the higher HF bands.

If you want better short-skip performance, you'll need to make the best possible use of the available horizontal space. Again the *HF Antenna Collection* contains a few good ideas, but you'll have to experiment. What you need is to get the middle part of a 3.5MHz dipole – the part that carries the high current and does most of the radiating – as high as possible and as nearly horizontal as possible. There will be some difficulties in such a sort garden because your mast needs to be as close to the far boundary line as possible, yet the tension of the horizontal wire will probably require a back-guy. For similar reasons I wouldn't recommend anything centre-fed, because the feeder will tend to drag the wire downwards and make a back-guy even more essential. Once again my preference would be to use a self-supporting metal mast, with a horizontal wire running back towards the house chimney giving a total length of about 60ft. With appropriate loading at the house end, this can be fed against ground as something like a 3λ/8 antenna (**Fig 2**), placing the current maximum somewhere near the junction between the top of the mast and the horizontal wire. A good starting value for the loading inductance would be 75μH, with a further 10ft of wire running onwards over the roof. With a 150 – 200pF variable capacitor at the base of the mast, you should see quite a good match to 50Ω if the ground system is adequate. As with any shortened antenna the bandwidth will be quite narrow, though unlike some systems you do have a ground-level adjustment to re-resonate the system when you change frequency. For a somewhat longer garden you could keep the same end-loading arrangement and extend the horizontal part of the wire for better short-skip performance

What about magnetic loops? After the initial euphoria, I think the situation is becoming clearer: they do work, even for the LF bands, but unless you're extremely careful to maintain low losses the efficiency can be very poor indeed. By the way, more than one UHF high-power user has noticed that a cost-effective way to make a continuous loop of large-diameter copper tubing, easily bendable to any required shape, is to use large semi-rigid coax cable (Andrew LDF5 or similar). This is often available at rallies and you should be able to haggle a very good price for offcuts of 30ft or less, because these are too short to be useful as coaxial feeder.

Finally, please note that very high field strengths can exist around end-loading systems, and if these are close to the house the antenna is high-risk as far as EMC is concerned. Don't say I didn't warn you! Again for EMC control, the coax feedline from a base-fed antenna should be buried in the ground for as far as possible. From the safety viewpoint, take care to prevent accidental contact with any exposed metal masts or wires that

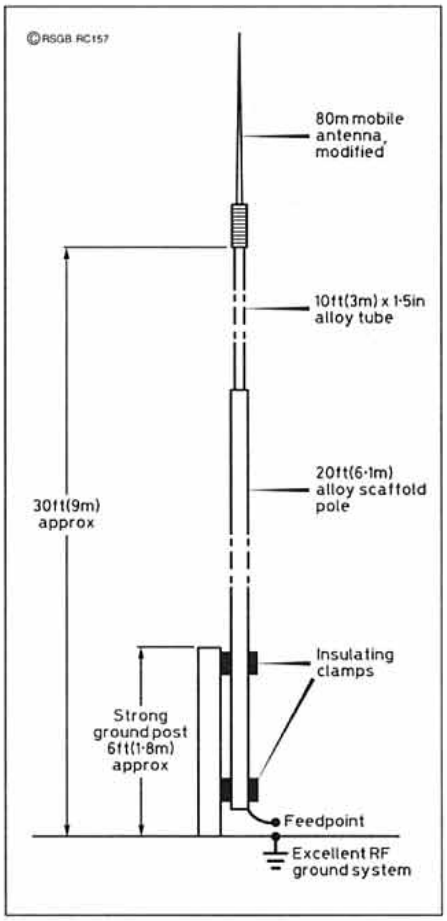


Fig 1: Top-loaded vertical for 3.5 – 21MHz (not to scale) with suggestions for construction. The base is insulated and fed via an appropriate matching unit for each band. The exact length of the mast is not critical, but the 80m whip will need to be resonated carefully for the desired portion of the band.

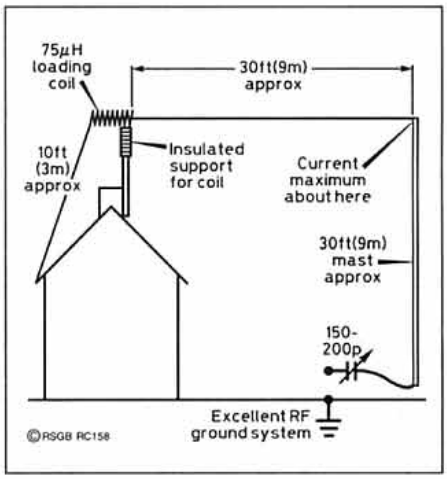


Fig 2: Semi-vertical 80m loaded '3λ/8' antenna for a very short garden, giving some short-skip performance.

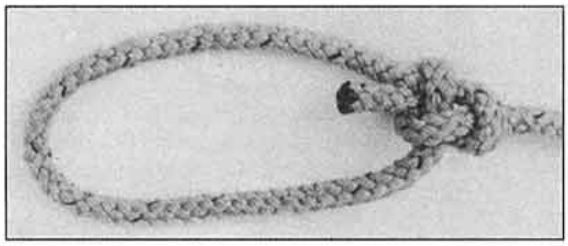


Fig 3: The bowline is used to make a loop or 'eye' near the end of a rope.

form part of the radiating antenna, and re-read last month's column about the use of grounded antennas on PME mains systems. Last of all, look to your insurance, especially if your antenna can fall outside of your own property.

WHAT KNOT?

WHAT IS THE BEST knot for synthetic fibre guy ropes?

IT DEPENDS WHICH END you mean. The end attached to the mast is always fixed, while the other end needs to be quite accurately adjustable – often within a fraction of an inch – to establish the correct tension on the guy. I'll deal with the two cases separately.

The difficulty with synthetic fibre ropes is that they are smooth and springy, so knots tend to slip and work loose if you're not careful. The standard loop knot for attaching a guy through a hole in a mast-head ring is the bowline (**Fig 3**). This is a very secure knot which tightens under load, yet remains easy to undo. However, if you don't ever intend to undo the knot, I've had very good experience with the double figure-of-eight (**Fig 4**), which avoids any sharp kinks in the load-bearing part of the rope. Note how the loop and the 'standing' (long) part of the rope come straight out of the knot along the line of pull. There are two ways to tie the double figure-of-eight. The simplest is to double-over the end and then tie the knot using the doubled rope. However, this won't work if you need to thread the rope through a hole, or to make a tight loop around a metal or nylon 'hard eye' to prevent chafing. To tie the double knot, first tie a single figure-of-eight some way down the standing part of the rope. Form the free end into a loop as required and then thread it back into the existing single knot, so that the rope always runs parallel with itself. When you pull the knot tight, it is almost impossible to work it loose by accident. Purists would say that an eye-splice is stronger than any knot to make a permanent loop, but I've never felt that confident in my splicing technique!

Tying-off a guy under load can be tricky. The standard knot for this purpose is the round turn and two half-hitches (**Fig 5**), though this can be difficult to tie when there are several feet of surplus rope. Take two full turns of rope around the guy-stake and then make a half-hitch on the standing part of the rope, threading the free end through on the side nearest to the stake. Then make a second identical half-hitch on the standing part of the rope. To prevent the half-hitches from springing loose, bring the free end back to the guy stake and tie it off to the stake with a couple more half-hitches. A secure knot doesn't need a dozen turns around the guy-stake – properly chosen and properly tied, a simple basic knot is all you need – but it's always worthwhile to tie-off the free end to make sure that the load-bearing knot remains in good shape.

For a fixed installation, there's no excuse for 'Field Day' knots to guy stakes. Use screw tensioners for accurate length adjustment, and terminate both ends of each guy in a proper loop with a 'hard eye'. Don't go to the DIY megastore for ropes and rigging equipment – consult your local yacht chandlers or farmers' merchants and get the real thing. If you want to know all about professional rigging and ropework, read the classic article by G3JMG [3].

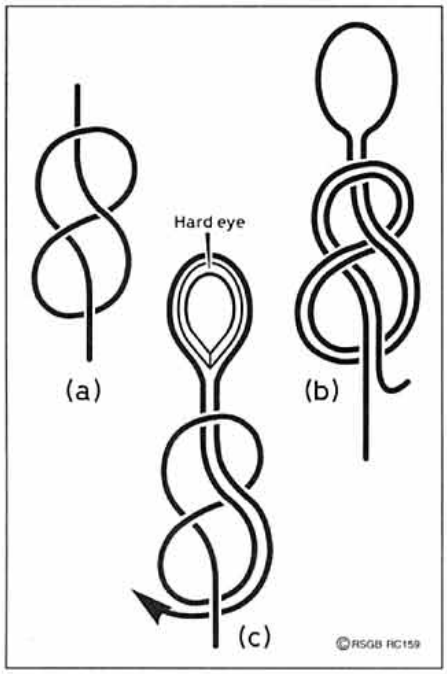


Fig 4: The double figure-of-eight knot. (a) The basic single figure-of eight (b) The same knot tied using a doubled rope to form a loop (c) To make a loop of exact size, eg. around a 'hard eye', thread the free end back through a single knot to the complete double knot as in (b).

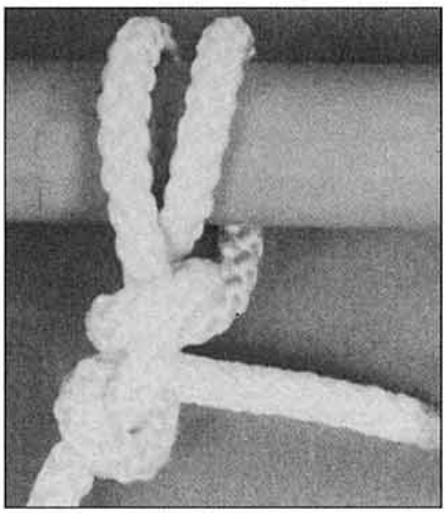


Fig 5: A round turn and two half-hitches for typing-off to a guy stake. For additional safety, tie the free end to the stake with two further half-hitches.

MORSE SPEED CALIBRATION

HOW DO I CALIBRATE the speed control on my home-built keyer?

USING A WRISTWATCH, that's how. You don't need a precision calibration and it can be done without any kind of electronic test equipment. The simple rule is that:

Words per minute = number of complete dashes in 4.8 seconds

If you favour the Continental convention of letters per minute rather than words, just multiply by 5 so that:

Letters per minute = number of complete dashes in 24 seconds

It's as simple as that . . . . but it does deserve some explanation. The basic unit of timing in Morse code is one dot, which constitutes one binary bit. The space between dots or dashes within an individual letter or numeral is also one bit. A dash is three bits long, or four if you include its trailing one-bit space. The space between letters or numerals is three bits and the space between words is seven bits. Using these rules, you can work out the length of any letter, numeral or word in terms of bits. The international standard 'word' used for this purpose is PARIS, chosen because it is exactly 50 bits long – work it out for yourself, not forgetting the trailing 7-bit word space. If PARIS is 50 bits long, then at 12 words per minute (WPM) that's 600 bits, ie exactly 10 bits per second.

This suggests one way to calibrate the speed control of your keyer, by measuring the frequency of a string of dots. Unfortunately an ordinary frequency counter won't go as low as 10Hz, but you could measure the duration of a string of dots on an oscilloscope with an accurate timebase. But it's far easier to do it by ear, and dashes come at about the right pace for all but the hottest speed-merchants. A dash is four bits long (including its trailing one-bit space) so twelve dashes take just 4.8 seconds – which is where we came in. If you really want to be accurate, time for 48 seconds and divide the result by 10.

REFERENCES

[1] 'Butternut HF6V-X Multiband Vertical Antenna', Peter Hart, G3SJX, *Radio Communication*, March 1991.

[2] 'Challenger DX-VI', Peter Hart, G3SJX, *Radio Communication*, December 1991.

[3] 'Ropes and Rigging for Amateurs – A Professional Approach', J M Gale, G3JMG, *Radio Communication*, March 1970. This classic article is still in print in the *Microwave Handbook, Volume 1* (RSGB).

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

Simply Silicon

by Paul Lovell, G3YMP

ANNOUNCEMENTS OF new technological developments in digital electronics are a regular occurrence, but the analogue sector is also advancing by leaps and bounds. For instance, we now have operational amplifiers which will function at several hundreds of megahertz, and a new speech storage chip – the ISD1020AP from Integrated Storage Devices Inc, of San Jose, California.

SPEAK AND STORE

FOR MANY YEARS, electronics engineers have been seeking a method of storing sound which does not require moving parts such as magnetic tape or some type of rotating mechanism. Recently it has become possible to use digital techniques and store the audio information in memory, using either RAM or programmable EPROM chips. However, during the late 1980s engineers at ISD made a breakthrough in analogue data storage.

They successfully extended the digital technology used in Electrically Erasable Programmable Read Only Memories (EEPROM) into the analogue sphere, and this has resulted in far less complex circuit configurations than for digital solutions. The process achieves a signal to noise ratio of approx 40dB at 1kHz, typical distortion of only 1% and in the case of the ISD1020A, a bandwidth of 2.7kHz. This makes the device ideal for many speech and datacomms applications.

As many readers will know, the great advantage of EEPROM over conventional Random Access Memory (RAM) is that the data is retained in the chip even when the power is removed. This feature also applies to the ISD1020AP, and adds greatly to its versatility, particularly for portable applications. The array of 128,000 cells are arranged in 160 groups, each having a capacity of 0.125 seconds and the address inputs can access any point in the 20 second sequence. So, for instance, it is possible to have five messages each four seconds long, or eight messages of 2.5 seconds etc.

BANDWIDTH SELECTION

AN INTERNAL CLOCK at approx 819kHz determines the overall bandwidth of the device, but this may be replaced by an external input for fine adjustment of the response. Care should be exercised if a different clock frequency is used, as too low a value will produce aliasing distortion on the output waveform. This is because the internal anti-aliasing and smoothing filters are of fixed frequency, instead of the switched capacitor type.

Although the output power may seem rather low at just 50 milliwatts, my own experiments with these ICs have resulted in excellent audio output from a small three-inch speaker. If more output power is required, then an additional audio amplifier can be used.

Various IC packages including surface mount are available, but **Fig 1** shows the pin-out of the plastic DIL package (AP suffix) which is likely to prove most popular with constructors. **Fig 2** is the internal block diagram, and this illustrates the many stages contained in this one device. I can envisage numerous applications for repeater groups, and with a little interfacing circuitry there could also be applications for blind operators who gain so much enjoyment from amateur radio.

ISD INCORPORATED ISD1020AP

- Single chip voice recording and playback
- 20 seconds duration
- Microphone preamplifier
- Automatic gain control
- 28-pin DIL package
- 100 year message retention
- Retains speech on power down
- Single 5 volt power supply
- Manual or microprocessor controllable

MANUFACTURER'S SPECIFICATION

THE ISD1020A device is designed to record and playback audio and voice information in a single chip with a minimum of circuit complexity. This compact, easy-to-use, non-volatile, low-power solution has been made possible by ISD's patented DAST™ technology, and the 128k DAST analog array has the equivalent of 1 Megabit of digital storage.

The ISD1020A family eliminates the need for digital conversion, compression and voice synthesis techniques that often compromise voice quality and complicate usage. The ISD1020A includes signal conditioning circuits and control functions which enable a complete, high quality recording and playback system in a single device. Devices may also be cascaded for longer recording times.

A noise cancelling microphone preamplifier and automatic gain control (AGC) enable recording of both low and high volume sounds. In fact, the AGC attack and release times may be adjusted by an external resistor and capacitor on pin 19 of the IC (DIL version).

The ISD1020A drives a speaker directly, via differential outputs which boost the power by four times and eliminate the need for an output amplifier. The device operates from a single 5-volt supply (or batteries), and includes a power-down function for applications where minimum power consumption is critical. This is due to the ISD1020A's CMOS-based design and non-volatile storage array.

TYPICAL APPLICATION

A SUITABLE CIRCUIT for experimenting with the chip is shown in **Fig 3.** This operates from

Control Step	Function	Action
1	Power-up chip and select record/playback mode	1.PD = Low 2.P/R = As desired
2	Set message address for record/playback	Set addresses A0-A7
3	Begin record/playback	$\overline{CE}$ = Low
4	Ends cycle	$\overline{CE}$ = High

Table 1: Indicates the basic control functions for the circuit of Fig 3.

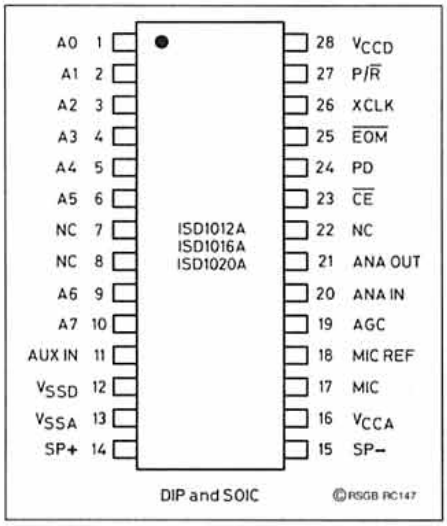


Fig 1: Pin out of the 28-pin DIL ISD1020AP.

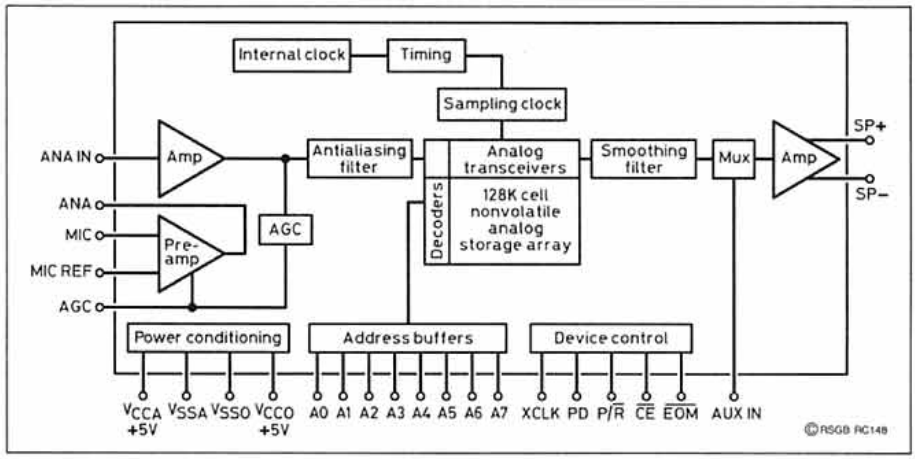


Fig 2: Internal configuration shows the many stages which make up this interesting device.

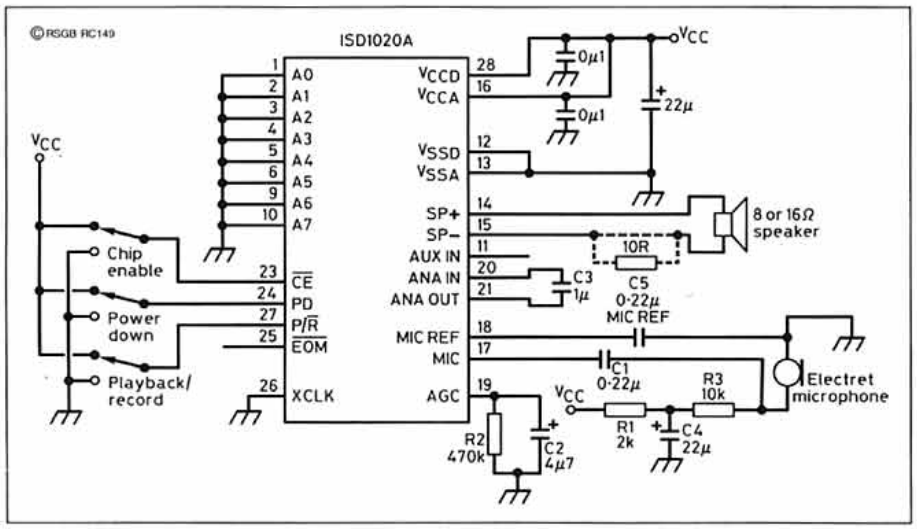


Fig 3: A typical application for the ISD1020AP. The 10Ω resistor is required only if an 8Ω speaker is used.

a single 5V supply (V_{CC}), with the control functions shown in **Table 1**. Some external components are also required, and their function is given in **Table 2**.

The value of capacitor C1 on the microphone input (pin 17), together with the 10kΩ input impedance of the ISD1020A determines the low frequency passband cut-off frequency. The microphone signal is amplified by an internal pre-amp, whose gain is determined by the voltage level at pin 19. The resistor and capacitor connected to this pin determine the attack and release time of the automatic gain control.

For applications which do not require the AGC facility, an audio input may be directly applied to ANA IN via capacitor C3. The specification states a maximum input of 50mV peak-to-peak at pin 20. The input to the power amplifier is multiplexed between the storage array and the auxiliary input pin 11. This input is active when $\overline{CE}$=High and playback has ended or $\overline{EOM}$=Low due to overflow. The auxiliary input also facilitates cascading of several devices.

To place the IC in standby mode, the Power Down pin (pin 24) is taken high, and Chip Enable pin 23 must be low for all record and playback operations. The state of the P/R pin is latched into the ISD1020A on the falling edge of $\overline{CE}$. A high level selects a playback cycle, while a low level selects a record cycle of up to 20 seconds. The chip will play back until an internal EOM (End-of-message) signal is encountered. In record mode, the input signal continues to be stored until / CE is brought high or until an overflow is detected. This will occur after the maximum 20 second period has elapsed.

Part	Function	Comments
R1	Microphone power supply decoupling network	Reduces power supply noise
R2	release time constant	Sets release time for AGC
R3	Microphone biasing resistor	Provides biasing for microphone operation
C1	Microphone CD-blocking capacitor. Low frequency cut-off	Decouples microphone bias from chip. Provides single-pole low frequency cutoff
C2	Attack/Release time constant	Sets attack/release time for AGC
C3	Low frequency cut-off capacitor	Provides additional pole for low frequency cutoff
C4	Microphone power supply decupling network	Reduces power supply noise
C5	Noise reduction	Reduces input noise

Table 2: Passive component functions for the circuit shown in Fig 3.

NOTE: Device characteristics and application notes in *Simply Silicon* are compiled from manufacturers' published data. Circuit diagrams are included for experimental purposes only, and have not been proven by *Radio Communication*. Transmitting equipment must be operated in accordance with national regulations. All data is copyright of the device manufacturer.

The $\overline{EOM}$ output at pin 25 will go Low under each of the following conditions:

(a) At the end of each message or

(b) When a message overflow occurs (device full).

THEY'RE EASY TO USE

ON-CHIP CONTROL functions make the ISD1020A easy to use in virtually any application. Each device offers a variety of modes and interface options, and the IC may be used in applications which require little more than a few switches and a battery. More sophisticated addressing and control may be utilised by means of the digital address inputs. The ISD1020A is organized in 160 segments, and addresses A0 through to A7 provide access to each (0.125 second) segment in the array for message addressing.

AVAILABILITY

UK DISTRIBUTORS for the ISD1020A are Sequoia Technology Ltd, Tekelec House, Back Lane, Spencers Wood, Reading, Berks RG7 1PD; tel 0734 258000. The ISD1020AP (Plastic package DIL version) is priced at £14.99 + £2.62 P&P including VAT (total £17.61) for one device. Readers are advised to phone the company to confirm delivery times. The company is also able to supply similar chips with longer storage times (eg 60 or 90 seconds) although these are more expensive than the one featured here.

WIN A FREE CHIP

RADCOM'S SIMPLY SILICON column is intended to encourage new uses for modern semiconductors, especially in the field of amateur radio. This month we have a competition which is open to all RSGB members. We are giving away two of these fascinating chips free to the members who suggest the most unusual applications for amateur use. Please mark your envelopes 'RadCom Competition'. The winners will be decided by the editorial team, and all entries must be received by 30 June 1994. So how about putting your thinking caps on, and let's have some bright ideas!

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FT-890

TS-450S

FT-530

R-5000

TS-650

FT-1000

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AKD-2001

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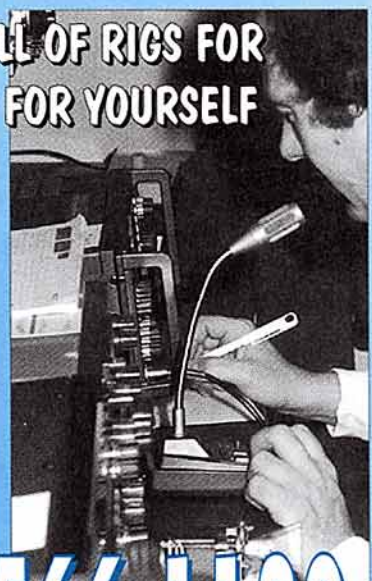

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Technical Topics

MULTIBAND OR ALL-BAND HF ANTENNAS?

THE AVAILABILITY OF THE 'WARC' bands not harmonically related to the 'traditional' amateur bands has led to increased interest in HF antennas that work well on all bands between 3.5 and 30MHz. However it has also apparently led to some confusion between such terms as 'broadband', 'all-band' and 'multiband' each of which refers to a particular class of antenna.

A broadband antenna is one that will present roughly the same feed impedance over a broad, continuous band of frequencies. Notable examples include the rhombic, terminated long-wire and other travelling-wave antennas. Directivity may be substantially unaffected by frequency.

An 'all-band' antenna as applied to amateur practice is one which can be made to operate (usually with the aid of a flexible antenna system tuning unit (ASTU)) on any of the amateur bands (efficiency will normally fall off on the lower bands unless the radiating element is some 30-40% of the lowest operating wavelength). Radiation pattern will normally differ on different bands unless, for example, this is determined by an additional element as with the W8JK centre-fed driven array.

A 'multiband' antenna implies an antenna that will work well on two or more of the amateur bands, but not necessarily on all bands. A simple example is a 7MHz half-wave dipole which provides a near match on 21MHz but would normally not be used on the intervening 10 and 14MHz bands except possibly with the aid of a flexible ASTU and a reasonably short coax feeder capable of withstanding a high SWR.

These thoughts have been stimulated by an article 'On centre-fed multiband dipoles' by Dr John Belrose, VE2CV, and Peter Bouliane, VE3KLO, (*QST*, March 1994, pp34-36) with its provocative sub-title 'Is the G5RV really an all-band antenna?'. VE2CV notes the several references made in *TT* to the G5RV and to the modified version developed by Dr Brian Austin, ZS6BKW/G0GSF, using computer-aided design which can provide (without ASTU) an SWR of around 2:1 or less at five frequencies close to amateur bands, but which should always be considered a 'multiband' rather than an 'all-band' antenna.

The Canadian authors have long been worried by some of the claims made (not by G5RV or G0GSF themselves) for this form of antenna. They point out: "Many amateurs regard this antenna with its so-called special feed-line arrangement as a panacea, particularly when it is used in a drooping dipole (inverted-vee) configuration. There is, however, nothing magical or superior about the antenna. It is merely a centre-fed dipole with a particular feed-line arrangement, which the newcomer to amateur radio may or may not want to duplicate. In fact, the performance of a multiband drooping dipole can be inferior to a dipole at the same apex height.

As pointed out many times in *TT*, the non-resonate centre-fed dipole (doublet) fed with open-wire (or ladder-line) feeder of any convenient length connected directly to a wide-range, flexible ASTU with balanced-output as in **Fig 2(a)** can provide an effective all-band antenna without the special feed arrangements of the G5RV, G0GSF antennas **Fig 2(b)** or PA0SE's 'Comudipole' etc. A variation of the Comudipole as praised by Jorge Dorvier, EA4EO, is shown in **Fig 3**. All three of these systems provide the attractiveness of a coax feeder into the shack and the ability of being able to use a G5RV/G0GSF antenna on at least one and possibly several bands without a wide-range ASTU. The justification for these variants is convenience rather than superior performance.

What seems to have got under the skin of the Canadian authors are the exaggerated

BROADBAND VALVE POWER AMPLIFIERS

THE CONCEPT OF THE broadband linear power amplifier which amplifies any, within limits, input drive frequency without the need for tuning/band-switching has become well established in these days of all-solid-state equipment. But it is less widely recognised that such amplifiers were used for professional applications in the thermionic era.

For example, a range of wide-band distributed amplifiers was developed in the early 1960s by the Marconi company and formed the basis of a series of advanced transmitters including the NT203 and NT204 broadband linear RF amplifiers for the maritime service. These were adopted by the Royal Navy (eg Transmitter type 640) for SSB/CW/FSK operation in the range 240kHz to 24MHz. The 640 was intended to run from 440V, three-phase AC supplies and required an external high-stability frequency standard (for the synthesizer), antenna tuning units (HF and/or MF) and a cooling air supply. The use of distributed amplifiers overcame the problem of retuning after a frequency change and also made possible simultaneous transmissions (at reduced power) on two or more frequencies. In order to avoid the generation of spurious signals, a high order of linearity was required and involved the use of an artificial transmission line with the shunt capacitances replaced by valve capacitances: **Fig 1**. The inductances, separating individual valves, effectively isolate the valve inter-electrode capacitances while the anode currents of the individual valves add up. The output line was designed as a compromise between a uniform impedance (in which only the final valve would operate at optimum efficiency) and a tapered impedance (which would make valve voltages too low). The early stages thus constitute a uniform transmission line and, when correct operating conditions have been achieved, the characteristic changes so as to maintain a constant voltage swing on each succeeding valve.

The principles of this form of distributed amplifier and details of the NT204 broadband amplifier were described in a number of the papers presented at the 1963 IEE Convention on HF Communication (*IEE publication Ed4*). Since the 500W PEP output of the NT204 amplifier required the use of no less than six pairs of 4X250B tetrode valves, and its associated frequency synthesizer was of the high-cost 'mixer' type rather than a lower-cost PLL synthesizer, this approach was, as far as I am aware, never implemented for amateur operation. It is possible that in the days when some amateur operation was permitted from Royal Navy vessels, before the security clamp-down of the late 1960s, some amateur contacts could have been made with maritime NT204s.

My interest in these distributed amplifiers has been revived by Malcolm Kirk, G4XMK, of Crowhurst, Surrey who for some years has had one of the heavy/bulky distributed power amplifiers (less the frequency synthesizer, PSU etc) in his garage. He now needs the space it occupies, and is looking for a 'good home' for it, possibly as a club station where there may be sufficient expertise to recover parts. I am not sure how much work it would require but the originally 'restricted' three-volume handbook of 1967 is indeed a formidable document, suggesting that this would not be a task to be undertaken lightly!

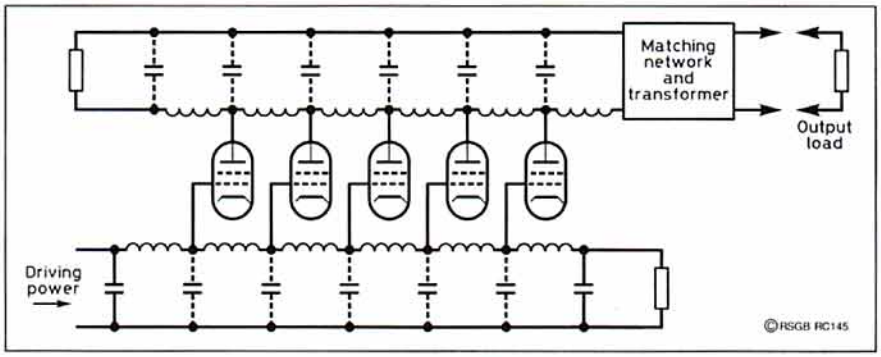


Fig 1: Simplified diagram of a distributed amplifier as used in the Marconi N204 transmitter.

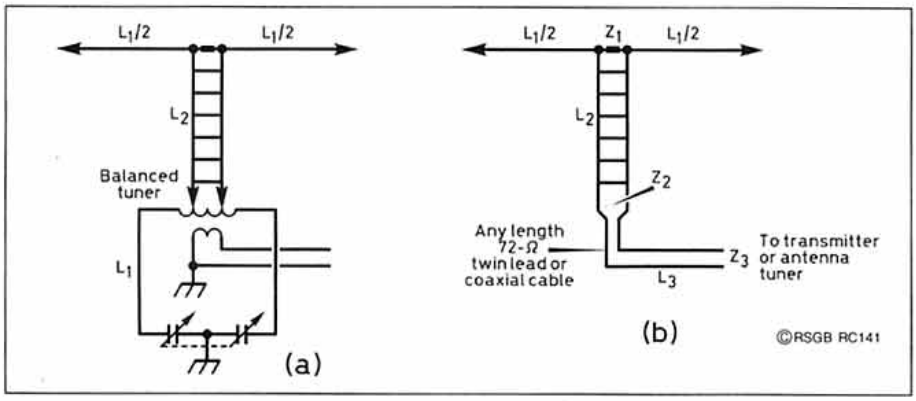


Fig 2: (a) Multiband or all-band dipole fed directly with open-wire line. The line is matched at the transmitter end with a balanced tuner. It is convenient (but not essential) if the length of the open-wire feeder is preferably an odd multiple of a quarter wavelength on the band in which the top element represents a resonant dipole in order to provide a low-impedance at the ASTU. (b) The basic arrangement of the G5RV or ZS6BKW variation, suitable for use (without an ASTU) on only some bands.

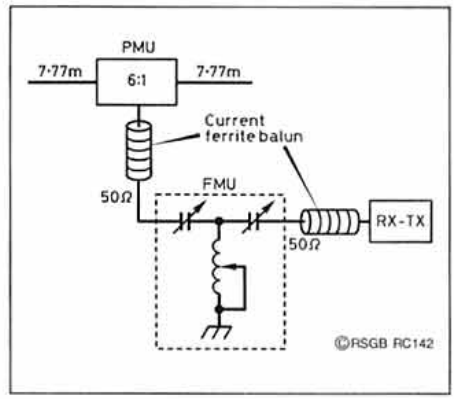


Fig 3: The EA4FO version of the Comudipole antenna. Note that the system works well without the toroidal ferrite current baluns. EA4FO uses 30m of RG-8 between the PMU and the FMU with no problems. Results have been excellent with an 8W transceiver. Between the FMU and the transceiver there is an SWR meter (not shown).

claims for the various variants of the doublet-antenna using special feed arrangements: "In our view, the correct feed-line length for a multiband dipole is that required to go from the output terminals of the antenna tuner to the antenna terminals, because – regardless of the length of the feed line – both the antenna and the feed line are made resonant by the tuner. Our recommendation, based on personal experience, is to use open-wire line for the total length of the required feeder. This will result in lower losses. An additional advantage in using a full-length feed-line is that any necessary balun can be inside the station, easing evaluation of its performance, or you can use a balanced tuner."

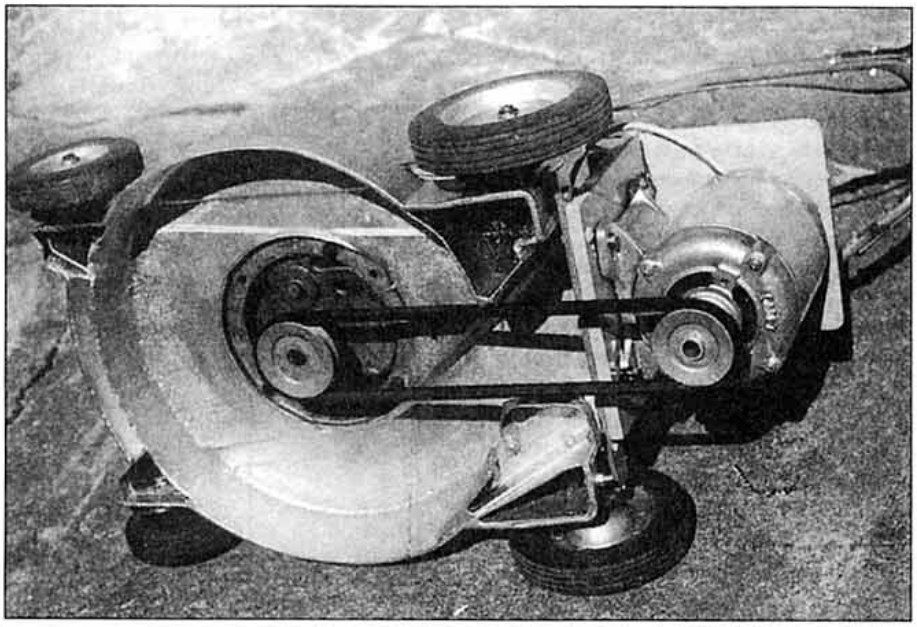
J H Gazard, VK5JG, in 'Tuned Feeders and Multiband Antennas' (*Amateur Radio*, April 1994, pp8-9) provides his experiences of both centre- and off-centre-fed antennas with tuned feeders. He concludes: "As a result of studying the operation of tuned feeders and making these and other tests my ideas of tuned feeder have changed and I have become aware of some facts that I have never seen in handbooks. These are that if the length of the antenna plus the length of each feeder wire is greater than a half-wavelength at the frequency concerned almost any combination of antenna length, feeder length, and feed point will function as a workable antenna . . .".

230V AC PETROL-ELECTRIC GENERATOR FROM SCRAP

RON MATHERS, ZL2AXO, in *Break-In* (September 1993) shows that it is possible to construct a 230V, 50Hz, 500W generator largely from discarded parts which should not prove too hard to find by a keen constructor. But while the generator is capable of powering relatively constant loads such as lighting, radio receivers, a TV set or, for example, a 20W transceiver, it is unlikely to prove suitable for supplying a 100W SSB/CW set since the rapid fluctuations of load represented by such a transceiver results in unacceptable swings in the generator terminal voltage.

The generator uses a discarded 3HP (petrol) lawn-mower motor as the prime mover and this is coupled by a belt drive to a 0.75HP single phase induction motor used as an induction generator. In practice the induction motor was an old 2850RPM pump motor salvaged from a local rubbish tip. [It is believed that suitable induction motors can also be salvaged from a number of domestic appliances, etc]. Both bearings in the motor were renewed but no other modifications made to the motor. Capacitive excitation was used in the induction generator: **Fig 4**. ZL2AXO found that a capacitance of 36μF, made up from three 12μF, 400V AC capacitors, resulted in 230V, 50Hz at no-load. Changing the size of the capacitor changes the no-load frequency with the output voltage being kept at 230V by adjusting the throttle of the motor. ZL2AXO notes that induction generators with capacitive excitation rely on the residual magnetism of the rotor to initiate the build-up of magnetic field much as a DC shunt generator relies on the residual magnetism of its field poles. The magnetic field eventually rises to a value limited by the saturation curve of the machine. He found that with lower-power induction motors the residual magnetism could be lost if the generator was overloaded or short-circuited, but provides suggestions for restoring residual magnetism of such motors.

Induction generators offer a number of advantages: (1) Low maintenance – no brushes, commutator or slip rings to wear. (2) The output voltage is a sine wave. (3) The generator cannot be permanently damaged by a short circuit. He warns that lights powered by this generator tend to produce a noticeable flicker at a frequency equal to that of the power strokes of the petrol motor caused by the low flywheel mass of the motor. However this did not affect pictures on a TV screen or the operation of other appliances.



ZL2AXO's home-made 500 watt petrol-electric generator based on a lawn-mower engine and a domestic appliance type induction motor.

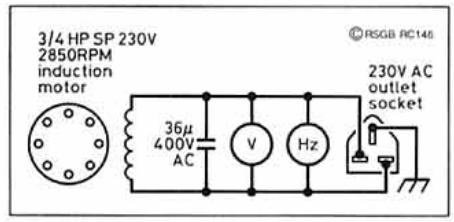


Fig 4: Induction generator as used for the 'scrap' 500W petrol-electric generator by ZL2AXO.

ULTRA-LINEAR VHF/UHF AMPLIFIERS

THE ENORMOUS EXPANSION of new forms of mobile, cellular and personal telecommu-

nications services, increasingly using digital speech and data modes, has brought about a major requirement for highly linear amplifiers. Such systems as the European digital cellular system (GSM), TETRA (European digital PMR), American and Japanese cellular and other emerging standards all require the use of linear (envelope varying) modulation formats to improve spectral efficiency. Unlike the traditional FM mobile services, a very high order of amplifier linearity is required in the transmitters to overcome the radiation of interference in the adjacent channels. In addition, both the UK and the USA are in the course of introducing 5kHz channelling for narrow-band modes such as SSB – in the USA such channelling is being located in part of the 220MHz band formerly used by radio amateurs.

The UK specification (MPT1376) for narrowband linear modulation PMR systems requires that the integrated power radiated in the adjacent channel should be 60dB below the in-channel PEP while the FCC transmitter mask requires any unwanted product (measured in a 100Hz bandwidth) more than 3.75kHz from the channel centre to be 61dB below the largest wanted signal.

To meet the requirements of these emerging or already operational systems, power amplifiers need to have two-tone third-order inter-modulation products specifications of some 55 – 60dB below peak level in circumstances where it is impractical to make use of Class A because of its overall low power efficiency.

A recent IEE colloquium 'Linear RF amplifiers and transmitters' (April 1994) provided some eight papers aimed at providing current experience on how such ultra-linear amplifiers might be implemented for mobile and also digital TV and sound broadcasting. Much of the present effort is based on the ideas originally put forward by V Petrovic a decade or so ago, initially for HF power amplifiers as a polar-loop amplifier (see *TT*, September 1979) and subsequently as cartesian feedback. With this approach (**Fig 5**), the inter-modulation performance of the amplifier can be of the order of 25dB with an additional 30 – 35dB provided by pre-correction based on demodulating a fraction of the output waveform and then comparing it with the input waveform to cancel out the waveform distortion (see **Fig 6**). The practical implementation of such feedback loops has been considerably facilitated by the use of digital signal processing.

