100 PAGES

Radio Communication

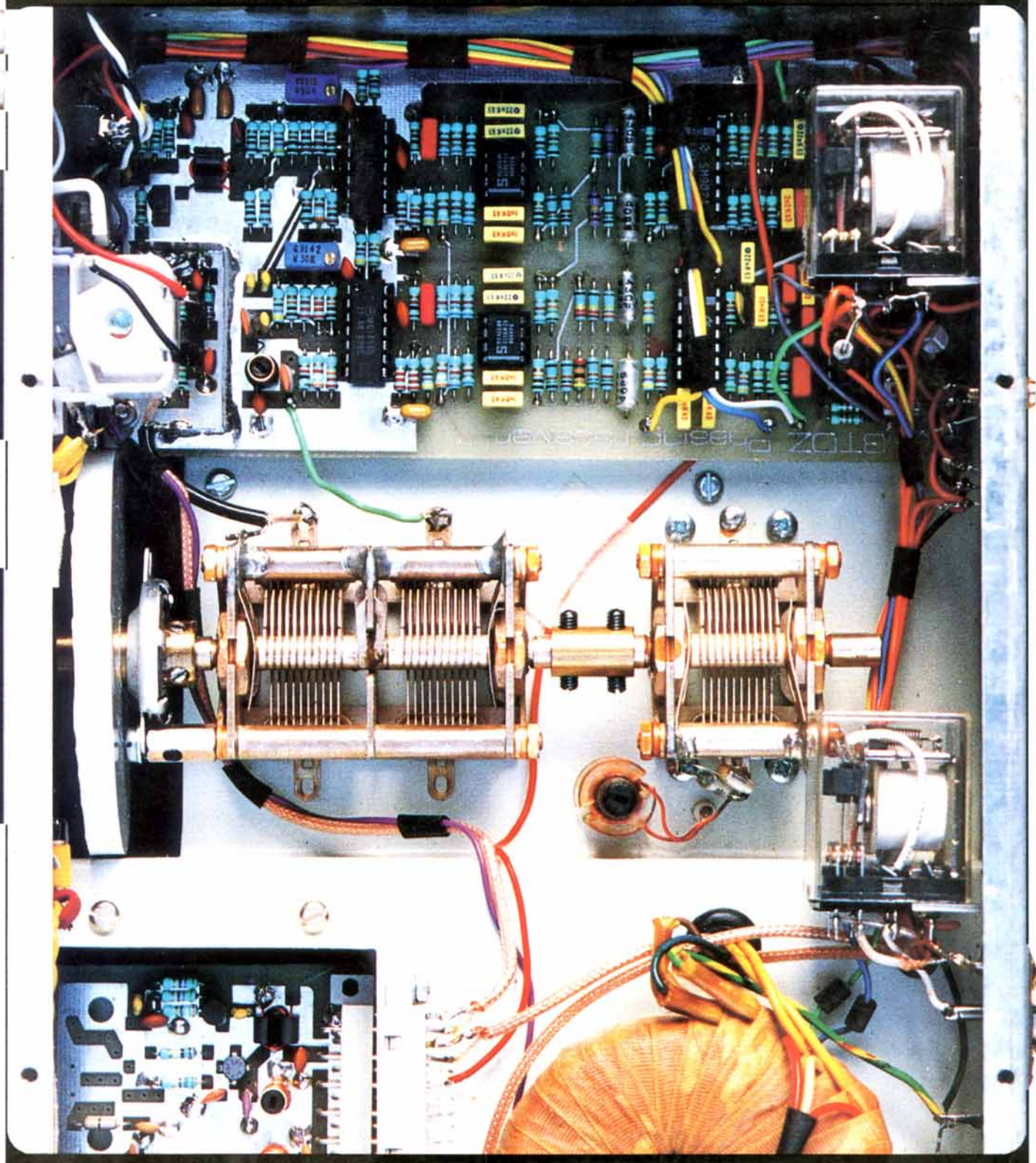
EIGHTIETH 80 ANNIVERSARY

The Journal of the Radio Society of Great Britain

July 1993

Volume 69 No 7

THE VOICE OF AMATEUR RADIO FOR 80 YEARS



Construction Feature: The G3TDZ HF SSB Transceiver

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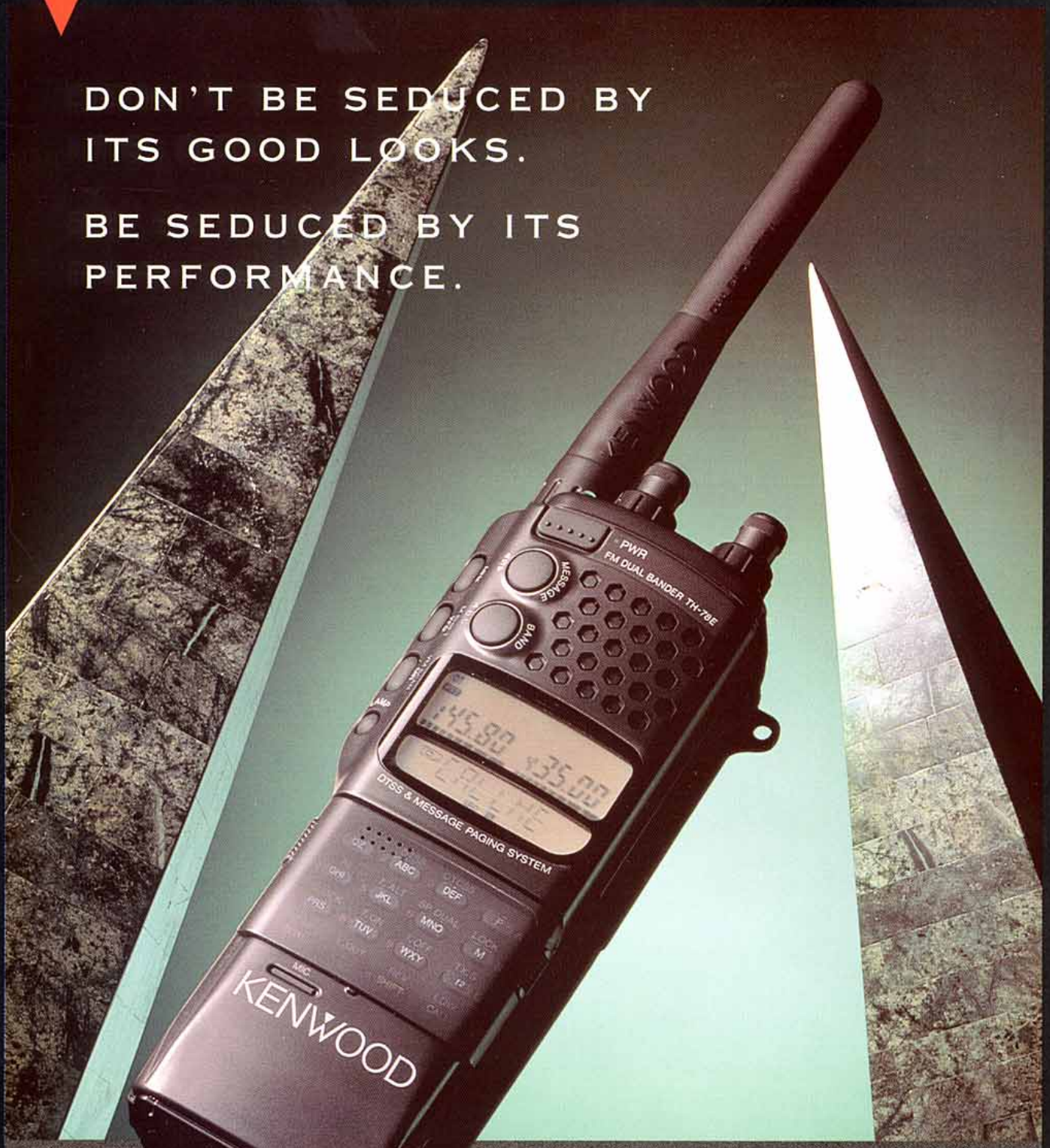

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Radio Communication is published by the Radio Society of Great Britain as its official journal on the first day of the relevant month and is sent free and post paid to all members of the Society.

Closing date for contributions, unless otherwise notified, is five weeks prior to publication date

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Filmset by JJ Typographics Ltd, Unit 4, Baron Court, Chandlers Way, Temple Farm Industrial Estate, Southend-on-Sea, Essex SS2 5SE.

Printed by Southernprint (Web Offset) Ltd, Unit 17-19, Factory Road, Upton Industrial Estate, Poole, Dorset, BH16 5SN.

RSGB membership at 31 July 1992: 32,416

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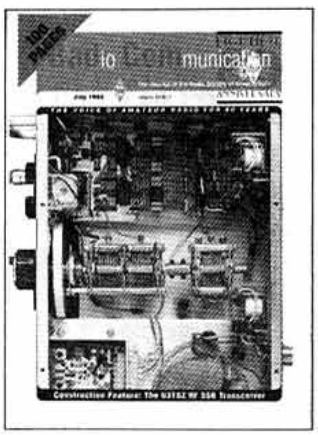

COVER PICTURE:
Detail of the novel multi-band HF transceiver by John Hey, G3TDZ. Colour Feature page 33.

Photograph: G3TDZ.

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RADIO SOCIETY OF GREAT BRITAIN

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Affiliated club or society/registered group (UK): £16.00 (including *Radio Commmunication*). (Subscriptions include VAT where applicable.)

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Membership application forms are available from RSGB HQ

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The RadCom Leader

The Amateur Radio Licence –

A Privilege or a Right?

IT IS ASSUMED BY SOME AMATEURS that having passed the RAE they have an absolute 'right' to the frequencies allocated to the Amateur Services by the ITU. In reality, authority for the Amateur Services to use those allocations in each country rests with the government department responsible for telecommunication services; in the UK that is the Radiocommunications Agency. Make no mistake – it is a privilege – and as such must be respected and protected.

From the 1920s the RSGB has worked to protect these privileges on behalf of all UK radio amateurs. The Society has negotiated for the sections of the spectrum, and the modes and power levels that are permitted today. I emphasise, ***on behalf of all radio amateurs***. We are very fortunate in the UK to have an administration – the Radiocommunications Agency – that is interested in the Amateur Services, interested in technical progress, interested in seeing how the ingenuity of amateurs is applied to maximise the amount of 'traffic' carried within the allocated spectrum, interested in innovation and genuinely prepared to listen to requests for permission to experiment outside the facilities currently available.

For this to continue we must all make good use of the spectrum allocated to the amateur service by experimenting with different types of operation, developing new techniques, providing a high standard of service, improving operating standards and showing a responsible attitude. Cases of deliberate interference or abuse should be reported to the RSGB Amateur Radio Observation Service (AROS), and intruders in exclusive amateur bands to the Intruder Watch (IARUMS). We cannot monitor all the bands all of the time.

In all our negotiations with the Radiocommunications Agency our strength lies in two areas. First by example, illustrating that we are a responsible group of people. Secondly, by the number of licensed amateurs and short wave listeners that the Society directly represents – its members. We are prepared, and always will be prepared, to represent non-members of the Society in our dealings with the Radiocommunications Agency, but in this modern society, at the end of the day it is numbers that count.

Can we count on you? "Me?" you say! Yes – *you*. Can we count on you always to set a good example when operating. Historically we know we can – but there are always some 'newcomers' and 'old timers' that will need your diplomatic guidance. Can we count on you to persuade one amateur non-member to join the Society. Again, I believe we can.

Remember – our strength and future depend on: ***example and representation***.

John Bazley, G3HCT,
Council Member, and Chairman Licensing Advisory Committee.

NEWS & REPORTS

● THE INTERNATIONAL Barbershop Singers Convention takes place in Calgary this month. The special call CH6IBC has been issued to the Calgary Amateur Radio Association for the event, and the station is planned to operate 27 June - 4 July on 14225 - 14245kHz, 21300 - 21320kHz and 28300 - 28320kHz.

● DUXFORD AVIATION Society successfully recreated a wartime link between the SOE in Denmark and a UK communications centre on the anniversary of VE Day on 5 May. Where possible 'suitcase' spy radios were used by GB2IWM, G4UJQ, OZ2JZ, OZ8SW, OZ1CHL and OZ4FF.

● WEST WILTSHIRE '93 Trade and Commerce Exhibition will feature GX2BQY/P operating on HF and VHF 22 - 24 July. Trowbridge and District ARC will use the station to raise money for the Wiltshire Air Ambulance Appeal.

● K0ODF TOLD *QST* about a friend who, try as he may, couldn't notch out an annoying interfering heterodyne. He was put out of his misery by his wife who pointed out that it was their smoke alarm!

● PAPERS FOR THE ARRL Conference on Digital Communications, held 11 September in Tampa, Florida, must be sent to ARRL HQ by 30 July in 'camera ready' form.

● GB0AMY WILL BE used throughout July by North Ferriby United ARS to celebrate the 90th anniversary of the birth of pioneer aviator Amy Johnson.

● THE CENTRAL RADIO Club of Czechoslovakia (CRCC) has split into the Czech Radio Club (CRC) and the Slovak Amateur Radio Association (SARA).

● GB4ATC IS ONCE again at the Royal Tournament, held 20 - 31 July at Earl's Court, London. HF and VHF stations will operate daily 1000 to 2100GMT.

● THE CANADIAN national societies CRRL and CARF (soon to be merged) are fighting a threat to their 220MHz band.

● PRESUMED KILLED in the Branch Davidian fire at Waco, Texas, were KJ5HK and KJ5HJ.

New RLO

THE RSGB Liaison Officer (RLO) for Cleveland is Chris Flannagan, G7NRO of 21 Pentland Avenue, Billingham, Cleveland TS23 2PG. His telephone number is 0642 553345.

***Carillon*: "A set of bells arranged to be played by hand or by machinery."**

Loughborough's Loftiest Celebrates Seventieth

PHOTOGRAPH: G0PHT

THE CARILLON War Memorial is a free standing 152ft tower, erected in Queen's Park, Loughborough, to the memory of 480 men who died in the 1914 - 18 war. In a town famous for its bell foundry, it is no surprise to learn that the tower has 47 bells, the largest of which weighs over four tonnes!

The Loughborough and District Amateur Radio Society is celebrating the 70th anniversary of the tower by running GB70CT continuously for six days from 0000GMT on 22 July. Planned frequencies are: 3550, 3765, 7025, 7085, 14050, 14250, 21050, 21250, 28050 and 28450kHz. The station will be located in Queen's Park and visitors are welcome.

The tower, which houses a military museum, is open to the public from 2pm to 6pm daily, but note that there are 138 steps so it is not suitable for the disabled. Bell recitals can be heard Sundays at 3.30pm and Thursdays at 1pm, plus Bank Holiday Monday 30 August.

Honorary Treasurer

PETER TUCKER, FCA, ATII, G4DWZ, the Society's Honorary Treasurer has felt it necessary to relinquish his position with the Society due to increasing pressure of business commitments.

Peter took on his responsibilities in March 1991 at a time when the Society was experiencing some financial difficulty. Despite being domiciled in Guernsey he devoted an enormous amount of personal time and effort in assisting to put the RSGB on a sound financial footing and was responsible for the majority of the planning and administrative work involved in the Warwick initiative.

The Society will miss his expertise and wishes him every success in his business life now that he has moved location to the mainland. A suitable successor will be difficult to find.

● ANY MEMBER wishing to apply for the volunteer post of Honorary Treasurer should first write for further information to the RSGB Company Secretary, John Hall, G3KVA, Corfe Lodge, Ipswich Road, Long Stratton, Norfolk NR15 2TA. Please enclose a brief outline of what qualities and experience you could bring to this important post.

EIGHTIETH 80 ANNIVERSARY

AT A MEETING on 5 July 1913, the London Wireless Society was formed with the object of bringing together all amateurs interested in wireless telegraphy and telephony. In 1922 it became the Radio Society of Great Britain.

RA Liaison Update

REPEATER AND PACKET licensing has dominated the majority of meetings with the RA recently. At a meeting with the RA on 6 May, the status of all outstanding matters was reviewed as part of the hand-over to new staff. The topics are summarised below:

SSL

THE RSGB has received many letters complaining about administrative problems with SSL and these have been brought to the attention of the RA. The RA is well aware of these problems and is taking them up with SSL. If you have any difficulties that you cannot resolve with SSL, please write to the RA at Waterloo Bridge House or to the RSGB.

VLF

THE SOCIETY has been pursuing an experimental VLF allocation for several years, and a considerable number of people have expressed interest. The RA now hopes to be able to find us a channel wide enough to be used for speech transmission, and those who expressed interest in a VLF allocation will be contacted shortly for further input.

Greetings Messages

THE RA IS prepared to extend the greetings message facilities to all radio amateurs. It will take some time for the necessary procedures to be completed, but we hope it can be achieved by the end of the year. They are not prepared to allow 'phone patch' operation.

1.8MHz

THE RSGB IS working towards getting the full power level of 26dBW in the remaining part of the primary segment of 1.810 - 1.850MHz.

Reciprocal licensing

ARRANGEMENTS WITH France have now been resolved, and an information sheet is available from HQ. Progress with other countries continues in the background.

Licence age limits

THE SOCIETY is exploring ways of removing the anomaly whereby a Class A Novice can pass the RAE and 12WPM Morse test but has to wait until the age of 14 before getting a full licence.

Repeaters

A CONSIDERABLE amount of time has been spent on the subject of repeater licensing and abuse. A draft agency agreement for RSGB to issue NoVs to individual repeater keepers is still under discussion. We are very aware of the inconvenience caused by the curfew on the Midlands repeaters and have asked the RA to lift it as soon as possible.

Site Clearance

SOME BEACON and Repeater applications have been in the national site/frequency clearance procedure for a very long time. We have asked the RA to look into the reasons for the delays, and some further clearances have recently come through. It is an unfortunate fact that these applications do not have a very high priority in the system, but we will continue to monitor their progress.

Packet

VARIOUS ASPECTS of NoVs and site cleared stations will be discussed once the speech/TV repeater licensing arrangements have been resolved

Callsigns

INPUT IS STILL being gathered on the level of interest in the availability of special callsigns or the ability to hold more than one callsign.

Aeronautical Mobile

A MEETING is to be arranged with the Civil Aviation Authority to discuss the possibility of aeronautical mobile operation.

Morse Requirement Below 30MHz

THE RESULTS of the survey are being processed.

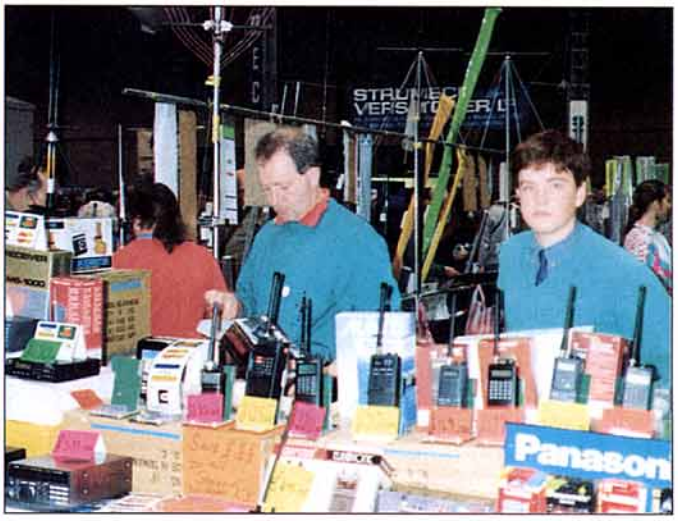
GAM1 Propagation Beacon

THE LICENCE for this station is being progressed.

CONTINUED ON PAGE SEVEN

RSGB'93

The RSGB Book stand did a roaring trade as usual.



A wide range of goodies was on sale. In the foreground is the SRP Trading stand. The Strumech Versatower stand, behind, dominated the trade show.

RSGB committees were on hand to advise. Here members of the Planning Committee discuss a member's problem.

The computer gear attracted just as much attention as the radios.

A little overdressed and completely legless was this dummy (really) on the Air Training Corps stand.

A space was set aside for members to meet the RSGB Council. Here Clive Trotman, GW4YKL, (right) holds a surgery.

CapCo's loop antennas stood out from the crowd.

On the British Amateur Television Group stand, Tom Mitchell, G3LMX, dispensed books and expert knowledge.