From an amateur viewpoint, probably the most interesting of the colloquium presentations was 'A practical cartesian loop transmitter for narrowband linear modulation PMR systems' by Simon Whittle of Linear Modulation Technology Ltd (part of the Securicor Group). Securicor has been involved in 5kHz channelling systems since 1986, initially working with other firms on modified SSB equipment for DTI sponsored trials. LMT is currently manufacturing FCC-approved 220MHz trunked 25W mobile transceivers and base stations and has completed the design of a 100W base station.

The problems induced by Doppler shift etc with 5kHz-channelling mobile SSB are well-known but can be overcome by such techniques as Transparent Tone-in-Band (TTIB) modulation which provides a pilot carrier some 10dB below PEP, with Feed Forward Signal Regeneration (FFSR) originally developed at Bristol University (which now houses the Centre for Communications Research).

With TTIB, a reference pilot is placed in the centre of the RF channel and the band-limited baseband input signal is transposed symmetrically about the pilot typically 10dB below PEP. The pilot is normally the largest discrete signal and is, in effect, spaced as far as possible from the adjacent channels, minimising adjacent channel radiation. The FFSR technique allows a fading narrowband channel to be accurately equalised, improving voice performance and allowing 9600 bit/s 16QAM data to be transmitted reliably to a moving vehicle.

It is claimed that the cartesian loop transmitters now being marketed by LMT meet both FCC and MPT requirements for 5kHz channel-spacing PMR equipment, with image and carrier suppression of 35dB and two-tone IMD 60dB below each tone. The complete mobile transceiver requires 40W DC to produce a 25W PEP voice transmission, less than a third of the DC power required for an FM transmitter of comparable communications range. The LMT 100W amplifiers using FETs have two-tone IM products more than 70dB below each tone. Performance tends to be limited more by pick-up and supply modulation than by individual circuit blocks. The frequency synthesizers are particularly critical in this respect. The firm is currently developing equipment for other PMR mobile bands, and has started development of hand-portable equipment, using application-specific integrated circuits (ASICs) to reduce size, power consumption and cost.

Currently, it is admitted that compared with mass-produced FM mobile transceivers the 5kHz-channelling ultra-linear SSB units are 'premium-priced'. The improved performance and better spectrum utilisation of such systems seem to point the way that mobile radio will go – and clearly this is a portent also for amateur VHF/UHF operation, both fixed and mobile. From MF to UHF, ultra-linear power amplifiers and low-noise oscillators and synthesizers could 'clean up' the bands to a truly significant extent.

MAGIC OF MARGINAL ELECTRONICS – ANTENNAS & OSCILLATORS

FOR THOSE WHO BELIEVE that amateur radio has an important role to play in encouraging youngsters to take up the profession of radio communications engineering, it should not pass unnoticed that the current Chairman of the IEE's Electronics Division is Professor Mike Underhill, G3LHZ.

Over the years G3LHZ has made many contributions to both professional and amateur radio technology, including 'silent tuning' and 'quiet tuning' to avoid or minimise radiation during matching of antennas (Simple quiet tuning and matching of antennas' *RadCom*, May 1981, pp420-422) and also the concept of the two-stage approach to practical and versatile wide range antenna matching networks most recently exploited in the PA0SE Comudipole multiband antenna (*TT*, May 1993, pp54-55).

He has also been prominent in the development and better understanding of oscillators, including stabilisation by the use of delay lines and more recently in the investigation of improved frequency synthesizers.

In the written version of his Chairman's address ('The Magic of Marginal Electronics'

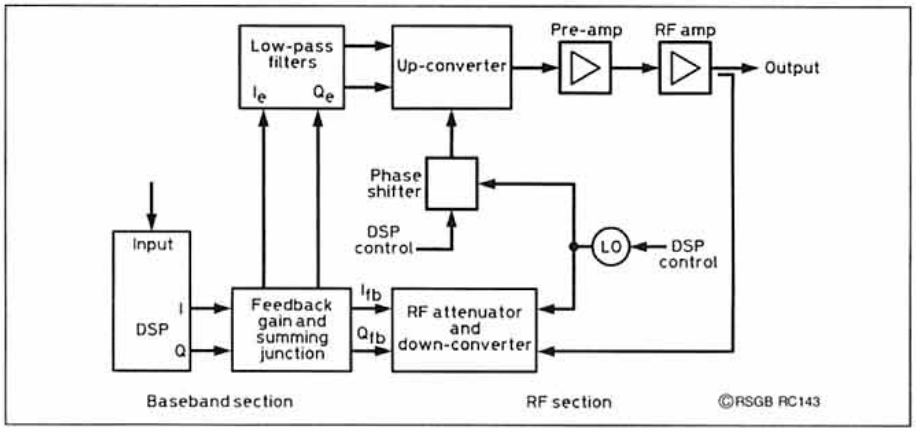


Fig 5: Basic configuration of a cartesian-loop ultra-linear amplifier, implemented using digital signal processing (DSP).

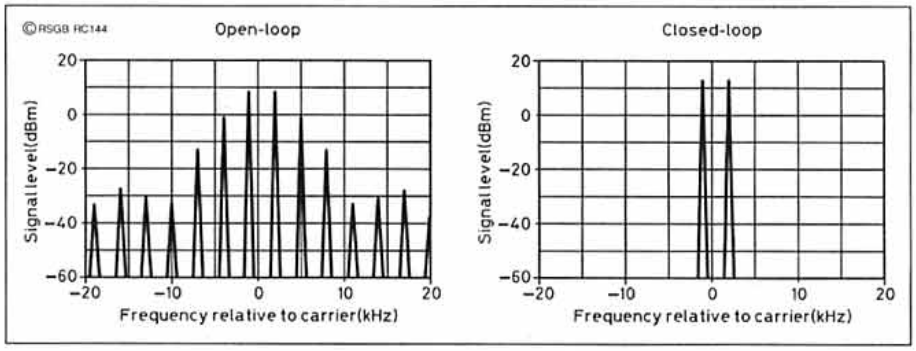


Fig 6: The open- and closed-loop performance of a cartesian-loop transmitter.

appears in the IEE's *Electronics & Communications Engineering Journal* (December 1993, pp359-368) he defines 'magic' as 'an extraordinary power or influence producing results which defy explanation', adding 'to many who have succumbed to the fascination of electronics this definition would seem very appropriate'.

He notes: "For scientific research it is the ultimate laws of science and nature that define the boundaries to be explored. For engineering it is the limiting trade-off between performance, safety, cost and timescale that becomes the challenge. Science is to a great degree curiosity driven, where the goal is better understanding of the laws of nature, whereas engineering has as a goal the modification or control of the environment (for the betterment of the human condition hopefully). Engineering needs science because not all engineering can be based on experience of what works in practice. It remains true that any engineering technology will ultimately only develop as far as the limits allowed by the laws of nature as discovered by scientific endeavour. Electronics has both its science and its engineering."

In the body of his address G3LHZ reviews the fundamentals of electrically small radio antennas, still often not understood by amateurs brought up on the idea that the only truly efficient radiator is a resonant half-wave dipole element. This concept is being slowly discarded in order to cope with the problem of HF antennas that need to cover both the traditional and the WARC non-harmonically related bands.

To quote G3LHZ: "The gain, or ability, of an antenna to radiate power (or receive power) in a given direction is almost the same for a very small antenna (no matter how small it is) as for its equivalent full-size antenna. (This is true for both monopoles and dipoles, where the full-size versions are, respectively, a quarter-wave and a half-wave in length). This is because the radiation patterns are almost identical for the small and full-size versions.

The gain is also proportional to the capture area of the antenna. The capture areas of a full-size and a small dipole, no matter how small the dipole is in length or wire thickness, are both a little over one tenth (0.12) of a square wavelength. If the antenna is made from a rod or wire of moderate thickness, the physical area of even a full-length antenna can be as little as one four-hundredth of the capture area.

"There is however a catch: the bandwidth of a very small antenna (that is the band of frequencies over which it works) is very small. There is a beautiful proof, originated by L J Chu but articulated in more practical terms by H A Wheeler, which shows that the bandwidth as a fraction of the frequency of interest cannot exceed a constant times the volume of the sphere (expressed in units of wavelength cubed) in which the antenna can be contained, no matter what shape the antenna is or what material it is made from. The fractional bandwidth is the reciprocal of the quality factor, Q, which is the ratio of the energy stored in the space around the antenna to the energy radiated or received during the time of one cycle of the waveform . . . . Q is very high for a small antenna [such as a transmitting magnetic loop] and we find that extremely strong electric and magnetic fields exist and store energy in the space immediately surrounding it when it is used for transmitting even quite low powers. A high value of Q is the price paid for having a capture area which is much bigger than the physical size of the antenna . . . .

"Fortunately H W Bode proved that it is possible to trade efficiency for bandwidth. For the case of a resonant (high Q) circuit a trade-off can be made between the bandwidth and the power loss . . . . for small transmitting antennas there is Foster's reaction theorem (based on an energy conservation argument) which is not very well known but which tells how to match a small antenna to a transmitter with a minimum of extra loss due to Q limitations. It also allows maximum bandwidth to be retained when matching an antenna for several frequencies of operation. (The secret is to minimise the stored energy by making all network reactances as far as possible of the opposite sign to the load reactances). This theorem was used in the design of the HF multicoupler in the beacon experiment in the first University of Surrey [UOSAT/AMSAT] satellite.

"Another nice theorem for radio antennas and radio transmission is the 'principle of reciprocity'. It means that if receiving and

TOROIDAL HELIX ANTENNAS

I GATHER THAT THE articles by Roger Jennison, G2AJV, on his compact single and twin toroidal antennas (*RadCom*, April and May, 1994) were mistakenly considered by some readers to be an elaborate April Fool joke rather than a practical approach to mobile and space-limited applications. It therefore seems worth pointing out that alternative forms of toroidal helix antennas (without the top and bottom plates) were outlined in *TT* in October 1983, pp889-890. This was the result of Alec Clelland, DJ0FL/G3UUQ drawing attention to the 70-page European Patent Application EP 0 043 591 Al made by James Corum of West Virginia, who, from the examples described, appeared to hold an amateur licence. [K1AON – *Ed*]

In his application, James Corum claimed that various implementations of the basic principle "possess greater radiation resistance and radiation efficiency than loop antennas of similar size". He also claimed that such elements "radiate controllable mixtures of vertically, horizontally and elliptically polarized electromagnetic waves, and possess radiation patterns different from those produced by small loop antennas, and can be used to form both driven and parasitic arrays." It was pointed out that although such elements are similar in form to a toroidal inductor, they are essentially not perfect toroidal inductors which would have zero radiation efficiency.

Examples given in the Patent Application (including those outlined in **Figs 7 and 8**) covered frequencies as low as 200kHz and as high as 450MHz. The inventor admitted that "one does not get something for nothing. The price one pays with the toroidal helix is that it is a narrowband (high-Q) structure and inherently not a broadband device . . . . [but] these antennas by virtue of their construction possess a greater radiation resistance than known antennas of similar electrical size not having the slow-wave winding features . . . . the helix permits the formation of a resonant antenna current standing-wave in a region of electrically small dimensions, and it permits the controlled variation of antenna currents, resonant frequency, impedance, polarization and antenna pattern."

I cannot recall the 1983 *TT* item attracting any great attention and we owe a debt to G2AJV for further developing this interesting antenna concept and showing its practical value for such applications as mobile operation. His articles clearly deserve to attract further work.

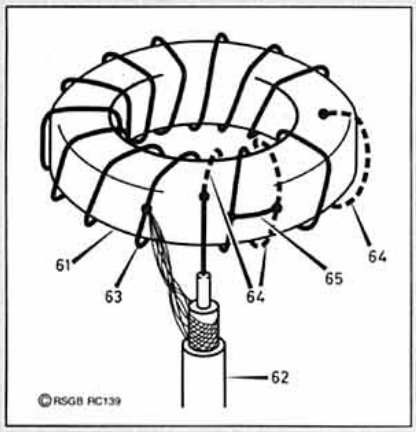


Fig 7: One of the several forms of toroidal helix antennas described by James F Corum in his patent application. Isometric representation of the antenna (61) and transmission line (62). The main conductor (63) is continuous. In addition there is a shorter inductor (64) helically wound around the toroidal support between some of the turns of the main conductor (63). A sliding tap (65) connects the two conductors 63, 64. One side of the transmission line is connected to one end of the shorter conductor (64) and the other side attached to the main winding 63. The sliding tap (65) is moved to provide proper impedance matching. This point is found empirically at the operating frequency by moving the sliding tap to the optimum position.

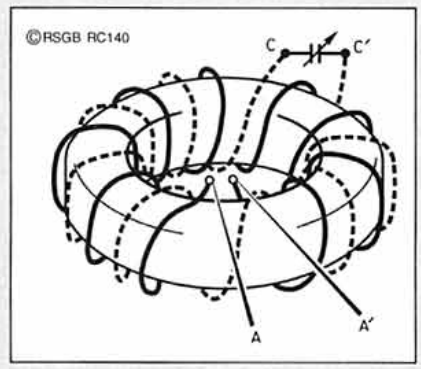


Fig 8: Use of a variable capacitor to vary the resonant frequency of a toroidal helix antenna without changing the number of turns. The antenna comprises two helices, one fed at points AA' and the other at CC'. The variable capacitor is connected across feedpoints CC'.

transmitting antennas are interchanged there will be no change in the received signal for a given transmitted power (the path loss is the same either way provided both antennas are power matched to their terminations)."

G3LHZ illustrates reciprocity by showing that this would apply even to the interchange of the Droitwich 198kHz 400kW antenna and a ferrite rod receiving antenna – at least for the few microseconds that 400kW could be fed into the ferrite rod antenna! But he emphasises that to obtain maximum radiated power an antenna [system] must be resonated to the transmit frequency and then matched in impedance to the transmitter. In practice of course much of inefficiency of electrically small antennas arises from the losses involved in the matching networks – all the power actually fed into the radiating element will be radiated apart from the usually small ohmic loss.

G3LHZ also underlines in his address the importance of oscillator phase noise: "If the oscillator used is itself noisy (having phase noise), then in the case of a transmitter the oscillator noise spills over into the adjacent channels and, in the case of a receiver, signals in the adjacent channels are allowed to corrupt the wanted signal by the process called 'reciprocal mixing'. In either case the adjacent channels become unusable.

"The phase noise of an oscillator, no matter how it is implemented, obeys a simple rule of thumb originally put forward by Leeson (*Proc IEEE*, 1966, Vol 54 (2) pp329-330), then extended by Underhill (Fundamentals of oscillator performance' *Electron & Comm Eng J*, August 1992, Vol 4 (4) pp185-193). The rule of thumb is that the timing jitter/noise which represents the phase noise in any oscillator is inversely proportional to the power P of an oscillator times the quality factor squared, Q^2. Thus for low phase noise in any oscillator, the figure of merit PQ^2 should always be as large as possible . . . . The phase noise of an oscillator can also be reduced if its temperature is lowered . . .".

ANALOGUE MULTI-METERS ARE VERSATILE

JOHN OSBORNE, G3HMO, believes there is still a place for old-style analogue multimeters which have a versatility not found in digital multimeters (DMM). He writes: "I find the DMM fine for accurate measurements of resistance for calibration purposes and very occasionally for some special facilities such as capacitance or frequency measurement. But it is not reliable for testing continuity as the applied voltage is often not enough to break down switch-contact resistance etc.

"On the other hand the analogue multimeter has a high enough applied voltage to break down switch-contact resistance [usually, but not always, low enough to avoid damaging semiconductors] when circuit testing. When testing capacitor insulation one notices the charging pulse for those over about 1µF. Then, if one gets a bigger pulse on reversing the leads, it indicates that leakage is small and it is a useful capacitor. There is no need to use sophisticated testgear for most work in the shack."

G3HMO illustrates the versatility of the analogue multimeter with two examples: (1) Non-destructive test to find the breakdown voltage of semiconductors; and (2) wet-finger test for semiconductors.

(1) *Break-down voltage test:* Semiconductor devices have been described as the fastest fuses known to man. Exceeding the breakdown voltage can be very expensive and time consuming. The manufacturer's specification is likely to be conservative in order to cover variations in production. A particular specimen could be safely run above the specification if the real breakdown voltage is known. A typical plot of reverse voltage against current for a junction is shown in **Fig 9(a)**. When the voltage reaches the turn-over point, further increase in voltage produces an indefinite increase in current; the resulting wattage dissipation soon destroys the junction. Any test must limit the current to safe values.

The setup for a simple test is shown in **Fig 9(b)**. A variable voltage supply, monitored by V1, is applied to the device. A second voltmeter connected in series should be a high-resistance moving-coil instrument which passes a small but measurable current. A 20kW/volt MM passes 50mA at full scale and 25mA at midpoint, whatever the voltage range. I find my AVO Model 8 ideal. This meter reads V2 the difference between the voltage across the device and the applied voltage. It also monitors the current through the device as already noted. Typical plots of V1 and V2 against the current in the device appear in **Fig 9(c)**. V2 is directly proportional to the current. V1 rises as the small current through the device rises. At the turnover point no further increase in voltage is required to increase the current and both voltages rise at the same rate. The difference is V3, the breakdown voltage of the device.

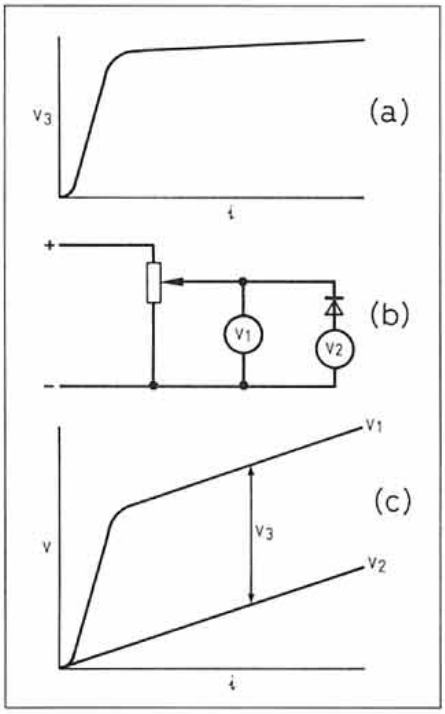


Fig 9: Use of analogue meters for non-destructive testing of the breakdown voltage of a semiconductor junction.

A little thought and practice reveal that the graph, Fig 9(c), is not needed. When winding up the voltage of the supply and watching the AVO the difference becomes a matter of mental arithmetic. Because the maximum current that can flow through the device with a high-sensitivity meter is so small the test is non-destructive.

(2) *The Wet Finger Test:* The requirement of an amateur is often simply to check that a component is viable and not a dud. With the common transistor, the requirement is usually not so much a precision measurement of gain as a confirmation that the device has some useful gain. The wet finger test, with an analogue multimeter on an ohms range, can indicate this. Digital meters are unsuitable. A transistor is effectively two back-to-back diodes (base-to-collector and base-to-emitter). First check each diode separately with the meter; in the forward direction a typical reading would be 200 to 600Ω; in the reverse direction (simply connecting the leads to the diode the other way round) the apparent resistance will usually be above 100kΩ, tending towards infinity.

In the simplest transistor amplifier circuit a transistor, has a supply voltage connected. With no current in the base, a negligible current will flow in the battery circuit. If a small current is caused to flow between base and emitter, a much larger current, perhaps one hundred times as much, will flow between collector and emitter. A multimeter on a high resistance range connected between collector and emitter will show a very high resistance. If a suitable resistance is connected between collector and base, the small current will be amplified and the meter will indicate a large drop in resistance. A suitable resistance can be readily provided by licking one's fingers and applying them between collector and base. Putting fingers in parallel with collector and base will indicate the order of magnitude of the wet finger resistance; the much bigger drop when connected between collector and base gives some indication of useful gain.

Note that the multimeter lead polarity is reversed on the ohms range. The basic circuit of a multimeter on the ohms ranges is shown in **Fig 10(a)**. The wet finger test is illustrated in **Fig 10(b)**. ***G3VA***

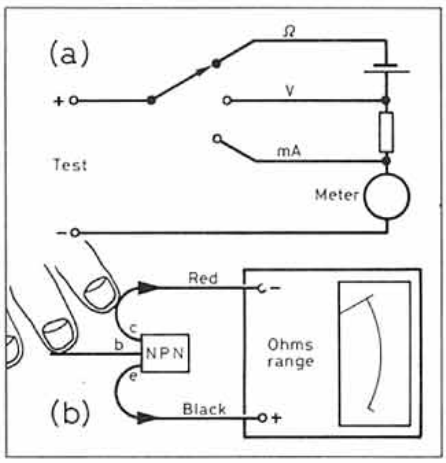


Fig 10: The 'wet-finger test' to check that a transistor is functioning and not a dud, using a high-sensitivity analogue multimeter such as the AVO Model 8.

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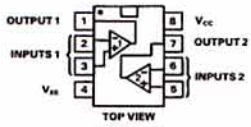

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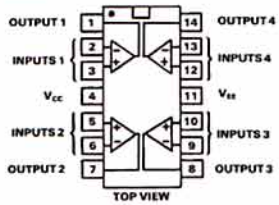

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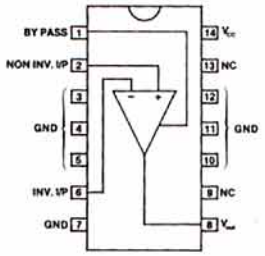

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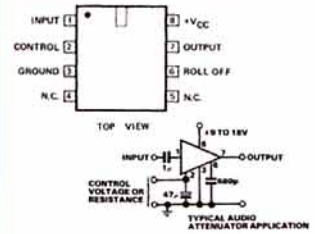

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CIRCUIT DESCRIPTION

THE INSTRUMENT CAN BE separated into three blocks: Waveform generator, power supply and digital frequency counter.

POWER SUPPLY

The power supply schematic circuit diagram is shown in **Fig 1**. The mains input passes through a 1A fuse F1 and front panel ON/OFF switch S1. Transformer T1 steps down the mains voltage to produce two identical $15V_{RMS}$ outputs, the centre tap of the secondary is connected to ground to define a 0V reference. Bridge rectifier D1 produces positive and negative voltages which are symmetrical about the ground reference.

Regulator IC1 is used to produce the +12V rail and regulator IC2 is used to produce the –12V rail. Capacitor C7 is necessary to reduce a small spurious spike that would otherwise appear on the generator's sine wave output (see C8 later). The digital frequency counter uses the +12V and 0V rails only.

A single supply rail (ie GND and +V) can be used for the ICL8038, however as the IC output waveform is centred on V/2 a DC decoupling capacitor would be required, and that would be undesirable due to the frequency sensitive nature of capacitors. By using +V and –V supplies, the wave forms are centred on 0V removing the need for an output decoupling capacitor.

AUDIO FREQUENCY WAVEFORM GENERATOR

THE WAVEFORM GENERATOR schematic circuit diagram is shown in **Fig 2**, the ICL8038 is shown as IC3. A triangle waveform is created by using internal current sources to charge and discharge an external capacitor (C9 to C12), the square wave is derived from this triangle waveform and finally the sine wave is created by feeding the triangle waveform into an internal non-linear network.

For fixed frequency applications a simple fixed value capacitor (connected to pin 10 of IC3) and fixed resistor (connected to pin 5 of IC3) could be used, the duty cycle could be set by connecting a fixed value resistor to pin 4. Connecting a variable resistor to pin 5 would not provide a suitable waveform gener-

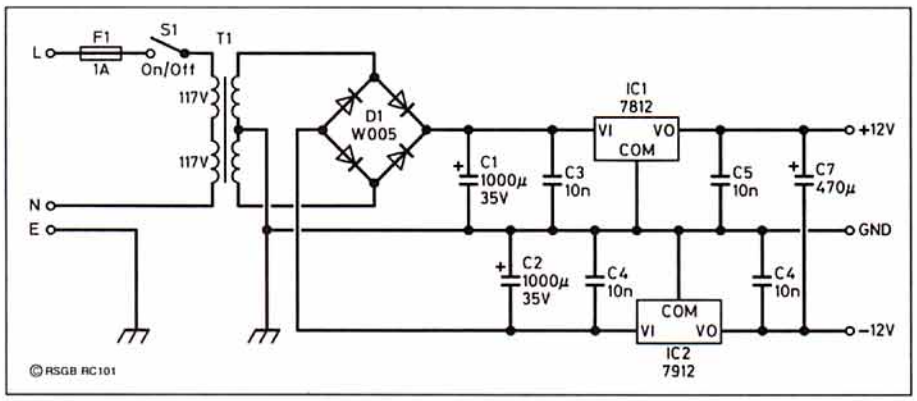
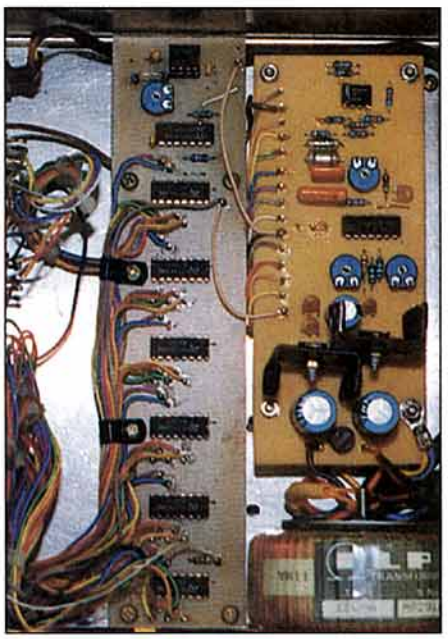


Fig 1: The power supply.



Internal view of the prototype.

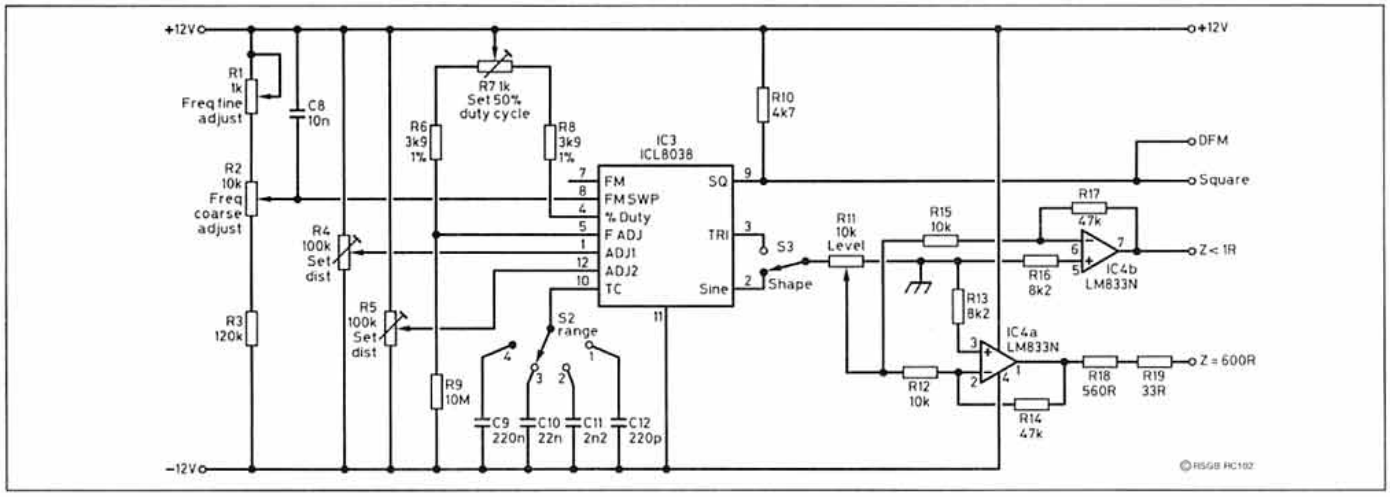


Fig 2: The AF Waveform Generator.

ator as varying the frequency in this manner would also vary the duty cycle.

The ICL8038 can be made to sweep its frequency by applying an AC sweep voltage to pin 8, if instead of AC this sweep voltage is DC then a simple means of varying the frequency becomes realistic. Resistors R1 and R2 are front panel potentiometers and provide FINE and COARSE frequency adjustment respectively. Capacitor C8 is necessary to remove a small spurious spike that would otherwise appear on the generator's sine wave output as a result of the non-linear network (see C7 earlier).

For a 50% duty cycle it is necessary to have equal values for R6 and R8, so preset resistor R7 is included to trim the duty cycle and resistor R9 reduces the variance of duty cycle with frequency. Over large frequency ranges (ie 10Hz to 80kHz) the duty cycle still varies slightly and if required R7 could be brought out to the instrument front panel as a panel mount potentiometer.

As the sine converter part of IC3 comprises a non-linear network the sine wave output will be an approximation to a pure sine wave, preset resistors R4 and R5 are included to enable the user to trim the sine wave distortion to a minimum during the initial setting up.

Capacitors C9, C10, C11 and C12 determine the four frequency ranges, these overlap slightly but are nominally:

10Hz	to	100Hz
100Hz	to	1kHz
1kHz	to	10kHz
10kHz	to	80kHz

Switch S2 is a front panel 4-way switch which selects which one of the four range capacitors is connected to pin 10 of IC3.

The sine and triangle wave forms from IC3 are fed to S3 which selects which one of these is fed via level control resistor R11 to the amplifiers. These amplifiers are identical in all respects except for their output impedances, so only one is described.

The op-amp gain is set to approximately 5 (14dB) by resistors R12 and R14, the value of R13 being chosen to be the parallel equivalent of R12 and R14, this reduces the op-amp's DC output offset voltage to about 0V.

The output impedance of IC4a is very low, effectively acting as a reasonably ideal voltage source. A *standard* impedance used in audio circuits is 600Ω and so R18 and R19 bring the equivalent output impedance up to 600Ω. The output of IC4b is left as a low impedance source as this can be equally useful on the work bench.

The slew rate of IC4 limits the output waveform rise time (and fall time) and as the IC cannot switch instantaneously between the rails. The practical effect of this is that as the frequency increases the triangle output becomes distorted, eg the triangle waveform develops a *squiggle*.

The square wave-form output remains a true square wave over this frequency range but note the output impedance is about 200Ω (with a load current of less than 5mA). The square waveform output from pin 9 of IC3 is an open collector output and so R10 is used to provide a load. The square wave output at pin 9 is tapped to provide an input for the digital frequency counter circuit (see later). Note that C13 is not used, it was used on an earlier prototype but has since been dropped from the design.

To provide a variable control for the square wave form output, use a dual-gang panel potentiometer for R11 and use one half to control the sine and triangle wave forms and the other half to control the square wave form. I choose not to.

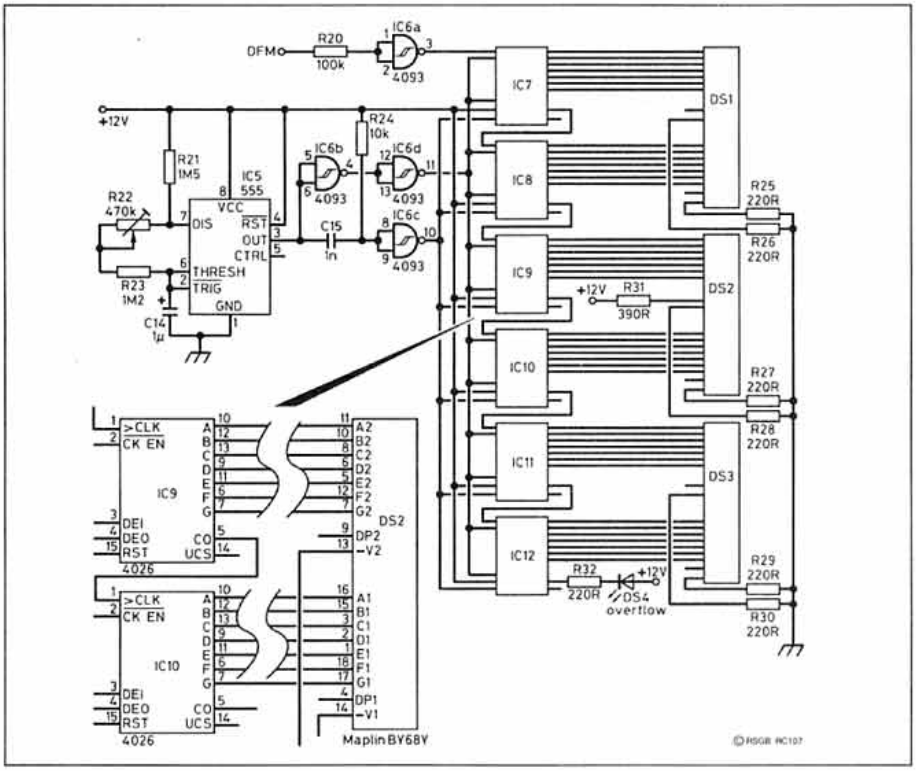


Fig 3a: The digital frequency counter.

DIGITAL FREQUENCY METER

The digital frequency counter circuit diagram is shown in **Fig 3**. The timebase oscillator is provided by timer IC5, which is configured

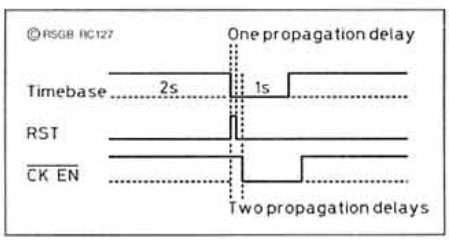


Fig 3b: Frequency counter waveforms.

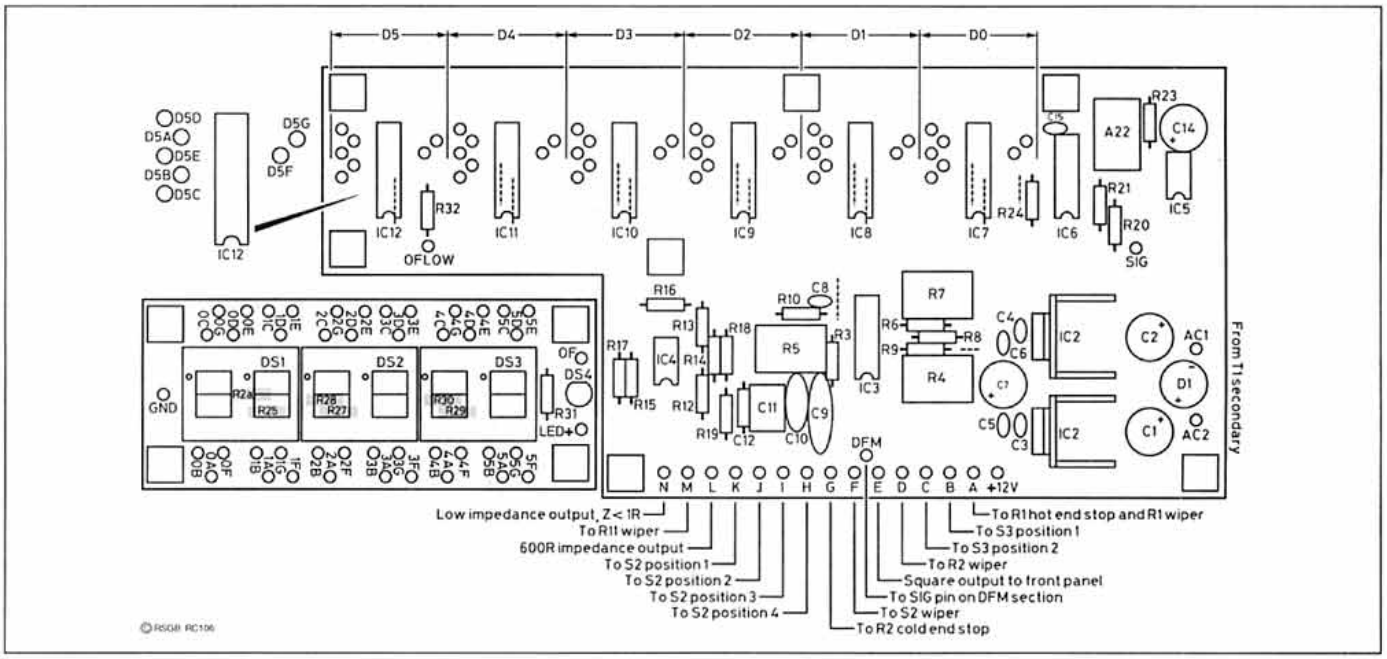


Fig 4a: PCB component layout.

in the astable multivibrator mode with the asymmetrical waveform output at pin 3.

The time high is

$$t_H = 0.693(R21 + (R22 + R23))C14$$

and the time low is

$$t_L = 0.693(R22 + R23)C14$$

This means that the output of IC5 is high for longer than it is low.

Resistor R22 provides for adjustment of the timebase to ensure that t_L can be set to one second (see later) and t_H is approximately two seconds. Input signal noise reduction is performed by Schmitt trigger gate IC6a.

The meter is formed around 4026 decade counter chips which directly drive the six 7-segment LED displays. A description of these chips is in order. Each time a clock pulse is received at the CLK input the number shown on the respective LED display is incremented, after ten pulses have been received at the CLK input the displayed number reverts to 0 and the carry out pin CO becomes active.

The 4026 can be made to stop counting by pulling the CK EN pin low, and the display can be blanked by pulling the display enable input DEI pin high. Finally the 4026 internal counter can be reset to 0 by pulling the reset pin RST high, if the CK EN is disabled and then enabled again without a reset then the count simply continues from where it left off.

The magnitude of the maximum count can be increased by connecting the first 4026's CO output to the next 4026's CLK input, hence with two 4026's it is possible to count to 99, with three 4026's 999 and so on. Hence with six chips the maximum possible count is 999999.

If the CK EN pins are tied together and active for precisely one second (see later) the display readout is given in Hertz, so the maximum frequency the meter can measure is 999999Hz or near enough 1MHz.

For the meter to operate correctly the ideal states which must occur in sequence are:

a) Blank the display.

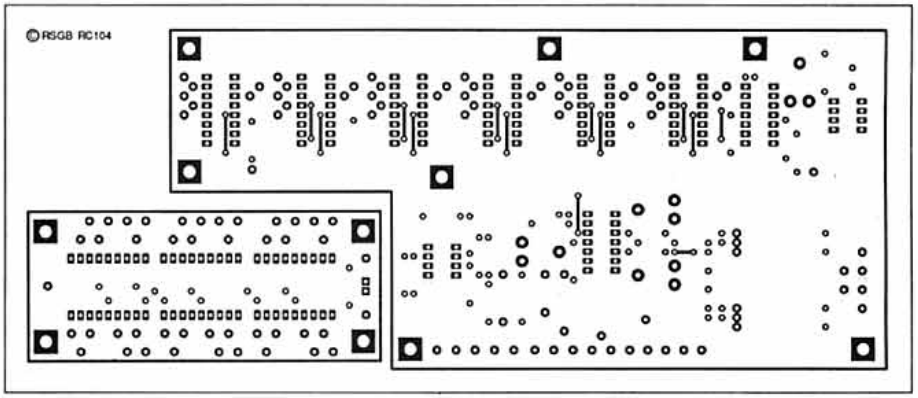


Fig 4b: PCB solder side, viewed as if looking through the PCB from component side (50% actual size).

b) Reset the internal counters to ensure a measurement starts at zero.

c) Enable the counters for one second.

d) Disable the counters.

e) Enable the display to show the last measurement.

f) Wait a reasonable period to allow user to absorb information displayed.

g) Repeat from (a).

Now assuming the output at pin 3 of IC5 is high, the CK EN and DEI pins will also be high (via IC6b and IC6d) so counting will be disabled and the display enabled, showing the last measured frequency. Capacitor C15 will block the output from pin 3 and so the RST pins will be pulled low by IC6c.

As pin 3 goes low a number of things happen, a very short pulse appears across C15, causing IC6c to strobe the RST line which resets the internal counters of IC7 to IC12, this is delayed by the inherent propagation delay of IC6c. The CK EN and DEI pins of IC7 to IC12 are pulled low. This disables the display and enables counting to commence, this action is delayed by the inherent propagation delays of IC6b and IC6d.

You may have noticed that this does not conform precisely to the states originally given, however by using the gates in this manner it ensures that a reset occurs before a new count is initiated and in any case the response time of the LED displays is such that the theoretically displayed 000000s are not noticed.

Additionally the count time duration will be out by two propagation delays which could affect the accuracy of the counter. This latter problem is offset by the adjustment of R22 so that the low time of IC5, pin 3 is actually equivalent to one second plus two propagation delays. This will not be noticeable as resistor R22 is simply adjusted until the correct frequency is displayed.

After the one second count duration pin 3 goes high again. This time no pulse appears across C15, as the IC6c side of C15 is already high, so a reset strobe does not occur. Instead the CK EN and DEI pins of IC7 to IC12 are pulled high, thus disabling further counting and enabling the current values stored in IC7 to IC12 to be displayed for a time period of t_H.

Hence the overall action of the counter is:

a) Blank display for one second whilst measuring.

b) Display frequency for two seconds.

c) Repeat from (a).

If the input count is greater than 999999 then the CO output of IC12 becomes active,

COMPONENTS LIST

Resistors

All 0.25W 5% metal film unless otherwise stated.