RSGB'93 PRIZE DRAW

CONGRATULATIONS TO the lucky winners of RSGB book vouchers, who are:

1st Prize – Errol Robinson, G4MET

2nd Prize – E A Turner, G4GLY

3rd Prize – B R Hewitt, G0AHC

RA Liaison Update

CONTINUED FROM PAGE SIX

Unattended Operation Beacon

THE RSGB HAS asked the RA to allow unattended operation of personal beacons in the band 24150-24250MHz to support narrowband operation at 24192MHz.

Spectrum Review

THE EUROPEAN Radiocommunications Office, which is part of CEPT, has held a Europe-wide version of the Spectrum Reviews conducted recently in the UK. The first report covers the frequency range 3400MHz – 105GHz and is trying to coordinate allocations across Europe. Its recommendations are being discussed with the RA.

Single Band 28MHz Equipment

THE SOCIETY reiterated its concern at the effects that the legislation against illegal CB equipment was having on amateurs. The RA is very determined to enforce this legislation, but has provided some clarification of the situation for amateurs. This is included below.

RA Phone Number

THE RA NOW has a telephone number for general enquiries – 071 215 2150. Previously, they had to be reached via the DTI.

Single Band 28MHz Equipment

SEVERAL YEARS ago, legislation was enacted to prevent the sale and use of non-approved 27MHz CB transceivers. Unfortunately, this legislation also encompassed single band equipment for the 28MHz amateur band. Its exact implications for amateur equipment were somewhat unclear, and several amateurs who have had equipment confiscated have felt that they have been penalised unfairly. The following is not a legal opinion, but is a brief summary of the position as we see it:

1) The construction of single band 28MHz equipment for your own use is not illegal.
2) Commercial manufacture or import of single band 28MHz equipment is illegal without a permit from the RA. We are not aware of any permits for commercial purposes.
3) The possession of single band 28MHz equipment is not illegal.
4) However, manufacture, import, sale or possession of single band 28MHz equipment is *illegal* if the equipment can be classed as CB apparatus, meaning that it is designed or adapted or has facilities permitting its adaptation for transmitting spoken messages in the band 26.1MHz – 28MHz.

The problem is that it is difficult to obtain clear guidance on what constitutes 'adaptability'. Almost any equipment could be adapted, given sufficient effort. Some models are dual purpose at manufacture, and are sold either as amateur or CB models, and these should certainly be avoided. Members should therefore exercise caution when buying any single band 28MHz equipment.

The RA has informed us that the following equipments are regarded as illegal, and amateurs are advised to avoid them: Uniden 2830, Uniden or President 2510, President Lincoln and the Belcom LS102. The RA is acting against these models as the Agency has established that they can all be easily converted to operate on illegal CB frequencies. [References to these model numbers in *Members Advertisements* will be deleted – *Ed*]

So that members can seek advice as to the status of an equipment they may possess or wish to buy, the RSGB will act as a clearing house for any requests for clarification from the RA.

Julian Gannaway, G3YGF,
Vice-Chairman Licensing Advisory Committee

The RSGB — Working for You

PHOTOGRAPH: GW0RTA/JA3AER

Over eighty ladies from all over the world attended the Asian YLs Meeting in Osaka, Japan, in April. Pictured is a group of Korean licensees.

More Fines

THE RA HAS reported two more successful prosecutions involving amateur radio:

A radio amateur appeared before Caernarfon magistrates Court on 6 May charged with the use of equipment outside the terms of his licence. He was found guilty and fined £300. He was also ordered to pay costs of £100. The case followed complaints from amateurs of unlicensed packet mailbox operation on the 70, 144 and 430MHz bands. The operator was interviewed on 15 December 1992 and the mailbox was closed down. The station is now licensed correctly.

Last December, RA staff monitored and traced unlicensed transmissions on the 144MHz band in Nuneaton. The operator was interviewed and charged with unlicensed use. The case was heard at Nuneaton Magistrates Court on 27 April where the defendant pleaded guilty and was fined £140 with £100 costs.

● THE FCC HAS denied a request from KW1I to run more than 1.5kW PEP of AM.

Ron Henderson, VK1RH, President of the Wireless Institute of Australia died on 26 April after a short illness. He is pictured here on a visit to Potters Bar.

Lost Canadian

PETER CRAIG WATSON, a relative of VE7BFJ, disappeared in April whilst hiking on Samosir Island, Lake Toba on Northern Sumatra, Indonesia. Anyone who has news of Craig is asked to contact the Consular Section of the Canadian Embassy in Jakarta (tel 62 21 510709, fax 62 21 571 2251) or Craig's father Mr J K Watson, at 104-2333 Beach Drive, Victoria B C, V8R 6K2.

Scanner Banner

THE FEDERAL Communications Commission (FCC) in the USA has banned the import and sale of radio scanners capable of receiving cellular telephone transmissions. But following representations from the ARRL, the new rule was modified to avoid inadvertently banning converters designed for the US 902 – 928MHz amateur band.

In the UK, Warrington Police, fed up with scanner users passing on their radio messages to 'undesirables', concocted a spoof message about UFOs landing. When the scanner ops turned up at the landing site, they were arrested.

Kilmarnock Sheriff Court recently convicted a man for an offence under the 1949 WT Act connected with listening to police broadcasts. He was fined £250 and his scanner was confiscated.

Operation Raleigh

WE WOULD LIKE to hear from any member who is, or has been, involved in Operation Raleigh for a possible feature in *D-i-Y Radio*, the RSGB's magazine for beginners. Please contact Marcia Brimson at RSGB HQ.

RAE & Morse Courses

● **Beginners' Morse** classes start early September, 8pm Mondays, at **Southend** and DARS, Rocheway centre, Rocheway, Rochford, Essex. Details Steve Muster, G4UOL, 0702 334014 (after 6pm).

● Course for May 94 **RAE** starts September, probably Thursdays 7 – 9pm at **Canterbury**. Will suit anyone as no prior knowledge is required. Details Ken Smith, G3JIX, Staple Farmhouse, Staple, Canterbury CT3 1JX.

● **RAE and Morse** classes start September at Burnham Adult Education Centre, **Burnham**, Bucks, evenings 1930 – 2130. Contact Roy Smith on 0628 667136.

● **Reading** and District ARC is now City & Guilds registered as an **RAE** and **NRAE** exam centre and will shortly also run exams for the **US Licence**. The club is currently running an NRAE course. Details from Peter Swynford on 0734 665981.

Committee Vacancy

THE EMC COMMITTEE has a vacancy for a Minutes Secretary. In the main the work involves taking minutes at evening meetings which are held in central London approximately once a month. Applications are invited from members who fulfil the following requirements: Live within easy travelling distance of London; have suitable secretarial skills (technical qualifications are not essential) and have a commitment to amateur radio and an interest in solving problems.

Like all committee activities, the post is voluntary but essential travel and other out-of-pocket expenses are recoverable. Applicants should please send a brief outline of experience and interests to: Chairman EMC Committee, c/o RSGB Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.

Appleton

IT IS PROPOSED to set up a museum in Bradford dedicated to the memory of Sir Edward Appleton (he of the Layer) who was born there in 1892. He received the Nobel Prize for Physics in 1947 for his researches into the upper atmosphere. To this end, RSGB Propagation Studies Committee Chairman Charlie Newton, G2FKZ, is looking for any memorabilia related to Appleton and the pioneering work he did. If anyone has such material – articles, books, stories etc – would they write to Charlie Newton at 83 Hollingthorpe Road, Hill Green, nr Wakefield, West Yorks WF4 3NW.

A Monster Expedition

MEMBERS OF THE WIESBADEN Amateur Radio Club, DA1WA, are mainly US military personnel. Their fourth expedition to Castle Frankenstein takes place from 2000 on 30 July to 1200 on 1 August. They will operate on 80 – 10m SSB, CW and digital modes. An 80m dipole will be suspended between the two castle towers.

RA Change

FAREWELL TO John Nash who has played a large part in the RA's support for amateur radio in recent years. His replacement at Waterloo Bridge House is John Keeling.

After 16 years of serving the radio amateurs of Leicestershire, Frank Elliott, G4PDZ, has put up the final CLOSED sign on his shop, Elliott Electronics. Despite the death of his wife, Eileen, G4SBY, in 1990, Frank has continued to serve the amateur community in his long-standing role as organising secretary of the Liecester Amateur Radio Show; "a post", he says, "I hope to hold for a good many more years yet."

*WHERE CAN YOU FIND THE UK'S WIDEST SELECTION OF **DIGITAL RADIO** PRODUCTS?*

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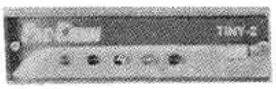
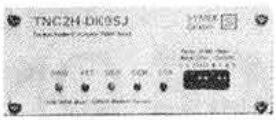
SISKIN MINI-PAK

Possibly the most compact packet system in the world, housed INSIDE a 9 way D shell! Complete with ready-made radio cable and PC software. New lower price of just **£69.95**. Is it really worth messing about with unboxed kits for a few £s less?? (Requires IBM PC or compatible).



SISKIN TINY 2 MKII

The UK's best selling TNC now includes FREE ready-made computer and transceiver cable for YOUR set up when ordered from Siskin direct (this offer may not be available through other dealers). Lots of bolt-on goodies available too. Just **£139** incl V3.1 firmware. Beware of cheaper imitations, if you can't drive over it, it's not a TINY 2!! *(Siskin does a great deal on the KPC-3 too!)*

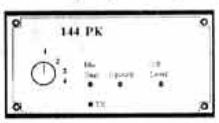


TNC2-H 9600 BAUD

At last a TNC designed specifically for 9600 baud at a sensible price. Superb German engineering coupled with licensed G3RUH 9600 technology makes the TNC-2 H the ideal power house for OSCAR 22 and high speed trunking etc. **£179** including ready made cable.

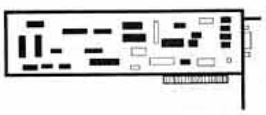
KAM PLUS

The KAM PLUS offers many of the popular data modes in one compact package. Features include HF/VHF packet radio (with HF-VHF Gateway), AMTOR (ARQ, FEC and Mode L), PacTor (now standard), RTTY (170/425/850 shifts), FAX receive (HF weather information etc), CW (including VHF FM CW TX), Navtex/Amtex, ASCII, 128K ram (expandable to 512K) and a battery-backed real time clock as standard! Mention you saw this ad in RadCom and we'll even throw in ready-made computer and transceiver cables plus software and no extra charge. **£395** *(existing KAM owners can update to virtually all the KAM PLUS specification, call for details).*



WOOD & DOUGLAS 144PK

At last a British company has come up with a 2M transceiver specifically aimed at 1200 and 9600 baud packet radio without mods. Why tie up £500 worth of Japanese black box on 144.650 with perhaps major surgery when you can *'Plug in and Go 9600'* with the 144PK-D. For JULY 1993 only we're making the 144PK-D available at just **£199** including a lead for YOUR TNC, that's 10% BELOW the recommended list price!



PC PLUG-IN CARDS

We offer a range of PC packet cards for a variety of applications. One of the advantages of a PC card is that you do not lose a precious COM port.

☐ The PC-320 supports VHF and HF operation + Personal Mailbox which can be run even while the PC is switched off! The list price of the PC-320 is £179 but for July only we're offering it for just **£159** including a ready made cable for your transceiver(s) and of course free software.

☐ The Thor RLC-100, a full size card offering two or 4 VHF/UHF ports for more serious applications such as Network Nodes, BBSs and DX Clusters. 2 port version **£165**, 4 port version **£285**, both supplied with BPQ software.

☐ The BayCom USCC 4 port card — card packs a lot of punch including 1200, 300 and 9600 (G3RUH compatible). Supplied with G8BPQ and BayCom terminal software. **£269.**

AEA PK-900

The popular AEA PK-232 (over 50,000 units sold world-wide) is now joined by a high-tech brother called the PK-900. All the features of the PK-232 are retained with the addition of grey scale fax, an HF to VHF Packet Gateway and PacTor now as standard and a stunning LCD display. Siskin price **£545** including PacTor option installed, ready made cables and software.

ICS FAX III

This superb PC software/hardware package produces quite stunning radio facsimile reception with up to 16 grey levels on a VGA screen. Other modes supported include RTTY, Navtex, FEC and now CW. **£139.95.**

PK-GOLD & KAM-GOLD

If you have spoken to PC owners in the USA they've probably told you how PK-GOLD and KAM-GOLD outperform just about any commercial multi-mode program to date even those produced by the equipment manufacturers. We've just secured the distribution rights for both programs in the UK and our aim is to get the cost as close to the US price as possible (sadly the import duty and VAT are something we can't avoid). Available now **£79.95.**

LEADS, SOFTWARE, SUPPORT

Siskin probably holds the largest stock of ready-made TNC-TO-COMPUTER and TNC-TO-TRANSCEIVER cables in Europe at prices up to 20% BELOW those of some other dealers. In many cases we actually supply leads FREE with a TNC or multi-mode purchase. We also supply FREE software with every unit purchased directly from us and what's more if you change computer at a later date we'll ensure you have suitable software at no extra charge. *Don't forget, we can supply software for virtually ANY popular computer, not just the PC!*

We also maintain an out-of-hours customer telephone support service in the evenings and often at weekends which of course may also be used for sales enquiries and orders too. Just ring our main office number and the latest telephone technology does the rest. (Sorry this service is available only to Siskin customers who purchased or are considering purchasing a unit from us.)

UPDATE NEWS (NEW TINY 2 CODE!)...

At last we have the long awaited update for the **Tiny 2** and PacComm TNCs (V3.1). Many of the TAPR 1.1.8 features are now implemented with further enhancements such as reverse forwarding of bulletins, timing parameters more acclimatised to the UK network, a much firmer implementation of KISS and support for external GPS based devices. Here's the really good news... existing bona fide V1.1.4D4 owners can upgrade with Siskin FREE, just send us proof of purchase, a 27256 or 27512 eprom and most important an SAE with an address label please. Alternatively we can supply you the update already on eprom with paperwork for just **£7.50** incl postage. If you are presently building a TNC kit we can still supply you the PMS eprom and paperwork at **£12.50** including postage.

PK-232MBX and **KAM 6.0** owners who purchased PacTor updates direct from Siskin should have received free updates from us by automatic mailing. If perchance you did not receive yours please let us know. Likewise anybody who bought a **KAM** from us from February 1st 1993 is entitled to a substantial discount on the new expansion board, call for details.

SISKIN ELECTRONICS Ltd
2 South Street, Hythe
Southampton SO4 6EB

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Once again SMC aim to offer the best in sales and service.

'BEST COMMUNICATIONS RECEIVER 1992'

FRG-100

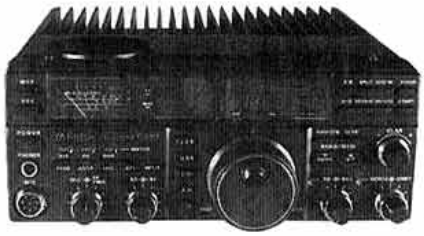
As awarded by the *World Radio TV Handbook* in their '1993 Radio Industry Awards'.

What do we need to say!

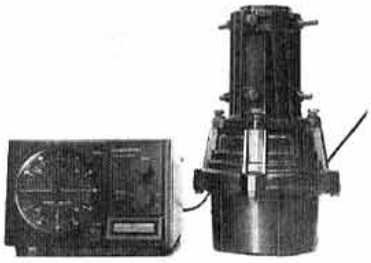
SEE REVIEW IN THIS EDITION – JULY RADCOM

Leeds (0532) 350606 **Axminster** (0297) 34918 **Southampton** (0703) 255111

FT736R – Probably the finest multiband base transceiver in existence – ideal for satellite operation – whole host of options available.

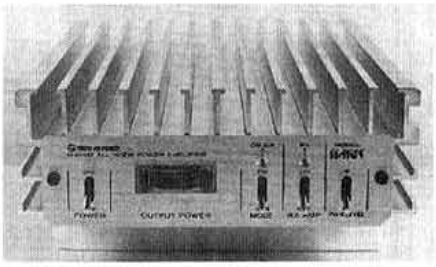


FT890 – Yaesu's latest HF winner available either with or without internal ATU – ideal for mobile/base – too many options to list – ring for details.



Rotators – We have a wide range of rotators to suit all applications from TV to multi-element HF antennas. Computer control is an option on some of the larger models to give extra flexibility of operation.

Linear Amplifiers – We have probably the best selection of linear amplifiers available on the market today. We have selected these ranges, Tokyo Hy-Power, Daiwa and Henry, for their outstanding reputation for performance, quality and reliability. Why not ring us now to discuss your requirements and the linear best suited to you.



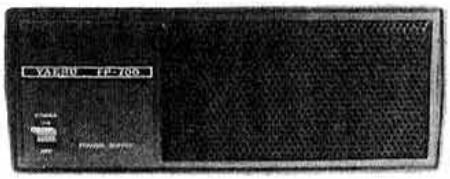
ICOM - For some time now we have stocked many items from the Icom range including the extremely popular ICR1 and ICR100 scanners.

Kenwood – All of our branches are able to supply the Kenwood range of products. Why not ring us today as we have a wide range of transceivers in stock including the **new TS-50S.**

Here at SMC we do stock a wide range of power supplies to suit all applications. There are two major ranges to choose from, the Daiwa range and the Yaesu range. Both ranges are high quality products which will provide many hours of continuous fault free use.

The models range from 4A to 32A continuous with convenient models at 9, 12, 20 and 24A. Many models have comprehensive current/voltage metering with prices to suit all pockets.

FP700	*13.8v fixed 10A cont/20A peak*
FP757HD	*13.8v fixed 20A cont.*
FP800	*13,8v fixed 20A cont*
FP400C	*13.8v fixed 10A cont/20A peak*
FP8	*13.8v fixed 8A cont*
SMC 120406	*13.8v fixed 4A cont/6A peak*



All the Daiwa range, except the PS140MKII, feature variable voltage with switchable voltage/current metering. Both the PS304 and RS40X feature a cigar lighter socket, convenient for powering your handheld transceiver.

PS120MKII	*3-15v variable 9A /12A max*
PS140MKII	*13.8v fixed 12A /14A max*
PS304	*1-15v variable 24A /32A max*
RS40X	*1-15v variable 32A /40A max*

Birmingham *021-327 1497*
Chesterfield *(0246) 453340*

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021-327 1497
SMC Birmingham
504 Alum Rock Road
Alum Rock
Birmingham B8 3HX
9am–5pm Tues-Fri
9am–4pm Sat

Chesterfield *(0246) 453340*
SMC Midlands
102 High Street
New Whittington
Chesterfield
9.30am–5.30pm
Tues–Sat

Leeds *(0532) 350606*
SMC Northern
Nowell Lane Ind. Est.
Nowell Lane
Leeds LS9 6JE
9am–5.30pm Mon-Fri
9am–1pm Sat

Southampton *(0703) 255111*
SMC HQ, School Close
Chandlers Ford Ind. Est.
Eastleigh
Hants SO5 3BY
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9am–1pm Sat

- *Same day despatch wherever possible.*
- *Yaesu Distributor Warranty, 24 months parts and labour.*
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- *Up to £1000 instant credit, a quotation in writing is available on request, subject to status.*

HF NEWS

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham B17 8QB

ROGER WESTERN, G3SXW, has written to me pointing out that the DX Advisory Committee of ARRL sent a list of recommendations to the ARRL Executive Committee in late 1992. These included recommendations that DXpeditions should operate split frequency, repeat callsigns, confirm any corrections by sending the calling station's callsign at the end of the QSO, identify at not less than every 10 QSOs and send QSL information not less than every 30 QSOs. It warned about practices that we all know can result in chaos (working stations out of turn when working by call-areas, or acknowledging another caller before the current contact is *properly* finished). It also urged callers to *listen*, avoid calling on the DX station's own frequency, calling 'blind' or acting as a 'policeman'. All very good advice.

However, the DXAC also made two other recommendations – that ARRL work with manufacturers to design equipment that cannot transmit on certain frequencies, and that a programme is developed aimed at educating operators to adopt ethical operating practices. Another proposal was a list of recommended expedition transmitting and listening frequencies. The limited spread of listening frequencies suggested could only be an improvement but any chosen frequency could be *somebody's* favourite – and some actually proposed were in the lower parts of 14MHz just above 14.1MHz – an area for many years traditionally used by French speaking stations, many of whom are DX themselves.

Roger supports another proposal to drop the 'disqualification criteria', that the idea of blocking certain transmitting frequencies is not a good one, and that the list of recommended transmitting frequencies is unnecessary. However a good separation between the transmitting frequency and the listening area is good. He feels that identification should be at one minute intervals. Anyone who has listened to (and worked) G3SXW on any of his expeditions will know that he is very familiar with the situation from both ends of the pile-up!

CONTESTS

IARU HF WORLD CHAMPIONSHIP

1200 10 July – 1200 11 July

Single and multi-operator. Single phone-only, CW only, or mixed mode. Multi-operator mixed mode only. IARU member society HQ stations send signal report plus official society abbreviation (eg RSGB). Others send signal report and ITU zone. Stations may be worked once per band/mode following IARU band plans. QSOs with own ITU zone and IARU society HQs count one point. Contacts with same continent in different zone count three, and all others five points. The multiplier is the total number of ITU zones plus IARU member society HQ stations worked on each band (NB – HQ stations do *not* count as zone multipliers). Entries may be submitted on diskettes as ASCII files or in the normal way. I can supply copies of the rules and suggest that if you are entering seriously that you have a copy (SASE please).

Results of the **1992 CQ WW WPX Contest (CW)** appeared in May *CQ Magazine*. Special mention for Chris Henderson, G4FAM, who operated as **GW8GT** and came top in the world entries on 3.5MHz thus winning the Lance Johnson Engineering Trophy. **G3LNS** was world second. **GB8FX** – operated by the late Al Slater, G3FXB, came ninth in the world listing in the single-operator all-band class. UK scores were as follows – calls in italics were those who entered the low power sections :– **All-bands – GB8FX** (4,526,832), **GB6MX** (2,196,592), **GB5VJ** (2,056,320), G3OZF (1,257,344), GX0AAA (667,584), ***G3ESF*** (495,292), ***GM3YTS*** (427,130), *GX5QK* (420,396), G3TXF (129,168), *G3OOU* (121,832), G3KKQ (85,314). **21MHz – GB0DX** (1,050,504). **14MHz – GM3CFS** (286,646), ***GX4ECT*** (50,840). **7MHz – *G4ZOB*** (371,070). **3.5MHz –GW8GT** (740,440), **G3LNS** (594,580).

AGCW-DL-QRP SUMMER CONTEST

1500 17 July – 1500 18 July

Nine hours rest time obligatory and may be taken in one or two blocks. 3.5 to 28MHz *observing IARU band-planning segments.* Four categories – VLP = up to 2W input, QRP = up to 10W input, MP = up to 50W input, and QRO = anything higher. Call "CQ QRP Test" and exchange RST/serial number/category. QSOs between QRO stations are not allowed. I can supply copies of rules (SASE please). Results of the **QRP Summer Contest 1992** show G3TXZ third in the VLP class with 5,976 points and G4XNP ninth with 2,442. In the QRP list G3DNF was fourth with 30,303 points, G3FNM 11th with 15,336, G4ZME 36th with 4,165, and GM4HQF 43rd with 2,016.

COLOMBIAN INDEPENDENCE CONTEST

0000 – 2400 17 July

Contest exchange is the report plus serial QSO number (from 001). 3.5 to 28MHz phone *or* CW but not mixed. Exchange RS/T plus serial number. QSOs with own continent count one point, other continents three, and with HKs five. Multiplier is number of DXCC countries on each band (including HK) and the number of HK zones worked on each band. Logs have to be mailed before 31 August. I have copies of rules (SASE please).

In the **Barcelona '92 HF Contest** UK scores listed are as follows: GOIDE (181,220 points), G3ESF (125,296), GM3CFS (69,552), GI0KOW (63,840), G3ICG (19,184), and G4POF (3,328). **Barcelona '92 Olympic Award Champions** were GM3ITN, G3OCA, GI0KOW, and GW0PUP.

RSGB IOTA CONTEST 1993

1200 24 July – 1200 25 July

3.5 to 28MHz only, observing contest preferred segments – ie avoiding 3.65 – 3.7MHz and 14.3 – 14.35MHz. UK stations may not use 3.5 or 7MHz from 1200 –1600 and 0800-1200. Entrants must be members of RSGB. For fuller details please see elsewhere in *RadCom*.

AWARDS

THE SAIL '93 DEN HELDER AWARD

Available to licensed amateurs and listeners for QSOs on 5 to 11 July inclusive. For contact with or hearing stations in the Dutch QSL region 23 and MARAC members only. PA stations give the report followed by their region number or MARAC membership number. PI4's ADH, DHV, MRC, PI5's DD, KOM, and ZH count as two points. PA6SDH counts as three. European applicants need six points. Send log extract (certified as correct by two other amateurs) plus US$3, DM5, or five IRCs to MARAC Award Manager, PO Box

BAND REPORTS

The early deadline this month together with the general falling off in conditions complained of by most has resulted in this section being rather smaller than normal. However, thanks to the following who did send in reports: G2HKU, G3s EUE, GVV, IQF, IZD, KKJ, G4DJC, GW4KGR, G4s MUW, NXG/M, XRV, and G0KDS. As always callsigns listed in italics were stations using CW:

10MHz	
0100	*ZF2UB/8*
0500	*KH6BGE*
0600	*PJ2AM*
1700	*C91J*
2000	*HV2CO*
2100	*C9LCK*, FY5FP, *V47WZ*
2200	*A71CW, C6A/DL7VOG, WP4IIW*, ZD8DEZ, *3B8CF, 7P8SR*
14MHz	
0500	FO5CS, 5X1DX, 5X1XX, VR6JJ
0700	KH6, KL7XD, S92LB, T71CE, 3C1TR
0800	A35KB, KH6ALF, NL7J, P29VMS, V63OM
1300	JW1CIA, VK9NS
1500	*BV4CT*, EP2MKN, 9M8s FH, YL
1600	T5/N9OQS, *4K3/UA1ZFQ*
1800	A71A, S21ZG, XU3UN, *YI9CW*, 9M2SH, G4SMC/9M6
1900	VQ9IO
2100	S92SS, 4K3RRC, 7Q7XX
2200	4S7EF
18MHz	
0700	KL7TC, PZ1EL.
1100	J49GI, KP2J, V73C
1400	A92BE, *V63AT*
1500	*V85KX, V85PB*, XU3UN
1600	AP2KAH, *9M2RH*
1800	*PA3CXC/ST0*, S79MX, *7P8SR, 8Q7VM*
21MHz	
0700	9L3BM
0800	V63OM
1000	YI1AL, 5X1A
1200	A41LD, *HL4CIS*, J49GI
1300	A71BY, HS0AC
1400	T5HLL, VU, YB
1500	A22EX, EP2MHB, ET3YU, VP8CLC, 9M8YL, *9V1ZG*
1600	C91J, ET3SID, TJ1GG, VQ9CE, YI1MG, 3C1TR, 5X1ZZ
1700	HS0/G4UAV, XW6A, 5R8DG, 5Z4JD, 9J2GA
1800	S79MD, VP8NY, 5X1DX, *G4AAL/60*
1900	D2/N6QHO, S92IJ, VP8QP, ZD7CW, ZD7SM
2000	W6-W7
2100	T5/N9OQS, VK2XT
24MHz	
1300	KP4YD, *8Q7MX*
1400	YV2BYT, 5N7BHF, *9V1ZG*
1600	JA2KSI, *3C1EA*
1800	*TR8SR*, 5Z4JD
2100	J68AY, JAs, V47WC, 9Y4NW
28MHz	
0800	VK6
1200	5U7M
1300	3X0HLU, 5X1DX
1600	C91AE, 5X1DX
1800	6W1AAD

QTH CORNER

AN7IOT	via EA5OL.
CU35MB	(Direct only) CU3AN, PO Box 157, 9702 Angra do Heroismo Codex, Azores Is, Portugal.
TA2BK	Bahri Kacan, Camlica Cad 26, Uskudar-Istanbul, Turkey.
VK4BX	Hervey Bay ARC, PO Box 829, Hervey Bay, Queensland 4655, Australia.
VU2PTT	(new) Prasad Rajagopal, PO Box 23, Mangalore 575001, India.
4S7RPG	R E Parkes, 2 Saxon Rd, Steyning, W Sussex BN44 3FP.
9G1SB	Sewell T Brewer, Box M 144, Accra, Ghana.
9G1UK	D Saunders, G4HZR, 32 Richmond Court, 28 Osmond Rd, Hove, Sussex BN3 1TD.
9M0S	via W4FRU, John Parrott, PO Box 5127, Suffolk, Va 23435, USA.

1993 WARC BANDS TABLE

	10MHz	18MHz	24MHz	Total
G3KKJ	99	134	125	358
G3IZD	60	107	95	262
G3IAR	92	104	55	251
G2AFV	68	53	33	154
G0MHC	32	52	25	109
GJ4GG	22	34	27	83
G3IQF	40	29	13	82
G4MUW	–	43	26	69
G4XRV	67	–	–	67
G0KDS	1	45	–	46

54, 1760 AB Anna Paulowna, The Netherlands. Do not send QSLs.

DIPLOMA ZHK

For confirmed contacts with at least eight of the ten Colombian call areas. (See below).

DIPLOMA CHK

For confirmed contacts with at least 25 stations in Colombia.

Send a list of QSLs certified by a national society awards manager or two other amateurs plus US$2 or four IRCs to: Awards Manager LCRA, Box 584, Bogota, Colombia.

PACC AWARD

Requires confirmed contacts with at least 100 stations in the Netherlands. If you make contacts in the PACC contest and submit a log these can be used for credit if the stations worked also sent in logs. These credits may be claimed for up to five years. QSLs and contest credits may be submitted with a log, and the fee is US $2.00, Dfl 4.00, or six IRCs. Stickers are available for 200, 300 stations etc. Listeners may also apply. Applications go to VERON, P O Box 1166, 6801 BD, Arnhem, The Netherlands.

DIPLIME DE LA ZONE 2

Available to licensed amateurs and listeners who have confirmation of contacts/reports from three areas - (1) VE2 located in Quebec north of the 50th parallel, (2) VE8 in NWT east of 102° and north of 50°, and (3) VO2. These since 1 January 1980 on any bands/modes. Send list of confirmations, certified by two other amateurs, together with US $3.00 or eight IRCs to Gilles Soucy, VE2GSO, P O Box 46, Fermont, Qc, G0G 1JO, Canada.

QRP 20 CLUB AWARD

Issued by the Port Elizabeth Branch of SARL to anyone who has made two-way communication with amateurs in at least 20 Maidenhead Locator zones in the Republic of South Africa using a maximum input power of less than five watts. There is a special endorsement if the power was less than one watt. Contacts must have been made since 1 January 1991 on any mode in the 1.8 to 28MHz bands (WARC bands not included). Send QSLs or a certified copy of your log to The Awards Manager, PE Branch, SARL, PO Box 10402, Linton Grange, 6015 Republic of South Africa.

DX NEWS

IN A PRESS release dated 3 May ARRL announced that DXCC credit would now be given for the following operations (dates from which valid in brackets): 5R8DJ (24.11.92), 9F2CW (15.12.92), D2/AA4HU (26.1.93), D2/KC6HUE (26.1.93), D2/N6QHO (26.1.93), D2BG (17.2.93), ET3DX (11.4.93), ET3JR (15.10.92), ET3RA (22.11.92), ET3YU (26.2.93), S21ZG (6.12.92), S21ZH (6.3.93), S21ZJ (6.3.93), and S21ZM (7.3.93). As *RSGB DX News Sheet* points out – some QSLs from ET3YU have "pirate radio ET3YU" printed on them! The DXCC backlog at the end of April was down to 1,140 applications representing 114,490 cards. Incidentally, ARRL did say that it would prefer the submission of cards for contacts with 9F2CW/A between 26 January and 4 February this year to be delayed until the exact DXCC status of Eritrea is decided following recent events.

Please note the new address of Prasad, VU2PTT which appears in *QTH Corner*. Prasad acts as QSL manager for VU2MTT and VU2OXX.

According to *DX-press* F2JD now has a licence in **Kenya** and is 5Z4JD. He will be there until the end of the year and active on all bands except 10 and 24MHz. F6FYD is at present EL2YD but sometimes visits **Togo** from where he has been on the air as 5V7YD. The situation concerning **Eritrea** was not clear at the time of writing. The referendum at the end of April decided on independence (to be declared on 24 May) but the position with regard to DXCC is not yet announced. Eritrea was a separate DXCC country until November 1962. It surely has to count again but details are awaited.

PA3CXC/ST0 will remain in **S Sudan** until September and will not be able to reply to QSL requests until he returns home. He should be on RTTY by now. His favourite frequencies are said to be 1.832, 3.510, 7.002, 10.101, 14.020, 18.070, 21.020, 24.895, and 28.020MHz. FT4WD, on **Crozet Is**, is said to be on most days between 1200 and 1500 about 20kHz above the low end of the CW bands. On SSB he tends to frequent popular DX frequencies and he can often be found on 28.480MHz between 1200 and 1230.

3C1TR in **Equatorial Guinea** seems to be a new one and according to the *Long Island DX Bulletin* is to be found near 14.195kHz from 1100. He also has been found near 14.225MHz at about 2115 and he is located in Malabao on Biako Is. N6TJ was expecting to revisit **Ascension Is** during June and July and to reactivate his ZD8X callsign. The recent 9G1AA operation is said to have made 30,000 QSOs and 9G1AJ, 9G1MJ and 9G1MR have since been reported from **Ghana**. 9G1SB is to be found near 21.335MHz in the afternoons – he is on again after being off the air for 13 years.

David Saunders, G4HZR, tells me that he was issued with the callsign 9G1UK on 12 May and is licensed to use 1kW input on 3.5, 7, 14, 21, 28, and 144MHz – no WARC bands for the time being. David visits Ghana on business from time to time.

9X5HG, in **Rwanda**, has been worked on 7.006MHz around 0100 and to keep a black-list of those who interrupt QSOs. *RSGB DX News Sheet* expected that A22MN would be back in **Botswana** last month for a two year stay. He is planning to be active on all bands including WARC.

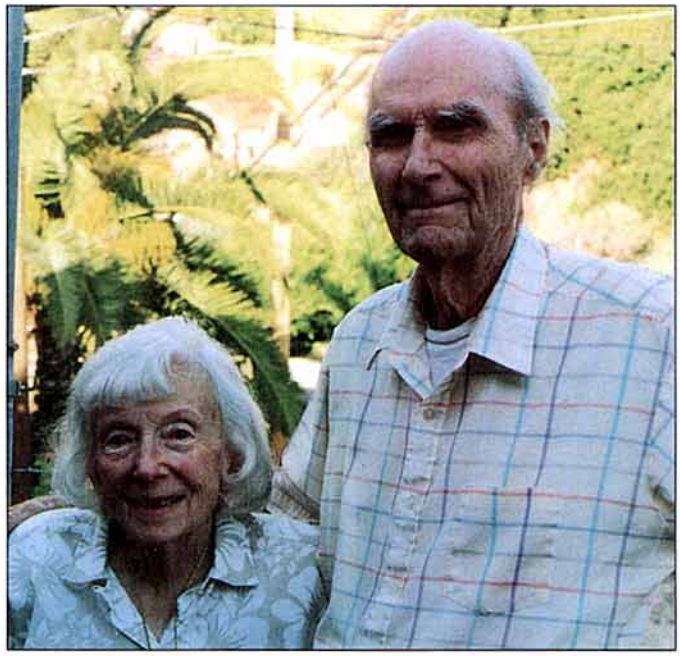
Rick Atherton, 7P8EB, has written to say that there are six new amateurs in **Lesotho**. They mostly operate the 7P8NUL station but their individual callsigns are 7P8FI, 7P8FK, 7P8FM, 7P8FJ, 7P8FL, and 7P8FN. KA3KJH/S0 is in **Western Sahara** and will be there until next month.

CE9OH is located at O'Higgins Base, **Antarctica**. he has been located on 14.190MHz at 2000 on Sundays.

FO5DV, in **French Polynesia**, still looks for Europeans between 0400 and 0700 on 7.007 or 10.107MHz.

My remarks concerning JX3EX in the May column brought a response from a reliable source in Norway that to date Norwegian

continued on page16 ▶



Bill, K6MQT, and Maxine, WA6AOE, at their home in Avalon, Catalina Island (26 miles off Los Angeles). Keen IOTA hunters (they live on NA66) they feel that DXCC deteriorated when SSB came in!

NEVADA EVER

SCANNING RECEIVERS

NEW – MVT-7100,
Set to be *THE* handheld of 1993. This radio must be heard to be believed. It provides effortless reception of SSB and CW signals using **TRUE** carrier injection with 50Hz resolution. It can even (with accessories) be hooked up for FAX and DATA reception.

- 100KHz–1650MHz
- 1000 memory channels
- All mode reception (incl. SSB & CW)

Each set is supplied with all accessories including: UK Charger, NiCad Batteries, Earphone, Telescopic Antenna, Original Yupiteru English Manual..... **PRICE £449**

YUPITERU MVT 7000 HANDHELD

- Receives 8 to 1300 MHz 100kHz-1300MHz (at reduced sensitivity)
- 200 Memory channels
- Rotary or keypad freq. control
- AM/FM/NFM
- Large display with strength meter

Each set is supplied complete with:-
Full set of high power NiCads, AC charger, DC power lead and carry strap **£369**

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Still our most popular handheld scanner.

- 500KHz-1300MHz
- 1000 Memory channels
- AM/FM/WFM Modes
- Sensitive Receiver
- Supplied with all accessories & UK charger..... **£299**

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A mobile version of the HP2000 hand-held but with added features.

- ★ Tape recorder voice activated switching
- ★ Audio squelch
- ★ 500kHz–600MHz, 805–1300MHz
- ★ Supplied with mains adaptor..... **£279**

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Mobile version of the 7000 c/w mains adaptor. Especially sensitive @ UHF. Recommended..... **£389.00**

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Full feature software for AR3000..... **£119**

AR1500 HANDHELD
Covers 500kHz-1300MHz receiving NFM/WFM/AM and SSB.

Supplied with a large selection of accessories including:-

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- Dry Cell Battery Case
- Long Wire Antenna
- Ear Piece
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Yaesu FRG100 HF receiver
A superb new radio covering 50kHz to 30MHz – our top selling general coverage receiver.... **£559**

Yaesu FT747GX – Still an unbelievable performer across the H.F. bands and one of the top 5 in budget H.F. Transceivers. Top Band to Ten, you won't be disappointed..... **£785**

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Yaesu FT-530 – A Twin Band Handheld and a host of features including Dual In-Band RX, CTCSS DTMF all fitted. Wideband coverage plus optional speaker mic with LCD display. Guaranteed to be the next No. 1..... **£449.95**

Yaesu FT-1000 – You will never want another H.F. Transceiver! The FT-1000 does it all. This has to be the ultimate word in H.F. communications.
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Yaesu FT990 All mode HF TCVR..... £1995
Yaesu FT757GX HF TCVR..... £995
Yaesu FT767GX HF + VHF/UHF..... £1597
Yaesu FL7000 500 Watt HF amp..... £1795
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Drake R8E – Number one in the U.S. since 1943. Drake is known right across the globe for its technology and above all, reliability – remember the "B" line separates (mine are still going!). Wide frequency coverage, excellent dynamic range Superb filtering In fact it's simply the best shortwave clarity you'll find. Outperforming many other receivers costing much more. Whatever your interests – Drakes' R8E can handle it!!!

- Fully filtered with AMS as standard
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- Computer control option
- I.F. Pass-band offset facility

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Options
R8E Matching Speaker..... **£49.95**
VHF Conv. (35-54 & 108-174MHz)..... **£225.00**
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Full Technical W/Shop Manual..... **£29.95**

KENWOOD RADIO

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Just arrived. This new "micro" 100 watt HF mobile rig is in short supply because of its popularity. We have purchased large quantities – call for info or part exchange price on your old HF rig..... **£999**

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TH28/48/78E's – The family of 3 "designer-type" handhelds that feel comfortable in the hand whether Two Meters, 70 Cms (ideal novice band) or 2/70 Twin Bander is what you're after - take a serious look at the "TH" range..... **£Call**

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Kenwood TS711E..... £1099
Kenwood TR751E..... £699
Kenwood TM741E..... £758
Kenwood TL922..... £1699
Kenwood TM702E..... £499
Kenwood TM732E..... £599

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Adonis 508G
Desk mic

- ★ FM/SSB audio selector
- ★ Electret insert
- ★ Slide switch to allow selection of 2 radios

99.95

Adonis 308 Low noise desk mic..... £84.95
Kenwood MC50 Desk mic..... £49.95
Kenwood MC60A Desk mic..... £99.95
Kenwood MC80 Desk mic..... £59.95
Kenwood MC85 desk mic..... £119.95
Kenwood MC43S Hand mic..... £22.95
Kenwood MC44E h/mic..... £29.95
Kenwood MC45E h/mic..... £29.95
Kenwood MC44 DME h/mic..... £45.95
Kenwood MC45 DME..... £49.95

Sadelta XL30 Desk microphone. Made in Spain especially for Kenwood Icom and Yaesu radios – The electret insert gives outstanding clarity..... **£46.00**

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High quality Japanese manufactured – outstanding performance.