1	R1	1k panel-mount pot
1	R7	1k PCB mount preset
3	R12,R15, R24	10k
2	R2,R11	10k panel-mount pot
1	R3	120k
2	R4,R5	100k PCB mount preset
1	R20	100k
2	R6,R8	3k9 1%
1	R9	10M
2	R10,R31	390R
2	R13,R16	8k2
2	R14,R17	47k
1	R18	470R
1	R19	33R
1	R21	1M5 1%
1	R22	470k PCB mount preset
1	R23	1M2 1%
7	R25,R26, R27,R28, R29,R30, R32	220R

Capacitors

All 25V disc/plate ceramic unless otherwise stated.

2	C1,C2	1000µ 25V elec radial PCB mount
5	C3,C4,C5, C6,C8	10n
1	C7	470µ 25V elec radial PCB mount
1	C9	220n Polyester
1	C10	22n Polyester
1	C11	2n2 Polystyrene
1	C12	220p Polystyrene
0	C13	NOT USED
1	C14	1µ 16V Tantalum bead
1	C15	1n

Semiconductors

1	D1	W005 1A bridge rectifier
1	DS4	5mm LED (overflow)
3	DS2,DS3	Double digit 7 segment common cathode LED display (MAPLIN part BY68Y)
1	IC1	7812 1A TO220 regulator
1	IC2	7912 1A TO220 regulator
1	IC3	ICL8038 waveform generator
1	IC4	LM833N dual op-amp
1	IC5	555 timer
1	IC6	4093 Quad Schmitt NAND
6	IC7,IC8,IC9, IC10,IC11, IC12	4026 decade counter

Additional Items

1	F1	1A mains fuse
1	S1	toggle switch (ON/OFF)
1	S2	SP4W switch (RANGE)
1	S3	SP2W switch (SHAPE)
1	T1	1A 15-0-15 transformer

2 TO220 heatsinks
8-way colour-coded ribbon cable
BNC connectors
Display contrast filter
Half size PC pins
Heat shrink sleeving
Heatsink paste
Hookup wire
Instrument case
Knobs
M3 mounting hardware
Mains lead
Panel mount cable restraint
Panel mount fuse holder
Printed circuit boards

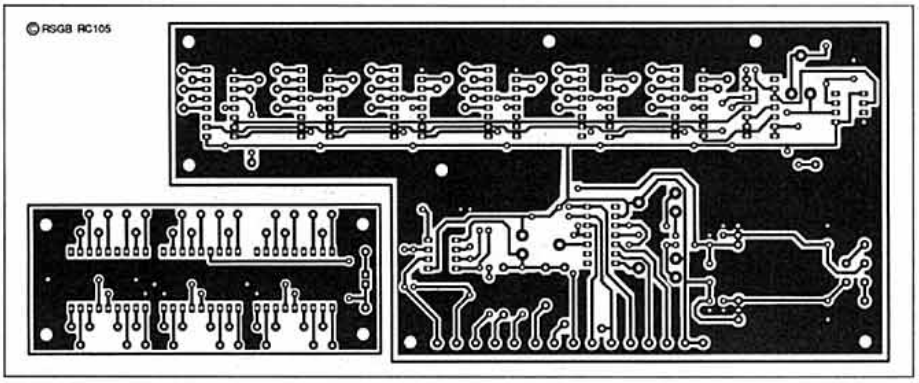


Fig 4c: PCB component side (50% actual size).

an LED and resistor are used to indicate an overflow condition.

Finally the frequency in Hz is converted to kHz by simply ensuring that the decimal point segment of the appropriate LED display is tied to the positive rail via resistor R31.

CONSTRUCTION

A SINGLE SIDED PCB LAYOUT has been designed for ease of construction, the component overlay is shown in **Fig 4a**. The solder side foil pattern as seen looking from the component side is shown in **Fig 4b** with the component side shown in **Fig 4c**. There are several short links that will need to be soldered to the PCB, these are marked by the dotted lines on the component overlay.

For those who wish to make a double sided PCB instead of using short links a component side foil pattern can be used – it is easier to make a single sided board and use links! If you choose to use a single sided board fit the links before any other component as some of the links need to run underneath some of the ICs (Fig 4c).

My assembled prototype is shown in the photographs (p60). Note that the prototype used separate boards for the waveform generator and digital frequency counter.

The following are front panel mounted: Resistors R1, R2 and R11, switches S1, S2, S3 and the three output connectors. The output connectors can be whatever suits your needs. I used BNC connectors mostly because I have a box full of them and they are convenient.

The fuse holder and mains cable are rear panel mounted. For safety reasons, where possible, all mains wiring connections and terminals should be routed to one end of the case and heatshrink covered. All DC wiring should be routed away from the mains wiring and ideally at the other end of the case. The instrument must be housed in a metal case and the chassis of the case must be connected to the mains earth. I used metal standoff pillars to mount the PCB to the metal case, thus completing the ground circuits.

The voltage regulators (IC1 and IC2) should have TO220 style heatsinks fitted (or the homebrew equivalent), it is essential that the heatsinks do not touch each other.

The LED display PCB has six resistors (R25 to R30) mounted on the solder side of the board; this reduces the size of the board. The PC pins should be inserted from the component side, as this will allow the on/off board wiring to be soldered on the back of the board.

The main PCB and display PCB boards are interconnected by eight-way colour coded ribbon cables. There are two reasons for this approach: Firstly whilst UK readers will have no trouble obtaining the correct LED displays, overseas users might prefer to use a local supplier and in all probability the LED display pin out will be different, hence using leads will allow almost any common-cathode display to be used (even if it has to be built on stripboard). Secondly by splitting the project onto to logically separate boards it will enable constructors to locate the display board to the front panel and locate the main board wherever it suits them within the case.

On the main PCB the PC pin labelled D0A indicates that this is Digit 0 Segment A and so on for the other digits and segments. These correspond with PC pin labelled 0A on the display PCB and so on. Digit 0 is the least significant digit (Hz) and digit 5 is the most significant digit (hundreds of kHz).

I first connected the ribbon cables to their respective decade counters (U7 to U12) and stacked the flat ribbon cables using P clips. Hence when it came to connecting the display PCB and main counter together it was easy to tell each digit apart and each segment within that digit.

TEST AND CALIBRATION

A VOLTMETER AND SINGLE BEAM oscilloscope with a bandwidth of 1MHz are required to calibrate the project.

All measurements are made with respect to the instrument chassis (ie 0V is used as the reference ground).

The method is as follows:

Apply the mains input to the unit and switch S1 to the ON position. Use the voltmeter (set to 30V DC range) and check that 6 of IC3 pin is +12V. Check that 11 of IC3 pin is –12V, you will need to reverse your voltmeter leads if using an analogue meter! This completes the DC tests.

Set PCB mounted preset resistors (R4, R5 and R7) to the centre position and set the front panel controls as follows: R1, R2 and R11 to the centre position, switch S2 to the 10kHz to 80kHz range. The setting of S3 is irrelevant at this stage.

Connect a high impedance oscilloscope probe to the square wave output, (PC pin E), adjust R1, R2 and the oscilloscope until a square wave of about 10kHz is displayed. Adjust the duty cycle preset R7 until a 50% duty cycle is obtained. You may need to adjust potentiometer R1 (frequency) until this is done.

Adjust front panel potentiometers R1 and R2 for precisely 5kHz (200µs as measured on the oscilloscope), and adjust PCB mounted preset resistor R22 until the front panel digital frequency counter shows 5.000.

Connect the oscilloscope probe to the sine wave output (PC pin B) and with the oscilloscope input set to DC coupling adjust PCB preset mounted resistors R4 and R5 for the best sine wave you can get. In addition you will need to adjust these resistors so that the wave-form is centred relative to ground. You will need to spend a few minutes over this, it's a case of backwards and forwards until you get a wave-form you're happy with! An alternative is to use a Distortion Meter for the distortion (but I doubt that many amateurs have access to this) and a DC voltmeter to get the waveform centred around ground.

Essentially that completes the testing procedure, except to check that the buffer amplifiers are operating correctly and that the four frequency ranges covered by the instrument are correct.

CONCLUSIONS

THIS DESIGN PROVIDES A SENSIBLE alternative to purchasing a commercial instrument costing ten times as much.

The electronic design complies with the philosophy of KISS and whilst not a beginner's project it should prove to be fairly easy for an experienced constructor to build in a few evenings.

For those wishing to use the frequency counter part for other projects, perhaps adding a MHz digit to enable it to be used with direct conversion transceivers, the main PCB can be split to allow the digital counter to be built separately.

NOTES

[1] All parts are available from: Maplin Electronics, PO Box 3, Rayleigh, Essex, SS6 8LR, England. Telephone: +44 (0)702 554161.

[2] Incidentally the data books will tell you that you can never get t_H to be less than t_L with a 555 timer. Well they're wrong! Here's a little trick that you may care to note for future reference. If you connect the CONTROL pin to ground the output inverts, that is the formula for t_H swaps with that for t_L, which saves bothering with an invertor gate should you ever require this!

SPECIFICATION

FREQUENCY:

Range 1	10Hz to 100Hz
Range 2	100Hz to 1kHz
Range 3	1kHz to 10kHz
Range 4	10kHz to 80kHz

DISTORTION:

Sine wave	1% (when correctly adjusted)
Triangle	0.1% linearity (10Hz to 10kHz)

LEVELS:

Sine wave	20Vpp (0dB variance over 10Hz to 80kHz)
Triangle	20Vpp (10Hz to 20kHz)
Square	20Vpp (0dB variance over the range 10Hz to 80kHz from DIRECT output)

OUTPUT IMPEDANCES:

Square	200Ω with load drawing less than 5mA
Low 600R	approximately less than 10Ω approximately 600Ω
Duty cycle	50%

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.

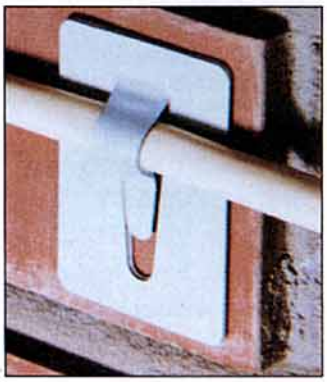
ANOTHER OF THE recent introductions from ICOM is the **IC-2340E dual-band mobile FM transceiver**. It runs 25 watts, reducible to 10 or 1W. A high power version, the IC-2340H runs 45/10/5W on VHF and 35/10/5W on UHF.

All major controls for each band are completely independent for increased operating convenience and greater driving safety. Dimensions are 5.5 x 1.6 x 6.5in (140 x 40 x 165mm) and the rig weighs 2.9lb (1.3kg). Die-cast construction and a cooling fan provide stable output power.

Bells and whistles include: 110 memories comprising 50 regular memories, 2 scratch-pads, a call channel and two scan edges, for each band; independent storage of frequency, offset direction, offset frequency, and tone squelch details (if fitted); auto power-off; time-out timer to prevent accidental continuous transmission; user-programmable switch on the microphone; customized operation and a built-in duplexer for cross-band working.

There's the usual range of optional extras, including a DTMF squelch unit, voice synthesized frequency confirmation (great for mobile safety or for blind operators), speakers, PSUs and microphones.

Available from: Icom (UK) Ltd, Sea Street, Herne Bay, Kent CT6 8LD; tel 0227 743001, fax 0227 741742.



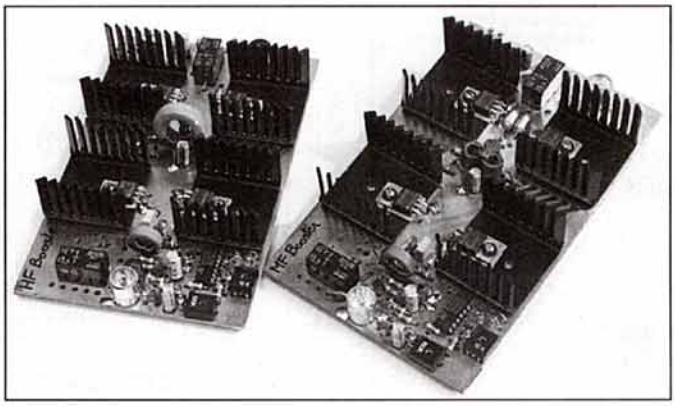
HAVE YOU ever wanted to run a cable across a wall but couldn't hammer nails in? Self Adhesive Fixings Ltd have the answer: **self-adhesive cable clips, cable ties and tie carriers** designed to stick to brick, metal and other flat surfaces. SAF companion packs contain 100 cable clips, ties and carriers in different sizes. Packs of 25 and 100 of a single size are also available.

For further information, contact: Self Adhesive Fixings Ltd, Victoria Avenue, Shanklin, IoW PO37 6PG. Tel: 0983 863939; Fax 0983 867504.

IF YOU'RE fed up with QRP, want to cut through the QRM, or have upgraded from a Novice licence, you'll need a QRP Booster from Walford Electronics (run by Tim Walford, G3PCJ). These **50W PEP MOSFET linear amplifier kits** can amplify the output of any rig producing between one and ten watts PEP, and contains all T/R switching control circuits for direct or RF-sensed switching with semi break-in operation for CW. It will cope with separates or transceivers.

Two versions are available. The MF 12 volt Booster uses IRF510 FETs to produce 50W on 160 and 80m. The HF 25 volt Booster uses VN88 FETs for 160 to 10m coverage, giving 35W PEP broadband with 25V. This can be increased to 50W PEP with 35V and an extra capacitor related to the operating frequency. The size is 100 x 160 x 35mm over the included heatsinks, and the price is £45 for either version.

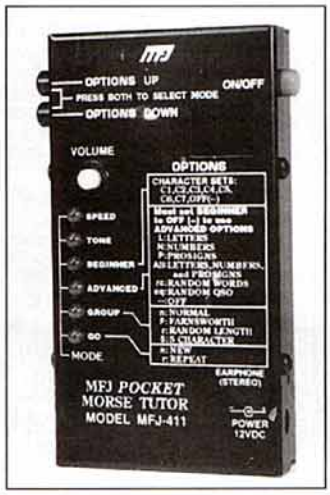
Full details from: Walford Electronics, Upton Bridge Farm, Long Sutton, Langport, Somerset TA10 9NJ. Tel: 0458 241224.



NOW THAT the Morse test is in QSO format, it makes sense to practise with text. New from MFJ is the Personal Morse Code Tutor, a pocket sized Morse tutor which takes you from the basic letters (EISH TMO etc), through random letters and numbers to plain English QSOs. It will even help the more experienced as it sends at speeds between 5 and 60WPM. Sidetone is adjustable from 300Hz to 3.3kHz.

The Personal Morse Code Tutor is 3 x 1.125 x 5.5 inches in size and runs from an internal 9V battery or optional extra power supply. A headphone socket is supplied so there's no excuse for not practising on the train or at the office, or a built-in speaker will allow group training. The price is £89.95.

Available from: Waters and Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS. Tel: 0702 206835; Fax 0702 205843.



THE MAY 94 *Data Stream* column featured G-TOR, the new HF data communications mode which is claimed to transmit reliable data at more than twice the speed of PacTOR under most band conditions. G-TOR now comes as standard in the KAM Plus (version 7.0P)and KAM Enhancement Board (version 7.0E) at no extra cost, and is available as an inexpensive (£35) EPROM upgrade (with a "supplemental manual") for current users of the KAM Plus or KAM with Enhancement Board.

Lowe Communications are offering free upgrades to anyone who has bought a KAM Plus or Enhancement Board since 1 Feb 1994.

For details contact: Lowe Electronics Ltd, Chesterfield Road, Matlock, Derbyshire DE4 5LE. Tel: 0629 580800; Fax 0629 580020.

GO 9.6 WITH SISKIN THIS SPRING!

Until recently whilst many of us have been aware of the advantages of 9600 baud Packet Radio versus 1200 baud but the major hurdle has been the lack of "ready-to-go" transceivers and modification details for existing rigs. Major manufacturers such as ICOM, KENWOOD and YAESU now offer "Off the shelf" transceivers with 9600 ready connection points but for those whose cheque books will not quite stretch that far Siskin is pleased to announce a new book listing 9600 connection details for many existing transceivers (many of which are quite painless) plus useful background material from various sources including James Miller G3RUH who originally developed the now global standard ("yes chaps, it's a British design for a change!). Entitled "*High Speed Packet Connections*" this book is packed with over 90 pages of circuit diagrams including many tried and tested connection points. Priced at only £4.95 plus £1 P&P we think this book will be a must to all serious 9600 enthusiasts.

THE SPRINT 9600...
We are expecting deliveries of the Sprint 9600 hi-speed TNC by the time you read this ad. and we are confident this little unit is going to really help accelerate 9600 hi-speed Packet into the UK scene. If you saw last month's RadCom you will have spotted that the Sprint offers a host of features including 128K ram, TNC-2 compatibility (ideal for Nodes/BBS etc.) and several novel firmware features including support for an on-board deviation meter and enhanced DX Cluster commands. Please write or phone for a full specification sheet. Price £199 including ready made computer and transceiver cables.

9600 KANTRONICS too...
Kantronics have announced a rather nitty little machine called the KPC-9612 which offers both 1200 and 9600 baud in one compact unit with the ability to access one port at 1200 and gateway out on the other at 9600 (and vice versa of course). All the usual Kantronics features such as the KaNode (with cross port facilities as per the KAM/KPC4/Data Engine are included plus 128K for a jumbo PMS. Due in stock around mid-June priced at around £259.

GOT A PC?... YOU NEED A BUCKMASTER!
We are pleased to announce we are now stocking the latest version of the Buck Master CD rom which includes both US and UK calls. Now you can perform exotic searches like "*List all the G6's whose postcode start with SO4*" plus integration with programs like KA & PK Gold so you can provide an on-line callsign search service for checking those 2M repeater pirates etc! Available now at just £39.95 plus £1 postage and packing.

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At Siskin we don't just sell a box. Where possible if you are starting from cold we'll supply with the cables made up for YOUR transceiver, YOUR computer and appropriate software generally at no extra charge. We stock the widest selection of Packet and Digital radio units in Europe and always try to suggest what best suits your needs rather than what we have 50 of on the shelf. Although Amateur radio is fast becoming very PC orientated we can offer support (leads, software, advice etc.) for other computers such as MAC, Archimedes, AMIGA, BBC, ST and many more popular home computers. What's more you can telephone us anytime from 8am to 8pm most days Monday to Saturday too. Please call or write for our current catalogue and prices list.

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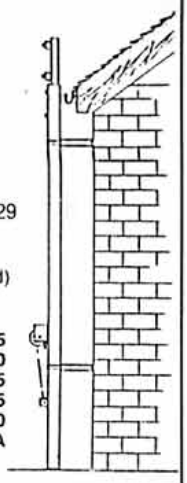

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RADCOM TECHNICAL FEATURE

RX84 Advanced HF Receiver

The second of five parts by Tommy E Bay, OZ5KG

IN THE FIRST part of this article (*RadCom*, May 1994) I considered the design of the RX84 receiver as a whole. In the subsequent parts, I shall look at the circuits in more detail, starting this month with the antenna input ciruit, the first mixer and the first IF amplifier.

ANTENNA INPUT CIRCUIT

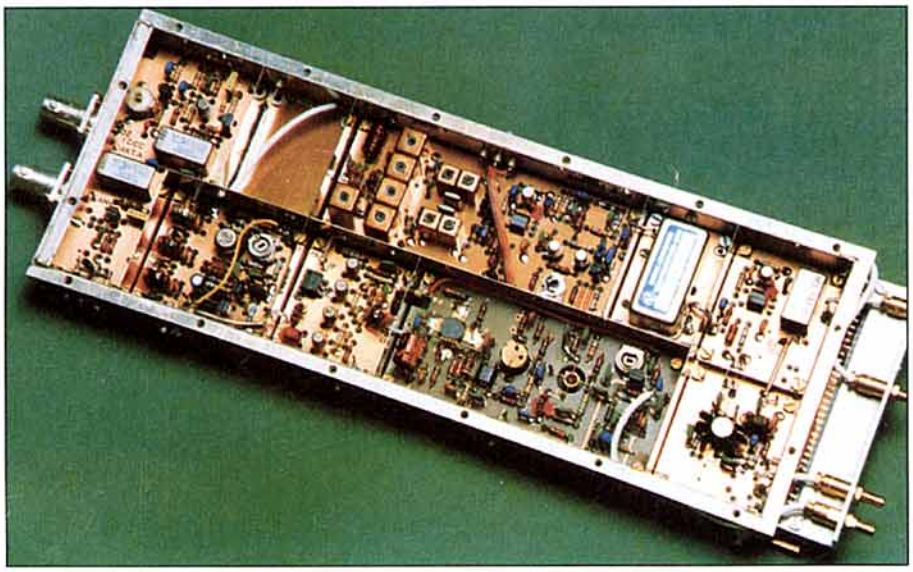
THE SIGNAL INPUT circuit of the RX84 is shown in **Fig 5**. It has an input protection circuit comprising a three-stage wideband detector, see top left of Fig 5. Protective relay RL2 is de-energized by this input protection circuit if the input to the antenna socket exceeds 1 Volt.

Excessive input signals are prevented from causing damage to the first mixer by the contacts of RL2, which earth the input of the first mixer when RL2 is de-energized. RL2 is also de-energized when the receiver is switched off and provides a 'fail safe' protection to the mixer.

Additionally, this input protection circuit operates an LED-diode in the S-meter, indicating signals at the receiver input are in excess of –7dBm (100mV). Signals in excess of this level could cause Intermodulation-Distortion (IMD) products which would exceed the receiver noise floor. The input circuit also has provision for a second antenna input, having +12V supply at the coax centre core. This was designed to operate an active antenna, which can be useful for signal strength comparison purposes.

FIRST MIXER

THE MIXER COMPRISES four Philips MOS-FETs, type BSV81. These devices were originally designed for clamp switching in television equipment and are relatively cheap compared with some of the components used in this project.



The input module. The darkish board in the lower right part of the module is the first oscillator buffer. The first mixer is to the left of this, followed by the low-pass filter. The mixer termination board is in the centre top row. The second mixer and oscillator buffer are to the right.

The auto-transformer at the input port is essential for the high intercept point design and is made using two stacked FT23-43 cores. The transformer ensures a good match for 50W, with a VSWR of less than 1:1.5, from 1 to 30MHz.

Matching the high impedance and capacitive gate input of the mixer FETs to the low input impedance oscillator input port, over the frequency range from 41 to 71MHz, posed a design problem. The solution to this was to use heavy resistor loading.

However, the FETs operate as switches and the gate voltage must exceed $15V_{RMS}$ to achieve the high intercept. This means that the local oscillator circuit must provide a fair amount of power.

The oscillator buffer amplifier, **Fig 6** has three stages operating in Class A and is capable of delivering two to three watts into a 50Ω load. An automatic level control circuit is provided to ensure that the $15V_{RMS}$ level is maintained over the whole of the frequency range.

Due to the excellent intermodulation characteristics of the first mixer (I have measured up to +45dBm third order intercept using a 50Ω termination, **(Fig 7)** and up to +42dBm in the circuit shown) pre-selectivity, in the normal sense, was regarded as unnecessary. I have fitted only a simple low-pass filter with a cut-off frequency slightly above 30MHz. The filter will suppress signals in the image frequency range and reduce the radiated oscillator signal to about–60dBm (a little above 200μV).

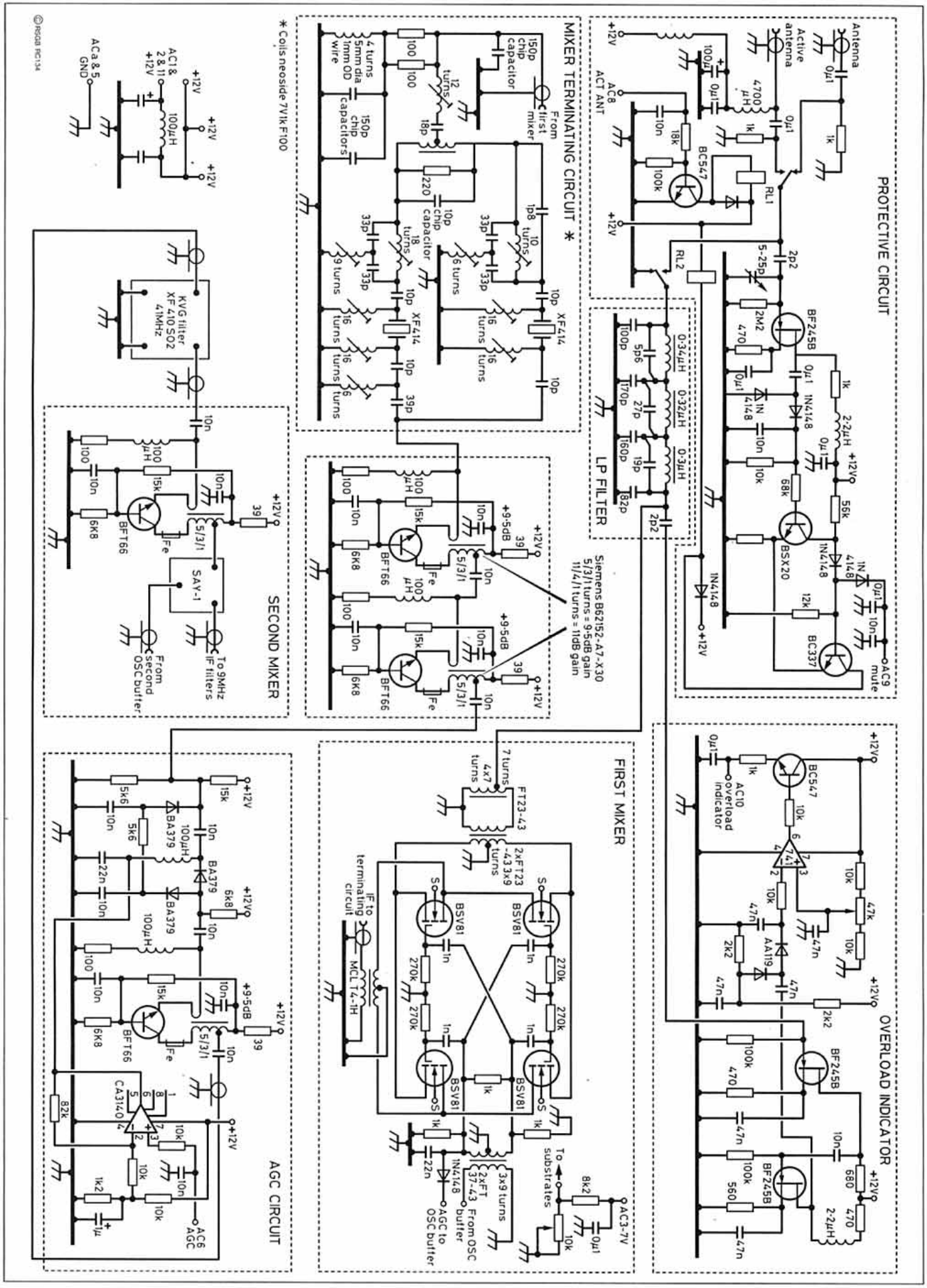


Fig 5: Input module.

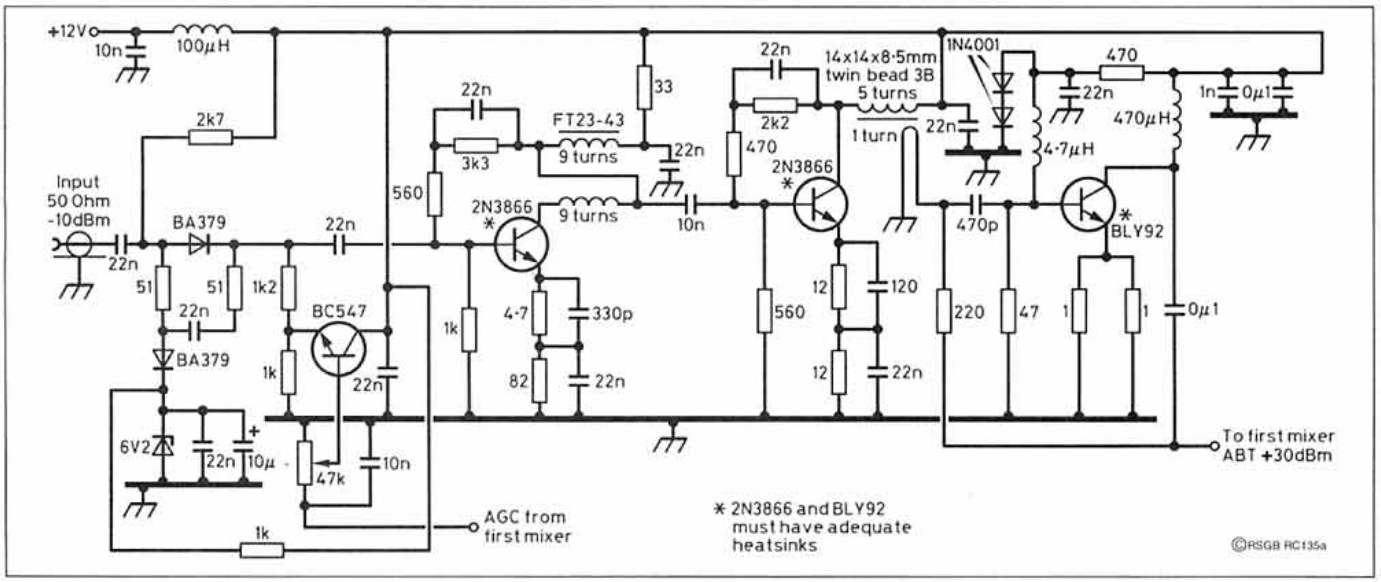


Fig 6: Oscillator Buffers.

MIXER TERMINATING CIRCUIT

THE DESIGN OF THE MIXER terminating circuit and filters was described in Part 1 under Design Considerations. This circuit uses a diplexer and two equal two-poled crystal filters. It provides front selectivity, while at the same time ensuring an impedance match to the output port of the first mixer inside the filter pass band and in the stop band.[3]

FIRST IF AMPLIFIER

THE FIRST IF COMPRISES two identical amplifiers cascaded. Norton describes [4] how an inductive feedback can improve the IMD performance of an amplifier, without degrading the noise figure. The IF amplifier gain is dependent on the turns ratio of the transformer used in the circuit. In our case, the ratio chosen is 5/3/1, which sets the gain of each amplifier at 9.5dB.

The 9.5dB amplifier shows an input intercept approximating 30dBm, and a noise figure well below 2dB. The bandwidth is from approx 5 – 200MHz.

The amplifier input impedance equals the terminating impedance for a particular stage. The cascoded amplifier stages' terminating circuit is an AGC-operated PIN-diode attenuator, showing a reasonable match to 50Ω over its entire regulating range of about 50dB.

To ensure best signal/noise values, the PIN-diode attenuator has a delayed action. It is not active at antenna voltages below 40 to 50µV. The AGC-characteristic is logarithmic, as is the S-meter dial.

This is achieved using a compensation circuit, **(Fig 8)** which has been incorporated to obtain a relatively accurate reading of the antenna voltage at the S-meter. The S-meter is calibrated from zero to 100dBµv.

The compensation amplifier has an output, ranging from 0 to 1V, fed to the receiver back panel. Also a simple squelch has been incorporated. The setting of this can be checked by pushing the squelch set-potentiometer.

The PIN-attenuator is followed by another 9.5dB amplifier, and the signal is fed to the 41MHz crystal filter. This is a 7.5kHz wide, six-poled KVG-filter type XF41S02, which is followed by yet another 9.5dB amplifier.

This may seem to be a lot of gain in front of the 41MHz crystal filter. However, if you look at the gain distribution, shown in the block diagram in **Fig 9**, you will see that it comprises four amplifiers of 9.5dB, less losses of 9dB in the first mixer and terminating circuit, and a loss of 4dB in the KVG-filter.

All this amounts to a total gain of about 25dB and is necessary because the receiver, in the wide selectivity position, uses only the 41MHz filter (7.5kHz). If the sensitivity after this filter were to be greater it would be more sensitive to the very strong local oscillator signal as the receiver is tuned to the very low frequencies (the oscillator frequency approaches the IF-frequency).

Leakage from the local oscillator can cause spurious mixing products. For example, when tuned to 29.5MHz, the first local oscillator will be at 29.5 +41 = 70.5MHz and its second harmonic is 141MHz. If we subtract the second harmonic of the second oscillator at 100MHz (two times 50MHz), we get 41MHz, which is the same frequency as the first IF.

The products could also coincide with the image frequency, or for that matter the 9MHz IF, or its image which is 50 +9 = 59MHz.

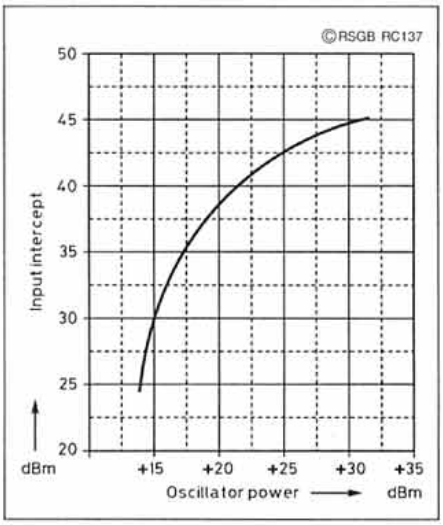


Fig 7:Mixer intercept/osc power.

There are various means of determining these spurious frequencies in advance, in order to find more suitable combinations of filters and local oscillator frequencies. These techniques are described in [1]. However, our design is something of a compromise in order to take advantage of the availability and cost of some of the filters. (See Part One).

To reduce the effect of these spurii I have extensively screened various sections of the receiver, which in a complex design like this is essential. It is, however, very difficult to contain the very strong oscillator signals.

This coupling of the oscillator signals to other circuits can be caused by stray capacitance, or most commonly, by mutual coupling of currents in the shielding. I regard it as acceptable if unwanted spurii can be suppressed to a level corresponding to 1µV at the antenna input.

Local oscillator interference on the 41MHz IF is indicated by a rise in AGC-voltage, causing a deflection of the S-meter. At narrower bandwidths, the 9MHz filters completely eliminate the problem.

Despite the high gain before the second mixer, the risk of IMD products arising in the second mixer, or in the crystal filter, is relatively low. Working backwards from the second mixer, the receiver input intercept, for signals inside the pass-band of the 41MHz filter, is about +7 dBm and is mainly set by the second mixer performance. For this reason I have used a 'high level' type mixer, see Design Note in Part One.

The second mixer converts the first IF signal of 41MHz to the 9MHz second IF, by mixing with a 50MHz oscillator signal. (A description of the synthesizer that produces these oscillator signal will be described in Parts four and five).

Receiver performance measurements showed a noise floor of–130 to–131dBm; this corresponds to a noise figure of 9 to 10dB at a bandwidth of 2.2kHz (SSB filter).

The third order input intercept was +39 to +41dBm. This was measured using two –12dBm signals wide apart in frequency at the antenna input, to produce an IMD product

at 10dB s+n/n. Alternatively an IMD product equal to a –83dBm signal, using two 0dBm signals closer together in frequency, at the input). This means a dynamic range of 130 +39 x 2/3 = 112dB.

At a frequency spacing of 20kHz however, the reciprocal mixing will set the limit, as a 3dB decrease in the noise floor can be detected by feeding a –25dBm signal to the input terminal. this corresponds to 105dB above the noise floor, which fits quite well to the measured synthesizer sideband noise of –137dBc/Hz, as 33.5dB must be subtracted for correcting the bandwidth of 2.2kHz

For generating a second order IMD-product at s+n/n of 10dB, two –23dBm signals must be fed to the receiver input. This means that the second order intermodulation is suppressed by 'only' 97dB or, in other words, a second order intercept at 97 –23dB = 74dBm.

No doubt, front-end selectivity would improve this figure considerably. However, considering the fact that most antennas by the

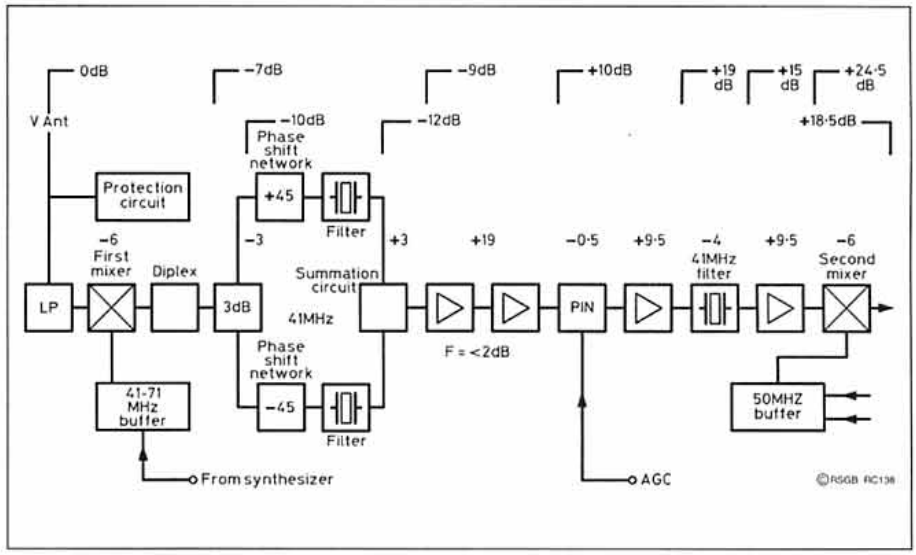


Fig 9: Receiver gain distribution, block diagram.

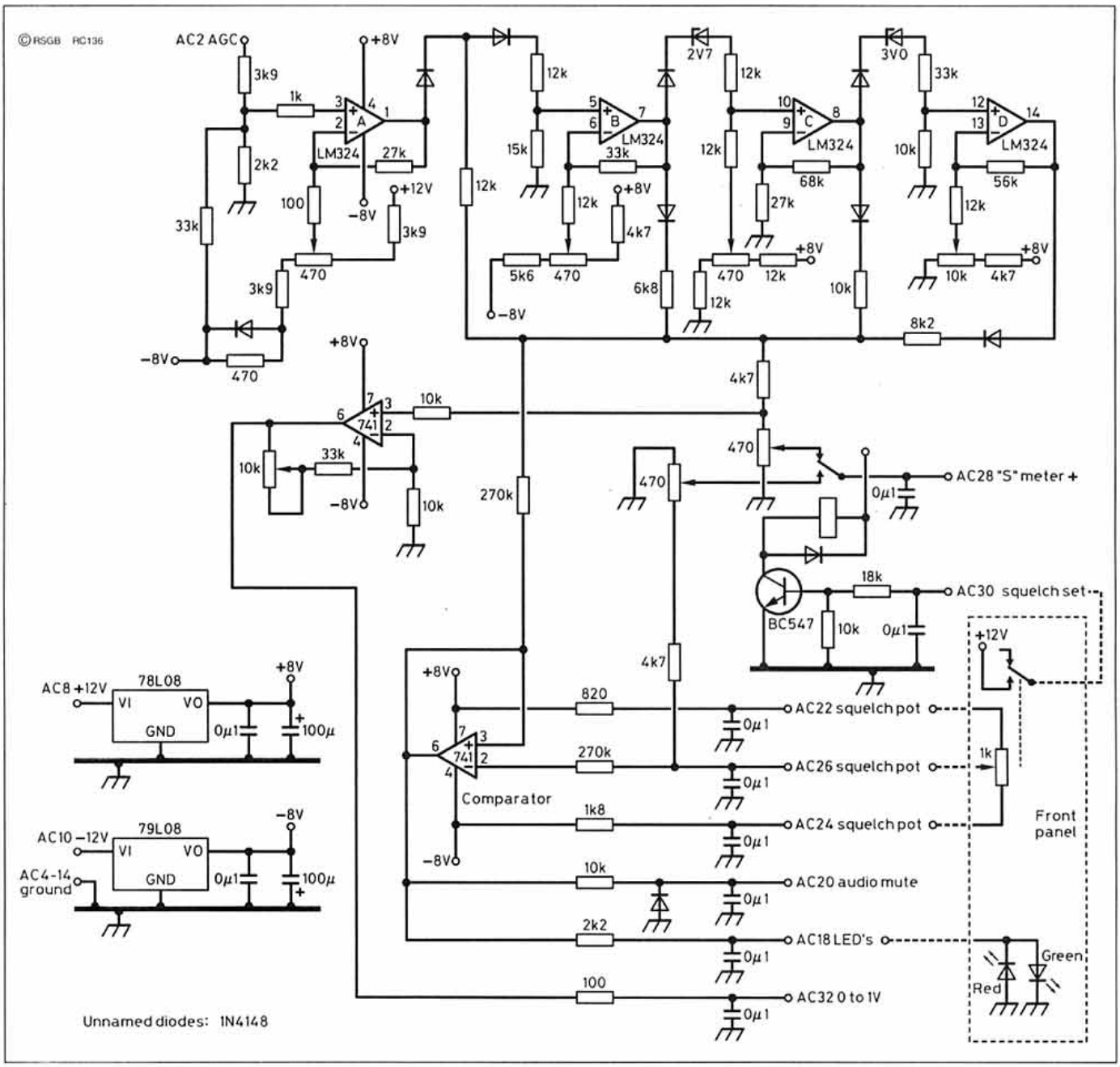


Fig 8: Compensation Unit. S-meter Amplifier.

most have some kind of selectivity, and that, at a later time I intend to incorporate a transmitter section which will include some filtering, I decided to try without.