End fed zepp antennas Using vinyl coated annealed copper wire – supplied with matching unit for coax feed.

ZA3.5F (39 mtrs long)..... **£79.95**
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EL40X (3.5/7MHz) 12.9 mtrs **£89.95**
EL40XC Pair of 40 mtr traps ... **£19.95**
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Suitable for: Dipoles, Long Wires, VHF/UHF Beams, GSRV and many other antennas.

A new and inexpensive aluminium 10 metre retractable mast that may be used at home or for portable use. Easy to erect in minutes - your antennas can now be independant of trees, buildings and other make shift fixing points! The steel guying rings are corrosion protected to provide years of useful life. Because individual requirements vary guy wires are *not* included. A base fixing plate is available as an extra.

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Icom IC-737 – A new full coverage HF transceiver with Auto ATU, Electronic Keyer, good receiver an a host of extras.....**£1350**

Icom IC-728 – If you like Icom, you'll like the 728 HF Transceiver. As expected, built to a high standard. Full coverage, 100W o/p, many accessories.....**£Under 1000**

Icom IC-735 – This is more than just another transceiver - well designed & stylish in looks with an enviable performance. All the usual features and still.....**£1069**

Icom IC-W21E – Twin band handie with full duplex "Whisper" mode. C/W NiCad and charger.....**£425**

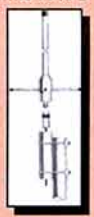
Icom R-100 – The mobile monitoring station. 500kHz to 1.8GHz. What more is out there? 100 mems, AM, FM & WFM modes.....**£565**

Icom R-7100 – An affordable - professional grade receiver. Hosting 25-2000MHz coverage & a whole 900 memories to play with! Full colour brochure available.....**£1259 incl. free discone**

Icom R-72 – Lets not forget all the S.W.L's - Icom haven't with this general coverage H.F receiver 100kHz-30MHz. All mode (FM optional) with 99 mems for favourite frequencies.....**£759 incl. free antenna**

SCANNING ANTENNAS

WB1300 Discone – (25-1300MHz) Stainless steel top of the range "N" type connector. Complete with short mounting pole and clamps. 8 elements with vertical whip. Suitable for transmit on 6m, 2m, 70cm, 32cm, and 23cm bands. Length 1.7 mtrs.....**£49.95**



Nevada Scanmaster – (500kHz - 1500MHz). New high quality wide-band receiving antenna uses fibre glass/stainless steel with 4 small radials. "N" type connector. Length 1.1 metres.....**£39.95**

Micro-Scan – (180-1300MHz). New low cost budget ground plane antenna.....**£12**

Skyband – (25-1300MHz). Our most popular stainless steel economy wideband discone. Recommended. Bargain Price ONLY.....**£27.95**

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Eartalker – A completely new concept in microphone technology. The Eartalker is a combination of earphone and microphone which is worn within the ear. It provides outstanding transmitted audio quality and is suitable for all leading brands of handheld (Call for details on your particular model). Separate volume, PTT switch and control box.....**£39**

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ERA Microreader – Data Communications decoder - decodes RTTY, CW, AMTOR (A) & SITOR (B). 16 character LCD display needing only connection to receiver extension speaker socket. Shortly to become available will be the large 4-line LCD display with built-in parallel printer driver port. Variable in-built morse tutor. (Call and reserve your optional display now).....**£169.00**

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Alinco DJ-580 – Fast becoming the top selling Twin Band handheld here in the U.K. Complete with all "mod-cons" including AM Airband RX. Comes ready to go just plug-in and charge - the perfect way to operate 2M & 70 Cms.....**£399**

Alinco DJ-F1E – Don't take my word for it but my customers agree that this is the perfect companion when considering a 2M handheld. Full coverage and again offered with Airband receive.....**£249**

Alinco DR-599E – Replacing the 590E - This little unit has an impressive 50W on each band, automatic remote repeater function (ideal raynet exercises) and a host of extra facilities including ext.RX. Full colour brochure available - call us now! **£599.95 incl. free duplexer**

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Alinco DJ-F4E – A popular novice band radio on 70cms. Simple to operate handheld with 40 memories and 5 Watts output....**£269**

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Superb Japanese low loss cable with aluminium foil and braid double earth screening, tough weather resistant yet flexible. Fantastic low loss – suitable for high power and frequencies up to 3GHz.

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Losses quoted at 100MHz

CONNECTORS (for above)
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BNC.....**£3.75**
PL259.....**£1.50**

KENPRO RADIO

KT-44 – 70 cms handheld. Thumb wheel frequency control. Full 10MHz! Ideal novice or repeater user. c/w NiCad, beltclip & charger.....**£159.00**

KT-22 – Popular 2M version of the KT-44 with simple NO FUSS operation. Ideal standby handheld or for use on Packet.....**£149.00**

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ALAN CT-145 – Fully featured 2M handheld with options for DTMF & CTCSS Paging. 5 watts output is available when powered from external 12V DC supply. Now with extended receive - 130-169MHz. Excellent reliability & performance.....**£199.00**

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As a Sony Shortwave centre, we stock a complete range of Sony Shortwave product. Here is a selection of our best sellers:-

SW77 – One of the best new editions to the Sony range. The SW77 covers 150kHz-30MHz plus an additional 76-108MHz. With a rotary tuning dial, 125 scan memories, the reception of AM/FM/USB/LSB and CW modes is a breeze. Fitted tape record facility finishes this superb all round receiver.**£349.95**

SW1E – Pocket Shortwave plus VHF Commercial radio. Each unit is supplied with headphones, case and shortwave guide. This model will not hurt your pocket..**£139.95 this month only**

SW55 – A new portable that gives good reception of SSB and all modes from 150kHz to 30MHz and 76–108MHz VHF...**£269.99**

SWR/POWER METERS

Diamond SX100
(1.6–60MHz) 3kW.....**£124.95**

Diamond SX200
(1.8–200MHz) 200W.....**£89.95**

Diamond SW400
(140–525MHz) 200W.....**£99.95**

Revex W520
(1.8–200MHz) 200W.....**£79.95**

Zetagi Mod 700
Professional line using 2 separate sensors 2–3MHz, 120–500MHz, cross needle power/SWR up to 1kW.....**£99.95**

OUR NEW SPRING EDITION CATALOGUE IS OUT NOW, PACKED FULL OF INFO AND NEW PRODUCTS
ONLY £2
(includes discount voucher)

NEW VECTRONICS AMP

Vector 500. "Canadian Punch!" A full 1000 Watts PEP on SSB enables you to beat the pile-ups. Now available here in the U.K. Top band to 10 from only 60-80 Watts input. Call now for your brochure!.

- 4x811A Low Cost Tubes
- 600W C.W. 1000W PEP
- Compact 24lb weight

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We buy as well as sell new and used radio equipment, please feel free to call Paul or John on our Hotline for an instant quote on either P/X or Buy-Ins.

Yaesu FT-690 6m Porta Pack **£345**
Yaesu FRG-9600 25-950MHz RX **£365**
Yaesu FT-290R 2m Porta Pack **£325**
Icom R72 Short wave RX, boxed **£695**
Trio JR500/S RX, Old Faithful **£99**
Tokyo HC200 ATU (80m-10m) **£99**
Trio R1000 Short wave digital RX **£325**
Yaesu FT-902DM HF TX, vgc **£625**
Adonis 308 deck mic, boxed **£65**
Icom R100 mobile scanning RX **£425**
Tokyo HT-120 20m mobile TX/RX **£245**
CT1600 2m H/H c/w BS25 & h/set **£165**
Kenwood TR-77 twin band h/held **£325**
Alinco DJ-560 twin band h/held **£345**
Kenwood TS-530/S HF TX, vgc **£549**
Tokyo HX-240 HF from 2m transv **£185**
Adonis 508 desk mic (compressor) **£75**
Yaesu FRT-7700 s/w RX ATU **£49**
Trio R2000 s/w receiver, vgc **£549**
Icom IC-R71E s/w receiver, vgc **£675**
Yaesu FL2000B HF 1kW PEP amp **£495**
Yaesu FT102 HF transceiver **£625**
Sommerkamp FT1012D HF TX/RX, vgc **£495**
Yaesu Memoriser 2m FM mobile **£185**
Trio 130V c/w VFO 120 (all filtered) **£450**
Alinco DR590 c/w REM **£450**

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VECTRONICS

Vectronics – Canadian based - HIGH QUALITY PRODUCTS

ANTENNA TUNING UNITS

VC300 – 150 Watt (300W P.E.P.) ATU with dual pointer metering of FWD/REV/SWR. Two coaxial inputs plus wire or balanced line (4:1 balun included).....**£149.00**

VC3000LP – As above but with built-in Dummy Load and peak or average pwr mtr.....**£169.00**

HFT1500 – 1500 Watt ATU (3kW P.E.P.) coax, line wire, and balanced line inputs (4:1 balun included). Peak and average power reading meter. High quality roller coaster and slow motion variable capacitor drives allow you to match just about anything!.....**£399**

PM-30 – Power/swr meter reads peak/average power up to 3kW 1.8–60MHz.....**£89**

NEVADA ATU COMPONENTS

HIGH POWER VARIABLES – 150pF, 170pF or 250pF (7.8KV).....**£19.95**

T.V.I. SUPPRESSION

KENWOOD LF30A – 1.5kW low pass filter provides more than 60 dB suppression above 35MHz.....**£39.00**

GLOBAL HP-4A – UHF TV high pass/band break filter.....**£9.95**

CAR SUPPRESSION

FU400 – RF suppressor for use with either car alternators or generators (effective 2.2–400 MHz).....**£7.95**

HF NEWS

continued from page 13

(and therefore Jan Mayen) stations are only licensed to use A1A on the WARC bands with a power output of 100W. The use of 1.820 to 1.850MHz is also restricted to A1A only with a maximum input of 15W. HV3SAC in **Vatican City** is a new station.

Bob Parkes, G3REP, has now returned to the UK from the Sultanate of Oman where he was A45XF. He has also been active as 4S7RPG and QSLs should be sent to the address in *QTH Corner*. **Kazakhstan** seems to have implemented prefix changes because UL7s seem to have become UN7; UL8s, UN8s and RL7s, UN9s. UL is now believed to be **Uzbekistan**.

'A51JL' has been on the air claiming to be in **Bhutan** however there is a feeling that this is not so. Jim Smith, VK9NS, hopes to operate from there again soon but no details were available at the time of writing.

The Hervey Bay ARC (of Queensland) will be running a special activity week during the first seven days of August. They will use 3.794, 14.235, 21.250, and 28.495MHz (7.1MHz is also mentioned but should not, of course, be used in the UK). The club has a number of QSLs left over from it's 1991 expedition to Fraser Is – please apply to the address in *QTH Corner*.

EXPEDITIONS

RSGB DX News Sheet quotes an interesting feature from the *OPDX Bulletin*: The Russian traveller and explorer Fedor Koniukhow continues on his way, possibly to Bouvet Is and now maybe Spratly. From the yacht *Admiral Nevelskoj* (R0L/MM) traffic is passed at 0800 on 14.275kHz. The operators are the captain, Leonid Lysenko, and the leader of the expedition, Fedor Koniukhov. Communication support is provided by UA0NL and others from the Far East. The expedition has bought a second yacht that is named *Formoza*. On this yacht Taiwanese amateur BV2AH, Tony, is among the members of the expedition team. The radio station on *Formoza* has been given the licence of BV0MM. At the present moment, both yachts have travelled from Taiwan to Hong Kong, and now they plan to travel to Singapore with a possible stay and landing at Spratly Is. The possible callsign on Spratly will be 1S/R0L.

Further plans for the expedition are landing on eastern Atlantic and Bouvet Islands (the licenses have already been received from Norway and Chile). For those interested in taking part in the expedition to Bouvet Island or to offer advice/assistance in working from different islands please contact: Yuri V Zaruba (UA9OBA, Chief of Radio Support of the Expedition), PO Box 1, Novosibirsk-92, 630092 Russia, CIS (Phone +7 383 2 46 27 65).

Four German amateurs – DJ0WQ, DJ2ZS, DJ4LK, and DK2WH – hope to operate from **Penguin Is** between 24 July and 3 August. They will be on all bands 1.8 to 28MHz on CW, SSB, and RTTY. Following this they are scheduled to visit **Walvis Bay** and **Namibia.**

It is reported that the DXCC administration has asked for additional documentation from 3W8RR in connection with his P5RS7 operation. It is rumoured that this is paperwork which can only be obtained in PDR Korea.

PROPAGATION

THE G8KG REPORT this month is a very short one: "The slow decline in solar activity reported last month continues during the second half of April and early May, the 27-day average solar flux sinking to 111 sfu, the lowest value for five years. The arrival of a new active region then caused a small recovery together with some rather disturbed days. The overall effect of this was to make conditions on the higher bands rather patchy, though by the middle of May Es was beginning to make its summer contribution".

THANKS

ONCE AGAIN to all those who wrote and to the editors of the following for news snippets: *RSGB DX News Sheet* (G4DYO), the *Lynx DX Bulletin* (EA2KL), the *EA DX Boletin* (EA1QF), *DX'press* (PA3DZN), and the *Long Island DX Bulletin* (W2IYX). Please send everything for the **September** column to reach me no later than **July 22.**

DX NEWS — SHEET —
A Must for HF DX Enthusiasts
See pages 94-95 for how to order
RSGB, Lambda House, Cranborne Road, Potters Bar, Herts. EN6 3JE

VHF/UHF NEWS

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

SPORADIC-E got off to an early start on 144MHz this year with a good opening on 12 May reaching as far as all Greek call areas. After some time in the doldrums, 50MHz came to life with several Es events and new countries available. There is news of several DXpeditions taking in the Perseids meteor shower; this could be a spectacular shower this summer.

UK BEACONS

THE MID-CORNWALL Beacon Repeater Group operates beacons in the 50, 70, 144 and 430MHz bands with the call GB3MCB. Their location (IO70OJ) is a site owned by South West Gas. Ted Warne, G3YJX, wrote that ". . . . the 1296MHz beacon has been taken out of service as the Company expressed concern over the increase in numbers of beacons operating from their site." Before spending time seeking an alternative site, and then effort and money on reinstating it, the Group would like to find out if there is a demand for this beacon. Ted is QTHR, so please let him know.

Someone who does appreciate the beacon service is Jack Hum, G5UM (LEC). He wrote: "A word of thanks to all who helped install GB3BSL on 432.930MHz on a hill behind Bristol. To G5UM at 104 miles, it is a useful propagation indicator, audible at all times."

MOONBOUNCE

NEWS

The following is compiled from notes in the May issue of Allen Katz's, K2UYH, *432 and Above EME News*. LU7DZ is now QRV on 70cm and has worked several Europeans. Eduardo runs 650W from a K2RIW PA to an array of four 33-ele BV (DJ9BV-type) Yagis. He frequently monitors 28.420MHz. As reported last month, EA6/DF5JJ is QRV on 23cm. Peter uses a 3.7m dish on a tripod with manual tracking, VE4MA feed, MGF1302 LNA (Low Noise Amplifier) and 450W at the feedpoint. He has no immediate plans for 70 centimetres. UA4API/A plans operation from LN39, 10-15 Aug using 1kW and two 7.5m BV Yagis.

ACTIVITY

Looking through recent K2UYH data reveals that dozens of British amateurs are active on EME on 432MHz and above. Many others are making contacts on 144MHz but their activities are not covered in Al's publication. The majority seem to adopt a low profile and very few send any reports to *VHF/UHF News*.

It is obvious that interest in this ultimate challenge mode is growing quite steadily. The most likely operators to start an EME career seem to be those who have worked 200-plus squares and who wish to widen their horizons. Those contemplating EME tests are keen to learn how others got started and assembled efficient stations. So how about revealing your early experiences?

The next sked weekend is 17/18 July but, as this is a New Moon period, Sun noise will be a problem. The next perigee weekend

Three VHF columnists: (l to r) Dave Butler, G4ASR, 'VHF Report', *PW* (and RSGB VHF Manager); Emil Pocock, W3EP, 'The World Above 50MHz', *QST*; and our own Norman Fitch, G3FPK, seen visitng RSGB HQ recently.

is 24/25 July. In London, Saturday GMT moonrise/moonset times are 1110/2135 and on Sunday 1230/2205. Declination drops from –7.9° to –14.5° in the period and the sky temperatures behind the Moon are 313 and 22° Kelvin for 144MHz and 432MHz respectively. All-in-all, it won't be a particularly brilliant weekend with a signal degradation on 2m about 2.7dB from the best possible value.

DXPEDITIONS

Jerry Russell, G4SEU, and Roger Banks, G4WND, plan portable Scottish MS operation from IO78 square on 11/12 August. 0900-1300 and 2200-0100 on 70.170MHz SSB; 1700-2000 on 50.370MHz SSB; 2000-2130 crossband SSB: Tx 70.170, Rx 50.370MHz. They will use 1min periods with a 'break' every 15s and will transmit in the first period.

Skeds will be accepted outside these random times. Telephone Roger on 0827 894464 prior to 5 August or write to Jerry at QTHR. They hope to be QRV on the European VHF net on 14.345MHz and also on 7.048MHz at 0800 and 3.748MHz at 0830 on 10/11 August, all times GMT.

Keith Tatnall, G4ODA, wrote that members of the Five Bells Group plan to operate from IP24 square in Iceland. They should arrive on 29 July, departing early on 12 August. They have a 500W permit for 2m EME and MS, and a 25W permit for 6m, but no operation on 6m is allowed 1800-2300GMT. Likely 2m QRGs are 144.028 and 144.215MHz and they will be on the 20m VHF net. The group will comprise G4DHF, G4ODA, G8IJC and G0JLF, calls being owncall/TF/P. No 70cm operation is planned due to lack of operators.

Paul Pasquet, G4RRA, wrote about IN79JX operation, 7-14 August using the call G4XBF/P. This will be a mainly MS project and no skeds will be taken. On 2m, they will use an IC275H, 3CX1500 PA and eight 9-ele Yagis and on 4m an IC751E, transverter and 100W PA with a 4-ele Yagi. They will be QRV on HF, too. The team will comprise G4RKV, G1KAW, G4RRA and G4XBF; G0NFA may join them.

REPEATER NEWS

IN CASE you missed the item in the 23 May *GB2RS* news broadcast, the Arfon Repeater Group has obtained a special licence allowing the first cross-linking of a UK 2m and 70cm repeater. This is the culmination of lengthy negotiation between the RSGB and the RA. The repeaters are GB3AR on R4 and GB3AN on RB4. They can be linked by DTMF (Dual Tone Multi Frequency) tones resulting in the two repeaters operating as one.

In use, you open up either repeater with the usual 1750Hz toneburst, access being confirmed by pips. You then dial DTMF tones of 9, 6 and a K in morse will confirm initiation of the cross-link; a B indicates that the other repeater is busy. This is an experimental set-up and changes may be made. Users should send reports, good or bad, to Brian Davies, GW4KAZ, who is QTHR.

METEOR SCATTER

THE PERSEIDS shower this year *could* be a spectacular event, both visually and on radio. In last November's *VHF/UHF News* I referred to the parentage of this stream as Comet Swift-Tuttle and how it had 'gone missing.' It was rediscovered last September by Tsuruhiko Kiuchi, a Japanese amateur astronomer. Astronomers are now certain it is the same object that Kegler observed in 1737.

In 1992, European radio amateurs reported exceptional reflections in the 1900-2100GMT period on 11 August; G6ZWP recorded a 3min burst at 1948 when IK0CXO (JN52) peaked at S9+60dB, for example. In the USA, peaks were noted at 1400, 1545 and 1845. It is unwise simply to add 5h.40min to these times to predict when similar peaks might occur this August. The best advice is to be prepared for exceptional activity any time between about 1800 on the 11th and 0600 next morning, and to accurately record the times of significant bursts.

Cloud cover permitting, the shower could be visually brilliant. For UK observers, at midnight GMT on the 11th the radiant will be ideally placed at 44° in the NE sky and rising, thus providing optimum conditions for NW/SE radio paths. The Moon will be in its last quarter and doesn't rise till 2300 in London. The IMO *1993 Meteor Shower Calendar* recognizes two peaks at solar longitudes (LS) 139.6° and 140.1°, corresponding to 0400 and 1500GMT on the 12th.