REFERENCES

[1] *Communications Receivers, Principles & Design* by Ulrich Rohde and T T N Bucher.

[3] *Solid State Design for the Radio Amateur*, 1986 Edition, page 119, (*ARRL*).

[4] David E Norton, Anzac Electronics. 'High Dynamic Range Transistor Amplifiers Using Lossless Feedback'. *Microwave Journal* May 1976.

NOTE

The RX84 is an advanced project incorporating the latest developments in HF receiver technology. It takes information and inspiration from many sources, any one or more of which could be included in your receiver or transceiver design.

Although this is a complete receiver project it is not a detailed construction article and does not have designed printed circuit boards and component lists.

With this design there is space in the cabinet sufficient for the transmitter modules so that the receiver can be changed into a transceiver at some future date.

. . . to be continued

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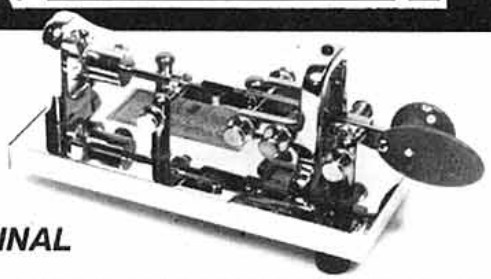

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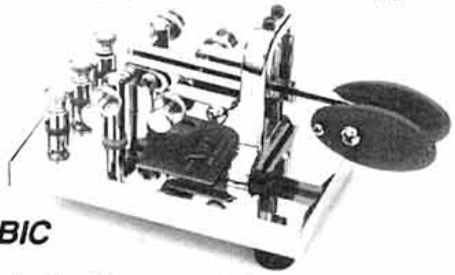

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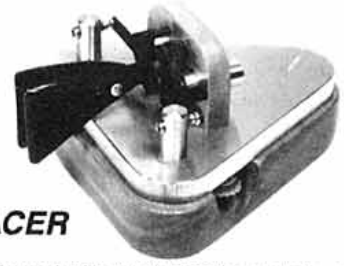

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IN THE EARLY 1970s when I first began my interest in QRP operating and construction, there appeared to be little interest in the USA. This was then increased by a series of good constructional articles on QRP topics, many of them by Doug DeMaw, W1FB. The QRP ARCI, the American national QRP club, then dropped its power limit from 100 watts to 5 watts and joined the rest of the world in real QRP! In recent times there has been a lot of QRP activity in the United States.

THE NORCAL QRP CLUB

Of all the QRP clubs in the USA based on a local area, a new one appears to enjoy considerable sucess. NorCal, the Northern California QRP Club, was founded in June 1993 by Doug Hendricks, KI6DS, and Jim Cates, WA6GER. They now have about 450 members worldwide and publish a quarterly magazine called *QRPp*. The last issue of *QPRp* ran to 72 pages with articles on construction, antenna, equipment reviews, operating experiences and general interest items. I have seen the first three copies and it is certainly a worthwhile publication.

The club actively encourages the construction of equipment including kits for their own projects. The first project, the NorCal-40, was a 40m CW transceiver based on a superhet design from Wayne Burdick, N6KR. 200 kits were offered for sale to members only and these were all sold within nine weeks. The club also has a library of improvements to the basic NorCal-40 and still sell printed circuit boards and manuals for the project.

The latest project, also by N6KR, is a multiband CW transceiver called the Sierra. This covers the CW portion of all nine HF bands using plug in modules for each band. The Sierra kit is being sold to members only for $199, with two band options and extra bands at $20 per module.

The annual subscription to NorCal is $5 (USA) and $15 (foreign) which includes *QRPp* sent airmail. Subscriptions must be paid in US funds. Membership is handled by Jim Cates, WA6GER, 3241 Eastwood Road, Sacramento, California 95821, USA. Cheques or money orders should be made out to 'Jim Cates'.

HAMBREW

Hambrew has just appeared in the USA, and its title page says, "for amateur radio designers and builders". It is a glossy A5 size magazine with a good variety of articles of amateur radio construction, antennas and reviews. At the moment it is quarterly but it plans to go bi-monthly soon.

I found the range of articles interesting and recognised some of the authors from their other work. Most of the content in the first two issues was *QRP*-orientated. *Hambrew* costs $20 per year (USA) and $35 (foreign). Not cheap but the quality of the magazine with its drawings and photographs is excellent and, so far, the content seems very worthwhile. The address to contact is: Hambrew, P O Box 260083, Lakewood, CO 80226-0083, USA. Tel: (0101) 303-989-5642.

MICHIGAN QRP CLUB LABOR DAY CW SPRINT

The Michigan QRP Club is a well established QRP group and this year they are offering a CW Sprint for America's Labor Day. For those not familiar with the term, a 'sprint' is a short contest. Rules are as follows:

Date and Times: 0000UTC 5 September to 0400UTC 5 September 1994.

Mode: CW only, all bands 160m to 6m, except WARC bands.

The contest is open to all amateurs

Classes:

A: – 250 milliwatts or less output
B: – One watt to 250 milliwatts output
C: – Five watts to one watt output
D: – Over five watts output

Exchange: RST, QTH (State, Province or Country) and Michigan QRP Club number (non-members send power output)

Frequencies: 1810, 3560, 7040, 14060, 21060, 28060, 50060kHz

Scoring: Stations may be worked once per band for QSO points.

All member contacts are 5 points, Non-member contacts in W and VE are 1 point. Non-member contacts outside W and VE are 4 points. Multiply total QSO points, on all bands, by number of States / Provinces / Countries worked on all bands for total points. USA and Canada do not count as countries.

Bonus Points: Total points may be multiplied by 1.25 for home brew Rx or Tx W/commercial Rx or Tx combinations. Multiply by 1.5 for a total homebrew station (HW-7/8/9 not eligible).

(Those using homebrew gear on some, but not all bands, may claim credit by listing the proper bonus points in each band's 'BPts' column on the score sheet, adding them upon and dividing by the number of bands used. Enter the average (round to two decimal places) in the 'Totals' row, under the 'BPts' column. I'll do this for you if you give me adequate rig info on each band)

Awards: Certificates awarded by class for each State/Province/Country.

Logs: A legible, chronological log is required. Please include your name, call, address, equipment description and *power output*. Logs must be received by **5 October**, 1994. Please send an SASE for a copy of the results. Log and entry sheets available for an SASE to me.

EUROPE FOR QRP WEEKEND

THE RULES FOR THIS internationally recognised QRP event organised by the OK and G QRP Clubs appear below.

Dates And Times: From 1600UTC 7 October 1994 until 2359UTC 9 October 1994.

Mode And Frequencies: CW only on 3560, 7030, 14060, 21060 and 28060kHz, all ± 10kHz.

Power: Not to exceed 5 watts RF output. Stations unable to measure output take half their DC input power (10W = 5W and so on).

Stations Eligible: Any licenced radio amateur.

Contest Calls: Call CQ EU QRP when seeking contacts.

Contest Exchanges: For a contact to be valid RST, power output, and name of operator must be exchanged and logged.

Scoring: Contacts with own country do not score. European stations score 1 point for each European contact and 3 points for each contact outside europe. Stations outside Europe score 5 points for each contact with Europe. The final score is the sum of the points obtained on each band.

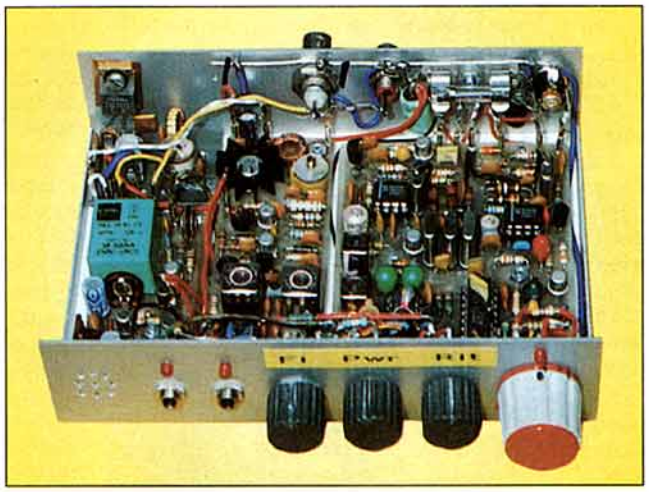
Logs: Separate log sheets must be used for each band, showing date, time, call, RST, power received and name received, and RST, power and name sent. A summary sheet must be provided showing name, address and callsign (please write legibly), claimed score for each band, total claimed score, and brief details of equipment used. Logs must be submitted to P Doudera, OK1CZ, ul baterie 1, 16200 Praha 6, Czech Republic, by 30 November 1994.

Awards: The leading station in each continent will receive a merit certificate and one year of free membership in the G QRP Club. Second and third in each continent will receive a merit certificate.

Disputes: In the case of any dispute the decision of the Organisers shall be final.

E-MAIL

THOSE READERS WHO have an electronic-mail facility can now find me on Internet as g3rjv@gqrp.demon.co.uk. I have received a lot of QRP information from this source.



A 20 metre CW Transceiver built by Norbert Litz, HB9BWY, using ceramic resonators in VXO configuration for the main oscillator and IF stages.

EMC

HILARY CLAYTONSMITH, G4JKS
115 Marshalswick Lane, St Albans,
Herts AL1 4UU

THIS IS (WE HOPE) the last word on RF triggering of alarm systems! In the December 1993 *EMC* column, we mentioned RF triggering of Texecom 'Medusa' alarm PIR sensors. Since then, we have heard from Mr A Lingwood, G3NKA, of St Albans who reported a problem with his neighbour's alarm system which uses the same type of PIR sensor. It was triggered when G3NKA transmitted as little as 10 watts using his Cushcraft R7 vertical antenna which is 6 metres from his neighbour's house. The alarm was a DIY installation which included four Medusa PIRs.

EMC Committee member Dave Lauder, G0SNO, contacted Texecom Ltd of Manchester who informed him that since mid-1993, they had been working with an EMC test laboratory to improve the RF immunity of this model which has been 'CE' marked and certified since March 1994. They supplied four of the new units with much improved RF immunity in exchange for the existing ones installed in G3NKA's neighbour's house.

The earlier model and the new model have the same case with two diagonal grooves moulded into the front cover. Inside, the earlier model has six pins for setting the pulse count and a label with 1< 3< 5< printed in red while the new model has three pins without a label. We have been informed that Medusa PIRs produced since March 1994 also carry the 'CE' mark.

Before going to the trouble of changing his PIRs, G3NKA's neighbour wanted to be sure that the new ones would solve the problem. To prove the point, we tested one on a pole at a distance of about 3 metres from G3NKA's vertical antenna (see photograph) and found that it was immune to 100 watts SSB or CW on all HF bands. G3NKA then supplied them to his neighbour who fitted them and returned the original ones. The problem was completely cured and we were pleased to receive a letter from G3NKA's neighbour thanking us for our help.

We have also heard from Fraser Robertson, G4BJM of Milton Keynes who wrote to us about the Medusa PIRs in his own alarm system which could be triggered by his HF or VHF transmissions. Texecom exchanged his PIRs for the latest type which are specified to be immune to field strengths of 30 volts/metre from 150kHz to 1GHz. He reports that the new PIRs have so far proved to be reliable in every respect and that he has no hesitation in recommending this newer model.

Both G0SNO and G4BJM found Texecom helpful in this matter. Texecom have said that if anyone has a problem with RF triggering of 'Medusa' PIRs they should contact them on 061-862 9482.

IN THE CLUB

AS PART OF the DTI's attempt to educate industry to take seriously the approaching date of 1996 and the implementation of the European EMC Directive, a number of EMC Clubs have been launched across the country. The purpose of these clubs is to provide a focal point for discussion and to offer a chance of comparing notes with EMC engineers from a number of companies in various areas of manufacture. They provide a forum for exchanging ideas on EMC design, test and methods of certification.

Because of the increasing use of transceivers in cars and the propensity for ever more electronic wizardry the EMC Committee has joined the Automotive EMC Club which is organised by MIRA (Motor Industry Research Association) at Nuneaton. This industry sector club has been set up to help manufacturers of electrical/electronic products which service the automotive industry. EMC presents a special problem for these manufacturers. Because of the obvious safety factors, most car manufacturers place stringent EMC requirements on their products.

The Club runs regular seminars, workshops and presentations. The most recent seminar held at MIRA provided an opportunity to hear presentations from Tony Bond of the DTI who gave an overview of the EMC Directive and methods of demonstrating compliance and Mike Sharpe of the RA who outlined the requirements as far as radio licensing is concerned.

John Pope of MIRA and Tony Stenning of VCA (the Vehicle Certification Agency) explained what was needed to achieve vehicle type approval for Europe. This presentation was particularly interesting as the 'shock horror' stories in the popular press have tended to give the impression that RF can easily cause air bags to go off, anti-lock braking systems to fail and engine management systems to pack in! The rigours of EMC testing and type approval were clearly stated. There is no self-certification for automotive electronics. The VCA issues certificates for vehicles, trailers and sub-assemblies. There are in fact 45 directives which relate to cars. Testing is carried out on the whole vehicle as well as on electronic sub-assemblies. These sub-assemblies are tested on the bench and type-approval is needed for each one. Although manufacturers cannot self-certify automotive electronics, they can follow the Technical Construction File route to compliance. Vehicles are always tested to a much higher level than the basic specification.

Immunity testing of an alarm PIR sensor at G3NKA

Christian Verholt, OZ8CY, will be chairing the next meeting of the IARU Region 1 EMC Working Group to be held this month at Ham Radio '94 at Friedrichshafen. He is pictured here with columnist Hilary Claytonsmith, G4JKS, and RSGB EMC Committee Chairman, Robin Page-Jones, G3JWI.

The whole vehicle is tested in the range 30MHz – 1GHz for broad band and narrow band radiated emissions as well as radiated immunity. The car EMC environment is specified as 30V/m but in fact vehicles are tested to about 100V/m. The 30V/m figure is used for on-board or nearby mobile transmitters. Eight spot frequencies are used with voice modulation, to confirm compliance of the product which has already been supported by manufacturer's documentation.

Sub-assemblies are tested at 13 spot frequencies and are tested at levels 25% higher than the specification. If safety is not involved then no test is necessary.

The day at MIRA was interesting and I was reassured that the car EMC environment limits are better than I expected. Before leaving, I managed to get a tour of their EMC Technology Centre which comprises an open area test site and a large semi-anechoic chamber capable of testing a lorry – most impressive!

HIGH PERFORMANCE FERRITE RINGS

FERRITE RINGS CAN BE very useful for amateur radio EMC purposes [1, 2] provided a suitable grade of ferrite is used. Mullard FX1588 ferrite rings used to be a favourite but these rings have not been manufactured for many years. The EMC Committee has been evaluating ferrite rings and we have found one made by Philips Components, type 4330-030-34450, which we consider to be the best all-rounder for EMC purposes from 3.5 to 70MHz.

The RSGB has ordered a stock of these Philips Components ferrite rings for sale to members at £3.91 and non-members at £4.60 per ring [see *RSGB Book Case*, page 95 – Ed].

These rings have a nominal inside diameter (ID) of 22.3mm, slightly smaller than the existing Neosid 28-041-28 rings which are 25.4mm ID. (The Neosid rings are still available from RSGB in packs of two). They are nominally 15.6mm wide which is wider than two of the Neosid rings stacked together. The Philips rings have a pink coating to indicate the grade of ferrite which is 4A11, one of eight different grades available in this size of ring.

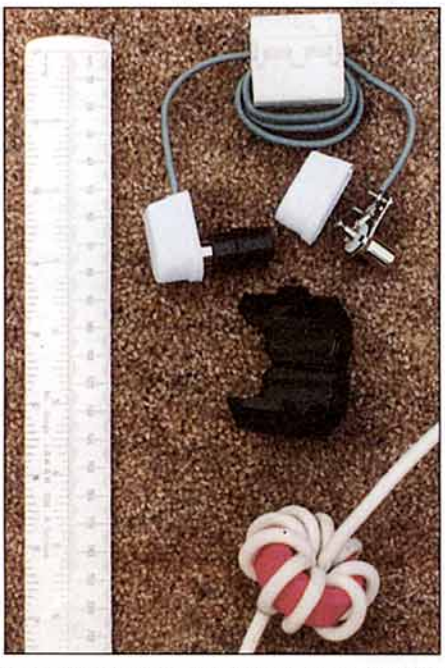
Pictured at the bottom of the photograph below is a Philips ring wound with 10 turns of 5.3mm diameter mains cable. 12, 14 or more turns will give even better results on the HF bands if space permits.

Fig 1 shows the characteristics of three different types of ferrite ring between 1.8 and 144MHz. Curve 'A' shows the characteristics of a 14 turn winding on a pair of FX1588 rings which were made of Mullard grade B2 material with a permeability of 200. They were very good at 10MHz and above but not so good on the 1.8 and 3.5MHz bands. Curve 'B' shows the characteristics of 14 turns on a pair of Neosid 28-041-28 rings. The Neosid rings are made of F8 material with a permeability of 1200 (minimum) and are best on the 1.8 and 3.5MHz bands but are progressively less effective on the higher HF bands. Curve 'C' shows the characteristics of a 12 turn winding on a single Philips 4330-030-34450 ring which has a permeability of 700 +/- 20 %. This is similar to curve 'A' at 10MHz and above but significantly better on the lower HF bands.

CLIP-ON FERRITE CHOKES

At the top of the photograph is a 'braid breaker' for plugging in series with a coaxial aerial cable feeding a TV, video recorder or FM broadcast radio. It uses six or seven turns of Maplin XR88V miniature 75Ω coaxial cable on a Maplin BZ34M computer data line filter. This requires a metre of coax which has a loss of about 0.5dB on UHF TV channel 21 rising to 1dB on channel 68. Normal coaxial plugs and sockets are not really suitable for use with this miniature coax so we have used two right-angled coax plugs from Tandy which have a good cable clamp for thick or thin coax. It is necessary to solder a short length of stout copper wire onto the inner of the coax otherwise the screw terminal will cut through the thin inner conductor. You will also need a coaxial line connector on one of the right-angled plugs as shown.

At the centre of the photograph is a similar type of clip-on ferrite choke made by Tokin.



Clip-on ferrite cores and Philips ring core. (portrait format, ruler on left)

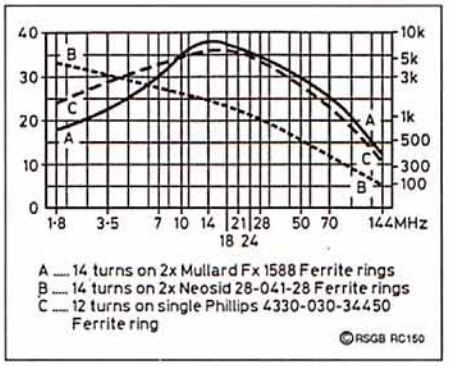


Fig 1: Impedance of various ferrite rings at different frequencies.

IDENTIFYING SURPLUS FERRITE RINGS

HAVING BOUGHT SOME surplus ferrite rings at a rally, how can you find out whether they are any good for suppression?'. You could try them to see whether they solve a particular EMC problem but if they don't, you don't know whether it's because the problem can't be cured with ferrite rings or because you are using a type of ferrite which isn't suitable. A way of checking ferrite rings at RF is given in [3] but it is also possible to find out the initial permeability of a ferrite bead or ring core by making measurements at any frequency up to about 100kHz (the permeability of some ferrites starts to fall above 100kHz).

Wind a convenient number of turns (eg 10) onto the ring and measure the inductance on an inductance bridge. Alternatively, you could tune the ring-cored inductor with a capacitor of known value and find the resonant frequency with a signal generator or use it to make an oscillator and find the frequency. In any case, it is best to make the measurement below 100kHz. Next, measure the dimensions of the ring in millimetres. If d is the inside diameter, D is the outside diameter and h is the height, calculate the average diameter, (d+D)/2 and multiply it by 3.142 to get the effective path length L_e. Now work out (D-d)/2 and multiply it by h to get the effective area A_e. These values of L_e and A_e won't be exactly the same as the manufacturer's figures but they should be close. Divide L_e by A_e to get the core factor C1.

Take the inductance of the ring-cored inductor divide it by the number of turns squared to get the inductance of one turn. This is also called the inductance factor A_L and is normally expressed in nanohenries. Multiply A_L (in nanohenries) by the core factor C1 then divide the result by 1.257 and you have the initial permeability of the ferrite! For more information on ferrite core characteristics [4].

Having found the permeability, this gives a rough indication of the likely performance of the ferrite for RF suppression purposes. It should be noted that different types of ferrite may have the same initial permeability but substantially different performance at 10 or 20MHz for example.

A permeability of 3000 or more means that it is probably unsuitable for any suppression use on amateur bands while a permeability of 1000 – 3000 is likely to give fairly good results on 1.8 and 3.5MHz but not on higher bands. If the permeability is 400 – 1000, it should give reasonably good all-round performance from 3.5 – 30MHz. If 100 – 400, it will not be so good on the lower HF bands but should be good on the higher HF bands and at VHF. Below 100 indicates either a VHF grade of ferrite or a powder iron core, neither of which is likely to be very useful for amateur EMC purposes on HF bands.

INFORMATION WANTED

THE EMC Committee is currently looking into the following topics. Please contact me QTHR if you have any information:

a) Radio paging interference on 144 – 146MHz: This is usually due to the amateur receiver responding to a strong signal outside the amateur band but we would be interested to hear of any cases where there is definitely a spurious signal from a paging transmitter in an amateur band.

b) Broad band noise on 430 – 440MHz: We are concerned at the high levels of broadband noise generated by some super-regenerative receivers for cordless alarm systems, garage door openers and pendant transmitters used to call for help in sheltered accommodation. Although the receivers operate on 418 MHz, some types emit noise for tens of megahertz either side of their operating frequency.

c) Cable TVI: Cable TV (CATV) is spreading and has recently been installed outside my QTH. I am not aware of any EMC problems in the St Albans cable system but I do know of a case in London where a newly installed CATV distribution amplifier box in the street outside an amateur's house is prone to picking up his HF and VHF transmissions and relaying them along the street!

d) Cordless telephones: We have a report of a spurious signal from a cordless telephone on 14.265MHz. It is believed to be a BABT approved model but we don't know which one. Does anyone know which model this is so that we can complain to the manufacturer? We have also had isolated reports of cordless phone signals or their harmonics in the 1.8, 3.5, 70 and 144MHz bands. These would probably be from non-approved models in which case we would pass any information on the RSGB Intruder Watch Co-ordinator.

e) 'Maruda' notebook PC. We would like to hear from anyone who owns or uses a 'Maruda' 486SX25 Mono Notebook computer.

f) Radio teleswitches. As well as the known frequencies of 144.400 and 145.920MHz, we have a report of teleswitch QRM on 70.450MHz, the 4m FM calling frequency. The signal has a unique characteristic which sounds like slow data, often with a rhythm which repeats every two seconds.

REFERENCES

[1] *Filters and ferrites in EMC*, D Lauder, G0SNO, *RadCom* Dec 1993, pp 45-46 and Jan 1994 pp 62-64.

[2] *RSGB Amateur Radio Call Book 1994*, pp 68-70.

[3] *The Radio Amateur's Guide to EMC*, R Page-Jones, G3JWI, RSGB pp 29.

[4] *Philips Components Soft Ferrites Data Handbook MA01*, Introduction section.

RADCOM NEWS FEATURE

IOTA Award Programme – Annual Listings

Roger Balister, G3KMA, reports on this popular RSGB Award

JEAN-PIERRE GUILLOU, F9RM, again tops the IOTA Honour Roll, a position he has held for almost 15 years. Second comes Livio Zenti, I1ZL, and third Gianni Varetto, I1HYW. Although not fully borne out by the table, the lead margins are known to be narrowing as recent activation of long dormant groups allows a degree of catching up. Close bunching is certain to increase. Top positions continue to be determined by the degree to which the siren calls of overseas holidays or the demands of the saltmine can be resisted!

The 1994 Honour Roll

THE HONOUR ROLL and Annual Listing for 1994 show a massive 43%, *yes forty three per cent*, increase in participation in the last 12 months! 509 stations are listed compared with 352 in 1993.

Analysing the figures we see that the USA has greatest growth, going from 78 to 135 participants, a 73% increase, to consolidate their leading position of last year. England and Italy retain second and third positions with 81 and 70 stations respectively, an increase of 18 participants in each case (29% and 35% up). Germany, Spain, Canada and Sweden have also registered spectacular increases. In fact there have been increases across the board. Over 50 countries are represented in the listings, with Norfolk Island, Papua New Guinea, Solomon Is, Hawaii and Reunion among the more exotic.

Six stations F9RM, I1ZL, VE3XN, I8YRK, I1HYW and G3KMA have now been awarded the IOTA Plaque of Excellence for contacting 750 of the 800 or so IOTA islands/groups which have been activated. Others are very close. Perhaps not surprisingly many who have taken up island chasing now say that IOTA, at the top level, is a greater challenge than DXCC. Wth a 43% increase in participation in one year who can deny that we now have 'lift-off'?

IOTA Honour Roll – April 1994

1	F9RM	775	41	ON4XL	687	80	I8ACB	593	119	IK2IGX	477
2	I1ZL	770	42 =	G3ZAY	683	81	WT2O	592	120	HA0DU	469
3	I1HYW	754	42 =	EA5AT	683	82	I1CAW	589	121	N5OUE	468
4 =	I8YRK	750	44	F6AXP	681	83	WB9EEE	587	122	DJ4XA	463
4 =	VE3XN	750	45	ON4FU	680	84	DL7CW	586	123	KB8O	461
6	ON5KL	745	46	OM3JW	673	85	G3TOK	583	124	CT1DIZ	460
7 =	GM3ITN	743	47 =	G8JM	664	86	I2VDX	579	125 =	VE7IU	459
7 =	I1SNW	743	47 =	K2VV	664	87	K6DT	578	125 =	I2JSB	459
9	OH2QQ	742	49	KD7SO	658	88	S51TE	577	127	ON7FK	453
10 =	W9DWQ	740	50	F6BFH	652	89	YL1XZ	576	128	ON4ADN	449
10 =	I1JQJ	740	51	F6DLM	648	90	I1TBE	570	129	DF2NS	446
12 =	VE7IG	738	52	G3XTT	646	91	W3KH	569	130	K5FNR	442
12 =	W9DC	738	53	OE3WWB	637	92	W1ENE	566	131	I2YWR	438
12 =	W4BAA	738	54	KC8PG	636	93	I4LCK	558	132	KA5TQF	437
15 =	DL8NU	737	55	ON5NT	633	94	OK1JKM	555	133	G0NXJ	436
15 =	EA4MY	737	56 =	G3VJP	632	95 =	DK6NJ	554	134	G3EZZ	434
17	IK1AIG	735	56 =	CT4NH	632	95 =	N6BOI	554	135	W2FXA	431
18	ON6HE	733	58 =	EA8AKN	629	97	W5BOS	548	136	ZL2VS	430
19	I8KNT	732	58 =	HB9RG	629	98	IK8TWV	546	137	N6JM	428
20	I8XTX	727	60	F2BS	628	99	EA5KB	543	138 =	I1UKM	420
21 =	G3GIQ	723	61 =	G3MLX	627	100	G4LVQ	542	138 =	IK1AOD	420
21 =	I0OLK	723	61 =	DK6NP	627	101	K5MK	540	138 =	WF1N	420
23	IK1GPG	720	63 =	W9NZM	626	102	KE4I	538	141	OE6MKG	414
24 =	G4WFZ	719	63 =	EI7CC	626	103	SM0DJZ	537	142	G3OCA	413
24 =	IT9GAI	719	65 =	F6CUK	625	104	KA5W	533	143 =	DL2SCQ	412
26	I8YZP	717	65 =	F6DZU	625	105	HB9BVV	532	143 =	K3FN	412
27 =	IK1JJB	716	67	9A2TW	621	106	G3NUG	531	143 =	I1ZXT	412
27 =	K9PPY	716	68	HB9AFI	620	107	F9MD	530	146 =	N6PYN	410
29	I2MWZ	708	69	I2FUG	619	108	I5DCE	525	146 =	EA4KK	410
30	F6AJA	704	70	IK2MLY	611	109	W0MLY	523	148	HA8XX	409
31	ON4AAC	702	71 =	G3YAA	607	110	DL6ATM	519	149 =	G4BWP	408
32 =	G3AAE	700	71 =	K2EYJ	607	111 =	N3CWP	515	149 =	PY2DBU	408
32 =	G3ALI	700	73 =	WD8MGQ	603	111 =	F6FHO	515	151 =	AA9DX	405
32 =	DL8FL	700	73 =	SM6CAS	603	113	VE6PW	512	151 =	IK7DBB	405
32 =	9A2AA	700	75	CT1ZW	602	114	4Z4DX	508	153	KM4RX	404
36	FE6CYV	699	76 =	GW3ARS	601	115	N7BZI	506	154	K8LJG	403
37	G4RFV	696	76 =	K8DYZ	601	116	SK6PJ	501	155	CT1AHU	402
38	OZ4RT	695	76 =	CT1UE	601	117	ON4QP	500	156 =	CT1BY	401
39	DK1RV	694	79	VE6VK	594	118	IK8JWA	493	156 =	G3ZQQ	401
40	ON7EM	693									

The "IOTA voice of Japan", Yuki, JI6KVR.

Jean-Michel, F6AJA; 30th on the Honour Roll.

Four leading island chasers (left to right): Gennaro, I8YRK (4th); Henry, G3GIQ (21st); Lino, I8YZP (26th) and Mauro, I1JQJ (10th).

Seven Foreign Translations

OVERSEAS DISTRIBUTION of the Directory under licence has perhaps been the single most important factor in this success. Seven foreign translations – French, German, Italian, Polish, Portuguese, Russian and Spanish – make up nearly half the total overseas distribution, the remainder coming from our Stateside distributor, Dewitt Jones, W4BAA.

Copies of the Directory have found their way to some 125 countries in 38 CQ Zones, with just Zones 34 and 37 required for IOTA Directory WAZ! The first RSGB IOTA contest last July was a resounding success and clearly increased people's perception of IOTA as a major international award programme.

This Year's IOTA Contest, taking place over 30/31 July, is likely to attract twice the participation of 1993. Due to popular demand CW is included this time.

The IOTA Convention

THE ANNUAL IOTA Conventions are also providing a higher profile for the programme. The next, to be held as part of the RSGB HF Convention at the Beaumont, Windsor on 7/9 October, will feature a 30th anniversary birthday party for IOTA. It is sure to be a bumper event and is a great opportunity to meet the faces behind the callsigns.

IOTA Annual Listing – 1994

158	I2YDX	391	206 =	JF1SEK	306	254	RB5MT	233	300 =	EA5YJ	206
159	G0LRJ	383	206 =	KD1CT	306	255	PS7AB	230	300 =	AB4DU	206
160 =	G3KYF	374	206 =	W0GLG	306	256 =	ON7DR	229	304 =	IK1SLE	205
160 =	NN2C	374	209 =	IK8CVZ	304	256 =	IN3ASW	229	304 =	KK6ZO	205
162	EA1KK	366	209 =	EA5BD	304	258 =	AA5ZA	225	304 =	LY2BZ	205
163	FE6ACV	365	209 =	OZ5PA	304	258 =	G3SWH	225	307 =	I6DQE	204
164	IX1BGJ	364	212	G3ZBA	303	260 =	K5BDX	224	307 =	VE2FVD	204
165	OH3MIG	363	213 =	VK9NS	302	260 =	CT4RH	224	309 =	OE3RE	203
166	IK1QFM	360	213 =	W1KSZ	302	260 =	HC2HVE	224	309 =	SM5JE	203
167	IK0AZG	357	215 =	N6AWD	300	263 =	VE3BAZ	223	309 =	NL7BY	203
168 =	G3XON	353	215 =	SM6DHU	300	263 =	G3TLG	223	312 =	KA1FOW	202
168 =	I4CSP	353	215 =	N4UH	300	265	JN3SAC	222	312 =	JA2BXV	202
170	WA2UZB	351	215 =	EA7OH	300	266 =	W0BBT	221	312 =	WA3L	202
171	W1OPB	350	219 =	IK8FUN	293	266 =	WD0BNC	221	312 =	DK8UH	202
172	WF5E	349	219 =	G4XRX	293	268	G4XOP	220	316 =	AA7FL	201
173	SM6CVX	346	221	GM0KCY	291	269 =	WA3HUP	219	316 =	W3YN	201
174	I2LXA	345	222	DL1ZN	289	269 =	IK1PMR	219	318 =	SM6BZE	200
175	N8EDQ	342	223 =	I8LEL	287	271	HB9BZA	218	318 =	CT1EEB	200
176 =	G0CGL	340	223 =	VE3ZZ	287	272 =	EA7SK	217	318 =	UY5XE	200
176 =	G3SJX	340	225 =	EA5OL	286	272 =	G3SMP	217	318 =	G4MVA	200
178	GM0AGN	333	225 =	G2ATM	286	274 =	YO3YC	215	322	N6WMF	199
179	NE8Z	331	227	I2PQW	283	274 =	IK2HSW	215	323 =	IT9VDQ	195
180 =	I8WES	328	228	IK1ADH	281	274 =	WW8W	215	323 =	G4SSH	195
180 =	IN3QCI	328	229	I0MOM	279	274 =	GM4KHE	215	325	OE3SGA	187
182 =	K9RHY	327	230	HB9CSA	276	274 =	DL3AOJ	215	326	G0DVT	185
182 =	DL3ECK	327	231	VE3HO	272	279	KA5EJX	214	327	G4SDJ	184
182 =	YT7DX	327	232	G4FAM	269	280 =	LA3IBA	213	328 =	DK1YP	183
185 =	EA7ABW	325	233	GW4OFQ	268	280 =	G3VQO	213	328 =	DL2GAC	183
185 =	ON7TK	325	234	EA3LS	264	280 =	JH3AIU	213	330	KF8UN	182
185 =	G4GIR	325	235	G4NXG/M	261	280 =	FE1JSK	213	331 =	S51RU	179
188	WB3DNA	324	236	VE7YL	260	284 =	W1KKG	212	331 =	SM2BQE	179
189	CT1CQK	322	237 =	EA1MO	259	284 =	RA6YJ	212	333	HB9CEX	178
190	KN4BN	321	237 =	G3VOF	259	286 =	UY5OQ	211	334	IK4HPU	177
191 =	DL1SCQ	320	239	G4HJA	257	286 =	SP6TPM	211	335 =	OZ1ACB	176
191 =	G3DZS	320	240	I8IHG	255	286 =	SM5BMB	211	335 =	VE6EJ	176
193	EA3KB	319	241	G3UAS	251	286 =	WB4UHN	211	337 =	PA0EHF	167
194	ON7LX	318	242 =	SV1JA	243	290 =	DJ8QP	210	337 =	G8GG	167
195	SM4DDS	317	242 =	DK7XX	243	290 =	SM1CNS	210	339	IT9JPK	165
196	G4CMT	314	244 =	K7LAY	240	290 =	EA7CIW	210	340	W0CON	164
197	G3AEZ	312	244 =	CT1RM	240	293 =	VE3NSZ	209	341	G0AHC	163
198	KN1I	311	246 =	RV6AF	239	293 =	AB5EU	209	342	WD9FEN	161
199	CE7ZK	310	246 =	UA6AF	239	295 =	WA7OBH	208	343	EI8AU	160
200	W5AWT	309	246 =	IK2HKL	239	295 =	PA3EXX	208	344 =	NQ7Q	159
201	CT1YH	308	249	G4OBK	237	297 =	ON4ON	207	344 =	KC9DS	159
202 =	AB5C	307	250 =	IS0JMA	236	297 =	KD9HT	207	344 =	NN7A	159
202 =	HB9CYH	307	250 =	G2FFO	236	297 =	OE1MEW	207	344 =	G3LHJ	159
202 =	KD7EC	307	250 =	KD6GC	236	300 =	G4YRR	206	348	FE1LMJ	155
202 =	WQ5Y	307	253	DJ2MN	235	300 =	GW3NXR	206	349	IN3PEE	154

IOTA SWL Listing – 1994

1	DE0MST	753	6	W0-20276	400	11	I1-21171	247
2	BRS8841	638	7	WDX3JFH	399	12	WDX2TAU	223
3	W0-6437	571	8	BRS3129	390	13	BRS94761	183
4	BRS47426	554	9	NL4276	364	14	EI-982/G	175
5	DL-9286	547	10	DL20064	325	15	UA0-124-451	166

16	ONL5923	154	350	AA6WJ	153	391 =	GM4ELV	132	429 =	IK4PMA	120
17	OM3-28013	151	351 =	AB5EA	152	391 =	G3LCG	132	429 =	WB2RQX	120
18	DE3HLA	116	351 =	AB4H	152	393 =	WD6CKT	130	429 =	WA5DTK	120
			351 =	H44MS	152	393 =	SM6TEU	130	429 =	FR5ZN	120
			354 =	G3YEC	151	393 =	K2YOF	130	429 =	HK3JJH	120
			354 =	KJ5LJ	151	393 =	JA1CKE	130	436 =	IK4HLU	119
			356 =	I8QJU	150	393 =	RZ1OA	130	436 =	SM5LI	119
			356 =	P29VMS	150	398	VE7LQH	129	436 =	K6BIA	119
			358	IK7MXB	149	399 =	EA5GOU	127	436 =	F5MPS	119
			359	EA5GMZ	148	399 =	HB9BCK	127	436 =	KJ6BW	119
			360 =	N8KCG	147	399 =	SV1ACJ	127	436 =	N3CYD	119
			360 =	NX9P	147	399 =	G3WCY	127	442 =	DJ6VM	118
			360 =	G0ARF	147	399 =	G3WRD	127	442 =	DF7HX	118
			360 =	CT1BWW	147	399 =	IK2ECP	127	442 =	JA8IYI	118
			364 =	EA5ZR	145	399 =	DL1NP	127	442 =	W4QCU	118
			364 =	W9ZGP	145	406 =	W1VXV	126	442 =	G3PMR	118
			366	LU1JDL	144	406 =	OE5AHL	126	447 =	N3PM	117
			367 =	KB8HNU	143	408 =	LU5EWO	125	447 =	KK6JY	117
			367 =	DL1XE	143	408 =	KD2NN	125	447 =	N9EXN	117
			367 =	G0GRK	143	408 =	LA1JDA	125	447 =	IK7OKB	117
			370 =	W9HR	141	408 =	F6DRA	125	451 =	DL4AO	116
			370 =	KE4DH	141	408 =	KL7UR	125	451 =	IV3GOW	116
			370 =	HB9BHY	141	413 =	EA5GRN	124	451 =	SM5SVL	116
			370 =	KW0U	141	413 =	WD6EYD	124	451 =	G3VPO	116
			374 =	G3GMY	140	413 =	4X4VF	124	451 =	VE3IMO	116
			374 =	G4DJC	140	413 =	UT5EH	124	451 =	WE2T	116
			374 =	KE5OD	140	413 =	HB9DDZ	124	457 =	G3JUL	115
			377	F1HNQ	139	413 =	CT1QF	124	457 =	SM0BNK	115
			378 =	G0APV	138	419 =	N5OVF	123	457 =	SM5DUT	115
			378 =	K1WNT	138	419 =	IK2ILH	123	457 =	HA1AG	115
			380	OE1RGB	137	421 =	DL6KY	122	461 =	WV3G	114
			381 =	G3IMK	136	421 =	EA5GJM	122	461 =	KB4VLO	114
			381 =	G3DPX	136	421 =	G0KEY	122	463	G3DNF	112
			381 =	N4VVR	136	421 =	OE1YGU	122	464 =	WS1F	111
			381 =	K3LVO	136	425 =	G3DEF	121	464 =	VE2XLT	111
			385	K6CJ	135	425 =	N3IHS	121	464 =	WA0GOZ	111
			386 =	IK8SMZ	134	425 =	UA3AQO	121	467 =	G2FQR	110
			386 =	N5MBD	134	425 =	KA2ANF	121	467 =	K4FDP	110
			388 =	4X6UV	133	429 =	WA4AUL	120	467 =	N6ONO	110
			388 =	DL3BRA	133	429 =	G3PJT	120	467 =	G0ABY	110

471 =	UC2IO	109	480 =	I1BRB	106	488 =	K4JSG	104
471 =	IK7NXM	109	480 =	HA1AD	106	488 =	N2KHH	104
471 =	N3ERM	109	487	G0AEV	105	488 =	VK6LC	104
471 =	IK1CJO	109	488 =	VE9JK	104	488 =	K8VKI	104
471 =	DL9MFH	109	488 =	K4JSG	104	488 =	WA3ELE	104
476 =	G4POF	108	488 =	N2KHH	104	488 =	UW9SG	104
476 =	IK2AWT	108	488 =	VK6LC	104	495 =	N1LJA	103
476 =	EA9PY	108	488 =	K8VKI	104	495 =	DF4SA	103
479	G4ASL	107	488 =	WA3ELE	104	497 =	G3RGD	102
480 =	N3LBC	106	488 =	UW9SG	104	497 =	IV3NZN	102
480 =	G3FIC	106	495 =	N1LJA	103	497 =	G2ART	102
480 =	G0FYX	106	495 =	DF4SA	103	497 =	WH6ASW	102
480 =	G3JTO	106	497 =	G3RGD	102	497 =	PR7CPK	102
480 =	UA9MCM	106	497 =	IV3NZN	102	497 =	WB0YEA	102
480 =	I1BRB	106	497 =	G2ART	102	503 =	WH6ASW/KL7	101
480 =	HA1AD	106	497 =	WH6ASW	102	503 =	G3CWW	101
487	G0AEV	105	497 =	PR7CPK	102	503 =	G8FF	101
488 =	VE9JK	104	497 =	WB0YEA	102	503 =	KB6ISL	101
488 =	K4JSG	104	503 =	WH6ASW/KL7	101	507 =	OE5BWN	100
488 =	N2KHH	104	503 =	G3CWW	101	507 =	WH6ASW/IM0	100
488 =	VK6LC	104	503 =	G8FF	101	507 =	KD1CO	100
488 =	K8VKI	104	503 =	KB6ISL	101			
488 =	WA3ELE	104	507 =	OE5BWN	100			
488 =	UW9SG	104	507 =	WH6ASW/IM0	100			
495 =	N1LJA	103	507 =	KD1CO	100			
495 =	DF4SA	103						
497 =	G3RGD	102						
497 =	IV3NZN	102						
497 =	G2ART	102						
497 =	WH6ASW	102						
497 =	PR7CPK	102						
497 =	WB0YEA	102						
503 =	WH6ASW/KL7	101						
503 =	G3CWW	101						
503 =	G8FF	101						
503 =	KB6ISL	101						
507 =	OE5BWN	100						
507 =	WH6ASW/IM0	100						
507 =	KD1CO	100						

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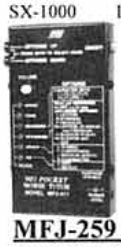

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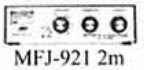

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RSGB Annual Meeting

Saturday 4 December 1993

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THE MEETING WAS in three parts: The Annual General Meeting as required by the Companies Act, an Extraordinary General Meeting and an Open Meeting comprising the President's speech, presentation of awards and a question and answer session. The AGM and EGM minutes were published in the March *RadCom*. The minutes of the Open Meeting are reproduced below.