What about operating techniques should the shower reach storm level? If it does, there may be lengthy periods on 2m sounding like an Es opening, which, in a way, it would be. There would be no point in everyone shouting on the MS reference frequencies since single burst QSOs could be made anywhere – so spread out. For those who can tear themselves away from the VHF bands, it would be worth trying on 70cm.

The possibility of a Perseids storm has reached the popular press. Arlen Pardoe, GM0HUO (FFE), sent a clipping from the 24 May edition of *The Scotsman* warning of possible damage to orbiting satellites, for instance. I am indebted to Alastair McBeath, vice-president of the IMO, who kindly supplied data, and to Emil Pocock, W3EP, editor of The World Above 50MHz in *QST*, who gave me a copy of his Perseids article, due to appear in the July issue, when we met at RSGB Headquarters on 27 May [see photograph opposite].

50MHZ

IT MAKES a welcome change to report a lot of activity now that the Es season is well under way. There are some new prefixes and DXCC countries to work this year. To summarize, Czechoslovakia has been deleted and replaced by the Czech Republic (OK) and the Slovak Republic (OM). The ARRL has added Macedonia to the DXCC countries list, following UN recognition on 8 April. The ITU has allocated the series T9A-T9Z to Bosnia-Herzegovina – see page 13 in the June *RadCom*.

PROPAGATION

In the Six and Ten Reporting Club's April report, editor Ray Cracknell, G2AHU (HWR), mentions the rapid fall in the mean sunspot number since February 1992, when it was 160, to this April's value of 62, as recorded by Boulder. (The number fell to 12 at the last minimum in September 1986). The corresponding solar flux values, as recorded at the Penticton observatory in western Canada, were 227 and a provisional 117.

Ray comments: "It is unrealistic to hold any hopes of normal F-layer propagation into Britain on 50MHz between now and sunspot minimum although sporadic-E can still be expected to function even better during the sunspot minimum period." (Visitors to the Propagation Studies Committee's stand at the March RSGB VHF Convention will recall seeing a graphical illustration of this inverse correlation phenomenon).

NEWS

The Irish Department of Communications has confirmed that the period of an approved 50MHz permit can be extended from one to three years on application. Ted Collins, G4UPS (DVN), reports that KM1E now has the permanent call, C6AGN, for use in the Bahamas. Bill's QSL manager for previous C6A/KM1E and current C6AGN operation is KA1DIG. CN8CC is a new Moroccan station whose QSL route is via F6FNU only; the other CN8s on the band are BA, HB and ST.

The QSL route for Ben, UC2AA (KO33), and Larry, UC2AAA, is via F6AML at PO Box 40, F-77120 Coulommiers, France. They had planned to operate from various parts of the Belarus Republic as EV9A and EV8A respectively in late May. 4X1MH (KM72LT) is QRV and made his first European contacts on 16 May, including about ten Gs. QSLs for SP4TKK/2 QSOs made on 21 May, when Chris was in

ANNUAL VHF/UHF TABLE
JANUARY TO DECEMBER 1993

	50MHz		70MHz		144MHz		430MHz		1.3GHz		Total
Callsign	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Points
G6HKM	16	20	–	–	60	16	33	9	6	6	166
GW0PZT	–	–	–	–	58	13	–	–	–	–	71
G7EWL	11	1	2	1	36	6	7	4	–	–	68
G3FIJ	–	–	16	2	23	6	14	7	–	–	68
G3UOL	–	–	–	–	53	12	–	–	–	–	65
G1UGH	7	9	–	–	36	11	–	–	–	–	63
GI4OWA	2	9	–	–	28	13	–	–	–	–	52
G7CLY	8	8	–	–	9	3	2	1	–	–	25
GW6VZW	8	16	–	–	–	–	–	–	–	–	24
GU4HUY	–	–	–	–	16	6	–	–	–	–	22
G3FPK	–	–	–	–	4	6	–	–	–	–	10

British counties are those listed on page 65 in the January 1993 RadCom; 77 in all. Up to three different stations allowed in all 12 GM regions. Do not include EI counties. Countries are the current DXCC ones plus IT9. Deadline for the next appearance is **29 July**.

JO92IZ, should go via his father, SP4KM.

Angelo, I2ADN will be operating this summer from JN51, a very rare square since there is only a tiny area of land in the NE corner; QSL via the bureau or direct. David Court, OZ3SDL/G3SDL has a special 6m permit and should be QRV from JM09 till 3 July; QSL to Egebakken 18, DK-3520 Farum, Denmark. EA8SIX (IL28) on 50.075MHz is a new beacon reportedly running 10W. EA8ACW is its keeper and EH5CHN has heard it.

ACTIVITY

Terry Chaplin, G1UGH (SFK), made Es QSOs on six days in May. 11th to EH7; 12th to I2, I4, I6-8, I0 and IT9, plus IK8HJC/ID9 (JM78) on Salina Island. in the Eolie group; 15th to ES; 17th to YU1; 18th to 9H and 24th to OK2. G5UM reports that the East Midlands FM net, established at Christmas 1987, continues meeting every Friday on 51.41MHz, 1930-2000 local time.

Ela Martyr, G6HKM (ESX), reports Es to 9H and I on 27 April. In May, on the 8th, she worked SP4TKK (KO03). The 12th was a good day with EH, I and ZB0 worked and SV and CN heard. New squares were EH1BCB (IN63) and I8TUS (JM89). SM3NRY (JP82) was new on the 14th, which also yielded OY3JE (IP62) and a couple of ESs. Next day she made QSOs with ES, OH, OZ, PA and SM stations. On the 25th, from 1700, 9A3FT (JN83) was another new square in a 45min opening which brought contacts with 9A1, YU1 and YO7VJ (KN14).

On 24 May, Mike King, G3MY (YSS) was called on CW by UB5BW in Odessa at 1245. The Ukrainian was RST558 but the contact was not completed; there was Es to Poland at the time, so was this double-hop Es? Graham Carrington, G8WVI (NOT), has recently returned from a five year work stint in Africa and is now QRV on 6m. On 27 April, using a TS-600 to a dipole, he worked I4CIL and I8TWK (JN64) at 1410, with 9H and CT heard. Nothing was heard or seen on Band 1 TV, though.

G4UPS and G3CCH are able to complete their morning tropo skeds every day now. Ted is also conducting experiments with SM7AED (JO65) at 0800GMT and they frequently complete. He is not convinced they are by MS mode and has observed these characteristic signals from SM and OZ at the beginning of each Es season.

Ted's comprehensive report lists some Es activity from Britain on 27 April and May 8-10, 12-18 and 21. The best day was the 12th and his best DX were 4X4IF at 1651 and 5B4JE (KM64) at 1841; Lebanon beacon OD5SIX was S8 at this time. C31HK worked into northern England and Wales this day. Highlights on the 13th were QSOs with UC2AA (KO33) at 0926 and CT3FT (IM13) at 1527; 15th, OM3OM (KN08) at 1356; 16th, 4X1MH (KM72) at 1625 and on the 21st, SP4TKK/2 at 1244.

Geoff Brown, GJ4ICD, sent a very detailed report. 9 May brought CT3FT at 1028, then Cedric worked other Gs. On the 12th, beacon 5B4CY was S9 for five hours from 1345. At 1630 beacons V51VHF and ZD8VHF were S9+ for 40min, Es enhanced TEP being the suggested mode. On the 19th, C31HK was S4 on tropo for a minute but could be detected most of the time during the sked.

144MHZ

ALEC TRUSLER, G0FIG (SXW), was inactive for five months, so was delighted when his first QSO after the break was on 12 May with IW8PPJ (JM78) and IW9CER via Es. The lunchtime opening lasted 45min but activity was very low. Tropo was good to SE France on the 16th when he worked F1JRX (JN25) and F6FTC (JN26).

On tropo G1UGH worked: on 27 April, DG9BDV (JN33); 2 May, FF6KIM/P (JN38); 3 May, G1JKX/P (IO95) on Longstone Lighthouse for a new square; 15 May, GI1CET (IO74) and next day GD4IOM, GM4ZAP/P and GM4ZUK/P (IO86). In the 12 May Es, Terry worked IK7UXY (JN90) for a new square, and heard SV3KH (KM07) and 9H1BT (JM75) before fade-out at 2020.

Paul Kerslake, G4NDG (DVN), returned from holiday in Crete at 1600 on 11 May, so was very pleased to catch the Es next day. His successes in the first session at 1210 were IT9DEC (JM77), IW8PPJ, then at 1601 SV9ANJ (KM25) and at 1638 SV1OH (KM18). The SV9 is in Heraklion which Paul left just 24 hours earlier. He mentioned there were thunder storms at both ends of the path; significant? Mark Holloway, G4YRY (DOR), missed the 12 May Es – he was busy gardening – but wrote that G0KON (DOR) worked SV1OH at 1641. According to his records, this was only the second reported Es opening for this time in May.

G6HKM contacted GI4KSO (IO64) on 2 May. At 1811 in the Es opening, Ela worked her first Greek station, SV3KH, a QRB of 2269km. IK7UXY (JN90) was also contacted. Tropo on the 24th yielded GM4AFF and GM1LPZ (IO87) and at 2247 on the 25th, GB3LER was S9; she was able to work GM0HTT (OKE), GM0ILB (SLD), GM4GUF (LTH) and GM1TDU (GRN).

May brought no auroral propagation to GM0HUO's QTH but tropo was quite rewarding for Arlen. LA3EQ and LA2PIA (JO28) were up to S9 at 2140 on the 11th. LA2PHA and LA0GH (JO38) were heard at 1540 next day, then at 1835 OZ1JVX and at 2200 OZ1BUR (JO46) were worked. The 15th brought QSOs with G, GI and GMs in IO74, 77, 87 and 93 between 1625 and 1856. Next day, 0935-1147 saw contacts with G, GD and GWs in IO74, 81, 82, 90, 91 and JO03. On the 22nd he completed on MS with LA6K (JP43) on CW from 0430 for a new square, by 'tail-ending' someone else. On the 25th, LA1ZE (JO28) was worked at 0732 and the evening produced QSOs with ON and PAs in JO20, 21 and 22.

Edward Allely, GW0PZT (GDD), participated in the May 1/2 contest but found no real DX; his best was F6HPP/P (JN19) at 686km. The Es on the 12th did not reach Pwllheli. Between the 19th and 23rd tropo was good enough to support QSOs to the near continent, such as ON4ANT on the 20th, and his brother, ON4GG, on the 23rd. The ONs, who operate from the same QTH, now have 140W to four 17-ele Yagis. The 23rd brought a contact with TM6SM (IN99KL) on an island (EU81) just off the French coast.

G5UM reminds us that Monday night is still CW night on the band, so check for signals from 2000. He wishes people would identify their QTH and where they are beaming when calling CQ. This applies particularly to operators who aren't listed in the *Call Book*. He suggests sticking to the recommended ICAO phonetic alphabet rather than using country names. (How about the WW2 8th Army version, Jack? 'Ay for 'orses, beef or mutton, C-forth Highlanders . . . . X for breakfast, etc! Does any reader have an authentic copy of the complete work?)

430MHZ UP

G6HKM RUNS 100W on 70cm which was enough to get a RS51 report from GM0ILB on 25 May. Unfortunately his 25W couldn't be heard in Great Waltham, so that was a got-away for Ela. About 23cm, she remarks: "If there has been any activity on the band I've missed it!"

G8WVI uses an FT-790, 10W PA and 19-ele Yagi on 70cm. In the May 1/2 contest Graham found a welcome increase in activity and worked stations in IO81, 91, JO01, 03 and 21 in fairly average conditions. Otherwise activity on SSB is very sparse. Wryly he comments: "I can't decide whether to invest in 4m or 23cm for my next slice of white noise!"

ANNUAL TABLE

ENTRIES IN the annual five band table seem to decline every year. Sometimes, previous participants say they'll give it a rest for a year, perhaps to concentrate on some other activity, like building or microwave work. You can enter any time and the points are based on unconfirmed contacts. If you want a copy of the simple rules, drop me an SASE.

COPY DATES

THE **AUGUST** deadline, which you may just make, is **1 July**, the **September** one is **29 July** and the **October** date is **26 August**. My fax machine is on 081-668 5582 which is not a dedicated fax line. When I am out of the office, or in bed asleep, it operates as a fax machine or answerphone depending whether it detects fax tones or speech. In speech mode it will record up to one minute, so please be brief.

CompuServe E-mail is excellent, my ID being 70630,603. If accessing via Internet, use 70630.603@compuserve.com – note the dot instead of a comma. The BT Gold mailbox is 76:MSX021 but BT is discontinuing Gold some time, hoping we will subscribe to Mailbox. However, there appear to be problems when using Mailbox with MicroSoft Windows, so we haven't decided whether to join.

RADIO AURORAS

Charlie Newton, G2FKZ

This new book gives a technical account of the latest research into how auroras are caused, how they can be forecast, and how best to use them to work DX.

Members price: **£5.95** plus p&p

RSGB, Lambda House, Cranborne Road, Potters Bar, Herts. EN6 3JE

QSL

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

ALAN HICKMAN, G0IAS, has written to say that despite any rumours to the contrary he is *NOT* the QSL manager for 5Z4FM and cards for that call should be sent to PO Box 34168, Nairobi, Kenya. He says that he will QSL direct cards for 7Q7RM and 7Q7JL accompanied by appropriate return postage but cannot handle directly cards sent to him via the bureau.

● Les James, G0EXY, considers it is high time the ARRL allowed national amateur radio societies to authenticate applications for DXCC thereby obviating the need to send cards to the USA. I must say I spent one or two anxious moments whilst mine were away and was much relieved when they were returned safe and sound.

● Iren, HA5AHT, says that a new QSL bureau has been formed in Hungary which will handle all cards for Hungarian amateurs irrespective of HRAS membership. The address is Central QSL Bureau, Budapest PF.840.1525 Hungary. I am not sure what status this bureau has but I pass on the information as requested.

● Hilary Claytonsmith, G4JKS, has sent me an interesting QSL card reproduced below which is the card of a lady well-known in her day for the book she wrote on Morse code. Apparently Margaret was a keen CWer (well, who isn't?) although the card is for a phone contact!

● The USA 6 call area operates a bureau behind the home of Archie Willis, W6LPJ, in Sun Valley, California. I am grateful to him for the information on the set-up there. The bureau deals with incoming cards and handles about 400,000 per year. Outgoing cards from the whole of the US are dealt with by the central QSL Bureau at ARRL HQ. The W6 bureau is staffed by about 60 volunteers. A few sort the cards initially by 'segment', that is the letter immediately following the 6. The cards are then re-sorted by complete callsign for storage or onward transmission to the relevant amateurs. They utilise about ten sub-managers who call into the main bureau and collect the cards for their customers. The rest of the cards are sent out by parcel service to those sub-managers located too far out to call in personally.

The main difficulty they face is that many do not subscribe to the service and so they have to destroy large quantities of cards after a period of retention.

● Ken Cheetham, G4RWD (ZF1WD and ZD8WD), wrote to say that he has answered nearly all cards received direct for the ZD8 operation in 1991 but there might be delay with cards sent via the bureau. Ken explains that some of these go via RSGB and some via ARRL. The latter are routed to Ascension Island and as their club meets infrequently the delay is inevitable. Steve, ZD8LII, is forwarding what cards he can on to Ken but Steve returns to the UK shortly and so that route will disappear. Ken says if you really want to get a card from him then mark it ZD8WD 'via G4RWD via RSGB'.

As to the ZF1 operation in 1992 Ken ordered some QSL cards from the USA and they have failed to arrive so he has to start all over again using a UK supplier this time! Once he receives these he will send them out. Again the correct route is via G4RWD via RSGB. Ken apologises for the delays and hopes people will understand.

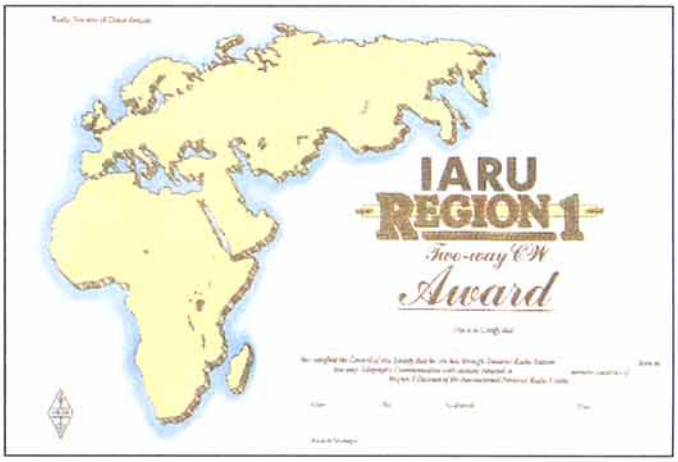
He also says he has suffered at the hands of incompetent operators whilst operating a DX station. One South American station has sent him a card with no date on it, no time on it the band is described as 15 or 20 metres (he is not sure which one it was!) and the message on the card reads "Pse QSL for my DXCC" – no comment!

The QSL card of Margaret Mills, G3ACC, original author of *Morse Code for Radio Amateurs*. An updated version of which is still available – see *Book Case* pages 94 and 95.

● We have at last received about 15 parcels of cards from Russia. This is the first consignment for some months now and one hopes that things are getting straight out there. That is the good news. I suspect that the bad news is that there are about four million cards out there still awaiting sorting!

● Adrian Donaldson, GM0SRD, got in touch with me about ET3YU (the 'pirate' from Ethiopia). Apparently Adrian worked him on phone recently and got a QSL card back promptly but this time the word 'pirate' is missing! If anyone works Dragan he can be reached through PO Box 60349 Addis Ababa. The call has been accepted for DXCC so it looks as though it is a genuine operation after all.

● John Kay, G3AAE, wrote to let me know that no plaque has been issued for contacting all Commonwealth countries. In fact one cannot be awarded until there is VP8 activity from South Shetland Islands. John says that although several South American countries have bases and operators there it is no good until the Brits activate the call. John ought to know because it is the only call he needs for the full house – and the plaque!



AWARDS

NOW FOR ANOTHER SOCIETY award to go for although I must confess it is an aspect of amateur radio with which I am totally unfamiliar. My knowledge of microwaves is limited to those things one puts coffee in to reheat! Although I was taught all about klystrons, magnetrons and resonant cavities in my RAF days the memory has dimmed.

It is the Microwave Award, pictured on this page, which is designed to recognise achievement on the microwave bands. The rules are detailed on pages 5 and 6 of the current RSGB *Call Book* and applications should be forwarded to:

RSGB VHF/UHF Awards Manager, Ian L Cornes, G4OUT, 6 Haywood Heights, Little Haywood, Stafford ST18 0UR.

● Now for an HF RSGB Award. It is the IARU Region 1 certificate. This recognises the achievement in effecting two-way communication with amateur radio stations located in the requisite number of countries whose national societies are members of the Region 1 division of the International Amateur Radio Union (IARU).

It is available in three classes as follows:

1 Contact with all member countries on the current list (the list of current countries is shown on page 4 of the RSGB *Call Book*)
2 Contact with 45 member countries
3 Contact with 30 member countries

A special version of the award is available, in the same three classes, for contacts made on the 28MHz band since 1 July 1983.

The HF Award General Rules are reproduced on page 3 of the current RSGB *Call Book* and applications for this attractive certificate should be made to:

RSGB HF Awards Manager, Bill Ricalton, G4ADD, 4 South Road, Longhorsley, Morpeth, Northumberland NE65 8UW

● A reader has asked me about the position regarding United Kingdom postage stamps bearing the mark '1st' and whether they have a shelf life. I have contacted Post Office Counters Ltd and am told that such stamps have an indefinite life. In other words if you put them on envelopes for your QSL Manager they can be posted back to you, even after the rates have increased, without incurring any penalty – that's official.