The President presented the following prizes:

The Ostermeyer Trophy to Bernie Pallett, G3VML.

The Wortley-Talbot Trophy to Charles, G3WDG, and Petra Suckling, G4KGC.

The Fraser Shepherd Prize to Andy Talbot, G4JNT.

The Norman Keith Adams Prize to Bob Pearson, G4FHU.

The President then gave a short commentary on matters that had affected amateur radio during the previous year. He spoke in particular of Society representation at a number of overseas events and the importance of maintaining such contacts. He drew attention to the EMC Directive of the European Commission which, he said, was ill conceived and poorly drafted. The fact that it did not specifically exempt home constructed amateur equipment was a source of considerable concern and on which the RSGB had made strong representations and would continue to do so.

However amateurs could help themselves by lobbying their Members of the European Parliament and stress the need for any directive concerning radio to specifically exclude radio amateurs and their equipment. Constant vigilance was necessary in order to prevent undesirable legislation being foisted off on the amateur service. The Radio Society of Great Britain would continue to monitor developments and take appropriate action whenever necessary.

QUESTIONS

THE PRESIDENT THEN opened the informal session of the meeting.

D E Clarke, G6XYA, said he was alarmed to discover that the VHF Convention was to be held on the same day as the Great Northern Rally. The General Manager replied by saying that he was aware of the clash and was trying to contact the Chairman of the Exhibitions and Rallies Committee with a view to rectifying the problem. He went on to say that the Society was re-examining its whole policy on attendance at rallies. There were over 250 events in any one year and the number was growing. Members present were concerned that the VHF Convention was always located at Sandown which posed substantial travel problems for those who wished to attend but lived in the North of England. The General Manager promised he would ask the E & R Committee to consider alternative venues.

Geoff Bond, G4GJB asked about expulsion from the Society.

J Bazley, G3HCT, then updated H Bellfield, G3SBV, about the progress being made with regard to greetings messages. Progress had been made and it was hoped to make an announcement early in the New Year. D A Lane, G3VOM, asked about the progress being made on an Aeronautical Mobile Licence and J Bazley said that meetings between the RA and the Civil Aviation Authority had taken place and the matter was being progressed, albeit slowly.

N R Paul, G3AUB, said he was tired of waiting for the beacon GAM1 to become operational and J Bazley sympathised with him. The fact was that the matter was completely in the hands of the Frequency Registration Board. As soon as frequency clearance had been obtained it would go on air.

G J Bond, G4GJB, asked what Society policy was on the expulsion of members. The Company Secretary replied that the matter was covered by Article 24 of the *Articles of Association*.

D C W Hewitt, G8ZRE, said that his son had passed the Novice Licence examination in June 1993. However it had taken until October 1993 for the course completion slip to arrive from the RSGB. He wanted to know why there was such a delay. The General Manager apologised and said he would investigate the complaint. However, he thought it was an isolated case. H Claytonsmith, G4JKS, said that in the six months from April 1993 to October 1993 638 completion slips were processed without complaint and one could only assume the questioner's son's slip had been temporarily mislaid.

B Cross, G3ZBZ, asked whether the Society had done any analysis of the reasons for membership loss and the Honorary Treasurer drew attention to page 12 of the *Annual Report* which showed a graph indicating the decline in membership figures. The rate of decline had slowed down but there was no room for complacency. Each failure to renew membership was followed up to ascertain the reason. The General Manager said that every effort was being made to encourage amateurs, particularly young ones, to join the Society although it was true that the number of amateur licences in force in 1993 had dropped and that was bound to have an impact on membership figures. Nevertheless, the Society continued to represent over half the active licensed radio amateurs in the country.

H Bellfield, G3SBV, and N P Lawrence, G0MEJ, asked whether membership without *RadCom* was a possibility and the General Manager replied that Council was currently looking into the structure of all membership categories, including the possibility of a *RadCom*-free one, but the issues involved were not easy to resolve.

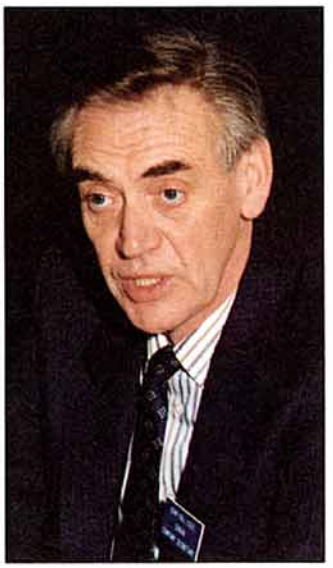
P Stewart, G7EAH, asked what Council's opinion was of a recent comment in *Electronics & Wireless World* that radio amateurs should not expect to occupy large slices of radio spectrum if they do not construct and experiment. The President confessed that he had not read the article but felt that what could be construed as experimentation was open to question. The fact was that if amateurs continued to use the bands they would retain them. The questioner felt the Society should constantly be on guard against such published opinions and react to them in order to prevent an attitude developing that was opposed to amateur radio activity.

F J Hall, G3NSY, asked what the Society proposed for future exhibitions in the light of the poor attendance figures recorded for the 1993 NEC event. The General Manager replied that the whole question of rallies and exhibitions was under review. The costs involved in hiring the NEC venue were prohibitive and the Society was examining other possibilities.

B Cross, G3ZBZ, said that he had received a letter from the licensing authority recently indicating that if his licence lapsed he would need to produce all the necessary documentation in order to renew it. He felt this was outrageous and would be extremely difficult for many members to comply with. The President said that the Society had protested strongly to the Radiocommunications Agency about the proposal and advised members to keep their latest validation

document as evidence. If problems arose a member should write to the Chairman of the LAC Committee with full details of the complaint.

D Johnson, G1GNS, asked whether there was any possibility of the RSGB submitting a tender for the issue of licences when the current contract expired. J Bazley said that he considered the contract would not go out to tender. He had no evidence to support that view, it was merely a personal opinion. There had been enormous problems with the current contractor which were well known to all present but the Society would have to consider the implications of submitting a tender very carefully before doing so. The Honorary Treasurer indicated that such a tender might be worth considering but, in his opinion, if it were successful then it would be a great deal of work for a small return.



Richard Horton (left), Honorary Treasurer and John Hall, Company Secretary.

R Sterry, G4BLT, asked what was being done to encourage the writing of middle-range technical articles for *RadCom*. The Editor of *RadCom* said he was not aware of a paucity of such features but he would look into the questioner's comments to see if they had any validity. Research had shown that a large number of readers favoured articles on simple construction projects and he had reacted to those requests. Happily, *RadCom* had an abundance of material available for publication and this, regrettably, led to delays in a particular article appearing in print. The magazine had been increased in size to try and rectify this.

P Higgs, GW4IGF, said he felt the poll conducted about CW was not representative of all amateurs. The rather predictable result had been that most Class A licensees wanted to retain CW while the Class B holders did not. D A Evans, G3OUF, responded by saying that the request for contributions to the debate had been circulated widely and the HF Committee had done all in its power to see that as many people as possible submitted their views.

F G A Mossop, G0DUB, asked what the Society's policy was on its use of E-Mail. The President replied by saying that the Society was looking into the possibility of using E-Mail but there were many disadvantages to it. I D Suart, GM4AUP, indicated that the Society had recently formed an Information Technology Committee which had taken on responsibility for investigating the possibilities. The General Manager said that, whilst he would be delighted to increase the efficiency of communications between the Society and its members, there were more urgent priorities than the introduction of E-Mail and the inherent expense involved. He had been impressed with the ARRL E-Mail system and would like to see something similar at RSGB Headquarters in due course. D Clark, G6XYA, said that, in his experience, E-Mail was an invaluable tool and strongly recommended the Society to take advantage of its communication facilities.

R C Muriel, G3ZDM, indicated that there used to be several pages of amateur information on Teletext and he wondered if this service could be revived. I D Suart, GM4AUP, said that the service had been provided in the past in certain areas as part of the local pages. Any proposal to reinstate such a service would have to be taken up with Teletext UK and they would make their decision purely on a commercial basis.

The President then declared the meeting closed and wished everyone present a safe return home.

Enjoying the meeting was Elaine Elliott, 2E1BUX.

Father and son: Keith, G3RTU, and Simon Kahn, G0STU.

The tea interval was an opportunity to relax and chat.

Charlie and Petra Suckling, G3WDG and G4KGC, received the Wortley-Talbot trophy for their outstanding work in the microwave field.

Chris Muriel, G3ZDM, suggested using teletext pages again.

Charlie Newton, G2FKZ, Propagation Studies Committee Chairman.

CONTEST CLASSIFIED

All rules should be read in conjunction with the General Rules published in *Contest News* January 1993

HF RULES

21/28MHZ CW 1994

Please remember that UK contestants making use of packet, or any other spotting assistance must enter as Multi-operator stations.

1. Rules: The General Rules for RSGB HF Contests (*RadCom*, Jan 94) apply.

2. Eligible entrants: Overseas (inc EI) - all licensed amateurs. UK - as per General Rules. Single-op or Multi-op entries accepted in the transmitting sections.

3. When: 0700 to 1900UTC, Sunday 16 October 1994.

4. Sections: (a) UK, **(b)** Overseas, **c)** UK QRP, **(d)** Overseas QRP, **(e)** UK Receiving, **(f)** Overseas Receiving

QRP stations may use 10W RF *output* or less.

5. Frequency/Mode: 21MHz and 28MHz bands, CW only. Entrants are requested not to operate in the sub-band 21.075 - 21.125MHz.

6. Contest Exchange: RST and serial number, commencing with 001. UK stations must also send their County Code (*RadCom*, Jan 94).

7. Scoring: (a) UK stations work only Overseas stations; 3 points per QSO. Multipliers: as per General Rules, **(b) Overseas stations** work only UK stations; 3 points per QSO. Multipliers: 1 for each UK County worked.

The final score is the total of QSO points times the number of Multipliers worked.

8. Logs: Overseas entrants may use the stationery provided by their National Society. UK entrants see General Rules.

9. Address for logs: RSGB HF Contests Committee c/o G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey CR7 7AF, England.

10. Closing Date for logs: UK entrants, postmarked by 14 November 1994; Overseas entrants, delivered by 12 December 1994.

11. Awards: T E Wilson, G6VQ, Trophy to UK single-op overall winner. Certificates of merit to leaders and runners-up in each section, overall and on each band; also to the highest-placed multi-op entries from UK and Overseas. Additional certificates may be awarded (at the discretion of the HF Contests Committee) to the leading stations from each Overseas continent/country.

RECEIVING SECTION

Single-operator entries only will be accepted. Rules as for the transmitting section except where specified below. Holders of transmitting licences for frequencies only above 30MHz may enter the receiving section.

7. Scoring: UK SWLs log only overseas stations in contact with UK stations participating in the contest. Overseas SWLs log only UK stations in contact with Overseas stations participating in the contest. Scoring and multipliers as for the transmitting section.

8. Logs: Columns to be headed: Time UTC; Callsign of station heard; Report/serial number sent by that station; County Code sent by that station (if applicable); callsign of station being worked; multiplier (if new); points claimed.

NOTE: In the column headed 'station being worked' the same callsign may only appear once in every three contacts except when the logged station counts as a new multiplier.

11. Awards: (At the discretion of HFCC, dependant upon the level of support): Certificates of merit to the leading three entrants from each section, and to the leading entrant from each overseas country.

21/28MHZ SSB 1994

1. Rules: The General Rules for RSGB HF Contests (*RadCom* Jan 94) apply. **Entrants are reminded that stations using packet or other spotting facilities must enter as Multi-operator stations.**

2. Eligible entrants: Overseas (inc EI) - all licensed amateurs. UK - as per General Rules.

3. When: 0700 to 1900UTC, Sunday 2 October 1994.

4. Sections: (a) UK, **(b)** Overseas, **(c)** UK Receiving, **(d)** Overseas Receiving.

Single-op and Multi-op entries accepted in transmitting sections.

5. Frequencies/Mode: 21150-21350kHz and 28450-29000kHz, SSB only.

6. Contest Exchange: RST and serial number, commencing with 001. UK stations must also send their County Code.

7. Scoring: (a) UK stations work only Overseas stations, three points per QSO. Multipliers as per General Rules.

(b) Overseas stations work only UK stations, three points per QSO. Multipliers: One for each UK County worked on each band. **Note:** *The same station may be contacted on both bands for QSO points and Multipliers.*

Total Score - The number of QSO points on each band are added together. The total number of multipliers on each band are added together. The final score is the total QSO points multiplied by the total multipliers.

8. Logs: Separate logs are required for each band. Overseas entrants may use the stationery provided by their National Society. UK entrants see General Rules.

9. Address for logs: RSGB HF Contests Committee c/o G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey CR7 7AF, England.

10. Closing date for logs: UK entrants, postmarked by 1 November 1994. Overseas entrants, delivered by 1 December 1994.

11. Awards:

Section a: The Whitworth Trophy to the UK single-op winner. The Powditch Transmitting Trophy to the leading single-op entry on 28MHz. Certificates of Merit to the 2nd and 3rd placed entrants overall and on each band.

Section b: Certificates of merit to the three leading entrants. Subject to the decision of the RSGB HF Contests Committee, additional certificates may be awarded to the leading entrants from each continent/country.

Multi-operator entries: Certificates of Merit to the leading groups in each section.

RECEIVING SECTION

Rules as for the transmitting sections except where specified below. Holders of transmitting licences for frequencies only above 30MHz may enter the receiving section.

7. Scoring: UK SWLs log only Overseas stations in contact with UK stations participating in the contest. Overseas SWLs log only UK stations in contact with Overseas stations participating in the contest. Scoring and multipliers as for the transmitting sections.

8. Logs: Columns to be headed: Time UTC; Callsign of station heard; Report/serial number sent by that station; County Code sent by that station(if applicable); Callsign of station being worked; Multiplier(if new); Points claimed.

Note: In the column headed 'station being worked' the same callsign may only appear once in every three contacts except when the logged station counts as a new multiplier.

11. Awards: (At the discretion of HFCC, dependant upon the level of support): The Metcalf Trophy to the leading UK entrant. The Powditch Receiving Trophy to the leading UK entrant on 28MHz. Certificates of Merit to the leading three entrants in each section, and the leader from each overseas country.

RSGB SSB FIELD DAY 1994

1. Rules: The General Rules for RSGB HF Contests, published in the January 1994 issue of *RadCom* will apply. This is a 'Portable' contest. Please note that as this is a multi-operator event, the use of packet radio to monitor the DX Cluster for spots is permissable, though it would be considered against the spirit of the contest to have an off-site monitoring station passing information solely to an entrant.

2. When: 1500UTC 3 September to 1500UTC 4 September 1994.

3. Sections:

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

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

Entrants in both sections may keep standby equipment on site, but it may not be connected to a power source or antenna at the same time as the main equipment.

4. Contacts: SSB only in the 3.5, 7, 14, 21 and 28MHz bands.

5. Contest exchange: RS plus serial number starting from 001.

6. Scoring: For each complete QSO with **(a)** a fixed station in IARU Region 1 - two points; **(b)** any station outside IARU Region 1 - three points; **(c)** a portable/mobile station in IARU Region 1 - five points.

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

7. Multiplier: ONE for each DXCC Country worked on each band.

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

9. Logs must be addressed as per General Rules, and postmarked not later than the Monday **twenty-two days** after the end of the contest. Please don't forget (i) Separate logs for each band, (ii) the list of Multipliers worked for each band and (iii) Alphabetically sorted checklist of callsigns worked ('Dupe Sheet') for each band if you possibly can.

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

HF RESULTS

21/28MHZ SSB 1993

The very poor conditions on both bands, but particularly 28MHz, was no doubt responsible for the low entry - although the change of date clearly caused some confusion for overseas contesters. Winning place was again taken by G3NLY by a very small margin over G4BWP. Multi-operator honours in the UK go to the Swansea ARS, GW4CC. The UK SWL section was again the territory of the three regulars, and Bob Treacher, BRS 32525, won again by a commanding margin. Comments in the overseas logs included several about the clash with the VK/ZL contest on the same weekend. Check log was gratefully appreciated from WA2PXR/3. Congratulations to all the award winners for perseverence. G3OZF

UK SINGLE OPERATOR

Pos	Call	Total Points	28MHz Pos	28MHz Points
1	G3NLY	200208	5	297
2	G4BWP	198849	2	2232
3	G3NAS	158304	3	672
4	G4DUW	93996	4	324
5	G4PKP	87975	6	189
6	GI0KOW	74906	7	75
7	G0BIR	69423	11	3
8	G4RFR	45423	11	3
9	GM4FDM	37628	8	27
10	G2QT	28380	10	6
11	G4IQM	15429	11	3
12	G3VYI	13464		
13	G4IUF	12285		
14	G2FNK	11438	9	45
15	G0AEV	2394	1	2394
16	G6QQ	726		
17	G4ZYF	708		
18	G4KDL	513		

UK MULTI-OPERATOR

Pos	Club	Call	Points
1	Swansea ARS	GW4CC	90576
2	Ipswich RC	G4IRC/P	58880
3	N Wakefield Club	G4NOK/P	57462
4	APAU Contest Grp	G0FUN	26928
5	Stourbridge & DARS	G6OI	5922
6	Charnwood Ctst Clb	G0OCE/P	5916

UK SWL

Pos	RS No	Total Score	28Mhz Score
1	BRS 32525	30810	144
2	BRS 20249	3948	3
3	BRS 28198	2772	12

OVERSEAS SINGLE OPERATOR

EUROPE

Pos	Call	Score
1	LZ2VP	32178
2	LZ6R	22794
3	9H1DE	14976
4	RB5QRW	13677
5	UB4LCB	5049
6	RA3XO	4743
7	YO7AEW	2375
8	UA4AVN	1944
9	YO7ARY	720
10	SP8KEA	396
11	OM3YK	189
12	OK1TW	72

NORTH AMERICA

1	K1BV	1188
2	N2LQQ	624
3	W2GTN	468
4	N9OCT	350

ASIA

1	UH8EA	37332

OCEANIA

1	V85PB	1020

OVERSEAS MULTI-OPERATOR

1	UR8J	28086
2	RB4IYU	13986
3	LZ2FM	3024

OVERSEAS SWL SECTION

1	ONL383	360

HF CONTESTS CALENDAR - 1994

29 Apr	QRS Cumulative (Jan 94)
7/8 May	*ARI DX (Mixed Mode)* (Apr 94, p20)
9 May	QRS Cumulative
14/15 May	*CQ-M (Mixed Mode)* (May 94, p20)
28/29 May	*CQ WPX CW* (May 94, p20)
4/5 Jun	NFD (Rules from G4IQM)
18/19 Jun	*All Asia SSB*
25/26 Jun	Summer 1.8MHz CW (Apr 94)

VHF/UHF CONTESTS CALENDAR

4 Jun	50MHz Trophy (Feb 94)
4/5 Jun	IARU 50MHz (Feb 94)
12 Jun	70MHz CW (Feb 94)
18 Jun	432MHz FM Fixed & Open
2/3 Jul	VHF NFD
3 Jul	3rd Back Packers 144MHz
23 Jul	144MHz Low Power/SWL
24 Jul	432MHz Low Power/SWL
21 Aug	432MHz Fixed/SWL
30 Aug	144MHz CW Cums
3/4 Sep	144MHz Trophy/SWL
4 Sep	4th Back Packers 144MHz
14/29 Sep	144MHz CW Cums
25 Sep	70MHz Trophy/SWL
1/2 Oct	RSGB 432MHz-24Ghz
2 Oct	1.3GHz Trophy/SWL
2 Oct	2.3GHz Trophy/SWL
1/2 Oct	IARU 432MHz-24Ghz
4/19 Oct	1.3 & 2.3GHz Cum
12/27 Oct	432MHz Cum
14/31 Oct	144MHz CW Cums
30 Oct	2nd 23cm & 13cm Fixed/SWL
3/17 Nov	1.3 & 2.3GHz Cum

DIRECTION FINDING

RIPON HF QUALIFYING EVENT (TOP BAND)

Date: 12 June 1994

Map: 104 (Leeds and Bradford)

Assembly: 1300 for start at 1320

Location: Plantation Road, Harrogate, NGR 289540

Competitors requiring tea should notify John Hall, tel: 0432 567390 no later than 1 June.

SALISBURY QUALIFYING EVENT (TOP BAND)

Date: 3 July 1994

Map: 184 (Salisbury and the Plain)

Assembly: 1300 for start at 1320

Location: Yarnbury Castle, NGR 041 402

Competitors requiring tea should notify Bert Newman, G2FIX, 74 Victoria Road, Wilton, Salisbury SP2 0DY, tel: 0722 743837 no later than 26 June.

SOUTH MANCHESTER QUALIFYING EVENT (TOP BAND)

Date: 24 July 1994

Map: 109 (Manchester)

Assembly: 1300 for start at 1320

Location: First car park at Pennington Flash Country Park. The car park is the immediate left turn after entering the park driveway (marked as 'Aspull Common' on the OS map, NGR 643984).

Competitors requiring tea should notify Dave Holland, G3WFT, 32 Woodville Drive, Sale, Cheshire M33 6NF, tel: 061 973 1837 (home) or 0477 571321 (office) no later than 18 July.

SOUTHGATE 144MHZ ARDF EVENT

Six teams from three clubs took part in the August Bank Holiday foxhunts organised by the Southgate ARC. This year's event consisted of two double foxhunts, with each hunt having one easy and one difficult fox to find. This allowed newcomers to find the easy fox by walking only, while experienced hunters could go for both foxes. There was also a treasure hunt combined with the ARDF hunt.

In the first double hunt, G7HJA set the easy fox in Whitewebbs Park, lying in an open spot under an umbrella. G4KZD set the difficult fox in thick undergrowth several miles north of the start point. Only two teams (GW1XBG/GW1DTA) and G4DFB were able to find this fox.

In the second double hunt G7HJA had moved to another part of the park area, while G4KZD decided to hide under a fallen tree in thick woodland to the west of the start point.

Afterwards, there was a barbecue and presentation of the G3SFG VHF trophy. The Swansea team (GW1XBG/GW1DTA) retained the trophy after last year's win.

This was an excellent event for beginners. Anyone interested in this and the RSGB North London VHF hunt for 1994, should contact Steve White, G3ZVW, on 081 882 5125.

Pos	Callsign(s)	Club	Points
1	GW1XBG/GW1DTA	Swansea	264
2	G3ZVW	Southgate	218
3	G4DFB	Southgate	195
4	G4JKS/G3OUF, G0NDB/G0SNO	Verulam	142
5	G0MEE/2E1BFL/Clair	Southgate	65
6	Mike Kaliski	Southgate	45

VHF RESULTS

144MHZ CW & MARCONI

Almost all contestants reported poor conditions for the contest with very little G activity. Even so, it was pleasing to note a good number of European callsigns in a number of logs, particularly those operating from the East Coast. Even though G4PIQ had amplifier problems at the beginning of the contest, he has still managed to win his section by a convincing margin. G4XBF/P put up a magnificent effort by working a great deal of excellent DX under flat band conditions.

GM4VVX/P operating in the far North had a particularly hard time working only four stations, but heard a great number of meteor pings. However, his perseverance was rewarded with a certificate for a second place. G4XPE wins a certificate for being the leading station running 25W or less to a single antenna. Congratulations to all certificate winners. The logs of G4PIQ, G4XBF and G4OUT have been forwarded for the Marconi Contest.

G4DHF

24 HOUR SINGLE OPERATOR SECTION

Posn	Call	Pts	QSO	Loc	Pwr	Ant	Best DX	Km
1 *	G4PIQ	70289	206	01MU	400	4X15 2X9	DK0OG	905
2 *	G4OUT	14138	56	92AT	40	12ZL	DK0BN/P	745

6 HOUR SINGLE OPERATOR SECTION

1 *	G3JRM	14856	55	02UL	100	17	DL0IU	599
2 *	G3JJZ	6498	33	01AJ	25	8/8	DL0WAE	584
3	G0ADH	6337	36	91KO	50	13	GM4ZUK/P	610
4	G4XPE	3392	15	92GU	10	10	DK0BN/P	718

24 HOUR MULTI-OPERATOR SECTION

1 *	G4XBF/P	78350	230	00EW	400	4X9	OK1KTL/P	887
2 *	GM4VVX/P	630	4	78WA	150	9	G4KUX	630

6 HOUR MULTI-OPERATOR SECTION

1 *	G0FBB/P	22255	83	01EV	400	3X17	DL0IU	708
2 *	G0PNT	12934	58	91VJ	150	16	DL8ZB/P	719
3	G2AA	6911	33	92KP	200	17	DK0BN/P	689

* Certificate winners

432MHZ FIXED AND SWL

It seems generally agreed that conditions for the contest were flat, with only a short enhancement to Holland. This may explain the lower number of entries compared to last year.

A warm welcome to Ruth Houghton, 2E1BZR, who was entering her first contest. Her tranceiver was an FT790 giving 1W to a homemade groundplane antenna. Let's hope that others follow her example and submit entries to next year's contest.

The standard of log keeping was good but some entrants need to remember that they can count 'G' as a country multiplier! Congratulations to the Sutton and Cheam Radio Society, G0GZQ, and to Peter Tribe, G8FBG, for winning their sections and also to the APAU Contest Group, G4WJS, and to Rob Briggs, G0TDF, on being runners-up.

The certificate for the leading single operator using 25W or less to a single antenna is awarded to D Newton, G3JJZ. Almost all entrants enjoyed the contest and are looking forward to next year's with hopefully better conditions and more entrants.

G4OUT

SINGLE OPERATOR FIXED SECTION

Pos	Callsign	Pts	QSO	Loc.	Ant.	Pwr	Best DX	Km
1	G8FBG	7680	62	IO91	28	400	G1LMC	436
2	G0TDF	5868	45	IO92	21	100	PA0WMX	513
3	G6HKM	5208	45	JO01	23	100	PA0AMJ	311
4	G0MLY	3450	34	IO92	21	80	G7KTE	273
5	G8JXV	2730	38	IO91	88	110	G4AGE	239
6	G3JZY	1235	19	IO90	18	40	G4ERG	341
7	G3JJZ	671	24	IO92	18	25	G0MLY	195
8	G5UM	451	15	IO92	18	10	G8JXV	153
9	G0GCI	231	9	JO01	19	210	G0MLY	231
10	G3YHF	150	8	IO92	19	1	G0GZQ	168
11	2E1BZR	24	4	JO01	GP	1	G3KPV	81

MULTI-OPERATOR SECTION

1	G0GZQ	5211	58	IO91	30	50	G4FRG	269
2	G4WJS	1648	40	IO91	30	30	G4ERG	233

THE 1993 SUMMER MICROWAVE CUMULATIVES

Thanks are due to Lehane Kellett, G8KMH, for the adjudication. On 10GHz, congratulations must go to Neil, G4BRK, the overall winner by a margin of some 1300-odd points, who operated also as GW4BRK/P from IO93JA.

For the first time since the Dain Evans (G3RPE) Memorial Award was instituted, Mike Walters, G3JVL, has failed to win the Award, although he came a close second and remained the leading Fixed Station in the cumulatives!

The number of QSOs per session (maximum 36) and the best DX (781km) have both dramatically increased with over 70 UK callsigns appearing in the logs received and analysed. The growing use of low-noise RX HEMT preamplifiers and Tx power output above the 1W level has helped this trend. However, the winner's use of a 1W Tx coupled with a gainy antenna and the skilful use of a good portable site enabled him to compete effectively with the fixed stations (and some portable stations) running much more power. It is hoped that this will encourage others, especially less well equipped newcomers, to use portable sites.

Logs were of variable quality but were generally accurate. Most, having read the rules, scored four qualifying sessions but not everyone submitted logs for all active sessions as was intended - a complaint often made by adjudicators in the past! G3BEX and G3WDG (operating as GM3WDG/P) are thanked for their check-logs.

I found it very disappointing to hear that there were no wideband entries at all this year even though, overall, entries were up on last year. The reason I found it disappointing is that WB represents the simplest, basic "entry" level to 10GHz operating where we might expect Novice entries: there were no Novice entries!

In the 24GHz band, Steve Davies, G4KNZ, once again achieved the leading position, being active in all sessions and from no less than 12 different sites. Peter Day, G3PHO, is to be congratulated on being runner-up with a very respectable score using low power WB.

Whilst the best DX and the number of entries is slowly increasing, it is rather disappointing to note that several of the operators who appeared in last year's tables were not active this year.

G3PFR

1993 10GHZ SUMMER CUMULATIVE RESULTS.

Pos'n	Call	Points	QSOs	Sessns	Pwr(W)	Antenna	Best DX	km
1	G(W)4BRK/P	20922	122	4	1	1.2m	G4DDK	324
2	G3JVL	18599	129	4	20	0.9m	G3NWU	436
3	G4KGC	14705	107	4	20	n/a	G3GNR	296
4	G3FYX/P	14638	111	4	3	0.9m	HB9MIN/P	781
5	G4FCD	14270	117	4	10	0.9m	F6DKW	428
6	EI/G4ZME/P	13982	90	4	0.8/20	0.8m	G4RFR/P	377
7	G4RFR/P	13776	92	4	10	1.6m	F1HRY	414
8	G3PHO/P	11438	77	4	0.23	0.6m	G4BCH/P	304
9	G4BCH/P	9477	73	4	0.15	0.4m	F6DKW	320
10	G3JMY	9298	84	4	6	n/a	G3LQR	278
11	G3ZTR/P	7770	43	4	1	0.6m	G4RFR/P	355
12	G4MAP/P	6252	64	4	n/a	n/a	G4KNZ/P	287
13	G8LSD/P	6198	65	4	0.125	0.8m	F6DKW	304
14	G0API	6059	47	3	15	0.6m	G3PYB/P	405
15	G3GRO	4828	48	3	15	0.6m	GW4BRK/P	296
16	G4KNZ	4416	55	4	20	0.4m	GW4BRK/P	247
17	G3JMB/P	4299	66	4	0.125	0.6m	GW4BRK/P	304
18	G8KMH/P	3663	56	4	0.04/0.7	0.3m	GW4BRK/P	197
19	G3LYP(/P)	3058	47	4	16	0.6m	G3ZME/P	138
20	G4ZXO/P	1659	20	2	n/a	n/a	G4RFR/P	170
21	G1MPW/P	1492	24	4	0.05	n/a	G4KGC	117
22	G6KIE/P	979	19	4	0.05	n/a	G4KGC	117
23	G4KNZ/P	911	6	1	3	0.6m	G4MAP/P	284

1993 24GHZ SUMMER CUMULATIVE RESULT

Pos'n	Call	Points	QSOs	Best DX	km	Equipment
1	G4KNZ/P	1062	16	G3PHO/P	120	50mW/0.3W wb/nb 60cm dish
2	G3PHO/P	711	12	G4KNZ/P	120	7mW Gunn, 20° dish
3	G4MAP/P	681	11	G4KNZ/P	90	n/a
4	G3FYX/P	661	8	G4KNZ/P	118	50mW Gunn, 18° dish
5	G8AYY/P	448	9	G3FYX/P	86	5mW Gunn, 30cm dish
6	G3UYM/P	372	7	G3PPF/P	85	5mW Gunn, 18° dish
7	G3ZTR/P	149	2	G3PHO/P	81	5mW Gunn, 18° dish
8	G8KMH/P	65	1	G4KNZ/P	65	500uW nb, 18° dish

2ND 1.3/2.3GHZ FIXED (OCTOBER 1993)

Disappointing seems to sum almost everything up in a word. The opening to Scandinavia during the 70cm cumulatives a couple of days earlier suggested that conditions might have been very good, but they weren't. Comments included 'quiet', 'poor', 'fair' and 'pretty grim'. Nevertheless, G3MEH made a few contacts into Germany, and GD4GNH and G8OHM both caught F1EZQ in JN27

It was disappointing not to have a few more entries from the 50-odd stations who were active, especially the handful who gave out serial numbers approaching 20, and equally disappointing to find only three stations and one entry on 13cm. Many thanks to all those who sent in entries.

One thing that wasn't disappointing was the log-keeping. Not a single point lost by anyone! Is this a first? Even allowing for the continental DX, G3MEH's volume of contacts overcame the points/QSO of GD4GNH. A fine showing from G8OHM should not be ignored because of its isolation in the multi-op section.

Congratulations and certificates go to G3MEH, GD4GNH, G8OHM and G8ZQB for their table positions, and G6HKM wins the low power/single aerial award.

GW8GSQ

1.3GHZ SINGLE OPERATOR

Posn	Call	Points	QSO	Loc	Pwr	Ae	DX
1	G3MEH	251	33	91QS	100	2x50	775
2	GD4GNH	113	7	74QD	10	4x23	974
3	G8ZQB	87	19	92JN	50	27	286
4	G8NEY	80	14	81VK	130	55	219
5	G6HKM	64	16	01FT	10	43	428
6	G4ZTR	47	11	01KW	10	23	220
7	G0JDL	26	4	02UL	15	23	249

1.3GHZ MULTI OPERATOR

1	G8OHM	149	23	92AJ	150	4x23	712

2.3GHZ SINGLE OPERATOR

1	G8ZQB	32	2	92JN	8	1.6m	21

VHF RULES

RSGB - 432MHZ - 24GHZ

1.3GHZ TROPHY AND SWL

2.3GHZ TROPHY AND SWL

IARU 432MHZ - 24GHZ

Date: 1/2 Oct

Time: 1400-1400GMT

General rules apply.

Sections: S Single operator; M Multi operator; L Listeners.

Scoring: RSGB - radial ring on 432MHz, 1 pt per Kilometre all other bands.

IARU - 1pt per kilometre (logs will be forwarded). Separate cover sheets and logs for RSGB and IARU (if you want to enter both contests that means 2 (TWO) 427's and 4422's).

1296MHz Trophy: This will run between 1400 and 2200h on the Saturday.

2.3GHz Trophy: This will also run between 1400 and 2200 on the Saturday.

Stations can enter all contests (IARU or RSGB 24h or 1.3 and/or 2.3GHz Trophies) but please separate logs and cover sheets for each contest.

Adjudicator: A Cook, Fishers Farm, Tendring, Clacton-on-Sea Essex CO16 9AA

NOTES FOR CONTESTERS:

All entries must be postmarked at the latest by the 16th day after the end of the contest, ie if contest ends on a Sunday (say 1 October) then the entry must be postmarked on or before the third Tuesday after that Sunday (17 October). For VHF Field Day an extra week is allowed, ie the fourth Tuesday. Any late entries can only be accepted at the discretion of the adjudicator.

No recorded delivery or registered post.

Entrants can obtain a proof of posting certificate from the Post Office which we will honour if an entry has been delayed in the post.

QTH information to be exchanged on 70MHz only. However not all 70MHz contests require this information, see individual rules and General Rule 24 (1994).

General rules: 1 through to 9, 11,12,13,15 to 23,25,26, apply to all contests. Any changes will be noted in individual contest rules.

Adjudicators will not normally enter contests which they are adjudicating. However if the adjudicator does wish to enter then his entry will be vetted by a subcommittee before final adjudicated list is published.

Every contest is open to foreign entrants who will be listed separately from UK stations, certificates will be issued to section winners (and runners-up, if enough entries).

IARU 50MHZ CONTEST ERRATUM

The full 6 character locator (eg JO01MU) must be exchanged during this contest as normal. If a non-competing station will only send a 4 character locator (eg JO01), the score is worked out as if he were located at the nearest point of that locator square to you. Scoring for the IARU event is at 1 pt/km.

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

A1 TEST EQ. Philips PMS390 100kHz-1GHz Signal Generator: £1270. HP 8654B 10-520MHz Signal Generator: £620. Marconi TF2008 10kHz-510MHz Signal Gen: £340. Texscan AL51A Spectrum Analyser 0.4MHz - 1GHz: £1320. Tektronix 475 200MHz Dual Oscilloscope: £270. Farnell AMMB Automatic Modulation Meter: £165. Wavelek No 157 Programmable Waveform Synthesiser: £315. Wayne Kerr 8424/N L,C,R Component Meter: £210. Marconi 2432A 0-500MHz LCD Freq Meter: £220. Feed Back TW6300 Waveform Multi Generator: £220. Racal 9824 560MHz Freq Meter: £170. All exc condx. Door to door carriage FOC First callers. (Suffolk) 0473 785203.

ABOUT HALF Price, as new! Lodestar Signal Generator 0.1-450MHz plus Calibrator and Audio 1kHz at 1v: £119. Lodestar Dip Meter, HF bands: £39. Frequency Counter SC40, 5Hz-400MHz: £59. SEM QRM Eliminator Mk1: £49. Nice Dixon Cases, booklets. (Gillingham) 0634 379140.

BARGAIN JOB Lot. Masses of components, books, magazines, equipment, hardware etc. Ideal opportunity for radio boot fair, rally sellers. Easily resell for £1000+. I have to clear urgently in one lot hence accept just £250. Small van/car + trailer needed to collect. Sorry no list (no time). View by appointment, Monday to Saturday 8am-7pm. Definitely no splitting, no offers, no timewasters please. (Birmingham) 021 472 3688.

CAPCO MAGNETIC Loop Antennas, covering 80-10m plus WARC bands, inc Control Box and cables: £230. Please phone after 6.30. (Sedgley) 0902 664482.

DATONG MORSE Tutor D70: £35. Tono 5000E Communications Terminal, codes RTTY, ARQ Amtor, L&A FES.B, CW on Tx/Rx and practice: £350. Tono MR250 Linear 210W o/p, 10W i/p with Rx pre-amp: £180. Wavecom 4010 M/mode Demodulator modes ARQ, RTTY, CW, Fax, packet and others receive only unit, Centronics O/P, Video O/P: £375. All plus P & P. G8WYT, QTHR. (Haywards Heath) 0444 450265.

PK-88 HF/VHF TNC, excl condx: £95 ono. Datong RF Speech Processor, a Dx pile-up breaker!: £55. Mega Vacuum Variable, allegedly 10Kv!!. Perfect for that QRO LF Loop: £55. Dave, G0OES. (Litchfield) 0543 254622.

QTH DETACHED modern 3-Bed Bungalow, 1000 sq ft plus Conservatory, garage, attractive location, secluded landscaped gardens of 1.75 acres (600x150ft) on edge of quiet, friendly village 450ft ASL, superb HF site, no noise/EMC/neighbour problems, easy access Carmarthen/Cardigan coast. All in good order, no chain: £76,000. GW3UEP, QTHR. (Llandysul, Dyfed) 0559 362632.

SEALS. Clark Mast, Scam 12, also 'O' Rings, the Set: £60. Revitalise your WW2 Pneumatic veteran. (Gillingham, Kent) 0634 379140.

SHACK CLEARANCE. Kenwood R820 Rx: £320. Yaesu FT690R 6m Tcvr: £240. Icom IC-210 2m Base: £140. Yaesu FR-101 Rx, HF+6m+2m: £195. Sony ICF-PRO80, 0.5-220MHz: £185. KR-500 Elev-Rotor: £140. 2 x 2m/70cm Tonas: £20 each. BBC model B Computer, viglen/case: £125. Vortex 286-Laptop: £395. Wrase SC-422 SSTV Conv: £185. SC-1 SSTV/FAX: £275 with Keyboard. HRO Rx, +Coils: £65. All ONO. Prefer Buyer collects. (Essex) 0621 828135.

TS830S, YK-88C CW filter fitted. good condx, manual, boxed: £530. Ring after 6pm. (Chesterfield) 0246 471072.