HF F-LAYER PROPAGATION PREDICTIONS FOR JULY 1993

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	....	.........11.	...111111341	1.2343323663	645665556898	875433334688	653111111357	32........24
MALTA	....	.........11.	...122212442	211444444774	756766667898	998544445689	886311112468	++3.......35
GIBRALTAR	....	....	.........12.	1..122121452	632565555787	987655445689	886432222468	++4.......3+
ICELAND	....	....	....	121	311133222565	765554444577	676432222345	343........2
** ASIA								
OSAKA	....	....	....11..111.	...121112332	1...21112574	352	.........13.	....
HONGKONG	....	.........1..	...111112431	1.1122123663	2...11113686	1........365	132	....
BANGKOK	.........1..	...111..121.	..1222213542	211123224775	41...1113688	3........367	1........135	2
SINGAPORE	.........11.	...1111.132.	..1233223662	211223224785	51...1113688	3........367	1........135	2
NEW DELHI	.........1..	...1111.132.	1.2222224652	322222224775	64.....13688	62.......368	3........146	3
TEHERAN	...111..121.	..1222112431	113333324774	435322335787	8641...13689	851......368	62.......146	3..........3
COLOMBO	...111..1...	..122211211.	112334334442	422223335675	74...1.13688	72.......368	4........146	3
BAHRAIN	...1111.122.	..1222223542	214333335775	545322335887	874....13689	851......368	63.......146	3..........3
CYPRUS	...1111.132.	..1333223542	313555556885	646766667898	987544456799	985211123578	762......257	53........24
ADEN	...111212321	1.1323334643	424434446876	756422335888	9851...13689	873......368	64.......146	4..........3
** OCEANIA								
SUVA/S	....	....	.........11.	...111.11331	..2321.12551	..23.....32.	....	....
SUVA/L	1.........21	21.1......43	3323......75	3345......75	.1561....162	..23.....23.	...1........	....
WELLINGTON/S	....	....	..........1.	..1111....42	113421....64	..33.....152	..........2.	....
WELLINGTON/L	1..........1	21.........3	5321......16	6553......37	44651.....65	1243.....252	..11......2.	....
SYDNEY/S	....	....	..12221....1	1124321....3	212521111216	...2.....353	131	....
SYDNEY/L	1	2..........3	4212.......6	53241.....17	32362.....46	..131....153	...1......31	....
PERTH	...111......	..12221.....	1124433.....	32345331....	631121.1111.	41.......35.	1........144	3
HONOLULU	....	....	.........11.	....11..1211	..2321.123..	..331....1..	...1........	....
** AFRICA								
SEYCHELLES	...1112121..	..1323334321	314434446654	636323335777	9751...13689	862......368	64.......146	4..........3
MAURITIUS	...112223431	..1323445653	1.4434456887	4.6433335899	8262.1.12689	863......368	651......146	42.........3
NAIROBI	...111333411	2.1323445733	524534556866	846523335888	9873...12689	885......368	662......146	43.........3
HARARE	1..111334532	3..323456754	611644556887	834733335899	97751..12689	8862.....368	763......146	43.........3
CAPETOWN	....113443..	...23245651.	...45455683.	...653335861	21.631.12686	75.3.....368	762......146	43.........3
LAGOS	11244641	21.232456863	532553456886	864652235898	99762...2689	8863.....368	7631......46	44.........3
ASCENSION Is	....1112344.	32235662	32..53346885	54..53225897	984331..2689	8863.....368	7641......36	44.........3
DAKAR	1...1.132431	21.132244663	642453344886	875653223798	998631...589	8863.....268	7641......36	44.........3
LAS PALMAS	....1..1.22.	1..121122442	421354454775	753576666898	987765555799	997532222478	87521....157	552.......24
** S. AMERICA								
Sth SHETLAND	......1334..	......35461.	......45684.	.....133577.	.....1.12584	4.1......367	6531......36	44.........3
FALKLAND Is	......12233.	244662	1....1355885	3....2334787	8211.1.12579	8752.....358	6641......26	44.........3
R DE JANEIRO	1.....122331	21...2243553	642..3344786	864113333688	997321..1379	88631....158	6641......25	44.........2
BUENOS AIRES	1.....121231	21...2233453	5312.3344676	8644.3334688	9976.1.11369	8863......37	6641......15	44.........2
LIMA	11	1...1.111132	52.131232355	752342232247	986531.1..26	88631......3	6641.......1	33..........
BOGOTA	11	1....1.1.122	42.122221245	741233222247	885531.1..16	78631......3	5641........	23..........
** N. AMERICA								
BARBADOS	11	1....1111132	52.123222255	752343222257	986531....37	88631......4	6641.......2	33..........
JAMAICA	....	1.........12	31...1111134	631112221126	885431.....5	68631......2	3641........	.3..........
BERMUDA	....	1.........12	31...2111135	631112111146	874431....26	78631......3	4631.......1	.3..........
NEW YORK	....	1	2......1.123	52...1111125	76321111..15	58631......2	2631........	.3..........
MEXICO	....	11	2......1.122	42.1..111113	56332.11...1	37631.......	.431........	....
MONTREAL	....	1	2.........13	41...1111125	763211.1..15	57631......2	2531........	.2..........
DENVER	....	....	1..........1	31.........1	4432.......1	2553........	.231........	....
LOS ANGELES	....	....	....	2..........1	2332....1...	.3531.......	.131........	....
VANCOUVER	....	....	....	1..........1	22321...1..1	.3531.......	..31........	....
FAIRBANKS	....	....	....	....1.......	112321..1111	.1231.......	....	....

The provisional mean sunspot number for May 1993 issued by the Sunspot Data Centre, Brussels was 61.2. The maximum daily sunspot number was 125 on 11 May and the minimum was 13 on 19 May. The predicted smoothed sunspot numbers for July, August and September, are respectively: (classical method) 58, 56, 54; (SIDC adjusted values) 45, 42, 39.

SWL NEWS

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

UNFORTUNATELY, the Gremlins managed to find their way into the CQWW Challenge results published in May. Eighth position was taken by BRS28198 but with the following score components – 264 countries, 688 countries and 181,632 points. While on the issue of SWL contests, the RSGB's SWL Contest takes place over the weekend of 10/11 July. The rules are reproduced on this page. The HF Contest Committee and I would like to see an even bigger number of entries than the 18 received last year. The contest takes place during the IARU transmitting contest so there should be a sufficient number of stations active to keep entrants busy.

Later in the month – on 24/25 July – the first IOTA SSB contest will be held. I hope that there are a number of SWL entries to show support for this new event. The rules can be found in March *RadCom*, page 81.

ISWL NEWS

YES, THE International Short Wave League is still going strong. Indeed, I used to be G13124 many moons ago. I have a copy of their *Broadcast Bands Special Edition* which took a detailed look at those bands. I was quite surprised at the amount of DX that had been reported. It shows that listening on the broadcast bands is still practised by a dedicated band of SWLs. The Editor of this magazine is Frank Moss. He can be reached at 3 Forrest Close, South Woodham Ferrers, Essex CM3 5NR.

WHERE ARE THEY NOW?

ANGIE SITTON, ex BRS88639 and G1XEO, now G0HGA is the latest to feature in this series. Angie was very active and well-known during her three years as an SWL in the early eighties. The radio bug bit her when she was only eight years old, after her father bought an 'UltraTwin' receiver. She learnt the Morse code in the Guides and used to exchange messages via torches with a friend across the road – until her Mum told her off! Angie can now be heard almost exclusively on CW.

During her first year on the air she borrowed a Heathkit HW9 QRP rig and followed that with a TR2100M. Angie now has 103 countries confirmed on HF and can boast the WAC CW and IARU Region 1 CW awards. Having improved her CW, Angie is now a member of four High Speed CW Clubs and favours Top Band CW as the manners are better!

Angie has set a number of objectives, but will abandon them if a friend calls her for a ragchew on the key. So that she can enjoy the hobby even more, Angie has taught herself German, French, Italian and French and she is able to conduct QSOs in each of these languages.

DX NEWS

HF DX NEWS was a little scarce at the time of compiling this piece. This is, no doubt, a comment on HF conditions during April. I have to say that whenever I listened, conditions did not seem terribly good, and the same obviously applied to some of my more regular reporters. Philip Davies, G1EMD, did however mention many of the International Marconi Day stations that were active in April. Apart from the British stations that were heard, he also copied CT1TGM, DA0IMD, IY0ORP, IY1TTM, VE1MD, VO1MD and K1VV/IMD.

A new reporter is Dave, G0AII, who felt he would add his weight to my recent overtures about how good 18MHz can be. With quite a simple antenna he has done well enough on the band, and encourages SWLs to give the band a try. He uses a 5-band vertical and a half sized G5RV, so antennas are certainly not the reason for preventing more SWL activity on the band.

Going back to band conditions, Philip compared them to those of the late 1980's when S E Asia was the most favoured area for propagation of 21MHz at around mid-day. The following represent the best of the stations reported for April: 18MHz: A71CW, DU3/W4NXE, FY5FP, J52AG, JX7DFA, P40AA, V47XS, V85KX, VK9NS, VS6UW, XU6NU, ZF2QP and 7Q7XX. 21MHz: AP2AL, BY1BH, BV7/N4VA, C9LCK/P, DU1CHD/6, EL8E, ET3DX, TZ6FIC, VS6CT, XX9AS, YF7VEE, YI1MH, 5H3JD and 5X1A.

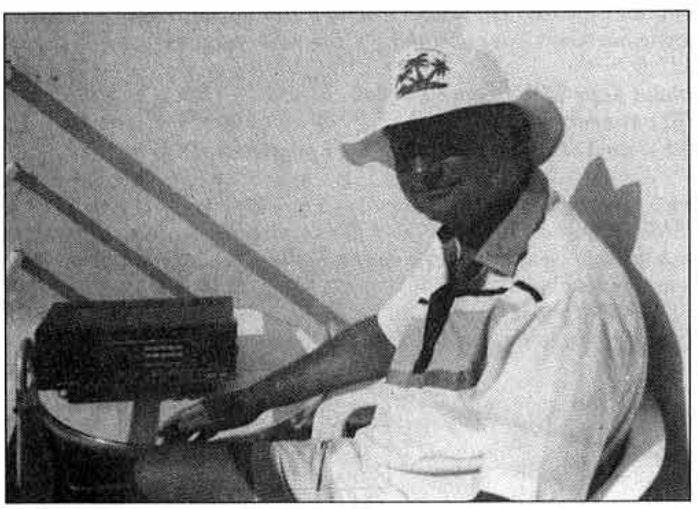
The first SWL-reported 50MHz openings occurred on 9 May when CN8CC, CT3FT, EH9IB and several EH7s were heard around 1000. Late on 12 May (while I was penning this column) a couple of 9Hs were heard. So the Es season arrived quite early. I hope for further reports on this exceptional (when its open) band during the course of the summer months.

TV DX

THREE BOOKS which anyone interested in DXTV might consider buying are the *Catalogue of TV Pictures* by Norbert Kaiser (ISBN 3-922221-31-9), the *World Radio and TV Handbook* (ISBN 0-8230-7792-6), and *A DXers Handbook* by Roger Bunney. I am sure these books have been mentioned in the column in the past, but with newcomers joining the Society all the time, it does no harm to pass on the information.

FINALE

News, views and comment for the September issue must be with me no later than 14 July.



Sun, sand and DX: David Whitaker, BRS25429, gets the most from his recent holiday in the Canary Islands.

RSGB LISTENER CONTEST 93 RULES

OBJECT OF THE CONTEST

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

DATE AND TIMES

1200GMT 10 July to 1200GMT 11 July 1993

SECTIONS AND BANDS

(a) SSB only
(b) CW only

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

SCORING

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

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

LOGS

Logs should show in columns, time (GMT), callsign of station heard, callsign of station being worked, an RS(T) report on station heard at SWL's QTH, multiplier (if any), points claimed.

If both sides of a contact are heard, they may be claimed as separate stations, and the callsigns are to appear in the station heard column. Each station heard can only appear once in the station heard column on each band. In the column for station worked, a callsign must only appear once in every three contacts logged (1 in 3) unless it is a new multiplier for the receiving station. The same 'station worked' may not be used for more than three successive multipliers.

Logs should be submitted with each band listed on separate sheets, 28MHz on one sheet, 21MHz on another and so on. A separate sheet listing all multipliers for each band should also be included.

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

ADDRESS FOR ENTRIES

R A Treacher, BRS32525, 93 Elibank Road, Eltham, London SE9 1QJ, England. Entrants should ensure their entries are postmarked no later than 2 August 1993.

AWARDS

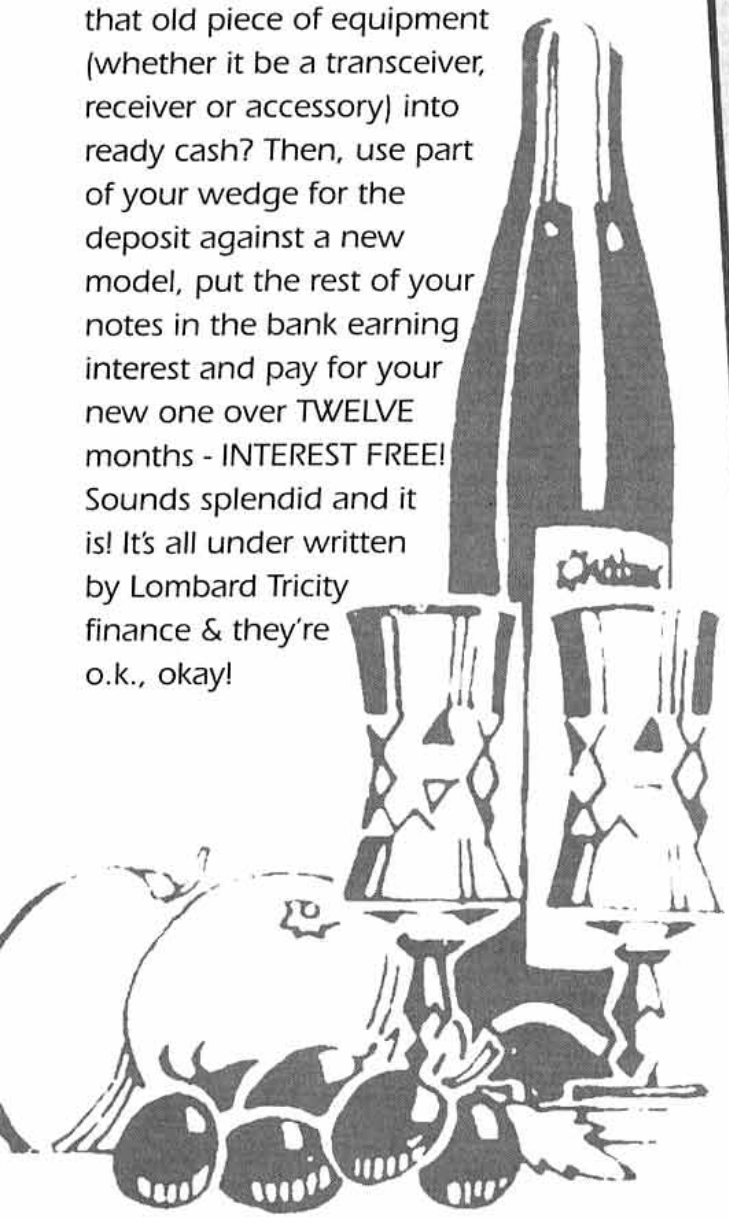
Certificates will be awarded to the leading three entrants in each section in the British Isles section provided there is a minimum of 10 entrants. A certificate will be awarded to the leading station in each country in the overseas section provided that station scores at least 50% of that section winner's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

LUNCH WI

NO SURCHARGES here...

No 10% added on, no tips required, no problems with the staff...just good old-fashioned service and advice - that's the only way to keep my customers coming back for second helpings...again and again and again!

DID YOU KNOW, that you can turn that old piece of equipment (whether it be a transceiver, receiver or accessory) into ready cash? Then, use part of your wedge for the deposit against a new model, put the rest of your notes in the bank earning interest and pay for your new one over TWELVE months - INTEREST FREE! Sounds splendid and it is! It's all under written by Lombard Tricity finance & they're o.k., okay!



A La Carte

Appetizers

Top of the menu, and the chef's 'dish of the day' is the NEW ICOM IC737. It's had all the IC735 owners drooling and I'm not surprised!
I'll pay you top money for your trade-in, be it an IC735 or not!
DEPOSIT £475.00 & 12 payments of £85.00

Why not try the new TS-50S from Kenwood. A real MINI-MOBILE H.F. Transceiver, no bigger than a TR751E 2M Multi!
Deposit £199.95 & 12 payments of £66.66
With AT-50 Auto ATU, Deposit £295.00 & 12 payments of £83.75

My favourite dish, the Yaesu FT-890. Did you know that it is now available with SPEECH ANNOUNCEMENT, (as an option), for blind operators? Only from LYNCH!
Without Auto ATU, Deposit £375.00 & 12 payments of £85.00
With Auto ATU, Deposit £495.00 & 12 payments of £90.00

Probably the tastiest H.F. transceiver in the world, the TS850S from Kenwood.
Without Auto ATU, Deposit £510.00 & 12 & payments of £95.00
With Auto ATU, Deposit £540.00 & 12 payments of £105.00

Entrees

It's crept up in price, but it's now only the same cost as an old TS940S listed at, 4 years ago! The radio? Yaesu's FT990. For Peter Hart to use words like "thoroughly recommended", I can't really comment anymore.
Without int. PSU & CW filter, Deposit £595.00 & 12 payments of £129.50
With both options, Deposit £699.00 & 12 payments of £150.00

At a 'take-away price', the Icom IC-728 offers excellent performance together with the quality feel from this famous manufacturer.
Deposit £195.00 & 12 payments of £66.66

For those of you who want a good, no frills, meat & two veg' H.F. package but also want to dabble on 6 Metres, how about the Icom IC-729? Identical to the IC-728, but with 10 watts on 50MHz as well as a full 100 watts on H.F.
Deposit £275.00 & 12 payments of £85.00

Sweets

Performance and flexibility of the "big boys", the TS-690S from Kenwood is still a tasty tempter. ***Without Auto ATU, Deposit £480 & 12 payments of £85.00. With Auto ATU, Deposit £510 & 12 payments of £95.00***

Try the the TS-450S. 100 watts, General Coverage, All Mode, Selectable filtering (no bones here) in both I.F's. Big radio features in a mid-sized package.
Without Auto ATU, Deposit £449.00 & 12 payments of £75.00. With Auto ATU, Deposit £480.00 & 12 payments of £85.00

Finally for those with a hefty appetite. The Flagships from YAESU & KENWOOD, the FT1000 & TS950SDX transceivers. If your serious, ring me for a tailored quotation to suit your appetite. If not, try the greasy spoon down the road!
FT1000 & TS950SDX, deposits from as little as £700.00.

MARTIN

G4

286 NORTHFIELD AVENUE, EALING, LONDON W5 4UB

THE AMATEUR RADI

TH LYNCH

Take away menu

Not a transceiver, but a WIDE BAND ALL MODE PORTABLE RECEIVER, the NEW MVT7100 from Yupiteru. 500kHZ to 1650mHZ, ALL MODE, in your hand.
Deposit £49.00 & 9 payments of £44.45

First the FT727, then the FT470 and now the FT530, YAESU get better and better at Dual Band portable design. Complete with CTCSS fitted as standard, are your tastebuds tingling?
Nicads & Charger included. Deposit £100.00 & 12 payments of £35.75

Tuck in to the NEW IC-W21ET dual band Handie. Massive dual display, Extended RX, superb "feel" to the user.
Nicads & Charger included. Deposit £74.00 & 9 payments of £45.00

Alinco DJ-580. Ask around the Dual-Band Handie users and the odds are they'll be using one. All the condiments, well prepared and very reliable.
Nicads & charger included. Deposit £53.00 & 12 payments of £33.00

When Angus Mckenzie, G3OSS said this is THE transceiver for Two metres all mode, he wasn't kidding. Full 25W out and don't forget the 70cm version, the TR851E!
TR751E 2M, Deposit £149.00 & 12 payments of £50.00.
TR851E 70cm, Deposit £199.00 & 12 payments of £50.00

Kenwood's TH-78E, performance, excellent ergonomics, beautiful build quality and endless user features. ***Deposit £49.00 & 12 payments of £35.00***

Side Dishes

Want a simple to use, REMOTE HEAD DISPLAY, High-Power Dual-Band Mobile, then the TM-732E from KENWOOD is for you! ***Deposit, £69.00 & 12 payments of £50.00***

Hands up those who want a SINGLE BAND HANDIE, but quite fancy the thought of being able to listen to the "other mob" on 2 or 70? The NEW TH28E & TH48E. Single band FM Handie, but press one button, and instantly monitor the opposite band to the one your transceiving on. They're lower priced so I can offer them on my nothing to pay (but small deposit), for 3 months scheme.

TH28E Transceive on 2M, rx on 70cm, Deposit £39.00, £250 in 3 Months
TH48E Transceive on 70cm, rx on 2M, Deposit £49.00, £280 in 3 Months

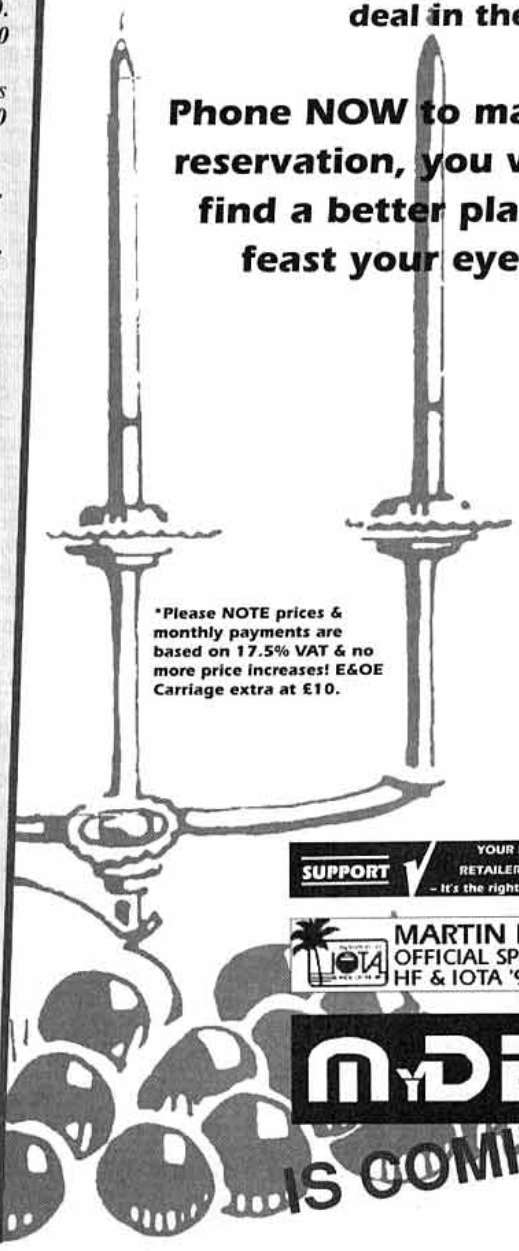
Still a firm favourite for people who want MULTI-MODE PORTABILITY on 2 Metres, the FT290R mk11, still has the market to itself.
Without matching linear, Deposit £129 & 12 payments of £35.00
With Matching FL2025 Clip on Linear, Deposit £159 & 12 payments of £45

Finally to end a perfect meal at the classiest joint in town, it's got to be the LYNCH + muTek FT736RDX from Yaesu. The most flexible multiband 2/6/70/23 all mode transceiver available today.
FT736RDX, with muTek, 2/70 operation,
Deposit £495 & 12 payments of £125
FT736RDX/6 with 6m extra,
Deposit £608 & 12 payments of £142.50
FT736RDX/23 with 23cm extra,
Deposit £623.00 & 12 payments of £160.00
FT736RDX/6/23 with all bands fitted, 2/6/70 & 23cm,
Deposit £742 & 12 payments of £175.00.

**** muTek FRONT END BOARDS available as "after fit kits",***
£199.95, plus £59.00 fitting charge if required.

IF YOU DON'T WANT TO TAKE ADVANTAGE OF MY FREE FINANCE AND WOULD RATHER PAY CASH, CHEQUE, CREDIT CARD OR TRADE-IN, THEN CALL 081 566 1120 TODAY FOR YOUR TAILOR MADE QUOTATION.
A lower deposit can be accepted with higher monthly payments, phone for details.
I promise you the best overall deal in the U.K.

Phone NOW to make a reservation, you won't find a better place to feast your eyes on!



***Please NOTE prices & monthly payments are based on 17.5% VAT & no more price increases! E&OE Carriage extra at £10.**

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Contest Exchange

ANDY COOK, G4PIQ
Fishers Farm, Colchester Road, Tendring, Clackton-on-Sea, Essex, CO16 9AA

LOOKING OVER THE last three months' contest columns I see that we have covered some of the basic reasons for entering contests and some of the very basic operating techniques. Perhaps it is now time to start to look at the requirements of an effective contest station. It will take several months to cover a complete station, but we will take it bit-by-bit and start this month with some generalities and a brief look at transmitter overdrive and receiver overload.

Basically, an effective contest station is based around an effective DX station. For those of you with interests in VHF/UHF contests, I recommend the new *VHF/UHF DX* Book, published by DIR Publishing, PO Box 771, Buckingham, MK18 4HH. This is an excellent practical guide to putting a VHF/UHF DX station together and will provide you with the information you need to make decisions about your contest system in more detail than I have the space to cover here.

The prime requirements of an effective contest station are that it is loud, clean (in terms of signal purity), loud, reliable, loud, easy to operate for 48 hours at a stretch, loud, has a good receiver and is loud! If you are expecting to be placed in the upper portion of the contest results, it follows that you will need to be able to spend a good proportion of your time calling CQ and letting people come to you. In order for this to be successful, you need to be the station who the casual operator picks out and wants to call as he sweeps his VFO around the band. There is more to it than just being a big signal, but if you aren't loud then it is very likely that he will just tune right past you.

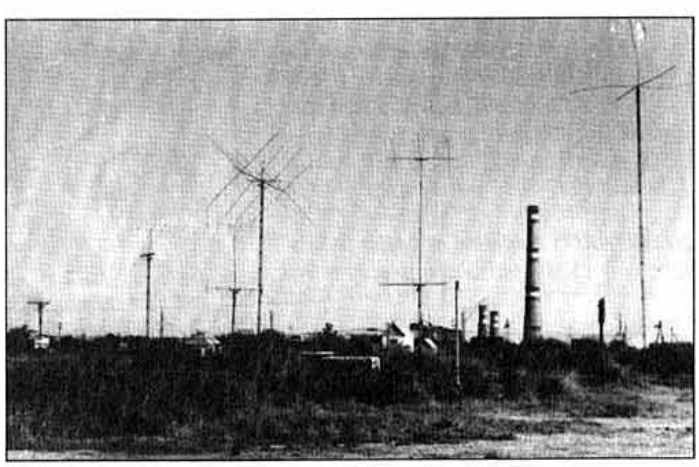
In theory then, winning contests should be easy - you just need an amplifier which is big enough to deliver the full legal power limit at the feedpoint of the antenna, and an efficient antenna system to make good use of the power fed to it. The reality of life is of course that nothing is ever that straightforward! Although being loud is important, and you won't be really successful without it; if you don't take some of the other factors into account, you will be equally unsuccessful, and you may also make life difficult for other users. A very important point to note is that a transmitted signal in a contest must be clean - as a starting point, this means that an SSB signal must be free from excessive splatter, and that a CW signal must be free from clicks. This subject will be covered more fully in future months, until then operators must know how to use the rig and amplifier correctly.

Don't try and squeeze the last drop of power out of your amplifier. The difference between running 300W or 400W out of say a single 4CX250 amplifier will be virtually undetectable at the far end (the difference is only just over 1dB), but it will make an astounding difference to the quality of your signal as perceived by other band users. This is particularly true for many of the transistor amplifiers in use - don't run them flat out on SSB, but back them off by a few tens of percent. Also, it may be very worthwhile to sit a small fan on the heatsink of your transistor amplifier since many of them become very non-linear when they get hot.

The complementary function to having a good quality transmission is that your receiver must be both sensitive, and have a wide dynamic range so that you can live in peaceful co-existence with your neighbours on the bands. On HF this is not too much of a problem, with the vast majority of commercial rigs being more or less up to the job. However, at VHF the situation is rather different. With the large antenna gains and low noise floors present at VHF, the difference between the strongest and weakest signals is huge (quite possibly in excess of 100 dB). In addition to this, in general the receivers of VHF rigs do not have a dynamic range which even approaches their HF counterparts (with some notable exceptions such as IC275, and rigs with MuTek replacement front end boards, but NOT the FT290 pre-amp!). To compound these problems, pre-amps placed in front of the receivers degrade the dynamic range still further.

The overall effect of all these factors is that, if you find that a signal appears wide to you, you need to consider very carefully whether it is his transmitter or your receiver. A good initial test is to move your antenna so the main signal drops by a certain amount. If your receiver is to blame the level of splatter will drop significantly more than the main signal level has dropped. If this is the case, try switching your pre-amp out of line. Also try listening with the noise blanker on your receiver turned off - these can often be badly affected by strong signals. If none of these actions cure the problem, then the fault may well lie at the transmitter site. If possible, try and get a second opinion from someone you know to be technically competent. If you confirm that there may be a transmitter problem, you should then speak to the station concerned and attempt to sort the problem between you.

If you are the recipient of a complaint, you should take the comment seriously and attempt to resolve the problem. Above all, you must make a note in the log of any bad signal complaints received. In the case of a dispute the relevant contest committee can decide what, if any, action to take, but in general it is very difficult, and indeed rather pointless, to take action after the event. A much more practical and preferable solution is for groups and individuals to understand properly the nature of the problems and to work together to resolve them, if necessary in conjunction with an unbiased external technical expert. There are some circumstances where no solution will be possible, such as where two major contest groups elect to operate only 10 km apart, and we will return to look at this situation in particular in a future column.



UH8EA's elaborate antenna system.

TO BUY OR TO BUILD

WITH SUMMER HOPEFULLY having well and truly hit the scene, perhaps you are giving a little consideration to doing some antenna work in order to improve your contest performance. I guess that it is also possible that some of you will be thinking that only the well-healed can afford to have substantial, contest-winning antenna systems. Well, perhaps after taking a look at the photograph in this month's column you may choose to re-think that opinion. The photo shows the antenna system of UH8EA, who were also operating as RH0E in the CQWW contests last year. This looks a fairly substantial, but relatively straightforward antenna system until you realise that the four element quad in the middle of the picture is actually for 40m! Other antennas in the picture include 2 x 3el quad for 20m, and 2 x 6 el quad for 10m.

These antennas are almost certainly home-made and this system is just one example of the sort of thing which can be done without recourse to commercial equipment. While, at least on HF and the lower VHF/UHF bands, it is possible to put a very effective contest system together from commercial equipment, it is also equally possible to home-brew all the components of the system - it just takes longer, and there is quite a simple trade-off between cash and time!

However, it is obviously easier to make a major saving in a short time on some parts of the system than on others. Building your own FT1000 or TS950 would be something of a time consuming exercise, but for example you can relatively quickly build an amplifier which is as effective (although perhaps not as pretty!) as the commercial offerings. It is only when you come down to some very specialist items, such as gear for 2.3GHz and upwards, or bandpass filters for multi-station HF contests that you are almost forced to 'roll your own'.

In short, buying saves you time, building saves you money, and for general contesting there is little which you cannot do either way! That's it for this month - next time we'll continue our look at what makes a competitive contest station.

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NOVICE NEWS

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

HAVE YOU SEEN the Society's *D-i-Y Radio* publication yet? You should. It has grown bigger and better and is of interest to all Novices – and others.

Published six times a year, it now contains 24 pages of simple construction projects, kit reviews, facts, and prize competitions. There are special offers too so you can save money on some of the construction kits and various components and equipment. At £9 a year (£7.65 for RSGB members) delivered to your door, it is good value.

As potential Novices do not apply for RSGB membership the minute they join a training course, how can they learn about *D-i-Y Radio* if they are not told by their Instructor? May I humbly suggest that all Instructors take out a subscription so that their students get the opportunity to see the publication for themselves? It is designed and written for beginners and Novices – with news and views from their contemporaries – in fact their very own publication!

On its arrival, I make sure I read my copy before making it available to my students – who usually borrow it in turn. Often, it initiates discussion and questions before it is filed in a well-thumbed but well-read condition.

At the back of the current edition (May-June) there is a questionnaire asking for your views. Please fill it in and return it so that future editions can cater for the wishes and needs of its readers. Why not ask for comments from your students too and add them to your own? That would really make it a "Do it Yourself Radio" publication. I promise that this is not a waste of time – *D-i-Y Radio* Editor, Marcia Brimson is waiting to hear from you.

PS – Space has not always allowed the inclusion of all items, some of which are suitable for the pages of *D-i-Y Radio*, some 'Profiles' for example. Watch out for reports previously sent to me and, most importantly, please keep them coming!

KIDLINK '93

AS PROMISED, I 'glued' myself to the chair in the shack during the three days to hear – and speak to – as many of the Kidlink stations as possible. With 25 schools, clubs and colleges on the air I expected to enjoy myself while ignoring household duties. What a pity that conditions let us down.

Thursday: There was a net in the afternoon which I listened into after announcing my presence. Greetings messages were passed by some very confident youngsters with the adults involved showing great patience and enjoyment – just how the project was intended to be.

Friday: I found only one school before conditions deteriorated – indeed, it was the only one I heard that day. The afternoon reception was appalling with no 'G' stations heard at all. They may have been there, but their transmissions escaped me completely.

Saturday: Obviously, only a few stations were expected to be operating, but I did find Rishworth School. I was fascinated to speak to eight-year-old Rebecca, who had just finished soldering a project. I don't think I was to be trusted with a soldering iron at that age! Emma, a Novice-in-waiting (for her callsign) sounded extremely confident.

Two Packet messages have reached me. Newminster School worked 40 stations in all from the Isle of Lewis to Cornwall, which certainly proved the possibilities of amateur radio to the youngsters involved. Unfortunately, the other message told me that the school was not on the air due to many other commitments. Next year, perhaps?

I will give a fuller account in the next issue when reports reach Peter, G0GTE, or myself. I hope that other stations were more successful and that youngsters were able to chat to each other about their hopes for the future.

NOVICE INVOLVEMENT

INFORMATION IS reaching me of Novices taking a more active role in the hobby than many long-licenced amateurs expected them to do.

Many are taking office within radio clubs where their involvement is valued; some help at Field Days and Raynet: others give a hand with Scout and Guide groups. I have heard of one who gives active help training the next generation of Novices. Already they are putting something into the hobby that will give them pleasure for many, many years.

So, tell us more. A few stories of Novices who fit the description above would be welcome in this column. Don't hide your talents – tell us about yourselves or a friend who is too shy to write in him/herself. Write to the address shown at the top of the page – it won't take you long – and I will answer your letter.

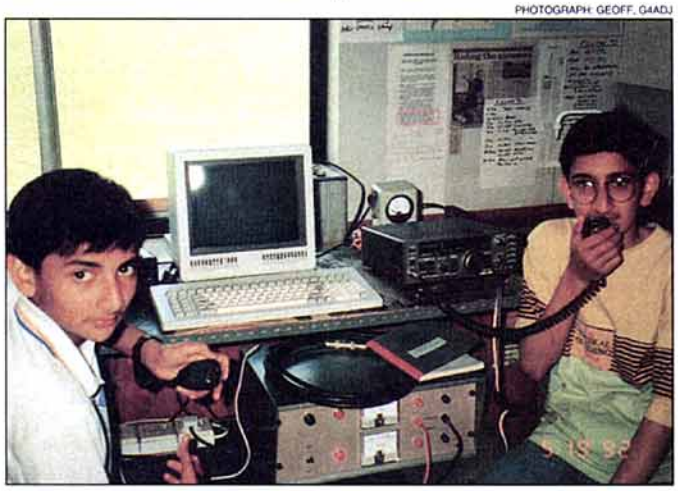
NOVICE COURSE

DO YOU KNOW anyone who would like to take a Novice course in Sheffield? A course starts on Monday 28 June at TriTec. Full facilities available for the disabled. Ring Steve for further details on 0742 750581.

There is also a course on 'How to run Packet Radio' on Wednesdays run by Tony, 2E1AGR, at Chapeltown. For further details ring Roy, 2E1BJD, on 0742 846720 who is Secretary of the Chapel Green ARC.

. . . . How's that for Novice involvement?

PHOTOGRAPH: GEOFF, G4ADJ



Pankaj Rathod (L) and Nitin Patel at the controls during Kidlink '93 – I wonder if the boys took a further interest?

Jon, 2E1BRM, was one of many Novices who visited the RSGB'93 Show in May.

US NOVICE BANDS

THE AMERICAN Novice band plan has reached me, and could be of interest to readers. Note that the US Novice Licence is rather different from ours.

Frequency Band (MHz)	Mode
3.675 - 3.725	CW
7.10 - 7.15	CW
21.1 - 21.2	CW
28.1 - 28.3	CW, Data
28.3 - 28.5	Voice

Two other bands, 222.1 - 223.91 (not allocated in the UK) and 1270 - 1295MHz (23cm) are also allocated.

Under normal circumstances, the last three HF bands are those most likely to give a contact with the UK, and our Novice frequencies do fall within them - many contacts have been made 'across the pond' with surprisingly low power on the key. The other possibility of course, is for Novices to team up with Class A licensees, and make new friends by this means.

STOP PRESS

LISTEN FOR GB4NWC on 11 July which John, G0FLP, and 16-year old Robert, 2E1AXZ, are organising. Novice frequencies especially will be used to allow contact in CW and speech with other Novices. If you live near March in Cambridgeshire, look in at the Neale-Wade Community College where operation is from "as early as possible" until about five in the afternoon. Listen for the station – you may yet work a Novice!

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HAMPSHIRE
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South Midlands Communications, S M House, School Close, Chandlers Ford Industrial Estate, Eastleigh. Tel: 0703 255111

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Radio Hamstore, 11 Watford Way NW4. Tel: 081 202 0073

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KENWOOD

Novice Note Book

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

AFTER THE SIX METRE CONVERTER (see *Novice Notebook*, April), I expect there are lots of you waiting for a companion transmitter to complete the six metre station! This CW transmitter **Fig 1** is simple, sure-fire and only needs a test meter to set it up.

BUTLER OSCILLATOR

I HAVE USED STANDARD components but modified T2, by removing the ferrite cup from the coil former as we did for the converter. However, in this design the slug *is* used. The former should be soldered in the board and then the can pushed over the base making sure that the two lugs pass through the holes, the lugs are then soldered to the ground plane on the underside of the board.

A simplified Butler circuit was chosen for the oscillator as this can be used in the fundamental mode or on the third or fifth overtone just by changing the tuned circuit. In fundamental mode the crystal oscillates on its natural resonant frequency whereas in overtone mode it oscillates at approx three or five times this frequency. It is forced to do so by only allowing feedback in the oscillator to exist at the third or fifth overtone frequency. Note that the third overtone frequency of an 8MHz crystal will not be exactly on 24MHz but up to 20kHz off. The crystal oscillates on its third overtone so we can either use fundamental crystals in the 8MHz range or overtone ones in the 25MHz range.

The oscillator output from the link winding on transformer T1 is fed to the base of TR3. The 22Ω resistor suppresses parasitic oscillations, as does the ferrite bead on the collector lead of the transistor. This stage is a doubler and turns the 25MHz oscillator signal into 50MHz at the collector tuned circuit (second harmonic) – hence the name 'doubler'.

MATCHING BY ETCHING

T2 COUPLES THE 50MHz SIGNAL to the base of the power amplifier transistor, and the 50MHz energy is developed across a 10µH RF Choke in the collector lead. The output tuned circuit (L1) is etched onto the PCB. Tests on three transmitters gave second harmonic suppression (at 100MHz) of 32dB. In other words, an output power at 100MHz of less than 100µW – a very low level.

After building the transmitter (see **Figs 2** and **3** for layout and PCB details), it's time to tune it up. To make this easy, I've included two test points TP1 and TP2. If you don't have a dummy load and power meter, solder a small pea bulb between the aerial output and ground. Then short the key pin to ground, and apply 12 volts between the +12V pin and ground. Connect your test meter (on its lowest voltage range) between ground and TP1.

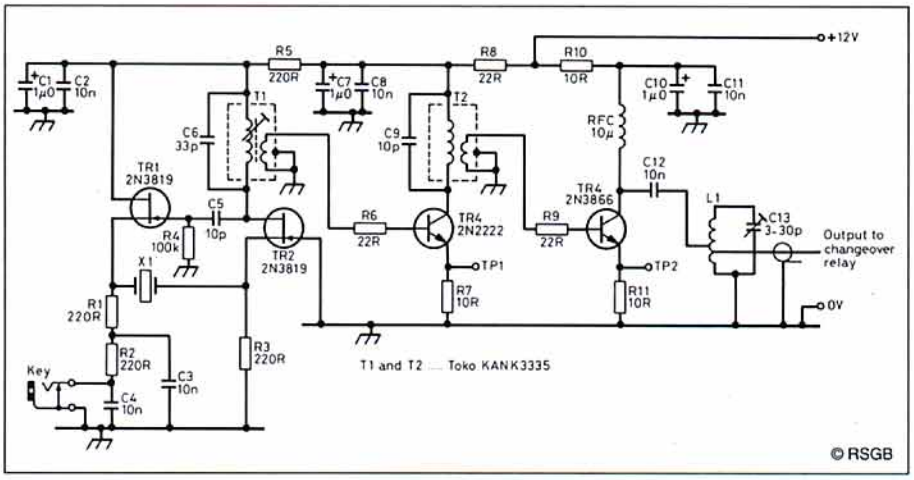


Fig 1: The 50MHz transmitter is particularly easy to build and adjust.