YAESU 902DM with Desk Mic, manual, packing, ex/cond: £475. Altai GDO as new: £25. Kent Keyer: £30. Bencher Key: £35. Pair 7MHz Traps, new £10. KR400 Rotator with Cable, Control etc: £50. HF 3ele Bear Tri/band Minus Mast boom bracket, few U/bolts. Offers. All plus carriage. Prefer buyer inspect collect. (Nr Cardiff) 0446 747223.

YAESU FT102 HF Tcvr fitted AM/FM narrow SSB filter, new valves, exc condx: £550. Yaesu FV102DM External Digital VFO, vgc: £175. Datong PC-1 General coverage Converter, immac condx, sensible offers. Microwave Modules 50W 70cm Amp/preamp, model MML432/50, sensible offer. (Watford) 0923 243650.

YAESU FT736R D/band M/mode, boxed, 3 months old: £1,100 ovno. Alton P330 Tiltover pygmy 3 section Lattice Tower, post mount with Autobrake winch, 3 months use, mint condx: £380 ovno. Could deliver locally. G2DYM Trap Dipole and Balum: £35. Landwehr 145 MAS 2m Mast Head Pre-amp, new and boxed: £110 ovno. (Exeter) 0831 872179.

YAESU FT767GX Tcvr, unused, mint, original packing: £1,100 ono. KW E-Zee Antenna Match: £25. Telequipment S54A Oscilloscope , mint: £50. G8BJP, QTHR. (Westgate, Kent) 0843 831069.

AEA PK232 MBX Multi Mode Data Controller with leads, manual: £210. (Monmouth) 0600 713549.

ALINCO DJ560E 2m/70cm H/held with Spkr/Mic case, battery box and Super Rod-7 Antenna, vgc: £290 ono. PacCom Tiny 2 TNC with cables and h/book, vgc: £95. Daiwa CN103 VHF-UHF Power Meter, vgc: £45. Call George, GI4SJQ, QTHR. After 6pm. (Portadown) 0762 334648.

ALINCO DJ580 D/band H/held, case, Spkr/Mic eartalker Helical and telescopic antennas, charger, boxed as new: £300 plus P & P. (Dundee) 0382 815173.

ALUMINIUM TUBES (Scaffold) 2inch Dia 12ft approx: £10 each. Commadore 64 with Packet Module, 14inch B/W Teleton TV: £50. (Rotherham) 0709 850517.

AMSTRAD 2086D, HD 20Mb, twin 3.5 Disks connected to AEA PK232 MBX programme loaded Pakratt V5.5 CW, Packet, RTTY, Amtor FEC B, ARQ leads connected for 480R 2m Icom751 for HF. Just plug in and go: £450. Tonna 5000E, no computer required, just plug in 2m or HF Rig, CW, RTTY, Amtor FRC B ARQ. Its own TV Screen, memories: £250. G4YPN, QTHR. (Rainham, Essex) 0708 523487.

AMSTRAD PC2386 built-in D/drives, Colour Monitor, MP 200 Printer, accessories, little used. Health reasons, cost £1,280 accept: £550 ono. (Ruislip) 0895 639262.

ANTENNAS Ideal for Contesting; 4x 9ele 2m Tonnas, H-frame, Power Splitter and Harness: £140 ono. Contact Simon, G0FCU, QTHR. (Stevenage) 0438 741550.

ATARI STE 4Mb Designer programme. Fill and take from catalogue system to make complex pictures. Suitable for PCB design, graphic stock control etc: £40. Also RTTY and Morse: £10. 70cm 10dB Co-linear Aerial: £45. Mr V McClure, 43 Roman Way, Seaton, Devon EX12 2NT. (Seaton) 23421.

ATARI STE RTTY Col Transceive + facility for transmitting files in HEX RTTY. Unique but may be usefull. Suit beginners: £15. Also Morse transceive: £15. Also Multi-role program (4Mb) for complex pictures and PCB design. Multi over trays, fancy filing cabinet etc: £300. Also cheap filing system fullup/down scrolling and storage capability but cheap: £5. Also Novel Pac-man move a shoal of diamonds around a maze but watch for marshal handicap: £5. Write V McClure, 43 Roman Way, Seaton, Devon EX12 2NT. (Seaton) 23421.

AUTOPHONE VHF Rx, valve. BC221 Freq Meter. CT-160 Valve Tester. Advance B4 Sig Gen. Umer Recorder. Radios HMV 1381, 5111, Murphy 144. Ferg 6Z1u. Avo Minor, Bush TR162. Many radios, valves, components. Collectors items. Phone (evenings) or SAE for List. (Chessington) 081 391 0580.

AZDEN Mobile Spkr: £20. Kenwood 78E D/bander, 3months old: £375. SSB.Electronics 70cm Masthead Pre-Amp: £95. 50MHz Bandpass Filter: £25. Quality USA Multi Meter: £25. Shack 70cm Preamp: £20. G-Whip one metre extension: £10. Solidstate Linears 80W: £45, 35W: £30. 2m 50Watts: £50. 29 FM Tcvr: £30. Himound Key HK707: £20. I still have LDF4-50 Cable, £1 per Yard. Wanted: HF Loop. Please ring 6pm-10pm. (Norwich) 0328 710641.

BARGAIN! Unwanted Retirement gift. New Alinco 2m/70cm station comprising DJ-580E VHF/UHF Handy(extended Receive), Two EBP-22N 12v/5W Nicads, EDC-35 rapid (1h) Charger, EMS-8 Remote control Spkr/Mic, EDC-36 Active filtered cigar-lighter cable, EDC-25 (slow) Charger. List £735, bargain at: £549. Carriage at cost or deliver 100 miles from Fleet for cost of petrol. G1JPP, QTHR. (Fleet, Hants) 0252 617962.

BBC COMPUTER, Drive, green Monitor, RTTY chip plus G3LIV Interface, Epson MX80F/T3 Printer, leads, S/ware, manuals: £150 ono. Peter, G4PGB. (Bishop Stortford) 0279 722612.

BBC-B COMPUTER 40/80 D/Drive, Watford ROM/RAM Board, sideways Ram Memory Roms, user Port Switch, manual: £150. G0HFB, QTHR. (Looe, Cornwall) 0503 262823.

BNOS LINEAR hardley used LPM 144MHz 10-100W: £120. Skyking medium SU4000 Rotator and Controller: £40. Mutek Mast head 144MHz Pre-amp: £40. 17 ele + 9ele 2m Tonnas: £20, or £200 lot. At present on 17ft ploe. Cordless Saisho phone, small fault with power supply: £20. SMC SWR/Power Meter T3-170L 3.5-170MHz Pwr 100W: £10. Boxed Rama PWR/SWR WA30 up to 10W, 27MHz only: £5. Echo Chamber Rama EC180 + Cheiza Mic: £10. Old Avo Minor, no leads: £10. Hi Mound CW Oscillator COK-2 ear piece, boxed: £5. Very heavy Brass Welsh Slate Base, hand Morse Key, collectors item: £30. G4ZSQ. (Uxbridge) 0895 639111.

BUTTERNUT HF5B 5 Band Beam: £150. Daiwa DC70SS Rotator: £50. 25 metre 6 core Rotator cable: £10. 32ft Aluminium tubular telescopic Mast for HF Beam with guys and winch: £100. HB 600W HF Linear 2x 813s and spares fully metered, cabinet with seperate 3Kv P/supply: £130. 3KW Z match ATU with Capco HV capacitors: £40. Revex W570 SWR P/meter 1.6-1300MHz with Remote sensor head: £80. Yaesu FT221 2m M/mode: £200. Drake R4A Rx, TX4 Tx, AC4 P/S, MS4 Spkr. All matching Units, manuals, spare valves. Just realigned, one owner: £500 ono. All equipment in good order. Buyer to collect. G3WYN, QTHR. (Haywards Heath) 0444 412420.

COLLECTORS ITEMS. Eddystone Horn Loudspeaker 1920s, gwo. 1191 Wavemeter with charts, Offers. MK328 small Receiver 2.5-30MHz: £90. Tony, G3KAG, QTHR. (Ashbourne) 0335 324393.

COLLINS 30L1 80-10m HF Linear: £450. Also PC XT Turbo 20Mb HDD, lots of radio Logging S/ware plus Pakrat. GM0ECO. (Stirling) 0259 781451.

COLLINS 32S-1: £150. PM2: £100. CC-2: £50. CC-3: £50. DL-1: £75. SM-2: £40. MM-2(Mic/Ns): £35. Waters 359 Compreamp: £30. DX Eng LC 1-32S: £30. Pair 572B Valves: £120. Codar AT5-Tx, PSU, T28 Rx, PR30 Preselector: £60 the lot. G3GGK, QTHR. (Cambridge) 0954 210374.

COLLINS KWM2A, 30L1 Linear, Control Unit; as a set: £600. FWO. Plus other items. More details Martyn, G4SOH, evenings. (Benson) 0491 838735.

COMPLETE STATION, Comprising Yaesu FT747GX HF Tcvr, 20A PSU, Yaesu Desk Mic, SWR/PWR Meter, Create 730V-1 Antenna and Mast, Qty books and accessories, equipment little used, owner QRT: £800 ono OR Exchange for Panasonic S-VHS-C Palmcorder. Phone anytime. (Stourbridge) 0562 883804.

COMPUTER IBM 286 Clone, 40 + 80M HD, 5.25 and 3.5 DD, 101 Keyboard, Colour Monitor, S/ware: £300. (Trowbridge) 0225 761472.

DETACHED TWO Bedroom Bungalow, gas C/H, garage, v good order. Village location near Holywell, North Wales. Easy access to coastal resorts, mountains, Chester, Manchester. 750ft ASL, excellent take-off across much of NE Wales, N England, N Midlands. Antennas for 70cm, 2m, 6m and HF, negotiable. Ample garden space. Photos available. Reasonable offers considered. derek, GW0UDJ. (Holywell) 0352 781311.

DRAKE TR7, PS7, RV7, service manuals, extender boards, 250Hz 500Hz AM filters fitted: £500. G3HVX, QTHR. (Hereford) 0544 318412.

EDDYSTONE 1650, 100 channel Memories, 6 filters, Auto/man Tuning, direct entry, excellent performance. Offer of exchange Rx only. (London M4) 081 813 9193.

EDDYSTONE 1837/2, high stability Receiver, 100kHz - 30MHz, Digital Freq Display, five IF Filters: £300. Nigel, G8PZR, NOT QTHR. (Harlow) 0279 505969.

EDDYSTONE EC10: £50. Buyer inspects and collects. Alan, G3XAQ, QTHR. (Canterbury) 0227 738520.

EIGHTY OLD Radio Books including 3 volumes of 1923 Modern Wireless edited by Scott Taggaret, containing original details of ST100 Receiver, some damp damage: £50. Also Valve Tester, Avo Valve characteristic Meter complete with manuals and adaptor: £40. (Northolt, Middx) 081 845 5904.

ELEVATION ROTATOR Kenpro KR500 for Satellite working and moonbounce: £145. GM4HWO, QTHR. (Edinburgh) 031 336 5917.

EMOTATOR 105 TSX Rotator, 9 months old with 40 metres cable: £120. 3rd Element for GEM Quad: £25. Kenwood SW2100 2Kw SWR/Power Meter: £80. G0CEM, QTHR. (NO PHONE NUMBER).

FRG7700 SSB/CW/AM/FM Rx, 150KHz-30MHz, Digital readout, gwo: £185. Steve, G4NNU, QTHR. (Herts) 0279 403143(work) 0462 440353(home).

FT101Z HF Tcvr 100W, mint condx with fitted fan and CW Filter, Mic, manual, spare valves: £275 ono. FT290R 2m M/mode exc condx with carry case, strap, Nicads, manual: £185 ono. MMT 432/28S 70cm Transverter, exc condx: £75 ono. Tonna 9 ele 2m Yagi, 25mtr RG213: £25 ono. Prefer buyer collect, but carriage at cost. NOT QTHR. (Darlington) 0325 359091.

FT101ZD FM, WARC, CW Filter, fan, Mic, DC-DC Converter, manual, with FC107 ATU, vgc, no boxes: £450. IC728 FM board fitted, mint condx, manual, boxed: £725. FT726R 2m, 70cm, Satellite HF, vgc, manuals, boxed: £800 Cash Only. Buyer collect, inspect. Keith, G4MXI. (Louth) 0507 363744.

FT102 FV102DM vgc: £650. Hewlett Packard Spectrum Analiser IF 8552A: £250. TF2015 Signal Generator 10-520MHz: £150. Almost complete Linear 5CX1500, Rack Mounted. Phone for details. HP Plug-ins 1830A, 1841A Offers. P & P extra. Ian, G3ROO. (Dover) 0304 821588.

FT221 VHF SSB/FM: £250. IC202 VHF SSB: £100. Pair QRO HF Tx, Offers?. Sailor HF Tx/Rx: £120. Wessie R1, R7, 1, S22, Pkt: £40. Europa SU20 Pre-Amp: £25. R + S UHF Test Rx, Offers?. 500v DC PSU, Offers. Call after 5pm, Pete, GM7EEY, NOT QTHR. (Aberdeen) 0831 348802.

FT225RD Mutek board, mint condx: £450. FRG9600 Withers version: £295. IC751 HF Radio: £750. F726R 70cm, 2m, 6m, Sat board: £800. 5 ele Tonna 50MHz, new: £45. 9x 19 Dual Band Yagi, new: £30. 9 ele 2m Tonna, new: £35. Wanted:- Old style 432MHz 21 ele Tonnas. Also wanted FT707 or FT902 or FT101ZD. (Blairgowrie) 0250 876235.

FT23R 2m H/held with FNB-10 battery Pack and charger: £140. G0DZU, QTHR. (Romsey) 0794 884286.

FT250 Five Band HF. One VGC with factory PSU u/s. One with Full 10m coverage, a bit tatty, with working H/brew PSU. Some spares,

manual, Mic etc: £300 the Lot or WHY? eg VHF/UHF Handie. G4ODI, QTHR. (Thame) 0844 212702.

FT290 MK2, charger, Mic, case, etc, boxed: £300. Spkr/Mic for FT290: £15. Revex 15/100W Dummy Load, unused: £15. Tonna 4 ele Yagi, boxed, unused: £20. Diamond SX400 140-525MHz SWR/Power Meter: £40. AKD WAI Wavemeter 120-450MHz: £15. Nick, G7IYG. (Uxbridge) 0895 236397.

FT290, manual, charger, Nicads, case, boxed, used as base station: £165. M/M Pre-Amp and Amplifier 30W o/p: £35. (Orpington) 0689 831908.

FT480R Perfect, boxed with Instructions, very little used: £250. HP150 Touch Screen Computer with some S/ware: £50. Apple 2E Computer with 2x Disk 2s, No Monitor. 12ft HD Steel triangular lattice mast sections: £20. (Flitwick, Beds) 0525 716206.

FT747GX as new, H/Mic and H/book: £450. FP700 PSU: £100. Both together: £500. LW5/2M plus G-400RC Controller Rotator, complete: £250. G4SKS. (Chadwell Heath) 081 597 7219.

FT902DM, FV901DM, YO901P, Band Scope, FC902, YR901, YK901, SP901, YVM1 Monitor, YD148 Desk Mic: £900. TS700S, mutek, VFO700S, SP70 c/w inbuilt Mutek ATCS 500/PSU, MC50 Desk Mic: £500. FT726R 6/2m/70cm, Satellite Unit, CW Filter, Hand Mic: £800. Echostar SR1000E Manual Satellite receiver: £130. 70MHz Bandwidth Filters: £50. All immac, with manuals. WANTED- TS940, SM220, B58, MC60A, SP940, FT736R, MH138, SP767. (Yeovil) 0935 28341.

GENERATOR Honda model 1900X. Rated o/p 1.7KVA, 230 and 115 volts: £300 ono. (Chichester) 0243 670489.

GOING QRT. TS940S, Auto ATU, SP230, MC42S: £1,275. KW100A Amplifier: £330. Drake MN2000 ATU: £210. 10A H/brew PSU: £25. 2KV Vacuum Capacitor: £38. Kenpro KR400 Rotator/ Controller with 80ft cable: £80. Osker 200 SWA Power Meter: £25. K2 Rag Balun: £20. (High Wycombe) 0494 534656.

HEATHKIT HW8 in working order with manual: £65. Heathkit HM102 SWR Meter: £20. GD4EIP, QTHR. (Foxdale, IoM) 0624 801592.

IC-751, 270Hz CW filter, Hi-Stab Reference Crystal, Speech Synthesizer, very gd condx, little used, boxed with manuals, including service: £825 ovno. IC PS35 Internal PSU: £95. Compaq 386S PC with Co-Processor, 11Mb Ram, 3.5/5.25 Floppies, 10Mb Cartridge Drive, 120Mb H/D, VGA (No Monitor): £400. G0BII, QTHR. (Oxford) Tel: 0865 880229 or 0367 710723.

IC-735, Keyer, vgc, boxed: £675. Yaesu FT221R 2m Base M/mode, vgc: £270. Amstrad PC1512 IBM compatable 2x 5.25 D/D, 12 inch Mono Screen: £100. All items with handbooks and leads. Buyer collects or carriage extra. G3DWQ, QTHR. (Preston) 0772 253810.

ICOM IC-260E 2m M/mode Mobile: £230. Alinco DJ-560 D/band H/held, charger and extra battery packs: £310. Datong FL3 Filter: £100. (Preston) 0772 654228.

ICOM ICW2E D/band FM Portable, complete with charger, DC power lead, HM65 Spkr/Mic, carrying case, as new: £310. G0OCX, QTHR. (Liverpool) 0704 878912.

ICOM ICW2E D/band H/held, charger and spare battery: £300. Icom IC229E 2m Tcvr: £250. Star LC10 Multifont Dot Matrix Printer: £50. All silent Key Sale of late G7LAB. Details G3VPE, QTHR. (Birmingham) 021 777 1320.

ICOM 740 with FM, Mic, Manual etc. Excellent condx: £550. NO offers. G0DXX, NOT QTHR. (Nr Pershore) 0386 561990.

ICS AMT1 AMTOR Terminal: £55. Service manual TS140 & TS680: £12. Various Surplus electronic Test Equipment. Phone (Stonehouse) 0453 828011.

ICS MET2 SHF Weather Satellite Receiving System for IBM compatible Computer complete with Card/Software, stunning clear high resolution grey scale animated colour enhanced Pictures 24hrs: £480. (Woodford) 081 505 7207.

JAYBEAM MM3 Minimax half-size 10-15-20m Antenna, works extremely well. Excellent condx, 18 months old: £175. Could deliver if arm twisted! (Retford, Notts) 0777 248080.

JRC NRD525 Owner's RTTY Demodulator CMH530, new price £129, unused: £80 swap Datong FL3 or NRD, Speaker or MFJ Audio Filter. (Derby) 0332 372696.

KENWOOD TL922 Linear Amplifier: £1,100 ono. Kenwood TR9130 2m Tcvr with mobile bracket BO-9A System base and Mic: £350. Kenwood SM-220 Monitor Scope with BS-8: £250. Ariki 2m Colinear Base Antenna: £50. All equipment in gd condx. (Camberley) 0276 65951.

KENWOOD TM231E 2m Mobile Tcvr, original packing, exc condx: £215. Yaesu MD-IC8 Desk Mic, new, boxed: £80. Both carriage extra. (Horsham) 0403 864222.

KENWOOD TM241E Tcvr 2m FM mobile 50W, boxed, little used as new cond, very little used, never used mobile: £200 ono +Carr. (W. London) 081 578 4484.

KENWOOD TR751E 2m M/mode Tcvr, mint condx: £470. FRG7000 Communication Rx 0-30MHz: £200. AOR 2002 Scanner: £250 ono. G7KFY. (Bury) 061 761 2610.

KENWOOD TR751E 2m M/mode, DCL: £425. MC55 Remote Control Mobile Mic: £30. Regulated PU 13.8V 5A: £25. Oscilloscope Telequipment D54: £60. Spectrum Analyser G4PMK: £75. Marconi HF/VHF Signal Gen type TF801D/1: £25. Universal Impedence Bridge type 373: £25. G0PJI. (Plymouth) 0752 775375.

KENWOOD TS430S HF Tcvr, perfect with FM board, never used Mobile, c/w Mic and handbook: £525. G3VZV, QTHR. (Beds) 0525 290343.

KENWOOD TS440S with PS50 and SP430, vgc, boxed, manuals: £900. FT290 Mk1, Nicads, charger, carry case, manual: £250. M/M 2m 30W Linear: £40. 286 System Unit 40Mb, VGA, needs attention (Boots): £100. House purchase means short term QRT. (Lutterworth) 0533 478730.

KENWOOD TS440S, AT230, PS50, Filters, MC60 Mic, etc: £775. Kenwood TH27E 144MHz: £125. Boxes, mint. Alum 38ft Mast (sections): £35. (Largs) 0475 675967.

KENWOOD TS440S, Auto ATU, narrow FM + SSB Filters, 0-30MHz Tx + Rx: £775. Heil HC4 Mic insert: £20. Exc condx inspect and collect, carriage extra. G0ONH. (Halesowen) 0384 65614.

KENWOOD TS820 mains HF Tcvr, new valves, manual, vgc. Must sell, best offer secures. G0UDB, QTHR. (Porthleven) 0326 564745.

KENWOOD TS940S HF Tcvr, voice synthesiser fitted, boxed with Mic and manual: £875 ono. Yaesu FT2700RH D/band Mobile Tcvr, voice synthesiser, fitted Duplexer and mobile bracket, boxed with Mic and manual: £275, NO OFFERS. (Durham) 091 384 7306.

KW2000B PSU, manual, circuit, articles, valves, non-working: £40. Wanted. ATLAS 180 manual to purchase/ copy. (Coventry) 0203 307272.

KW200DB, AC PSU, Mic, some spare valves (not PA), manual, diagram. Gone HB: £160 lot. Buyer collects. Phone Ken, G4SGF evenings. (Sheffield) 0742 302352.

KW600 looks good, goes well: £200. New Electrolytics fitted recently now have KW1000. G3GN, QTHR. (Great Bookham) 0372 458542.

LOWE HF-225 Receiver with Keypad and mains PSU as new condx: £375. G4EDR, QTHR. (Filey) 0723 515675.

MARCONI CR300/1 Rx Admiralty Pattern M500B PS/R No 105/54. Receiver for the Vintage collector or enthusiast. Silent Key sale, hence: £50 ono. (Brightlingsea) 0206 305851.

MFJ 1278 Data Controller, Packet, Amtor, RTTY, CW, Fax, Ascii etc. Uses Windows driver: £120. G3ZLS, Somerset. Phone 9-5. (Dulverton) 0392 413479.

MFJ GRANDMASTER 2 Memory Keyer model 486, with manual: £75. Bencher Paddle black Base: £25. Shure model 450 Desk Mic: £25. Hi-Mound Paddle: £10. (Bath) 0761 431198.

MICROWAVE MODULE MMT432/28S 70cm Transverter: £75. 48 ele Multibeam: £15. MET 3ele 6 Metre Yagi: £15. All ono. G4CCN, QTHR. (Woodbridge) 0394 386529.

MICROWAVE MODULES MMT144-28/R 2m Transverter, later model 25W o/p, GaAsFet front end: £150 ono. (Bideford) 0237 541065.

NATIONAL NCX5 Tcvr, mains PSU, circuits, calibrator, spare valves, working needs some attention Tx side: £80 ono plus carriage. (Whetstone) 081 368 8674.

OSCILLOSCOPE SOLOTRON CD1212 45MHz S/Trace, 24MHz D/Trace, excellent condx but BIG and Heavy, hence only: £30. Ken, G4WAS. (Walsall) 0922 475057.

PAKRATT PK-232 Data Controller, boxed with manual and all cables: £200 plus carriage extra. GM4BIT, QTHR. (Troon) 0292 317188.

RACAL RA17 HF Rx, gwo: £150 ono. Seiko Wrist Terminal with Data Transmission S/ware: £25 ono. Leader EHT Voltmeter/ Probe (0-40Kv): £30 ono. Trio 9R-59DS Rx: £35. Buyer sees and collects. (London SW16) 081 679 1387.

SATELLITE Command Aerials, 12 ele X Beams, 307.75MHz to 311.15MHz and 254.15MHz to 257.55MHz, Ex Ariel 6 Control: £35 each or nearest offer. Write G3FWE, QTHR.

SEM Z-Match ATU with EZI-Tune: £95. G4MET, QTHR. (Hereford) 0432 355297.

SILENT KEY SALE FT102 Tcvr with Mic and spare valves: £450. FC102 Antenna Tuner: £150. SP102 Spkr: £40. FT707 Tcvr: £400. FC70 Antenna Tuner: £130. Revex SWR/PWR Meter: £50. HF SWR Antenna Analyser model 247: £120. Shure 444 Mic: £20. Datong RF Clipper: £20. Avometer Model 7: £25. Dummy Load 100W T100: £20. BNOS PSU 13.8v 20A: £80. Vibroplex Bug: £50. Morse Key HK-704 Hi-Mound: £30. (Seaford) 0323 897145 or 892181.

SILENT KEY SALE. HF, VHF and Computer gear. Printing and Model engineers Equipment. SAE for lists. G3KJX, QTHR. (Northallerton) No Phone number.

SONY ICF2001 with PSU, manuals and long wire antenna: £100. Buyer collects. Phone (Hatfield, Herts) 0707 273640 eves 6 - 9pm.

SONY MONOCHROME Video equipment, AVC-3250-CE Camera, VC-2100 ACE Recorder, PVM-200CE 20inch Monitor, 20x 1inch Video tapes. Eumig 553 Video Camera with VNG502 PSU. Various 7inch spool R - R 4 track Recorders. Reasonable offers invited. Proceeds to School radio club GX0PCO. Buyer collects. Phone first instance. G3UXH, QTHR. (Rochester) 0634 250562.

SPC3000 Hi Pwr ATV including manual, never used Hi Pwr Tx, no Amplifier, recently checked + overhauled to 2.5KW 7KV AOK. Price: £90, P+P extra £8 or collect. Telephone any time. (New Malden) 081 949 4503.

STORNO 5000 Highband PMR Mobile 148/174MHz 25W 12.5kHz complete with Micophone cradle and power lead, gd condx: £145. GM4HWO, QTHR. (Edinburgh) 031 336 5917.

STRUMECH H/duty 60ft Portable Tower, complete with outriggers, ready to tow away. New price £3,300, open to Offers. (Boston) 0205 351844.

TELEPRINTER LEIGH 500 fitted Synchronous motor and gearing 110 Baud Baudot code, c/w service manual, exc condx: £5. GW4BVT, QTHR. (Newport, Gwent) 0633 893765.

TENTEC CORSAIR 2, 960 Power supply/Spkr complete with all filters, immaculate condx, very little used: £750. Bill, G0FAH, QTHR. (Dulwich) 081 693 9149.

TH78E, S/case, second Battery, charger, boxed, as new: £350 ono. R2000: £350. Kawai Organ: £450 ono. G3XLL, QTHR. (Diss) 0379 652043.

THREE TUBE COLOUR Camera: £200. TV Projection: £250. TV Tuner: £50. Teletext and Viewdata Units: £25 each. TV Camera DXC1200: £150. Colour Monitor: £50. Solatron Oscilloscope: £50. Echostar Satellite Rx: £150. Drake ESR 324E: £50. Tono 7000E: £300. VCR Tuner VWET108: £50. Icom 701: £300. Bearcat Rx 250: £50. (Welling) 081 304 8390.

TM97 50MHz Twin Trace Philips Fluke Scope Meter with built in Signal Generator hand held Scope: £850. G0RUR. (Derby) 0332 760353.

TOKYO HY Pwr Amps 60W o/p +Gaas FET, 2m: £85. 70cm Amp +Gaas FET 60W o/p: £120. 24 ele Para Beam 70cm, 14 ele Para Beam 2m. OFFERS. (Leicestershire) 0530 560598.

TOWER 60 ft Lattice, three sections with post. Dismantled X Motorway lighting Tower, located A19 Durham. Maybe arrange delivery: £225. G3NSI, QTHR. (Peterlee, Co Durham) 091 586 5259.

TRANSWORLD Communications 30/30 Tcvr s/state 160/20 metres 100W, compact 12 x 12 x 3inches, good performer, excellent Audio: £100. (Aylesbury) 0296 614128.

TRIO 7800 Tcvr 2m FM Mobile/Base 25W: £25. Victor V86 PC compatible Laptop Computer, twin D/D, manuals: £125. G3LBG. (Torquay) 0803 313318.

TRIO KENWOOD TS940S: £1,400. SM220 Station Monitor with Bandscan: £330. Handbooks, boxed, together: £1,680. Icom IC251E Mutek with Handbook: £330. KAM V6 with Pactor, boxed, Full H/book: £265. All exc condx. Collect or pay carriage. (Brecon) 0874 84266.

TRIO TS940S, Auto ATU, SSB and CW Filters, VGC: £1,400 ono. Buyer collects. (Melton Mowbray) 0664 64319.

TS430S narrow CW/SSB Filters, FM board, AT250 Auto ATU, suitable 12v PSU: £600. Please write, Terry, 7 Cavendish Drive, Clowne, Chesterfield, Derbys.

TS50 HF Tcvr with matching AT50 ATU, boxes, manuals, MC47, mint condx. NO SPLIT or time wasters: £1000. Buyer Collect. (Sheffield) 0742 320008.

TS520SE HF Tcvr 200W PEP, 160-10m, Vox, agc, alc, Xtal Calibrator, semi- breakin CW, processor, internal PSU/Spkr. Ideal first HF Rig or spare Tcvr. Original box, manual Mic, VGC, bargain: £280. Buyer collects, otherwise carriage extra. G3OLU c/o G3YEC. (Colchester) 0206 210710.

TS850SAT Auto ATU, narrow SSB and CW filters, PS52 Heavy Duty PSU, very gd condx: £1,650. G3ZLS, phone 9-5. (Dulverton, Somerset) 0392 413479.

UNIVERSAL M400 M/mode Decoder as new: £310. FAX 1, Decodes Fax, Navtex, RTTY, to Printer, with all cables, ex condx: £175. (Oxford) 0865 63000.

VERSATOWER P60 complete with ropes, winches and top section Bearing. Buyer to arrange collection: £450. Syhinx SSB Tx 160/80/20m: £60. (Wickford, Essex) 0268 764317.

VERTICAL Antenna 18AVT 10-80m: £50. EHT Transformer 1.8-0-1.8Kv 450mA suitable for valve Linear Amplifer: £50. Prefer buyer inspects/collects. G0BAG, QTHR. (Horndean)

W-ING FIBREGLASS 144/430MHz Base Antenna with standoff Bracket, gain 6dB(144), 8dB(430) length 2.65 metres: £40. Mobile Magnetic Mount 144/430MHz: £30. Pye 430MHz Base F414 seperate Rx and Tx each, mains powered: £30. 1993 Call Books, International: £8.50 and RSGB: £3.50. UR67 Coaxial 50 ohm 50p/metre. G3XSZ. (Alton) 0420 85956.

YAESU ARGOSY solid state transceiver, 3.5 - 30MHz, 5 - 50W, SSB/CW, mic, handbook, VGC: £295. GW3UEP, QTHR (Llandysul) 0559 362632.

YAESU FL2100Z Amplifier: £500. 80M Homebrew Tx/Rx: £30. Coutant 13.8v PSU: £50. TET 14 ele Beam: £25. 2m, 2 Way Splitter: £25. Katsumi EK150 Keyer: £50. WW2 "Bathtub" Key: £15. Jaybeam 70cm Co-Linear: £25. Nigel, G4NRR. (Solihull) 021 744 8672.

YAESU FRG-7700 0-30MHz Receiver, vgc, instruction manual, Deecomm SWL ATU, buyer collects: £275. G4YXO, QTHR. (Westkirby, Wirral) 051 625 7050.

YAESU FT221R 2m Base Station M/mode, Mutek front end, analogue readout. Buyer collects: £275 ovno. (Runcorn) 0928 715604.

YAESU FT2700 D/band Mobile, full duplex, u/d Mic, user friendly mobile, instructions, bracket, boxed: £279 or £299 with Heatherlite hands free Mic. Ken, G0HRR. (Harlow) 0279 426647 or 0850 484464.

YAESU FT401DX with shore Desk Mic: £175. Cheetah Telex converted to 50Bauds: £45. RM2 Radio Modem with S/ware for C-64: £45. Seirosha 100VC Printer: £30. 6 Telex Rolls: £5. Silver Reed Electric Typewriter: £50. Two single Band CB radios: £30. Realistic CB Tx/Rx 2005: £50. (Nr Oakham) 0572 85457.

YAESU FT575GX 2 Tcvr, All Mode, 160-10 metres with FP757GX PSU and Three Mics: £600. Prefer buyer to inspect and collect. (Bracknell) 0344 488847.

YAESU FT73R H/held, 70cm, 10 memories, scanning, 2W/200mW, case, charger, gwo, ideal Novice: £150 plus carr. 2E0ABI, QTHR. (Scarborough) 0723 863137.

YAESU FT747GX HF Tcvr with FM board and Hand Mic, boxed as new: £560. (Nottingham) 0602 617444.

YAESU FT747GX Tcvr: £430. MD1 Desk Mic: £60. Alan CT145E 144MHz Tcvr: £110. RadComs from 1971, offers. G3TSO. (Cirencester) 0285 750532.

YAESU FT790R2 430MHz M/mode, totally original in mint condx (showroom), boxed with original accessories, manuals etc. Also Yaesu FL7025 Clip - On 25W Amp (almost new). Total cost new over £700. Yours for a mere £499. Ian, G1HQK, QTHR. (March, Cambs) 0354 660800.

YAESU FT902 DM HF Tcvr, vgc, one carefull owner since new with only occasional use. Fitted with CW/AM/FM Filters, boxed: £530, NO offers. Buyer inspects and collects. Datong PC1 Gen coverage Converter: £40. (Chesham, Bucks) 0494 785010.

WANTED

AP1086 issue 1 (RAF Radio Stores Ref No's) Also Air Publications relating to Radio, Radar equipment. Excellent price offered. Would purchase Post-War to current Magnetrons, Klystrons, T/R cells, Photo-Multipliers, Thyratrons, Ignitrons, Planar-Ceramic Microwave types and special CV types. Required Rx type R1355 10D/13032 unmodified. Please phone any time. (London) 071 511 4786 or 071 790 2846 or Fax 071 511 4786.

KW202 +KW204, must be mint, NO Mods. Also looking for mint Eddystone Receiver. (Peebles, Scotland) 0721 722261.

B2 (Type 3 Mk2) Suitcase Set Wanted. Tx/Rx/PSU and any Accessories. Also any other similar Sets of interest. Tel: G4OFO. (Surrey) 081 949 2317.

BC453 or BC946 Command Rx or similar "Q Fiver". Working or not. May consider any other Rx with low final IF (between 50kHz and 100kHz). Mike, G8RCG, QTHR. (Knutsford) 0565 722262.

BIRD THRULINE Wattmeter. Also pair QRO 80M Traps. Write G3IGW, QTHR.

CIRCUITS:- W Kerr Bridge T-B121-Sn017. Marconi Timer TF-2414/2M. Scope BWD Ele M509A. Grundig Conpack Centre 340. G0IPT. (N London) 081 883 3474.

COMMUNICATIONS RECEIVERS. GW Smith UNR30, UR-1A. Lafayette HA600, HA800. Heathkit RG1, GR64. Eddystone, All Models. For cash. Lepino, anytime. Fax 0372 454381. (Surrey) 0374 128170.

MEMBERS' ADS

FTV7 Transverter for 160m on FT7. All letters acknowledged. G4HOL, PO Box 73, Liskeard, Cornwall PL14 6AA.

FV101E Remote VFO for FT101E, and knobs for SX28 Super Skyrider. Handbooks for Hallicrafters SX28 and SP44 (Panadaptor). Phone Chris. (Portsmouth) 0705 596836.

HALLICRAFTER SX28 Receiver, gd condx only, please. Details to G0KWS, QTHR. (Tyne and Wear) 091 252 7141.

HB443DX TET 4ele 10-40m Four Band HF Beam, any condx, or copy of manual. 3 ele version Considered. Dave, G4GED, QTHR. (W. London) 081 578 4484.

HEWLETT PACKARD 9133XV Computer + 150 Monitor HP-1B, info + Prog Disks wanted also Apricot PC xl user + SUC Manuals wanted. G6DTW. (Ashtead) 0372 277945.

HF TRANSCEIVER - Icom preferred, must be solid state, budget around £300. John Teague, Perrotts, Lydford on Fosse, Somerton, Somerset TA11 7HA. (Castle Cary) 0963 24319.

KENWOOD DFC230 Digital Frequency Controller. G4RHI, QTHR. (Axminster) 0297 32572.

MANUAL and Circiut diagram for Cleartone VHF PMR Tcvr 2010 170MHz Highband. GM4HWO, QTHR. (Edinburgh) 031 336 5917.

MORSUM MAGNIFICAT, numbers 1 to 19. Write to 9J2BO, Box 30222, Lusaka, Zambia.

MOTORS for Daiwa Rotator Type MR750 or complete Unit. Mario, GM3MZX, QTHR. (Newton Stewart) 0671 402190 day, 0671 402268 evenings.

RACAL MA1720 Drive Unit, complete and tidy but not necessarily working. Manuals prefered. Will arrange collection. (Aberdeen) 0224 780018.

RACAL TA349 Transmitter in original Cabinet. Must be in gd condx and complete. Your price paid!. Also need MA350B Synthesizer, Racal Table Top and 'Picture Frame' 19inch Cabinets, Creed 75 Teleprinters with four row Keyboards, Tape Reader and Transmitter attachments, Silence cover, Syncronous Motors 250/120v 50/60Hz, Toolkits, spares. Nigel Boyd, 2 Church Close, Lower Willington, Eastbourne, East Sussex, BN20 9QY.

RECEIVERS. Heathkit RG1 and Eddystone 1830 series, any condx. Tony Woodward. (Worcester) 0905 641759.

SHORT WAVE Receiver, must also cover the Amateur Bands SSB. Please contact G0CTE, QTHR. (Croydon) 081 688 4563 after 6pm.

SIGNAL GENERATOR HP8640A or HP8640B, prefer option 03 or especially 05, would also consider Marconi 2017, maybe others, thanks. (Shrewsbury) 0743 884858.

TRIO 2300 2m Portable Tx/Rx must be working and have Batt Holders and Mic. G7PPV, QTHR. (Bedal, N Yorks) 0677 423349.

WANTED. MAINS Transformer and Rectifier valve for Racal RA17 Tx. Bob. Office hours or 6-8pm. (Kelso) 0573 224302.

WANTED. Operating/maintenance manuals and/or circuit diagrams for Wayne-Kerr Component Bridge type B101 also Wayne-Kerr Bridge type B901 to buy or borrow to photocopy and return. Expenses will be re-imbursed. John, G4JG, QTHR. (Surbiton) 081 390 7499.

YAESU FT-212RH Mounting bracket part number MMB31. Will pay postage. G7MUM. (Minehead) 0984 40857.

YAESU FT101ZD FT902DM also FC902 or FC102 ATU. Would also consider FT747 & 757DX 1 or 2. Kenwood Desk Mic No 85-90. (Lancs) 0704 880345.

YAESU FT77 HF Tcvr in good condx and FM board fitted. Please state lowest price accepted. Can collect within reasonable distance from Barry. Write or phone GW0AGA, QTHR. No book? Write to: 11 Devon Avenue, Barry, S Glam CF6 6BJ. (Barry) 0446 736260.

EXCHANGE

INFORMATION and Programs. New Conference (Directory) Areas. From Amateur Radio to games, pictures and shareware. No charges! Immediate access, both BBS 24h. The Wizard BBS (14,400bps) +44 (0) 704 821420. The PD & S BBS (9600bps) +44 (0) 515 243407. Please get permission if you don't pay the phone bill!. Sysops: G7EVY and G0LZX. (Lancs).

TAIT ELECTRONICS UHF Tx/Rx type T345 T347 Operating on 430MHz FOR VHF Tx/Rx type T355 T356, suitable 144MHz. G4AJE, QTHR. (Cambs) 0354 741168.

UP TO FOUR Philips PF85, 5W Low Band H/helds as new for Highband (2m) versions, must be GWO. G4AJE. (March, Cambs) 0354 741168.

YAMAHA ELECTRONIC Organ FE 70 complete with stool, VGC, approximate value £850, will exchange for HF equipment. Phone (Cornwall) 0872 79262.

EVENTS DIARY

CLUB NEWS

DEADLINE - Items for inclusion in the August 1994 issue must be sent to HQ marked "Club News - DIARY", to be received by 24 June 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

NORTH BRISTOL ARC - 3, Committee meeting; 10, 'The latest in kits' by Jandek; 17, Relax and chat; 25, Home Constructor's Boast. Tution for RAE and Morse is available at every meeting. Details 0272 513573.

RSGB CITY OF BRISTOL GROUP - 21, 'Homebrew Transceivers' by Mike, G3TSO; 26, Longleat Rally. ***NEW VENUE***. Now meets at New Friends Hall, Purdown, Bell Hill, Stapleton, Bristol, BS16 1BG. Details G4NKT 0272 672124.

SHIREHAMPTON ARC - 3, Club Closed (half term); 4-5, HF NFD + 6m Contest; 17, Longleat Rally preparations, G4GTD. Details 0272 770504.

SOUTH BRISTOL ARC - 1, 80m Activity evening; 8, "Bulls Eye" darts evening at SBARC; 15, Test your Absortion Wavemeter, Peter, G0DRX; 22, Preparartion for Longleat Rally; 29, Home Construction (Judging) for Trophy, Terry, G4YTH. Details 0275 834282.

WESTON-SUPER-MARE - 6, Talk 'Radio Investigation' by D Dyer, G4CXO; 20, Workshop night. Details G8WAR, 0934 415700.

BEDFORDSHIRE

SHEFFORD & DARS - 2, Mainline Electronics a talk by Zoe Whysall, retail sales manager; 9, Members activity night; 16, VHF NFD planning; 23, Members activity night; 30, Final planning of VHF NFD. Details 0462 700618.

BERKSHIRE

BRACKNELL ARC - 8, Radio Treasure Hunt; 25, Barbecue. Details 0344 420577.

MAIDENHEAD & DARC - 2, tba; 21, 2m Fox Hunt; Jul 7, Talk 'Mellish Reef DX-Pedition' by John, G3WGV. Details 0635 863310.

READING & DARC - 9, What's in the PC in your Shack?; 24, Planning for VHF NFD. 1994 is the 60th year of the Club's existance. A number of activities are planned to celebrate this anniversary. Details 0734 733745 after 7pm.

BUCKINGHAMSHIRE

AYLESBURY VALE RS - 1, Talk by Jandek Kits; 15, Discussion evening. Details G4XZJ, QTHR, Tel: 0296 81097.

CHESHAM & DARS - 1, Planning meeting; 8, Computers in Amateur Radio, part 4 by Alan, G6CDV; 15, Discussion evening; 22, "CW" Talk and Practice; 29, Nite on the Air. All meetings take place in the Top Floor meeting Room at The White Hill Centre, White Hill, Chesham, Bucks at 8.15pm. Details 0494 676391.

CAMBRIDGESHIRE

CAMBRIDGE & DARC - 3, Can you Pass the NRAE?; 10, Indoor Target Shooting for members; 17, Talk "What is Packet Radio?" by Chris, G7HUV; 24, A Video from the RSGB Library. ***NEW SECETARY***. Details G0OEG, 0223 424767 evenings.

CENTRAL

DOLLAR ACAEMY ARC - Meets most afternoons at the Academy after 5.15pm. Details GM0LOD 0259 742126.

STIRLING & DARS - Meets every Thursday at 7.30pm in the Clubrooms, Bandeath Industrial Estate, Throsk, Nr Stirling. Morse instruction available when requested. Details 0324 636235.

CHESHIRE

CHESTER & DARS - 14, Talk 'Raynet' by Dave, G6IFA; 21, Outside operation on the Yeld; 26, Magnetic Loops by Carl, GW0TQM. Details 051 608 3229.

STOCKPORT RS - 10, Computer Group - A beginners View of TCP/IP by G0UDC; Details 061 439 4952.

CLWYD

RHYL & DARC - 13, Mini Lectures. Meets every 1st and 3rd Monday of each month, WRVS Centre 116, Vale Road, Rhyl at 8pm. Details 0745 351362.

WREXHAM AMATEUR RADIO - 7, Junk Sale; 21, Rally Final Preperations; 25/26, Wrexham ARS Mobile Rally. Details 0978 845858.

CO ANTRIM

CARRICKFERGUS ARG - Club meets every Tuesday at 7pm in Downshire Secondary School. Details 0960 351807.

CO ARMAGH

ARMAGH & DARC - Meets 2nd and 4th Wednesday of the month at County Armagh Golf Club, Newry Road, Armagh at 8pm. Details John 0762 870423 or mobile 0374 122213.

CO DOWN

BANGOR & DARS - Visitors welcome at all meetings. Details Keith 0247 883315.

CORNWALL

CORNISH RAC - 2, Potted Talks. Details Robin 0209 820118.

NEWQUAY & DARS - Now meets alternate Friday. Anyone intersted in Amateur Radio is welcome to attend. Details G0KEM 0726 882752.

PENZANCE RAC - Regular meetings on Mondays, also 2nd Morse Test centre, via RSGB only. Details Brian, 0736 61427.

POLDHU ARC GB2GM, GX0PZE - Hold regular meetings on Tuesdays and Fridays 7.30pm. Visitors welcome. HF net Wednesdays 7.30pm around 3.75MHz. All welcome. Details 0326 290638.

CUMBRIA

EDEN VALLEY RS - Meets, ODD months at BBC Club, Penrith. Details 07683 52106.

DERBYSHIRE

BOLSOVER ARS - 8, 3rd DF Contest; 4th DF Contest. Details 0246 822856.

BUXTON RA - 14, Quiz night; 28, Night on A. Meets at the Lee Wood Hotel, Buxton at 8pm. Details 0298 25506.

DERBY & DARS - 1, Surplus Sale. Details 0773 856904.

NUNSFIELD HOUSE ARG - Meets every Friday at 8pm, at Nunsfield House Community Centre, Bolton Lane, Derby. Details 0332 518256.

DEVON

APPLEDORE & DARC - 20, Talk 'Microwave Techniques' by Bill, G6XM. Meets 3rd Monday of each month at Appledore Football Clubroom at 7.30pm. Details 0237 477301.

EXETER ARS - 13, Surplus Sale; Jul 11, A Talk by Ians. Club meets in the Moose International Centre, Blackboy Road, Exeter at 8pm. Details 0392 78710.

EXMOUTH ARC - Meetings held at the Scout Hut, Marpool Road, Exmouth on alternate Wednesdays at 7.30pm. Details 0395 279574.

INTERNATIONAL POLICE ASSOCIATION RC - 25, Annual General Meeting at Podimore at 7pm; 26, Annual Rally at Longleat. Details Mike, G3PGA, QTHR or Tel: 0271 860930.

PLYMOUTH RC - 7, Natter night; 21, Business meeting (PRC Rally facts). Start of Summer program, (1st and 3rd Tuesdays of June, July and August). Details 0752 563222.

TORBAY ARS - Meets each Friday at ECC Social Club, Highweek, Newton Abbot. Details Walt, G3HTX 0803 526762.

DORSET

BLACKMORE VALE ARS - 14, Talk "Packet for Beginners" by G7JIF; 28, On Air night.***New SECRETARY*** Mr S Ruffell, G7JIF QTHR. ***NEW VENUE*** Now meets at Shaftesbury School, Dorset on 2nd and 4th Tuesday of each month. Details G7JIF 0963 362766.

DORSET POLICE ARS - 2, Talk 'Direction Finding' by Ted Bain and Clive Hardy; 16, 2nd Annual DPARS B-B-Q!; 19, PW VHF Low Power Contest. Club meets at Dorset Police HQ on 1st and 3rd Thursday of each month. Details from Pc 915 Richard Newton, Ferdown Police Station, Dorset on 0202 229351.

FLIGHT REFUELLING ARS - 5, Talk "Meteors" by Wessex Astronomical Society; 12, BBQ and skittles night; 19, Guest speaker; 26, Video - G6CJ's Aerial Circus. Details 0425 653404.

SOUTH DORSET RS - Meets 1st Tuesday of every month. New members and visitors welcome. Details from Mike, G7HNY 0305 773860.

DYFED

ABERYSTWYTH & DARS - 12, Ynyslas Car Park, Ham radio Picnic (talkin S22); 30, GW0ARA on the Air(S17); Jul 2/3, VHF Field Day 3pm, Pen y Garn. Club meets 2nd Thursday each month at 8pm, Scout Hut, Plascrug Avenue, Aberystwyth. Details 0545 580675.

EAST SUSSEX

CROWBOROUGH & DARS - 23, Microwaves by Tim, G4GVV. Details 0892 661807.

HASTINGS E&RC - 15, Talk "The British Wireless for the Blind Fund" by Laurie Philp, G7MEC. Details 0424 830454.

SOUTHDOWN ARS - 6, Bring Your Own Thing (Home brew not essential); Jul 4, Club Barbecue at Polegate Windmill. Please enquire about RAE and Morse Classes. Details Bob 0323 484282.

WORTHING & DARC - 5, Special Event Station GB2SPD, Coastguard station, Shoreham Beach; 15, Discussion evening; 19, 2m QRP Competition Chanctonbury Ring, Worthing; 22, Discussion evening; 29, BBQ. Meets at 7.30 for 8pm at Parish Hall, South Street, Lancing. Details 0903 753893.

ESSEX

BRAINTREE & DARS - 6, Discussion Carnival entry; 20, The informative use of Packet Radio. Club meets every Monday at Bocking Hockey Club at 8pm. Details 0376 327431.

COLCHESTER RA - 2, Construction Competition; 16, RLO and the RSGB, by Malcome, G3XVV; 30, Rally Planning, by Richard, G7BIV. Details 0206 764034.

VANGE ARS - 2, No Meeting; 9, Guns by Bob, G1IUC; 16, Satellites by Bert Thompson; 23, Packet by G1VWB. Details 0268 552606.

FIFE

DUNFERMLINE & DARC - 9, Demonstration of Contest Logging - Super Duper and G3WGV Loggers by GM0GNT. This rescheduled from May 19th. Club meets every Thursday at 7.30pm at the former RAF Radio station at Outh Muir. Details GM0GNT, QTHR.

GLOUCESTERSHIRE

CHELTENHAM ARA - Meets 1st Friday of each month at Charlton Kings Library. Details 0242 242336.

GRAMPIAN

ABERDEEN ARS - 3, NFD Briefing; 10, Junk Sale; 17, "Wet String" Listening Competition - Round 4; 24, Fox Hunt; Jul 1, Junk Sale. Meets every Friday at Queen Mother House, Aberdeen. Details 0224 780591.

MORAY FIRTH ARS - Meets every Thursday at 7.30pm. Details 0343 86395.

GREATER LONDON

BROMLEY & DARS - 21, 2m Direction Finding Hunt. Details 081 777 0420.

COULSDON ATS - 13, "RIS and Baldock Radio Monitoring Station" by Alan Betts, G0HIQ; Jul 11, Quiz night - other Societies/Clubs are invited to take part. Details 081 684 0610.

CRAY VALLEY RS - 2, Surplus Sale. Details 081 850 1386.

The R S of HARROW - 10, Test Equipment evening - Bring your rigs for a technical check-out. Details 0895 632377(eve, w/end) or 071 251 2700(daytime).

KINGSTON & DARS - 15, Talk 'The History of Cameras' by Chris, G0KEB. Club meets 3rd Wednesday of the month at 7.45pm for 8pm. Details 081 398 1128.

SILVERTHORN RC - Club meets every Friday at 7.30pm. Details Dave, G0KHC 081 505 1871.

SURREY RCC - 6, 'Early Days of Baird TV' by Ray Herbert, G2KU; Jul 4, "Domestic Entertainment" by G0GNA. Details 081 660 7517.

SUTTON & CHEAM RS - 16, History of Radar by Eryl Davis. Club meets at Sutton United Football Club, Gander Green Lane, Sutton. Details John, G0BWV 081 644 9945.

WIMBLEDON & DARS - 24, VHF Antennas by J Gale, G4WYJ. Details 081 540 2180.

GREATER MANCHESTER

ECCLES & DARS - 7, Discussion '432MHz Low Power Contest'; Jul 5, Lecture "Image Intensifiers" by G8PMX. Details 061 773 7899.

SOUTH MANCHESTER RC - 3, Talk 'Amateur Radio for the Disabled' by G0BJU; 10, Quiz; 17, Mid-Summer DF; 24, Visit to Communication's Centre. Details G7FQY 061 969 1964.

TAMESIDE ARS - Now meets every Wednesday night at 7.30pm at the ATC Hut, Moorcroft Street, Droylsden, Tameside. Details from: A N Laughlan, 8 Kempton Close, Droylsden, Tameside, M43 7JL.

GWENT

NEWPORT ARS - 6, General meeting; 13, Talk; 20, Construction Night; 27, Talk (tba). Details 0633 250017(work) Fax 0633 840254.

GWYNEDD

DRAGON ARC - 6, The art of QRP by Rev George Dobbs, G3RJV; 20, Demonstration of the new Amateur Television Repeater by John, GW3JGA; Jul 4, Sale of Surplus equipment. Details 0248 600963.

PORTHMADOG & DARS - 16, Quiz Night. Details 0766 770546.

HAMPSHIRE

ANDOVER RAC - 7, Natter night; 21, Planning for VHF Field Day. RAE classes each meeting at 7pm. Meets at Wildhearn Village Hall, 1st and 3rd Tuesdays of each month. Details 0264 773547 evenings.

BASINGSTOKE ARC - 4/5, 2m DF Weekend in New Forest, Foxes - G8FMH/G4BEZ/G4SQZ - Saturday Competition under RSGB Rules; 6, Visit by local RSGB RLO and VHF Field Day planning; 26, 2m DF Competition: OS185 - Fox, Clive, G4ODM; Jul 4, Talk 'The Secret Listeners'(WW2 Radio Monitoring) by Brian, G8DIU. Details 0256 25517.

FARNBOROUGH & DRS - 8, Talk 'RF Loads and wet string Antennas' by G3HEJ; 22, VHF Field Day preview and HF Post Mortem. Details 0252 715765.

HASTINGS E & RC - 15, Talk by Laurie Philp, G7MEC on the British Wireless for the Blind Fund. Details 0424 830454.

HORNDEAN & DARC - 2, Talk 'Radio Bygones' by Geoff Arnold, G3GSR; Jul 7, History of the Nab Tower by Bernard Green. Meet 1st Thursday in the month, Horndean Community School i room X5. Details 0705 472846.

ITCHEN VALLEY ARC - 10, Talk 'Amateur Radio Astronomy' by John Smith; 24, Sarex, the Shuttle Amateur radio Experiment' by Doug Loughmiller, G0SYX. Details 0703 732997.

WATERSIDE ARS - 28, Amateur TV by John, G7JTT. Details G0IDN 0703 843491.

HEREFORD AND WORCESTER

BROMSGROVE ARS - 14, Construction Competition - 80m Rx; 28, Antenna Construction (2m DF). Details 0527 542266.

BROMSGROVE & DARC - 8, Computers. Details 0562 710010.

HEREFORD ARS - Club meets on 1st and 3rd Friday of each month. Details G4MET, QTHR.

VALE OF EVESHAM RAC - 2, Talk 'A nostalgic look at Contesting in years gone by' by Dave, G3UEY at 8pm, BBC Club Evesham. Details 0386 41508.

REDDITCH RC - 9, Talk 'Electronic Equipment Reliability' by G4YIG. Club meets 2nd Thursday each month, WRVS Centre, Ludlow Road(opposite Liberal Club) at 8pm. Details 0789 762041.

HERTFORDSHIRE

CHESHUNT & DARC - 1, NFD Planning meeting; 4/5 NFD at Windmill Lane, Cheshunt; 8, Natter Nite & members Forum; 15, BBQ at Tolmers Scout Camp, Tolmers Road, Cuffley; 22, Natter night; 29, Open Air Meeting and visit to GB7TH. The village Green, Therfield (outside the pub). Details 0992 464795.

DACORUM ARTS - 21, 2m Treasure Hunt, details 0442 66787. Meets 1st and 3rd Tuesdays, 8pm at Heath Park, Cotterells, Hemel Hempstead. Details 0582 766973.

HODDESDON RC - 9, First visit of twelve members to Air Traffic Control Centre, Stanstead; 23, Operating from Tolmers Scout Camp Cuffley, GB2RST from 2pm followed by Bar B Q and VHF DF Fox Hunt from 7pm. Details 0920 466639.

STEVENAGE & DARS - 7, Cheap Transmitters - what to look for by Paul, G8IUG and Simon, G0EVZ; 14, General(bring along your projects, etc) evening; 21, Talk/demo "Weather Satellites" by Dennis, G1UBO; 28, Discussion - 'How the recent RAE course went' by Tony, G7JAW. Details Neil, 2E1ASZ on 0438 350882.

HUMBERSIDE

GOOLE R & ES - 3, 'On Air' evening; 5, DF Event; 10, Talk 'Raynet' by Geoff, G0FRX; 17, University challenge; 24, Contest Equipment Check. Details 0405 769130.

GRIMSBY ARS - 2/3, Preparation of Equipment for NFD in club room and on site on 3rd; 4/5, CW NFD; 9, NFD "wash up". Details 0472 825899.

HORNSEA ARC - 15, Pye Westminster & Test Equipment by G3RMX; 29, Book Review, G4IGY. Details 0964 534283.

ISLE OF WIGHT

BRICKFIELDS ARS and Vintage Wireless Museum - 1st Monday of every month, Bring & buy nights; Every Tuesday of week Novice Training & Construction evenings by Mike, G0SEB 7.30pm to 10pm. Morse classes to be run as and when required; 26, Visit to Fawley Power Station. The Clubs Isle of Wight County Award is now Available, details Dennis, 2E1BND. Details G1VGM at GB7IOW.

KENT

DARENTH VALLEY RS - 8, DF Talk; 22, DF Hunt. ***NEW SECRETARY - Ray Rodgers, G1UKH ****. Details 0689 826846.

DOVER RC - 1, Novice evening; 8, RF Q & A session; 15, Natternight & committee meeting; 22, CW by G3ROO; 29, Natter and Operating night. Meets Wednesday evenings 6.30-10pm during term time. Novice, full RAE and Morse classes. All ages (over 8) welcome. Details 0304 825030.

EAST KENT RS - 2, Novice class at 7pm, Slide Show by Alan, G7RBBat Icom; 16, Annual Car Treasure Hunt, start after 6.30pm at Icom car park, contact G3VJF if taking part; Jul 2, Annual BBQ at Erwin, G4LQI QTH at 6.30pm. Details 0227 743070.

SEVENOAKS & DARS - 20, Amateur Freq. Measurements by Ray, G0OAT. Details from The Secretary, Sevenoaks & District ARS., c/o Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG.

LANCASHIRE

BURY RS - 14, Presentation talk by RIS; 21, Operating & Ragchew; 28, RSGB Video. Details 0204 883212.

DARWEN ARC - 15, Lecture on QRP by Rev George Dobbs, G3RJV at 8pm at Darwen Catholic Club. Club meets every 3rd Wednesday of the month. Details Bill, G2AKK 0254 703767.

FYLDE ARS - 28, Informal meeting. Details 0772 635464.

ROCHDALE & DARS - Meetings held every Monday, except Bank Hols at The Cemetry Hotel, Bury Road. Details 0706 376204.

THORNTON CLEVELEYS ARS - 4, Barbeque; 11, Evening meal at Burns farm; 13, Treasure Hunt; 20, Talk "Poulton le Fylde and St Chad's church" by Christine Storey; 27, VHF Field Day preparations. Details G4BFH, QTHR.

LEICESTERSHIRE

LEICESTER RS - 6, What is Packet? "KISS" talk by Jack, G4PVG; 13, Q progress open meeting; 20, Model Avionics. Dave, G7OGY and Mike, G7OCM; 27, HF/VHF night on the Air. Details 0533 546851(eve) or 0827 711722 daytime.

LINCOLNSHIRE

LINCOLN SHORTWAVE C - 8, Junk Sale; 12, Fox Hunt; 15, Walking Treasure Hunt. Meets every Wednesday at the city Engineers Club, Waterside South at 8pm. Details 0427 788356.

LOUTH & DARS - Meet on 3rd Tuesday in month at The Wellington, Louth.. Details G1XWD, QTHR.

SPILSBY ARS - **Change of date of monthly meeting.** Now held at The White Hart Hotel, Spilsby, 1st Thursday in month at 7.45pm. Details 0790 52712.

LOTHIAN

LOTHIANS RS - 8, Annual General Meeting; 22, Barbecue at Peter GM4BYF and Kay GM6KAY, QTH. NB July/August - Summer Break. Details Colin, GM4HWO, QTHR or general enquiries to the club Secretary, Dick, GM4DTH, QTHR.

MERSEYSIDE

LIVERPOOL & DARS - 7, Special event preparations; 14, GX3AHD on the Air; 21, RAE course Planning; 28, Surplus Sale. Details Ian, G4WWX, QTHR.

NORTH SEFTON ARC - Meets 2nd Wednesday of each month. Details 0704 579017 or Fax 0704 570089.

WIRRAL & DARC - 29, Eileen Medley Challenge Cup, DF Hunt, 8pm Heswall. Details 051 677 0210.

NORFOLK

DEREHAM ARC - 9, Informal. Details 0362 691099.

ARC FAKENHAM - 7, Annual General Meeting. Details Dave, G4DCJ 0485 528633.

YARMOUTH RC - 2, NFD Briefing; 4/5, NFD. Details 0493 721173.

NORTHAMPTON

KETTERING & DARS - Club meets every Tuesday at Electricity Sports & Social Club, Eskdale Street, Kettering at 7.30pm. Details Len, G0RDV 0536 514544.

NOTTINGHAMSHIRE

ARC OF NOTTINGHAM - 2, forum and night on the air; 9, Visit to Nottingham Ambulance HQ; 16, Fox Hunt number 3; 23, Construction/activity night; 30, Talk 'A Signal to the Admiralty' by Ted, G7IVB. Details 0602 501733.

MANSFIELD ARS - 13, Evening on the Air'. Meets at The Polish Catholic Club, Off Windmill Lane, Woodhouse Road, Mansfield at 7.30pm. Details Mary, G0NZA 0623 755288.

NOTTINGHAM RAYNET ARC - 16, Talk by G7HWU on operational map reading (7.30pm start, 9.30pm finish) (County Hall); 19, Great Nottingham Bike, 9am - 5pm (Holme Pierponte Water sports Centre). Details 0602 400111 9am to 5pm then 0602 260391 after 6.30pm.

SOUTH NOTTINGHAM ARC - 3, Talk 'Amateur Radio on the Move - Safer Mobile Operation' by David, G7MMQ; 5, 2nd Fox Hunt - meet at Highbank; 10, Open Forum - Members only; 17, Construction + (On Air HF and VHF) Fairham College; 24, On Air HF and VHF + (Construction). Details 0509 672734.

NORTH YORKSHIRE

HAMBLETON ARS - At all the meetings in June, the club callsign G0JQA will be in operation using all modes to celebrate the clubs 10th Anniversary. Details 0609 776608.

OXFORDSHIRE

OXFORD & DARS - Meets 2nd and 4th Wednesdays of the month. Club and programme details Terry, G0CFN 0865 863526.

VALE OF WHITE HORSE ARS - 7, Meeting. Club meets 1st Tuesday of every month at The Fox, Steventon at 8pm. Visitors Welcome. Details 0235 531559.

SHROPSHIRE

SALOP ARS - 2, Natter night; 9, (TBA); 16, Fox Hunt, chase 3. Oak Hotel car park for 7.30pm start; 23, Talk 'Telephone Systems' by Graham, G7LID at 8pm; 30, NFD Preparations, 8pm. Details Sheila, G0SST 0743 361935.

SOMERSET

YEOVIL ARC - May 31 to Jun 7, D-Day SES operated by members at Ex GI Base at Sherbourne; 2, RSGB Video of DX-Peditions; 9, A QRP Booster, by G3PCJ; 16, Aerials for back gardens by G3GC; 23, A practical look at Aerial Matching Units by G3CQR; 30, Club Station on Air & committee meeting. Details 0258 473845.

STRATHCLYDE

PAISLEY (YMCA) ARC - RAE/Morse classes, run on Tuesdays. Details Stuart, GM0UKD 0505 335195.

TELEGRAPH RC - 7, Final preparations for SES event; 14, HF operating evening; 28, Construction evening. Meets every Thursday at 7.45pm. Details 0506 31645.

SUFFOLK

FELIXSTOWE & DARS - 6, Novice RAE examination; 12, Picnic and Kite Aerial Flying at 2pm, (weather dependant) (Details from Neil, G0ORG); 27, Talk 'Contest Hints and Tips' by Andy, G4PIQ. Detail 0394 273507(evenings).

IPSWICH RC - 1, Computer contest Logging practice evening; 15, Solar Data forecasts and Propagation by Ian, G0OZS; 26, 1st Sunday afternoon 2m Fox Hunt. All meetings start at 7.30pm, at The Rose and Crown. Details Sheila, G8HYE 0473 742072.

SUDBURY & DRA - 7, Talk "Using Integrated Circuits" by Tony, G8LTY; 19, SES in Halstead, details G8LTY; 25, SES at Gt Cornard Middle School,details Dom, G0HXZ; Jul 5, Talk on Propagation by Mike, G4GGC. Details 0787 313212.

SURREY

DORKING & DRS - 28, 'Operation Overlord', 50th Anniversary Presentation by David Ford. Arrive at 7.45pm Venue 'Friends Meeting House', South Street, Dorking. Details John 0306 631236.

ECHELFORD ARS - 9, Talk 'EMC' by G4JKS; 23, Bring and buy with discussion. Details 0344 843472.

REIGATE ATS - 21, Talk 'The Sussex Repeater Group' by Mike, G4EFO. Club meets at Tilgates, Bletchingley at 8pm. Details 0342 325322.

TAYSIDE

DUNDEE ARC - College closes for summer recess. Meets on Tuesdays in the College of Further Education, Graham Street, Dundee at 7pm. Details from GM4FSB, QTHR.

TYNE AND WEAR

HAZELLRIGG ARC - Meets every Monday, Hazellrigg Community Centre at 7pm. Classes for Morse, Novice and talks on various subjects held on last Monday in the month. Details 091 264 4608 after 6pm.

WARWICKSHIRE

COVENTRY ARS - Meets every Friday, 8pm at Baden Powell House, 121 St Nicholas Street, Radford. Details 0203 311468.

STRATFORD U AVON & DARS - 13, Visit (to be confirmed); 25, Treasure Hunt and BBQ. **NEW SECRETARY** Martin, G3XZO. Meets 2nd & 4th Mondays the Home Guard Club, Main Street, Tiddington, Stratford upon Avon at 7.30pm. Details 0789 740073.

WEST GLAMORGAN

SWANSEA ARS - 16, Annual Treasure Hunt. Details GW3SIY, 0792 403527.

WEST MIDLANDS

ALDRIDGE & BARR BEACON ARC - Meets 1st & 3rd Mondays in the month. Details G0NOL 0922 36162.

RS of BLOXWICH - 13, Contest Preparation; 27, Treasure Hunt. All meetings and events are Non-Smoking. Details 0922 683877.

COVENTRY ARS - Meets every Friday. Details 0203 311468.

MIDLAND ARS - Every Wednesday, RAE & Morse classes; Every Thursday Night on Air; 2nd and 4th Monday in month, PC night; Last Friday in month Atari night. Details John, G0LAI 021 628 7632.

SOLIHULL ARS - **New Secretary** Paul Gaskin, G8AYY, QTHR. Details 021 783 2996.(Nov 10th notified)

STOURBRIDGE & DARS - 6, Portable Operating eveningat the 'Sheep walks' near Kinver; 7, Visit to Kidderminster ARS; 20, Talk "Early Days of High Fidelity" by Ken, G8AAW; 25, Treasure Hunt by Clive, G4IEB and James, G7HEZ, start at 5pm; Jul 4, Portable Operating evening at Hob Green Primary School. Details 0384 374354.

WEST BROMWICH CENTRAL RC - 4/5, SES GB4SVR, Sandwell Valley Reserve, RSPB Reserve, Tanhouse Avenue, Great Barr.Annual Family activity open Day; 18, SES GB4MCS Mesty Croft School, St Lukes Road, Wednesbury. Annual Open day and Fete; 25, SES GB4HIS Hampstead Infant School, Tanhouse Avenue, Great Barr, Annual open Day. Meets every Sunday at the Sandwell Hotel, High Street West Bromwich, at 7.30pm for 8pm. Details Ian Leitch 021 561 2884(home) or 0902 353522 ext 2093(office).

WEST YORKSHIRE

HALIFAX & DARS - 21, Talk by Tony, G7OKW. Details 0422 202306.

KEIGHLEY ARS - Meets every Thursday at 8pm.(Raynet events, 5, Ulfkill Stride; 26, Rainton Run. Details Trev, G1SRA 0274 496222. Club details from Kathy 0274 496222.

NORTH WAKEFIELD RC - 2, Natter night/On the Air; 9, Talk 'How does your burglar Alarm work?' by Mathew, G7RCG; 14, Visit to British Gas Communications Centre; 16, Talk by Peter Shepherd, G4EJP, RSGB Council Member zone A; 23, Natter night/ On the Air. Details 0924 362144.

SPEN VALLEY ARS - 2, tba; 16, Annual 2 metre Fox Hunt, DF night. Details David, G1CTO 0924 497767.

WILTSHIRE

CHIPPENHAM & DARC - Tuesdays 7.45pm, Sea Cadet HQ Chippenham. Details Jon, G4LGZ 0225 743352.

SALISBURY R & ES - 7, Open Forum "July to December"; 14, HF Operating "B" licences under supervision; 21, Construction and Advice Clinic evening; 28, 2m Mobile Fox Hunt; Jul 3, RSGB DF Qualifying event (G2FIX). Details 0722 330971.

TROWBRIDGE & DARC - 1, Annual 2m DF (foxhunt) Competition, start 7.30pm; 15, Special event Planning. Details 0225 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 JUNE

BURNLEY Radio Rally - St Peter's C E Primary School, Church Street, Burnley. Doors open 10.30am till 4pm. Bring and buy, stalls and refreshment. Admission fifty pence. Details 0282 37533 or 451342.

SPALDING AR Exhibition & Rally - Springfields Exhibition Centre, Spalding, Lincs. Doors open 10am. Trade stands, car boot sales, restaurant, ample on-site parking. Details G4TWR 0775 722940 or G7CWM 0775 680447.

6 JUNE

D-DAY EXHIBITION - Details G3KPO, QTHR or 0983 567665.

12 JUNE

The 25th ELVASTON CASTLE National Radio Rally - Elvaston Castle Country Park, nr Derby. Details Ken, G3OCA, 0332 662818. Trader enquiries to Keith, G1ZLQ, 0332 662896.

ROYAL NAVAL ARS Annual Mobile Rally - The Sports Field HMS Collingwood, Fareham. Leave M27 at jn 11 and follow A27 to Fareham. Doors open 10am to 5pm. Features dozens of trade stands, a bring and buy sale, flea market, local repeater and radio clubs plus a large arts and crafts exhibition. Plus a range of entertainment for all the family. Refreshment available. Talk-in on 144 and 432MHz. Details Clive, G3YTQ 0705 3327621(daytime) 0329 234143(eve).

19 JUNE

The 5th BELFAST Radio Rally - The Chimney Corner Hotel, 630 Antrim Road, Glengormley. Starts at 12 noon. Features the usual trade stands, a bring and buy and other attractions. Entrance one pound and accompanied children fifty pence. Proceeds go to the RAIBC equipment fund of Northern Ireland. Enquiries/details 0232 471370.

BURY ST EDMUNDS ARS Car Boot Sale - Scout Pavilion Stanton (A143). Open 10am. Trade stands and Raynet supplies. Light refreshments available. Talk-in on S22 by G2JO. Free parking and admission. Details Jim, G0MEV 0359 50271.

DENBY DALE & DARS Annual Mobile Rally - Shelley High School, midway between Huddersfield and Wakefield on B6116 road 2 miles from its junction with the A636, Wakefield to Holmfirth road. Doors open 11am. Features the usual traders, craft stalls, bring and buy and car boot sale. Morse Tests will be available on demand, participants must bring two passport size photographs. Refreshment available and talk-in on S22 and SU22. Ample car parking. Details G4FSQ 0484 644827.

NEWBURY Car Boot Sale - Acland Hall, Cold Ash, Nr Thatcham, nr Newbury. 9am to 3pm set up after 8am. Plots 8 pound. No advanced bookings. Free admission & parking. Talk in on S22 by GB4NBS. Details Richard, G3ZGC on 0635 46241.

25/26 JUNE

WREXHAM Amateur Radio Society Mobile Rally - The Clwyd Veteran and Vintage Machienery Societys 18th Annual Steam Rally at the Plassey, Eyton, Near Wrexham, Clwyd. Features a Radio/electronic related 'Car Boot' Flea market. Provision has been made for traders to bring along a Caravan/Tent at a reduced camping rate. Details from Ian on 0978 845858.

26 JUNE

The 37th LONGLEAT Amateur Radio Rally - Longleat Park near Warminster, Wiltshire. Follow the brown tourist signs for "Longleat House", not the Safari Park, from the A36. Doors open 9.30am, with a disabled car park near the rally. Features over 150 traders, covering communications, computers and associated peripherials, a bring and buy stand for private sales and a Craft fair. A Royal Signals special event station and the Journeaux Historic Wireless collection exhibition. Refreshment will be available. Prices to both visitors & trade will be frozen at 1993 levels, two pounds fifty pence for adults, one pound and fifty pence for pensioners and fifty pence for children. For Campsite booking contact Longleat Caravan club tel: 0985 844663. Details Shaun, G8VPG on 0272 860422 (office hours). 0225 873098 (eve & weekends), FAX 0272 869387.

NORFOLK RAYNET BARFORD Rally - Village Hall and Playing Field, Barford, 7 miles west of Norwich on B1108. Starts 10am. Trade stands, refreshments, car boot pitches available. Book your pitch now, contact Bill, G4TWT, 0603 427008.

2/3 JULY

HAMFEST-UK - The County Showground, Weston Road, Stafford. Some 5 minutes from M6 jun 14. The new event for Amateur Radio, SWL and computer enthusiast. Features a large trade presence, lectures, bring and buy, special interest groups. RSGB Morse Test on demand, bring two passport size photographs. Refreshment available. Talk-in on S22. Details 0923 893929.

3 JULY

YORK Radio Rally - Tattersall Building, York Racecourse, Knavesmire, York. Doors open 10.30am. Amateur radio, electronics and computers, Arts and craft. Admission one pound. Refreshments, licenced bar and Cafe. Talk-in on S22. Details Dave, G7FGA 0904 790079.

NEWPORT ARS Junk Sale - Brynglas Community Centre, Brynglas Road, Newport, Gwent. Open 10am to 2pm. Features junk sale with bring and buy, car boot, refreshments. Talk-in on S22. Details 0633 250017(work).

9 JULY

CORNISH 31st RAC Rally - Penair School, Truro, Cornwall. Doors open 10.30am. Features bring and buy, official Morse Test(via RSGB). Hot snacks, free parking and talk-in on S22. Details from Ted on 0872 222605 or Ken on 0209 821073.

9/10 JULY

THE VHF/UHF DX Convention - Organised by the Northern Lights. Features Lectures on Saturday and Sunday, VHF/UHF trade stands and computer software, also demonstrations. Refreshments. Details Tony, G4APA 0270 761805.

10 JULY

HORNCASTLE AR Electronics and Computer Fair - Venue is half way between Lincoln and

EVENTS DIARY

Skegness and signposted on the main roads from Boston, Louth, Skegness and Lincoln. Features many trade stands, a bring and buy. Refreshments available and talk-in on S22. Details from Tony, G6CZV 0507 522482 or G6CZV @ GB7LNX.

SUSSEX AR and Computer Fair - Brighton Racecourse, Sussex. Doors open 10.30am. Trade stands, covering most amateur radio and computer interests, plus a bring and buy stall. Refreshments available. Admission one pound fifty pence. Free car park and free minibus trips to Brighton beach. Details Ron, G8VEH, QTHR Tel: 0903 763978 or 0273 417756 office hours.

17 JULY

The 11th McMICHAEL Rally and Car Boot Sale - Haymill Youth and Community Centre, Burnham Lane, Slough, near Burnham railway station. Doors open 10.30am. Admission one pound fifty pence. Car boot sale(no advanced booking) is seven pounds per pitch on the day. Trade bookings contact Julian, G7JTV 0734 732059 Fax 0734 733721. General details contact Neil, G0SVN or Roy, G4XYN on 0628 25952.

RAIBC Romsey Picnic - Broadlands, Romsey, Hants. All members, families, friends and supporters welcome. Features a grand draw, junk sale, refreshments. Talk-in on S22. Details John, G4COM 0703 693017.

24 JULY

COLCHESTER Radio & Computer Rally - St Helena School, Sheepen Road, Colchester. Adjacent to the Colchester inner bypass Avenue of Rememberance. Doors open 10am - 4pm. Wide range of radio and computer traders, amateur radio car bot sale and a bring and buy. Refreshments and licensed bar. RSGB Morse Test on Demand, but two passport size photographs must be produced. Admission £1. Ample free car parking and easy access for wheelchairs. Talk-in on S22. Details Frank, G3FIJ 0n 0206 851189.

FIRST HUMBER BRIDGE AR Rally - The Exhibition Centre, Freightliner Road, off the Clive Sullivan Way, Hull. Easy access one mile from the bridge, on site parking. Doors open 11am, 10.30am for disabled visitors. 2 large halls, with excellent access facilities for disabled visitors . Bring and buy, bar and refreshments. Talk-in on S22. Details & booking contact Roly, G0UKS on 0482 837042.

28-31 JULY (THURSDAY-SUNDAY)

AMSAT-UK Colloquium - The University of Surrey, Guildford. Details from Ron, G3AAJ 081 989 6741.

31 JULY

RUGBY ATS 6th Annual Amateur Radio Rally - BP Truckstop on the A5, 3 miles east of Rugby and just 2.5 miles north-west from jun 18 of the M1. Open from 10am, admission is one pound per car. Pitches are seven pounds pre-booked or ten pounds on the day. Refreshments available. Details Peter on 0455 552449 or Steve (for bookings) on 0788 824214.

7 AUGUST

RSGB WOBURN Rally - Details from Norman Miller, G3MVV, 0277 225563.

14 AUGUST

DERBY & DARS Annual Radio Rally - Littleover Community School, Pastures Hill, Littleover, Derby. Details Martin, G3SEJ 0332 556875.

FLIGHT REFUELLING ARS HAMFEST'94 - Flight Refuelling Sports Ground, Merley, Wimborne. Details Richard, G4VCQ 0202 691021.

21 AUGUST

5th GREAT EASTERN Rally - ***NEW DATE*** (organised by the Kings Lynn ARC) - Cattle Market, Hardwick Narrows, Kings Lynn. Details 0553 765614.

SOUTHEND Rally - Rocheway Centre, Rochford, Essex. Doors open 10am. Feature trade stands and weather permitting a bootsale for radio, computer and electronic equipment on site on the sports field. The event is organised the Southend and District Radio Society for the benefit of the local community to enable the club to put on display at other local events. Talk-in on S22. Details for stands etc from The Rally Organiser, PO Box 88, Rayleigh, Essex, SS6 8NZ.

WEST MANCHESTER Radio Clubs "RED ROSE RALLY" - Details Dave, G1IOO 0204 24104(evenings only).

27-29 AUGUST (SATURDAY-MONDAY)

COMPUTER FAIR 1994, To include a Radio Rally & Electronic Fair - Walsall Airport, Aldridge, West Midlands. Details 0543 372807(after 5pm or anytime weekends).

28 AUGUST

THE EAST COAST Amateur Radio and Computer Rally - Clacton Leisure Centre, Vista Road, Clacton-on-Sea, Essex. Details 0473 272002 or Fax 0473 272008.

GALASHIELS & District Amateur Radio Society Open Day - Focus Centre, Livingstone Place, Galashiels. Doors open 11am till 4.30pm. All the usual activities, bring and buy, traders, club stalls, raffle and refreshments. New attraction - Bring and Sell, have a stand of your own. Details John, GM0AMB, QTHR Tel: 0835 822686.

30th TORBAY Rally - Details John, G3YCH, QTHR 0803 842178.

29 AUGUST(MONDAY)

HUNTINGDONSHIRE ARS Annual Bank Holiday Monday Rally - Details David, G7DIU 0480 431333.

SCARBOROUGH Radio Electronics and Computer Fair - The Spa, South Foreshore, Scarborough. Details Ross, G4NZ, 0723 514767.

3 SEPTEMBER

ANNUAL WIGHT WIRELESS RALLY - Details G3KPO, QTHR or 0983 567665.

4 SEPTEMBER

BRISTOL Radio Rally (Incorporting Bristol Computer & Electronics Market) - Details G4YZR 0275 834282.

PRESTON Amateur Radio Society 26th Annual Rally - Details George 0772 718175 or Godfrey on 0772 253810.

TELFORD Radio Rally - Details 0743 249943.

VANGE Amateur Radio Society Rally - Details Stuart, G1VWB 0375 859632.

11 SEPTEMBER

BARTG Rally - Sandown Exhibition Centre, Sandown Park Racecourse, Esher. Details Peter, G8VXY 021 453 2676 or write: 38 Mitten Avenue, Rubery, Rednal, Birmingham B45 0JB.

13th LINCOLN Hamfest - Details Sue, (XYL G8VGF) 0522 525760.

17 SEPTEMBER

SCOTTISH AR CONVENTION - Cults Community Centre, Cults, Aberdeen. Convention dinner and accommodation details on request. Details GM0LNQ, QTHR or Tel: 0358 761385 (eve and wekends)

25 SEPTEMBER

HARLOW Amateur Radio Rally - Details Mike, 0850 487863 or Ken 0279 426647(home).

THE THREE COUNTIES Rally - Malvern, Worcs. Details G4PQZ 0905 773181.

NORTH WAKEFIELD Radio Club Rally - Details G4RCG 0924 362144 or G0EVT 0924 825443.

PETERBOROUGH Radio & Electronics Society East of England Rally - Bookings and further details contact Ted, G0REM 0733 66471.

2 OCTOBER

BLACKWOOD & DARS Rally - Details Norman, GW0MAW 0495 227550.

GREAT LUMLEY AR & E S Radio Rally, Co Durham - Details Barry, G1JDP 091 388 5936.

7-9 OCTOBER (FRIDAY-SUNDAY)

RSGB INTERNATIONAL HF & IOTA CONVENTION and IOTA's 30th Birthday Party - Details G3NUG. Tel/fax 0442 62929.

WORLD ASSOCIATION of Christian Radio Amateurs and Listeners Conference - Liverpool. Details and bookings contact G4EZU 0474 533686.

8/9 OCTOBER

THE ALL IRELAND INTERNATIONAL Radio & Hobbies Exhibition - Details GI8RLE 0762 870423 Mob 0374 122213.

9 OCTOBER

KIDDERMINSTER & DARS Rally - Details G8JTL 0384 894019, G4HFP 0299 823818 or G0RJP 0299 822206.

THE COMPUTERCATIONS'94 Amateur Radio and Computer Rally - Details Bill, G6ZRM 0803 - 522216.

21/22 OCTOBER (FRIDAY/SATURDAY)

LEICESTER AR Show - Granby Halls - Details Frank, G4PDZ 0533 871086.

22 OCTOBER

RSGB OPEN REGIONAL Meeting - Bristol. Details Julian Gannaway, G3YGF, QTHR.

23 OCTOBER

HORNSEA ARC (East Yorkshire) Radio Rally - Details Duncan Heathershaw on 0964 532588.

5/6 NOVEMBER

NORTH WALES Radio & Electronics Show - Details Barrie, GW7EXH 0745 591704.

6 NOVEMBER

The 14th NORTH DEVON Rally - Details G8MXI, QTHR.

12 NOVEMBER (SATURDAY)

THE ALL MICRO Show - Details 0473 272002.

13 NOVEMBER

MARS-STOCKLAND Radio/Computer Rally - Details Norman, G8BHE 021 422 9787 or Peter, G6DRN 021 443 1189 evenings.

20 NOVEMBER

BISHOP AUCKLAND Radio & Computer Annual Rally - Details G0PRO 0388 766264.

27 NOVEMBER

BRIDGEND & DARC Radio Rally - Details Mike, GW7NIS 0656 722199 or Don, GW3RVG 0656 860434.

WEST MANCHESTER Radio Clubs "WINTER RALLY" - Details G1IOO 0204 24104(evenings only).

4 DECEMBER

LEEDS AND DARS CHRISTMAS Radio Electronic and Computer Rally - Details Phil, G6HGT 0532 680006.

11 DECEMBER

VERULAM CHRISTMAS Rally - (**NEW VENUE**) Watford Leisure Centre, Horseshoe Lane, Garston, Watford, Herts. Details from Walter, G3PMF on 0923 262180.

5 FEBRUARY 1995

SOUTH ESSEX ARS Radio Rally - Details 0268 693786 or 0268 755350.

19 FEBRUARY

RSGB VHF CONVENTION - Details G3MVV 0277 225563.

SILENT KEYS

WE HAVE BEEN advised of the deaths of the following radio amateurs:

DJ0MN	Mr W Troostheiden	Nov 93
EI6HI	Mr A E Walker	21.02.94
G0CPH	Mr F P Higgins	08.09.93
G0DOF	Mr W J Higgins (Bob)	11.02.94
G0KMQ	Mr P J Davison	
G0RUL	Mr D A Dix	
G1WHR	Mr J J Galvin	
G3AJV	Mr S Easthaugh	Apr 94
G3FLD	Mr P F Ross	30.03.94
G3GSS	Mr S M Sugden	20.03.94
G3KEM	Mr H W Walker	22.02.94
G3PIX	Mr R W L Jones	24.03.94
G3RFI	Mr P F Scottorn	
G4LA	Mr J G Wardhaugh	13.03.94
G4RLE	Mr D Bernard	
G4UYS	Mr D C Gratton	
G4VGC	Mr S Whittam	23.03.94
G4XDI	Mr J Byram	24.02.94
GM3GDX	Mr W Hamilton	19.03.94
GW3BUT	Mr C G Barry	
GW3MRI	Mr D C J Green	12.01.94
RS13299	Mr W Dunn	21.03.94
RS94120	Mr G Marriott	23.01.94
TK5FF	Mr J E Clarke	

Norman O'Brien, G3LP

NORMAN O'BRIEN, FAII, FSCA, ACIS, MIMI, died on 24 February 1994, after a long illness.

Norman, or 'G3 Little Pigs' as he was widely known in the amateur radio fraternity, was first licensed on 1 June, 1938. He served during World War II in the Royal Air Force as a wireless mechanic, most of the time in Burma, and was a life member of the Burma Star and the RAF Associations.

Norman was for some years Chairman of the Gloucester Amateur Radio Society and served twice on the Council of the RSGB - the last time in 1988.

He consistently worked to further the cause of amateur radio and will be sadly missed by all who came in contact with him, both on the air and by personal acquaintance.

E A Perkins, G3MA.

GB CALLS

The list below shows all special event stations licensed for operation during this month and up to 26 June. It was taken from the HQ computer on 6 May. These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days.

MAY

28	GB0CCC	Castell Chirk Castle
	GB0GR	Goodwin Radio
	GB0YAM	Yorkshire Air Museum
	GB2HBC	Happy Birthday Church
	GB2SR	Stella Radio
	GB4MNR	Merchant Navy Remembered
	GB5BC	Broughton Castle
29	GB4SWR	Sulfolk Wireless Revival
	GB50DD	D Day
30	GB2ASF	Allington Summer Fete
	GB2NCL	North Carr Lightship
	GB2OUR	Oxford University Radio
	GB6BT	British Telecom

JUNE

1	GB0BOB	Battle of Britain
	GB0PUO	Pipeline Under Ocean
	GB1HC	Hellfire Corner
	GB2BME	Brighouse Model Engineers
	GB2GXT	Royal Marine Barracks Old Call
	GB2MAR	Marconi Amateur Radio
	GB2SPD	Shoreham Port Defences
	GB2VE	Victory in Europe
	GB4CG	Commonwealth Games
	GB4CW	Commonwealth
	GB50DD	50th Anv of D-Day Landings
	GB5DD	D Day
	GB6OL	Over-Lord
2	GB50ONL	D Day
3	GB2WW	2nd World War
	GB5OA	D Day
4	GB2CCG	Cupar Children's Gala
	GB2VW	Volkswagen
	GB4SVR	Sandwell Valley Reserve
	GB4TSF	Trinity Summer Fair
5	GB0RJS	Ravensthorpe Junior School
	GB4AC	Air Cadets
	GB6GB	Gold Beach
	GB8ATC	Air Training Corps
6	GB2DD	D Day Landings
	GB2HTC	Hatfield Town Council
	GB2ROC	Royal Observer Corps
	GB4RR	Rolls Royce
	GB6DD	D Day Landings
	GB800DON	800 Doncaster Festival
9	GB4STD	St Dunstan's
10	GB1ASS	No 1 Air Signals School
	GB2RCC	Radio Caravan Club
	GB2SCR	2nd Collingwood Rally
	GB2SEG	Scottish Expedition Group
	GB4SRS	Signallers Radio School
	GB4WWF	Wakefield Waterways Festival
	GB5XQ	XQ 50th Anni (XQ=RAF Callsign)
11	GB2MPC	Meopham Parish Centenary
	GB2WOB	Woburn Church Fete
	GB4OCR	Operation Clandestine Radio
	GB5OCR	Clandestine Radio
12	GB4AC	Air Cadets
	GB8ATC	Air Training Corps
	GB800DON	800 Doncaster Festival
13	GB2HC	Harrogate College
	GB4QRP	QRP 'Low Power' Operation
14	GB4BCK	Registation of Buckie Fishing
15	GB2GMM	Guglielmo Marconi Memorial
16	GB2ERC	Edale Railway Centenary
	GB2HWS	Hatfield Woodhouse School
17	GB0NEV	Ben Nevis
	GB2RAF	Royal Air Force
	GB2WTC	Willenhall Town Carnival
	GB4HAF	High Ash Fair
18	GB0ATC	Air Training Corps
	GB0DFS	Derbyshire Fire Service
	GB2HHF	Hanbury Hall Fete
	GB4MCS	Mesty Croft School
	GB4NBS	Newbury Boot Sale
19	GB4EKG	Essex Kite Group
20	GB2HAM	Hamfest UK
	GB2RAF	Royal Air Force
	GB4HAM	Hamfest UK
21	GB4RAF	Royal Air Force
24	GB0DAS	Dollar Academy Sports
	GB25OU	GB 25th Open University
25	GB0AMC	Ardenlea Marie Curie Centre
	GB1WXM	Wrexham
	GB2GSB	Guernsey Scout Bonspiel
	GB2PYB	Positive Youth Basildon
	GB2SR	Stella Radio
	GB4BPM	Bromley Pageant of Motoring
	GB4HIS	Hampstead Infant School
	GB6RS	Royal Signals
26	GB2RCC	Radio Caravan Club

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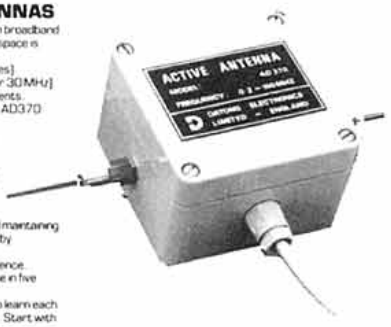

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RSGB – at Your Service

SOME OF THE RSGB'S TEAM OF VOLUNTEER EXPERTS — AVAILABLE TO HELP YOU

RSGB Policy Matters (Zonal Council member):

Zone A (North of England):

Peter Sheppard, G4EJP, 89 St Catherines Drive, Leconfield, Beverley, North Humberside HU17 7NY. Tel: 0964 550397.

Zone B (Midlands):

Dave Gourley, G0MJY, 4 The Serpentine, Kidderminster, Worcs DY11 6NX. Tel: 0562 862374.

Zone C (SE England and East Anglia):

Neil Lasher, G6HIU, 8 Highwood Grove, Mill Hill, London NW7 3LY. Tel: 081 201 1578.

Zone D (SW England):

Julian Gannaway, G3YGF, Dean Hill Barn, East Dean, Salisbury, Wiltshire SP5 1HJ. Tel: 0794 40008.

Zone E (Wales):

Clive N Trotman, GW4YKL, 19 Park View, Dolau, Llanharen, Pontyclun, Mid Glamorgan CF7 9RZ. Tel: 0443 226198.

Zone F (Northern Ireland):

Ian Kyle, GI8AYZ, 1 Portulla Drive, Pond Park Road, Lisburn, Co Antrim BT28 3JS.

Zone G (Scotland):

Frank Hall, GM8BZX, 45 Priory Cottages, Lunanhead, Forfar, Angus DD8 3NR. Tel: 0307 467565.

For general advice and details on local clubs, or if you don't know who to contact:-

Your RSGB Liaison Officer

See January and February *RadComs*, page 91.

Antenna Planning:

Need for permission and how to apply – booklet free to members from the Amateur Radio Dept at RSGB HQ.

Planning application refused – RSGB Planning Panel, via RSGB HQ.

Planning Advisory Committee Chairman: Geoff Bond, G4GJB, QTHR.

Awards:

For contest awards, refer to the appropriate contest committee.

For other awards, enquiries and applications go to either the HF Awards Manager, the IOTA (Islands on the Air) Awards Manager, the VHF (and Microwave) Awards Manager. See column 4.

Band Plans and operating practices:

See the *RSGB Call Book* or January 94 *RadCom* for latest bandplans. For policy, contact the appropriate spectrum manager or committee chairman.

HF Committee Chairman – David Evans, G3OUF, PO Box 599, Hemel Hempstead, Herts HP3 0SR.

VHF Committee Chairman – Peter Burden, G3UBX, 2 Links Road, Penn, Wolverhampton WV4 5RF.

Microwave Committee Chairman – Steve Davies, G4KNZ, 14 Herondale, Birch Hill, Bracknell, Berkshire RG12 7ZT.

(see Honorary Officers opposite for Spectrum managers.)

Council, Committees, Honorary Officers and Repeater Management Group

The Society has a large number of volunteer experts available to help and advise members on a wide variety of subjects. Each month we will be focussing on a different section of the volunteer workforce, whilst still giving brief details of the main office-holders. See also the Information Directory section of the *RSGB Call Book*.

Beacons:

HF Beacon Coordinator – Prof Martin Harrison, G3USF, QTHR.

VHF Beacon Coordinator – John Wilson, G3UUT, QTHR.

Microwave Beacon Coordinator – Graham Murchie, G4FSG, QTHR.

RSGB Contests:

First contact the contest adjudicator (see the contest rules). For policy, contact the respective Committee Chairman:

HF Contest Committee – Chris Burbanks, G3SJJ.

VHF Contest Committee – Bryn Llewellyn, G4DEZ, QTHR.

ARDF (direction finding) Committee – Brian Bristow, G4KBB, QTHR.

EMC:

Advice on solving breakthrough and other electromagnetic compatibility matters:

Committee Chairman: Robin Page-Jones, G3JWI, QTHR.

For local EMC Coordinators see Feb 94, p97.

Exhibition & Rally Committee:

Chairman: Norman Miller, G3MVV, Tel: 0277 225563, QTHR.

Licensing:

Licensing Advisory Committee Chairman – Peter Chadwick, G3RZP, Three Oaks, Braydon, Swindon, Wilts SN5 0AD.

Licence Renewals – Subscription Services Limited, PO Box 885, Bristol BS2 8RH.

New Licence Applications – Subscription Services Ltd, PO Box 884, Bristol BS2 8RH. SSL Help Desk – 0272 258333.

Membership Liaison:

Membership Liaison Committee Chairman – Peter Sheppard, G4EJP, see zone A (above).

Packet Radio:

Datacomms Committee Chairman – Tom Lilley, G1YAA, QTHR.

President:

Peter Chadwick, G3RZP, 'Three Oaks', Braydon, Swindon, Wilts, SN5 0AD.

Executive Vice President: Clive Trotman, GW4YKL, (see zone E above).

Propagation:

Propagation Studies Committee Chairman – Charlie Newton, G2FKZ, QTHR.

QSL Bureau:

Outgoing cards – PO Box 1773, Potters Bar, Herts, EN6 3EP.

Incoming cards – your QSL sub-manager (see *RSGB Call Book* or send to RSGB HQ for a list).

Repeaters

Repeater Management Group. Please contact the Manager in your zone:

Chairman - Geoff Dover, G4AFJ, 31 Newbold Rd, Kirkby Mallory, Leicestershire, LE9 7QG. Tel: 0455 823344. Packet @GB7AYI.

Manager for Scotland - Colin Dalziel, GM8LBC, QTHR.

Manager for N England - Ernie Bailey, G4LUE, 8 Hild Ave, Cudworth, Barnsley, S Yorks S72 8RN.

Manager for the Midlands - Alan Marwood, G8SSL, QTHR.

Manager for SE England (North and London) - Tony Horsman, G0MBA, QTHR. Packet @GB7COS.

Manager for SE England (South) - Robin Hickmott, G8MFV, QTHR. Packet @GB7MHD.

Manager for SW England and Channel Is- Fergus McGilp, G8URB, QTHR. Packet @GB7APC.

Manager for Wales - Dave Brown, GW4NQJ, QTHR. Packet @GB7PMB.

Manager for N Ireland - Ian Kyle, GI8AYZ, QTHR.

Special Projects Manager - Dave McQue, G4NJU, QTHR. Packet @GB7BEN.

TV Repeaters - Graham Shirville, G3VZV, QTHR. Packet @GB7BED.

Spectrum Abuse:

Packet: Via Datacomms Committee.

Repeaters: Via the Repeater Management group.

Other: Via Licensing Advisory Committee.

Technical Queries:

Technical and Publications Committee Chairman: Dick Biddulph, G8DPS, QTHR.

Training and Education:

T and E Advisory Committee Chairman – John Case, GW4HWR, QTHR.

Radio Amateur's Examination – George Benbow, G3HB, QTHR.

Novice RAE – Hilary Claytonsmith, G4JKS, QTHR.

Trophies:

Trophies Manager – Bob Harrison, G4UJS, QTHR.

Honorary Officers

HF Awards Manager – Fred Hanscombe, G4BWP.

VHF (and Microwave) Awards Manager – Ian L Cornes, G4OUT.

HF Manager – Post vacant.

VHF Manager – Dave Butler, G4ASR.

Microwave Manager – Mike Dixon, G3PFR.

Emergency Communications Officer – Greg Reilly-Cooper, G0MAM.

Intruder Watch Coordinator – Chris Cummings, G4BOH.

Morse Practice Transmissions Coordinator – David Pratt, G4DMP.

Project YEAR Coordinator –Hilary Claytonsmith, G4JKS.

Trophies Manager – Bob Harrison, G4UJS.

IEE Liaison Officer – Peter Saul, G8EUX.

Chief Morse Test Examiner – Roy Clayton, G4SSH.

Society Historian – George Jessop, G6JP.

Audio Visual Library Coordinator – David Simmonds, G3JKB.

QSL Bureau Liaison Officer – John Hall, G3KVA.

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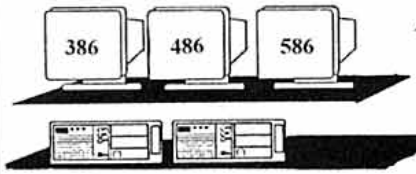

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The LAST WORD

TOO TECHNICAL?

I normally look forward to receiving my *RadCom* but at the moment I am bewildered. Last month's article 'Toroidal Antennas' had some semblance of intelligence, but I was in doubt as to whether that was any good at all, but now this month's concluding article (thank the Lord for that) was just beyond belief.

The article was not presented in a way that the average amateur could follow, or understand for that matter. We had discussions at our club on both articles and came up with the answer that surely someone down at Lambda House must be having a joke; one of our members even built these antennas including the 20m one and I would not like to have that on top of my car and work mobile. For one thing it would distort and be non-resonate so it would not work at all.

So why spend the members' money on such garbage as that; the young members must think we are a bunch of idiots, and will stand for anything to fill the magazine's pages. So come on Editor, who's the technical wizard down there who lets this kind of stuff be published?

My second gripe is the following. Surely you cannot print a five-part project that is not even a full constructional article, not even with any PC Boards or circuit diagrams. Come on people, this is once again the members' money you are forking out and for something that is of very little use to the average member. Whether this is printed in whole or in part does not really matter. I'm just making a point which I think is unfair to the membership.

I must add that I did enjoy the article by Roger Western, operating from Tristan da Cunha. It was well written and the points made regarding the operating procedure very valid; these I have noticed myself on the air. Also I must comment on the article regarding the IOTA contest. It was excellent and I am very pleased that this will be an annual event.

So with all that off my chest, I do hope in the future that we see some of the more straightforward construction articles, with all the bits and pieces listed.

Francis Alan Hunter G3KTT

[Compare this with the letter from G0PAN to see just what a difficult job it is to please everyone. The antenna article and the RX84 receiver, which has **lots** *of circuit diagrams incidentally, are both aimed at the experimenter, rather than the beginner. So far this year we have published the Yearling receiver, the QRP CW Transceiver and the Low Power Dummy Load, plus projects in each* Novice Notebook. *This month's Impedance Bridge is also simple to build. I do try to balance all levels of interest and apologise for last month's rather 'heavy' edition; I hope you like this one - Ed]*

NOT GOOD ENOUGH

'A Really Good Read' from G1HBE (*The Last Word*, May) has to be a delayed April fool.

The RadCom Technical Feature 'Home Construction is Dead . . . ?' (April) has nil technical content and covered two pages. The April and May issues between them contain nine pages of disguised advertisements in the form of 'Radcom User Reviews', and dedicated four whole pages to a trip to Tristan da Cunha that could well have been condensed to a single news item.

There were also six pages about a novel antenna which appears to have all the reception performance of a dummy load. That makes 20-odd pages from a total of 110 pages of non-advertising material in the two issues that are certainly *not* a good read.

RadCom has improved, but there is room for more good reading.

D F Elkington G0PAN

[Do readers appreciate our User Reviews? The aim is to provide a middle path between the three-page Peter Hart Reviews, and a paragraph on the Product News page. Are they useful? Please let me know - Ed]

TINY FINGERS

I would like to congratulate Mr Smith, G0DPT for his views (*The Last Word*, May). What will be the ultimate outcome of all this miniaturisation? A hand-held rig that utilises ESP because buttons are too big to input functions? I think not. Only the constraints of current battery technology dictate the workable size of a hand-held radio, once that problem has been breached there will be only one restriction to the physical size of any radio, the human being!

Chris Askew G0LXA

CAN YOU GUIDE A GUIDE?

I am a young Novice Licence holder who came to amateur radio through Thinking Day on the Air in 1991. I am trying to compile a history of amateur radio in Guiding from the very earliest days (1910) and would be very grateful for any relevant information. Although there were few YL operators in the early years of amateur radio there were Guide badges for electrical engineering and signalling including Morse at speeds of up to 20WPM. Does anyone know of Guides who held these badges or who used their skills during the two World Wars? I am also interested in YL operators who were in Guiding, even if they did not combine their interests.

I would like to hear from operators of JOTA stations with Guide participants, of Guide stations before Thinking Day on the Air became an organised event and of Special Event stations from camps and similar situations in Britain and abroad. Information from Guides and Guiders who visited or were involved in organising any such station would also be very welcome.

Personal accounts, cuttings or references to magazine articles are all welcome and all information will be acknowledged.

Rowena Gaskell 2E0ADA ex-2E1AAL (QTHR)

LESS MORSE SPACE?

It's getting quite tricky finding somewhere to chat on 2m (FM) these days. What with new allocations for packet radio, there's now even less space to just 'have a natter'. For example, anyone monitoring our local frequency of 145.225MHz recently would be forgiven for wondering where we all were. Instead of the expectation of any of the regular local crowd to pop up and have a chat, the listener would have heard a lot of QRM.

This included a group, one of whose members is in a very advantageous place and romps in with 150W to a vertical co-linear, and a group of Morse enthusiasts, banging away at this or that character and debating (ad nauseum) the merits of this or that technique. So a call to shift frequency was made; up to 145.250MHz. We'd hardly got started, when an official-sounding voice announced that *GB2CW* was about to strike up and would we kindly clear the frequency! Faced with such opposition, we again changed, to 145.275 - this was occupied as well with a net.

If we are to have instruction in Morse (and we all encourage such a thing), please can a bit of the 'CW only' part of the band (144.0 - 144.15) be set aside for 'Morse Instruction', with the proviso that some talk-back is permitted. It need not be much - a few 12.5kHz channels would, I think, be all that's needed, but it would have the advantage of taking some of the pressure off the 'normal' FM chat channels.

We believe that 150kHz is too much valuable band space for what is, in truth, a very narrow-band mode of communication and let's face it, there's not a lot of activity down there, is there?

L G Smith G4SUJ and D R Coomber G8UYZ

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.

BREADBOARD CONSTRUCTION

I suppose I must reply to G4CWY's letter (*The Last Word*, May), as I have just completed my kit car after four years of construction and I bake all my own bread. Yes, there had to be somebody!

The above are completely disparate activities, and as such bear no comparisons at all to amateur radio. Apart from replicas of exotic cars, it is impossible to buy a kit of a car that is sold in the plate-glass showrooms of dealers, for the simple reason that they have no appeal for home construction. A kit car is an individual creation and not an alternative. It would be like trying to build an FT-1000.

No, for cars you build something a bit different from the Euro box on wheels. I built a Spartan, which is a stunning creation in red with soft top, running boards, long louvred bonnet and sweeping wings. Unlike amateur radio, it immediately creates interest from the general public just by being parked. People photograph it, ask questions about it and want rides in it.

Baking your own bread is also not an alternative to the plastic wrapped cardboard from the supermarket shelves. Not many people possess the necessary chemicals to make the stuff. Yes, it is cheaper and more convenient, but you miss out on the satisfaction of cooking, the tremendous smell and the delicious taste of warm bread with butter.

However, building a rig is an alternative to a commercial unit. It does the same job, and on air how would anybody know the rig was home-made until told? I have tried designing and building complex and simple rigs, building kits, modifying PMR gear, and buying expensive rigs, from all of which I have gained different forms of achievement. With the expensive rig I was amazed not to work DX as a matter of course. With a two transistor QRP rig I was amazed to work anybody at all.

Operating has also offered me variations in the hobby. I find the type of contest which involves shouting incomprehensible number sequences a bit of a struggle to join in with; but a straight key evening is really good fun.

I would never race my car (or my bread) against anybody else, and I don't think I would build a rig for competing. I build and use things because I'm lucky enough to be able to, and I enjoy doing so. If construction was compulsory for amateurs, then it would put it back to the 1950s when hardly anybody could afford one of the few available commercial rigs. If the use of non-commercial rigs was illegal, where would that take amateur radio? We are very lucky to have a wide spectrum for the hobby in all senses of the word, to ensure the survival of the pastime.

As for G4GSA's homebrew contest, it would presumably consist of the logical set of operators who love contests and homebrew, which might not be a large group of people. If there were a homebrew mobile contest for automotive bakers, then I might be interested. After all, I might even stand a chance of winning.

Eric Calvert G4EIC

GOD BLESS GAIL

May I just say what a wonderful change it was to read such an inspiring article regarding Gail Taylor's difficult progress into the world of amateur radio. What a difference to read such material instead of the usual doom and gloom we are constantly subjected to via the various media. Her efforts make me proud to be part of this wonderful fraternity and I am sure that all amateurs wish her well for the future. I'm sure that the article should (if only temporarily) stop some of the usual moans and groans so often heard from us 'normal' amateurs. God Bless you Gail, and I sincerely hope that I shall have the opportunity to have a QSO with you on whatever mode you decide to have a go with. May you have a wonderful time on the air and we all wish you best 73's and of course 88s.

Art Smyth G3XNE

UBIQUITOUS MARCONI DAY

In the past I have seen complaints about the lack of space in *RadCom*. I have thought at times that there has been some duplication of information but never paid it much thought until the April issue. I found four separate mentions about Marconi Day which totalled about six columns. This is about a page and a half. Now, as a lot of the information was repeated in all four articles, I see a lot of wasted space which could be put to better use.

David A Kennedy G7GWF

Chairman Salisbury Radio & Electronics Society

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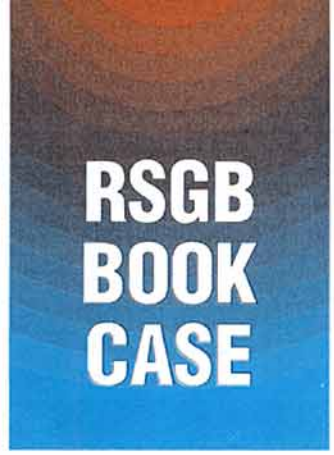

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AVAILABILITY. Goods are available over the counter at RSGB Headquarters 9.15am to 5.15pm, Monday to Friday. However, you are strongly advised to confirm availability of goods by telephone before visiting Headquarters.

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G3LLL IN CROATIA Closed mid June (weeks holiday). Phone before calling — otherwise open Tues, Wed, Fri & Sat lunch 12-1.30. Holdings Amateur Electronics, 45 Johnston St., Blackburn BB2 1EF. Tel: (0254) 59595.

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"RAYNET" YELLOW REFLECTIVE TABARDS with "RAYNET". Medium £10.50, Large £11.00, XLarge £11.50. "RAYNET CONTROLLER" 50p extra.- EPSON PX4+ lap top computer, built-in printer, charger Eprom for packet £46.50 inc pp. Nonreversible battery connectors line/panel mounting (10 pairs/pack) £6.50. Mike Watson G8CPH, Ipswich (0473) 831448.

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ANTI-T.V.I. CUSTOM BUILT HF/VHF AERIALS, Trap-dipoles, multibanders, traps, baluns, parts. Reconditioned TX/RX's, ATU's. Data 38p SAE, Aerial Guide £1.50. G2DYM, Uplowman, Devon, EX16 7PH. Tel: 03986-215 any time.

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DIY Z MATCH ATU 80 to 10 BFO and other radio projects. SAE Rylands, 39 Parkside Avenue, Southampton SO1 9AF.

LANDWEHR VHF/UHF MASTHEAD PREAMPLIFIERS 2 metre 145mas £147 and 70cm 435ma £152. Post & packing £4. Write or phone for leaflet. Qualitas Radio, 23 Dark Lane, Hollywood, Birmingham B47 5BS, Tel: 021-430 7267.

AERIAL WIRES, strong pvc coated £6.50, hard drawn 14swg £14, 16swg £11.50, all per 50 metres post/VAT paid, 30p stamps for full list of cables, etc — W. H. Westlake, Clawton, Holsworthy, Devon.

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G-WHIP-G-WHIP-G-WHIP. Mobile Antennae/Spares, Now DIRECT. Brochure/ Prices S.A.E. G-Whip Products (Amat) 5, Y-Bryn, Glan Conwy, Clwyd LL28 5NJ.

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RSGB AMATEUR RADIO INSURANCE SCHEME

"ALL RISKS" INSURANCE for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment insurance for affiliated clubs and societies. Details and leaflets from Jennifer Lawson, Amateur Radio Insurance Services Ltd, Shepheards Hurst, Green Lane, Outwood, Surrey RH1 5QS. Tel: 034-284-4000. Fax: 034-284-4554.

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G4UXD's MORSE TUTOR/PRACTISE: See Feb. "Novice News". IBM-PC's, BBC's. New "QSO" format. Random everything! Adjustable speed, delay, letter frequency. 100 tests, attach your key. £9.50. SAE details/trial. P. Brandon, 1 Woodlands Rd, Chester, CH4 8LB.

G4BMK PACTOR — See display advert this issue. Grosvenor Software, 2 Beacon Close, Seaford, Sussex.

SUPER-DUPER, the PC Contest Logging Program for RSGB and international HF Contests. Includes separate program for the IOTA Contest. "Highly recommended" — RadCom September 1993. £25.00. Paul O'Kane EI5DI, 36 Coolkill, Sandyford, Dublin 18. Tel: 01 0353 1295 3668.

G4TYF LOGS, PC compatible, Amiga, Commodore, BBC. Try before you buy. SAE for free demo disk. State size. 64 Gurney Valley, Bishop Auckland DL14 8RW. 0388 607500.

MORSE PRACTICE IBM PC compatibles. Adjustable wpm/character speed. Random letters/number groups (or mixed). Tests from disk. Key morse from keyboard or attach key. Dual Media, Manual, £10. CompRad Limited, PO Box 64, Wokingham RG11 3YY. Tel/Fax 0734 733214.

SHACKLOG4 *the* PC logging system. Real time and post event QSO logging. QSL labels. Database analysis, reports, import, packet terminal etc. Optional IOTA database (G3KMA). Plus lots more!! Still only £27.50!! SASE (+disk for demo copy) for full details. G3PMR, 30 West Street, Gt Gransden, Sandy, SG19 3AU. 0767 677913.

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FLYING FROM GATWICK? Stay at Mill Lodge Guest House. 4 minutes from airport. Transport available. Telephone (0293) 771170.

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MISCELLANEOUS

COURSE FOR CITY & GUILDS, Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCSE, career and professional examinations, etc) write or phone — THE RAPID RESULTS COLLEGE, Dept JT108, Tuition House, London SW19 4DS. Tel: 081-947 7272 (9am-5pm) or use our 24hr answerphone service 081-946 1102 quoting JT108

VIDEO TAPE CONVERSIONS to and from all modes N.T.S.C.; S.E.C.A.M.; P.A.L.N.; P.A.L.M. Digital processing. Fast and economical service. Also 'cine' conversions. Phone G4WMP 0932 846139.

OLD STORNO EQUIPMENT WANTED. Have you any old Storno radios lying unused? Best prices paid. Call Richard Lane on 0202 673636.

RAE COURSES TAUNTON: Somerset College of Arts and Technology, Wellington Road, Taunton will again be offering the RAE Course for the May 1995 examination. The Course will be held on Tuesday evenings from 7.00pm to 9.00pm commencing next August and September 1994. Course Tutor is Peter Upton G7CCV (Golf Seven, Charlie, Charlie, Victor). For enrolment details, please tel: 0823 283403, ext 211 or 219.

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Readers are also reminded that the use of radio transmission and reception equipment (including scanning) is subject to licencing and the erection of external aerials may be subject to local authority planning regulations.

ADVERTISERS INDEX

NEXT COPY DATE

The display advertisement copy date for our August 1994 issue will be **8th June, 1994**

ICOM'S NEW IC-736 HF/50MHz STAGGERING VALUE & PERFORMANCE AT £1849!

The IC-736 has many features that make it superior to other transceivers, here are just a few to prove it:

- Built-in power supply and high-speed automatic antenna tuner on all bands, to save shack space.
- Power MOS FET's (Motorola MRF174 x 2) to guarantee stable transmission.
- 100 watt output power for both HF and 50MHz bands.
- Quick-split function with one-touch offset.
- Newly developed DDS system to provide 1Hz tuning steps.
- Double band stacking registers.
- Memo pad function.
- XFC function.
- Split lock function.
- Built-in electronic keyer
- Full Break-in.
- Bright and large LCD shows modes, receive and transmit frequencies.

Some typical operations:

- Push ANT to select antenna (two connections are available).
- Push FULL to activate full break-in (QSK) function.
- Push TUNER to instantly activate the internal 160-6m automatic antenna tuner.
- DDS (Direct Digital Synthesis) provides crystal clear reception and transmission.
- Adjust KEY SPEED to vary the speed of the internal electronic keyer.
- Press SSB, CW/N, AM, or FM to select desired operating mode.
- Press MP-R to recall memo pad memories for intermediate use.
- Press MP-W to automatically write the present operating frequency and mode to memo pad memory.
- Using the KEYPAD, select a desired band or directly enter frequencies.
- Retain your last selected frequency and modes with DBSR (Double Band Stacking Registers - Two frequencies per band), use one for CW and one for SSB.
- Hold SPLIT down for one second to start the split mode function and initiate QUICK SPLIT feature, equalizing both VFOs to the same frequency.
- Press NOTCH and adjust to eliminate annoying beat signals.
- Rotate MEMORY CHANNEL SELECTOR to select a channel from 101 available memories (memories store frequency, mode, antenna selection and tuner on/off condition).
- Adjust PBT to reduce interference.
- Push RIT and/or ΔTX to change the transmit or receive frequency +/- 9.999 kHz.

If you need even more proof, don't do things by half... *buy one!*

ICOM

ICOM manufacture a full range of base-stations, mobiles and handheld transceivers and receivers to cover all popular Ham frequencies... and beyond. No matter what your requirements, ICOM have the radio for you. the full picture and details of your local authorised Icom dealer contact:

Icom (UK) Ltd. Sea Street Herne Bay Kent CT6 8LD.
Telephone: 0227 743001 (24hr). Fax: 0227 741742.

NEW!

FT-11R/41R
2m/70cm Handhelds

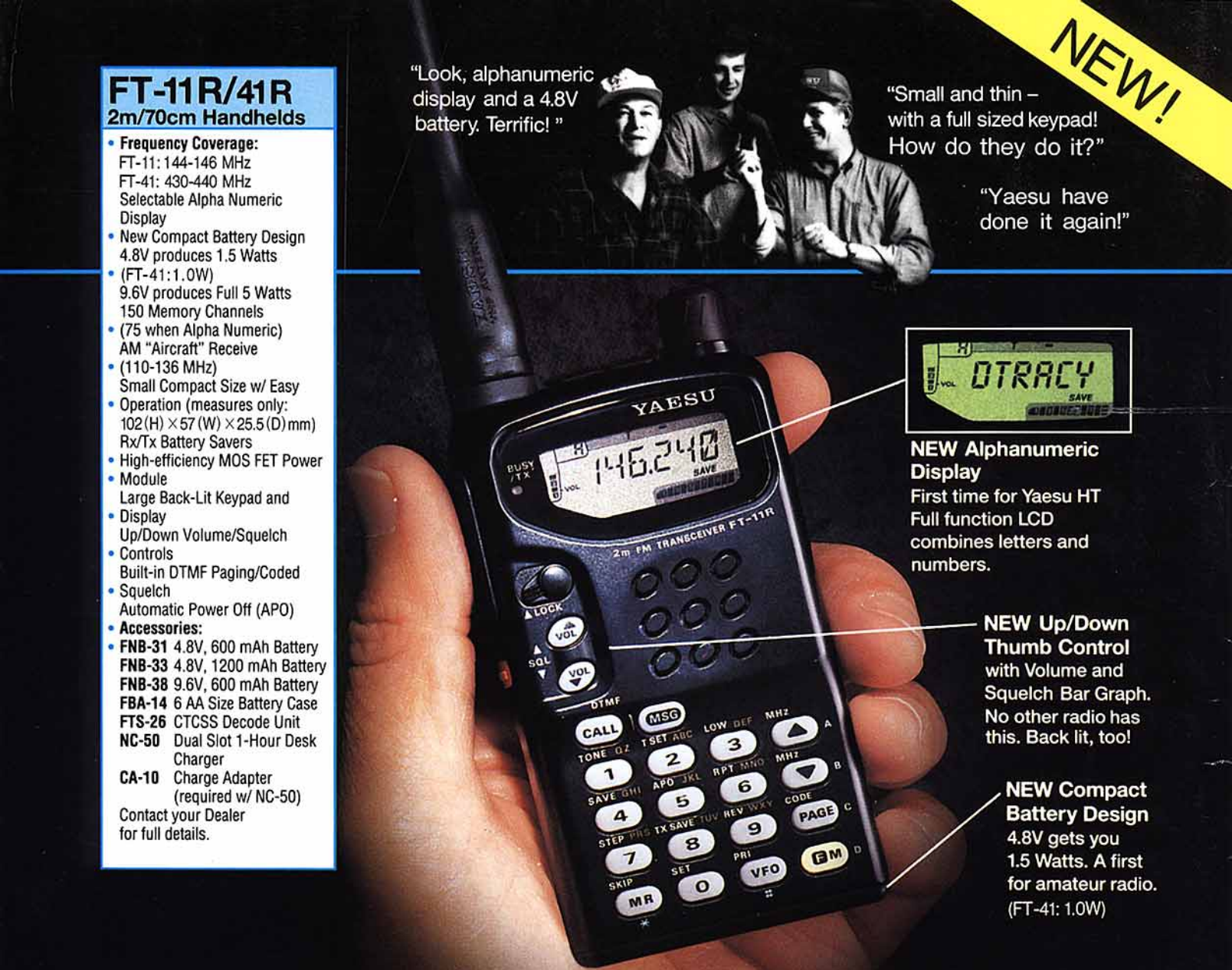
- **Frequency Coverage:**
  FT-11: 144-146 MHz
  FT-41: 430-440 MHz
  Selectable Alpha Numeric Display
- New Compact Battery Design
  4.8V produces 1.5 Watts
- (FT-41: 1.0W)
  9.6V produces Full 5 Watts
  150 Memory Channels
- (75 when Alpha Numeric)
  AM "Aircraft" Receive
- (110-136 MHz)
  Small Compact Size w/ Easy
- Operation (measures only:
  102(H) × 57(W) × 25.5(D) mm)
  Rx/Tx Battery Savers
- High-efficiency MOS FET Power
- Module
  Large Back-Lit Keypad and
- Display
  Up/Down Volume/Squelch
- Controls
  Built-in DTMF Paging/Coded
- Squelch
  Automatic Power Off (APO)
- **Accessories:**
- **FNB-31** 4.8V, 600 mAh Battery
  FNB-33 4.8V, 1200 mAh Battery
  FNB-38 9.6V, 600 mAh Battery
  FBA-14 6 AA Size Battery Case
  FTS-26 CTCSS Decode Unit
  NC-50 Dual Slot 1-Hour Desk Charger
  CA-10 Charge Adapter (required w/ NC-50)

Contact your Dealer for full details.

"Look, alphanumeric display and a 4.8V battery. Terrific!"

"Small and thin – with a full sized keypad! How do they do it?"

"Yaesu have done it again!"



NEW Alphanumeric Display
First time for Yaesu HT Full function LCD combines letters and numbers.

NEW Up/Down Thumb Control with Volume and Squelch Bar Graph. No other radio has this. Back lit, too!

NEW Compact Battery Design 4.8V gets you 1.5 Watts. A first for amateur radio. (FT-41: 1.0W)

Get a grip on this!

World's smallest size HT with a full sized keypad
Measures only: 102(H) × 57(W) × 25.5(D) mm

"Small" is relative, isn't it? It could mean size – which in this case it does. And, it could mean "reduced", which it doesn't! Nothing missing from the hot new FT-11R HT from Yaesu except bulk! You're going to wonder just how all the features of this full-function radio fit in. Until you remember Yaesu pioneered 2-way radio micro technology.

To see what this really means to you, check out all the new features. Like the alphanumeric display. This Yaesu HT first, lets you tag your favourite frequency by name, call sign or number. Or, the new "voltage stingy" battery. It's an industry first for amateur radio. Smaller and compact, the 4.8V battery gives you 1.5 watts on TX (FT-41: 1.0W). And, if that's not enough, there's an optional drop in, dash mount battery charger.

You see it's not a small time performer. Just small sized. The FT-11R. Another small example of Yaesu superiority. See your dealer today!

YAESU

Performance without compromise.℠

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