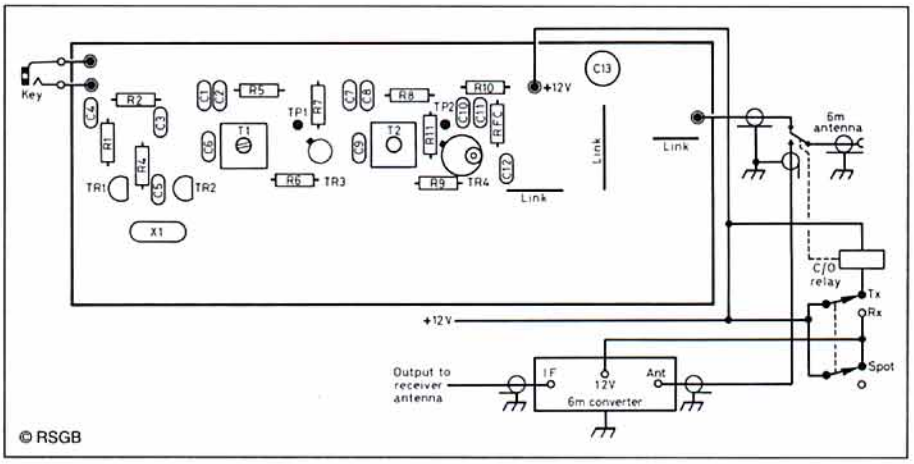
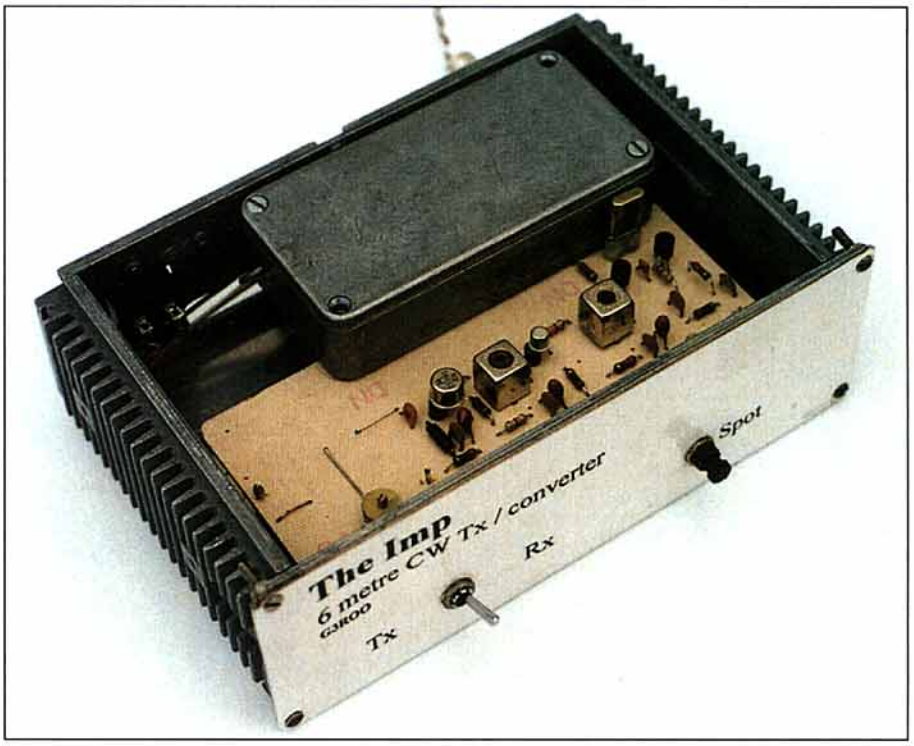


Fig 2: Layout of the components and antenna changover relay.



The transmitter fits neatly into a box with the 6m converter from *Novice Notebook*, April '93.

Next, using a trimming tool, unscrew the core of T1 until it nearly falls out, then slowly wind it in until a voltage appears on your meter. Peak the core for maximum and you should get between 0.5 and 1 volt. Now transfer your meter probe to TP2 and adjust T2 in the same way as T1 – you should peak on TP2 to about 1 to 1.5 volts. Now remove the meter and slowly tune C13 watching the lamp, peak for maximum brilliance, it is pretty dim as you

COMPONENTS LIST

Resistors
All 0.25W 5%

R1,R2,R3,R5	220R
R4	100k
R6,R8,R9	22R
R7,R10,R11	10R

Capacitors

C1,C7,C10	1µ0 electrolytic
C2,C3,C4,C8,C11,C12	10n ceramic
C5	10pF ceramic
C6	33pF ceramic
C9	10pF ceramic
C13	3-30pF trimmer

Inductors

T1,T2	Toko KANK3335

Semiconductors

TR1,TR2	2N3819
TR3	2N2222
TR4	2N3866

Additional items
Crystal to give final frequency between 50.080 and 50.100MHz.
Printed circuit board
Key socket

KITS AND BOARDS

Kits of parts (excluding PCB) for all on-board components, including a suitable crystal, are priced at £19.95. Printed circuit boards are £2.95. Both prices include postage and packing.

Kits and boards are available from: Kanga Products, Seaview House, Crete Road East, Folkstone CB18 7EG. Tel: 0303 891106.

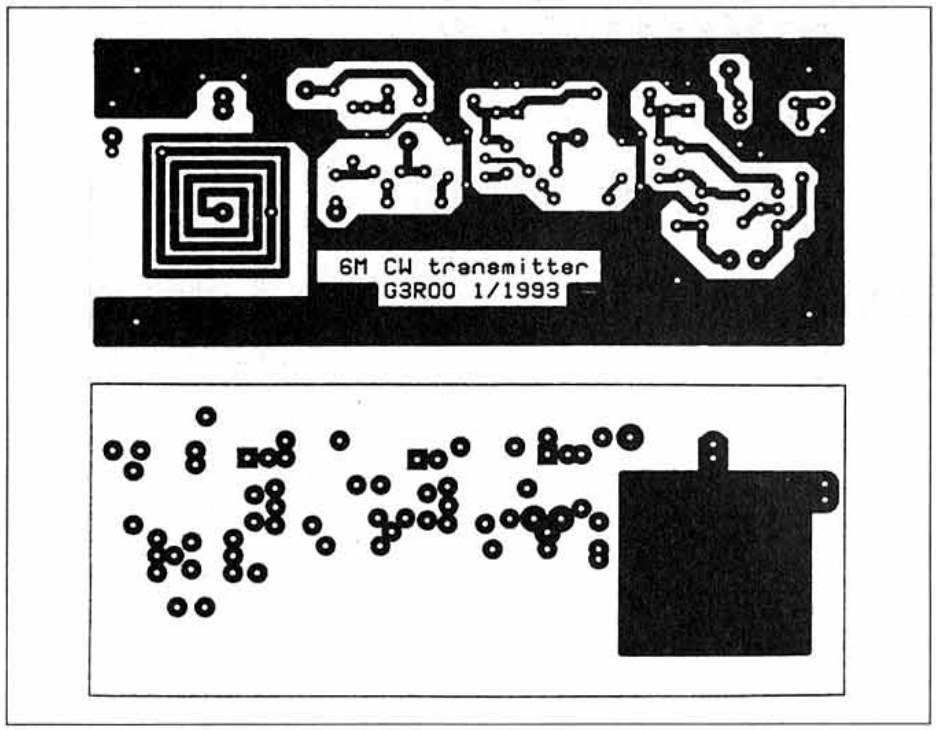


Fig 3: Printed Circuit Board: (Top) Track side showing PCB 'coil' L1. (Bottom) Ground-plane side or components side. The black areas on this side of the board are where the copper must be removed. Note that the above layout is 70% of the true size.

only have 100mW, but in the past I have worked across the Atlantic on 10mW CW!

CW is fun to use, and contrary to popular belief Morse is not difficult to learn and can give much pleasure. Whether it's the other side of town or an exotic DX station, the contact can be made with much lower power than with speech modes.

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20089	144	9/P	3.47	13.1	49.95
20818	144	9x9	3.47	13.1	89.95
20822	144	11x11	4.62	14.1	115.95
20811	144	11	4.62	14.1	77.95
20813	144	13/P	4.43	14	64.95
20817	144	17	6.57	15.3	92.95
20899	144/43	9+19	3.5	13/16	85.95
20909	432	9	1.24	13	43.95
20919	432	19	2.82	16.2	52.95
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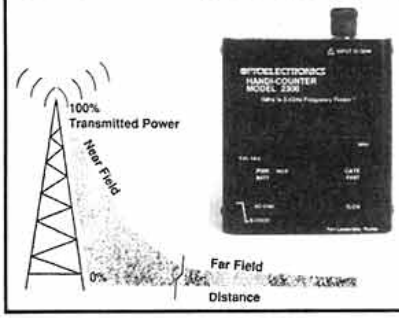

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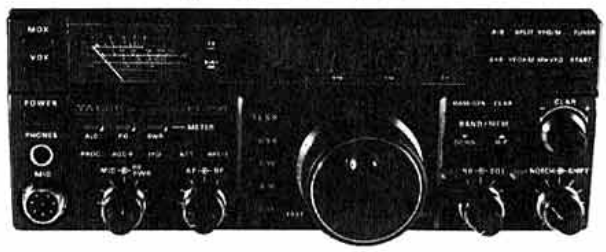

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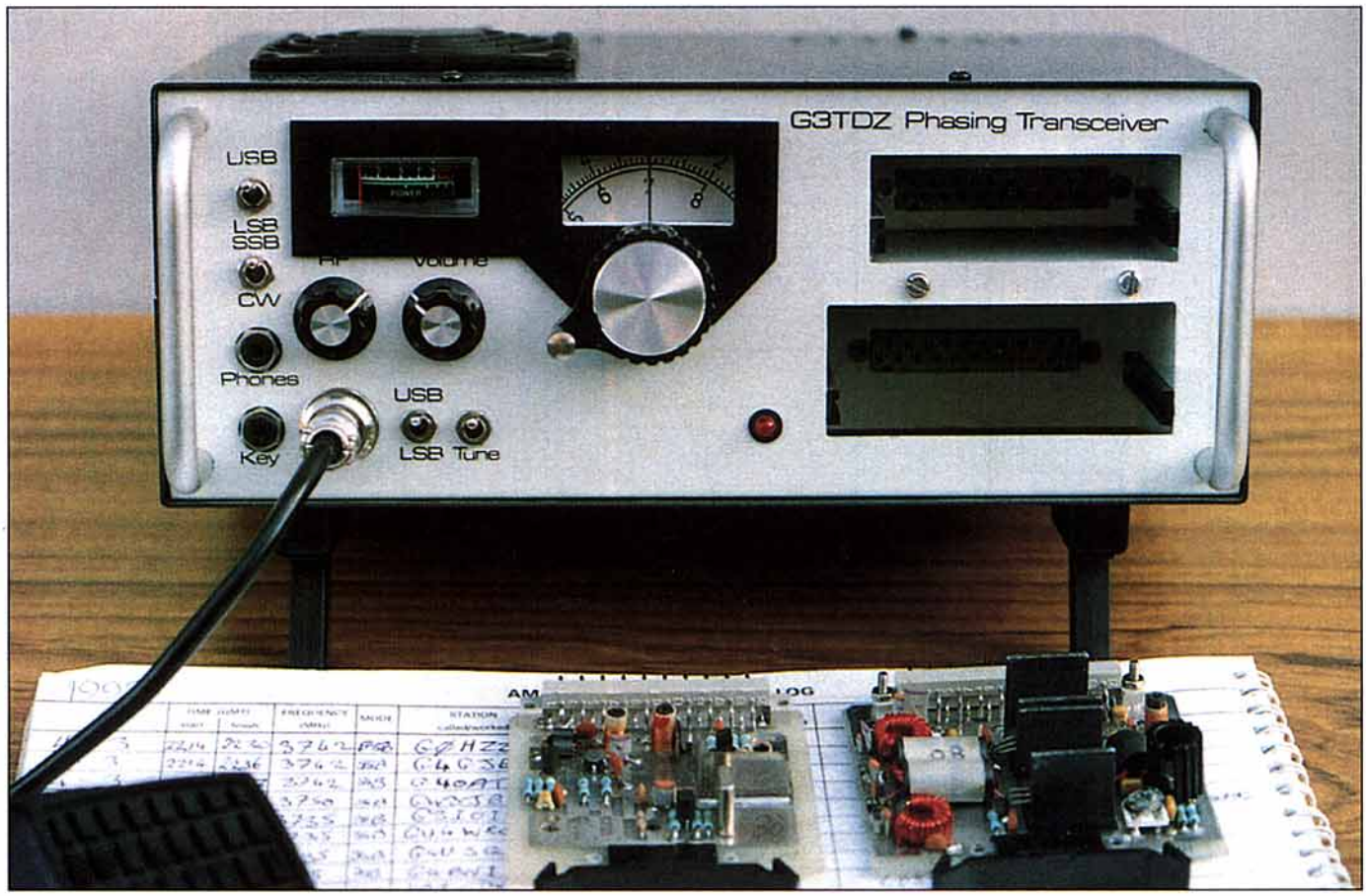
RADCOM TECHNICAL FEATURE

Multi-Band Phasing Transceiver

The first part of an article by John R Hey, G3TDZ



WHEN THE WHITE ROSE receiver was launched as a club project in September 1988, it was envisaged that a complementary SSB transmitter would be designed. A phasing-method exciter avoids expensive filters and crystals. The success of this, with its low price and excellent on-air speech quality reports, indicated that the method might also be employed to overcome the main deficiency of the basic direct conversion (DC) receiver technique.

As time has passed, the better points emerging from experience with the old receiver and new exciter have been grouped together to form a neat transceiver where both receiver and transmitter employ the phasing method to cancel the unwanted sideband.

At first it seemed sensible to use common circuitry such as balanced modulators, filters, phasing networks in both transmitter and receiver. However the switching necessary, either digitally controlled analogue gates, or mechanical switches or relays, completely out-priced its usefulness. Separate boards are retained; thus enabling stand-alone units to be constructed which may complement existing equipment.

PCBs are available from the author as follows:

Phasing Receiver Main Board	£4.85
SSB Exciter Board	£3.50
Band Converters (each)	£1.95
5W Linear Power Amplifiers .	£2.70

John Hey, 8 Armley Grange Crescent, Leeds LS12 3QL.

RECEIVER DESIGN

DESIGNED TO OPERATE WITH the range of White Rose converters [1], the main receiver board tunes 6 to 6.5MHz (**Fig 1**). A cascode RF stage allows sufficient gain, low noise, selectivity against images, control of gain, and feeds two mixers in parallel using the common MC1496 chips. Input from the VFO is amplified by TR3 which feeds the RF phasing network (R22-R25 and C15), to produce a pair of signals in phase quadrature for mixer injection.

Third order Butterworth filters at 2.4kHz follow the mixers, where an inverter (gain x3.5) completes the drive requirement for the audio phase shift networks. These use off-the-shelf 1% resistors and polystyrene capacitors to produce a further plus and minus 45° pair of outputs. After buffering by IC5a and IC6a, the two sets of signals are combined in IC6c; by switching in the inverter IC5b, a choice of USB or LSB is obtained. Two further filter stages, a third order Butterworth and a second order Chebychev ensure sharp SSB selectivity. For CW, a further band-pass filter at 700Hz is switched into circuit.

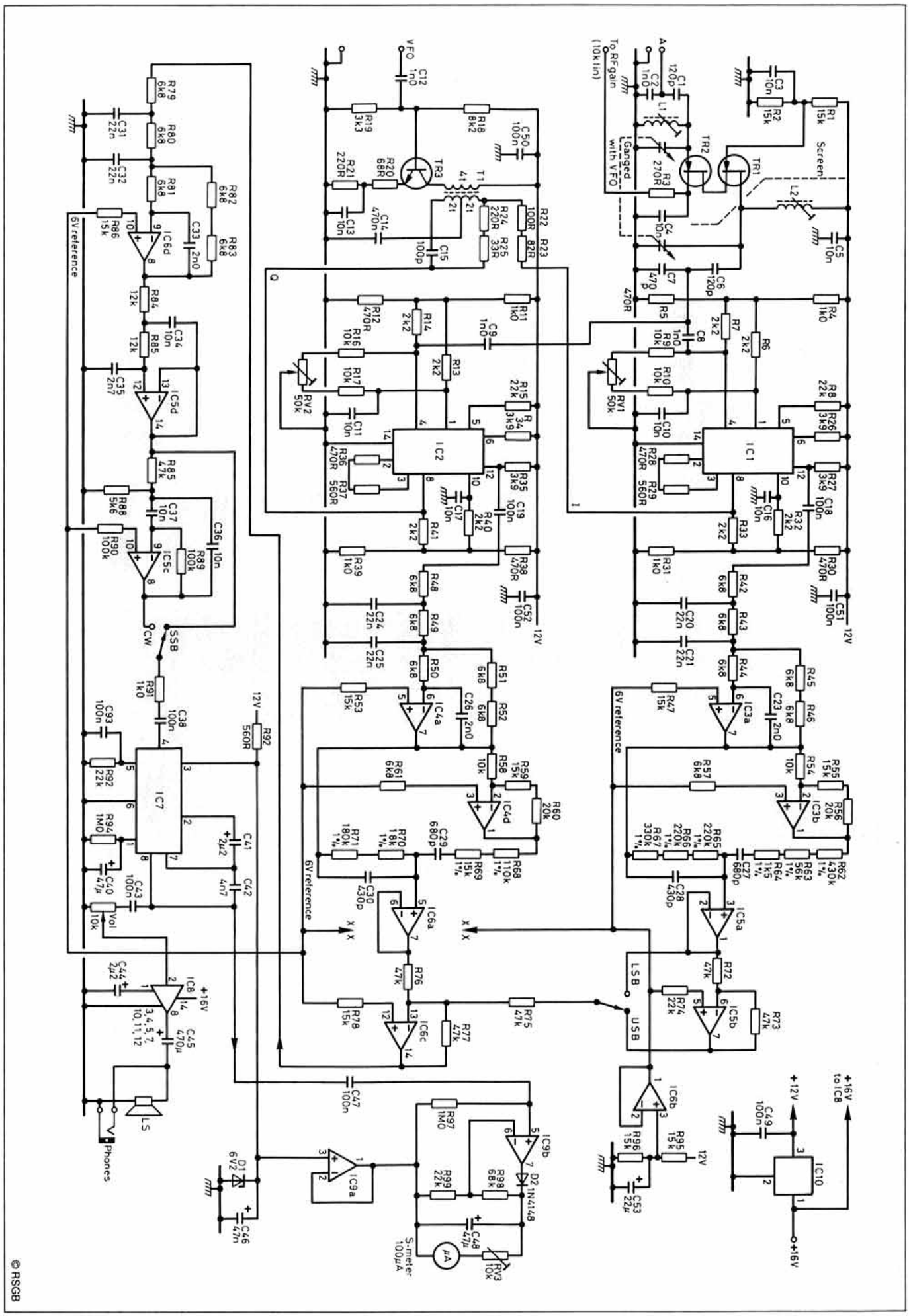


Fig 1: The phasing receiver takes its signal input (6 – 6.5MHz) from plug-in converters for each band.

An SL6270 VOGAD chip (IC7) provides audio gain and AGC action, then feeding the volume control and the LM380N power stage (IC8). The low level stages operate from a 12V regulator IC10. An improved S-meter circuit completes the receiver.

The whole receiver except for the VFO is accommodated on a single printed board measuring 3in by 6.4in. Where three gang tuners are difficult to obtain at the recommended 50pF per section, provision has been made on the board to include series capacitors so that the more plentiful broadcast types may be employed. Shown dotted in **Fig 2**, series capacitors are usually 56pF. The printed circuit track on the upper surface of the board is soldered only where resistors are located, so no difficulty in soldering should be experienced. A tin plate screen 0.5in (12mm) tall is soldered as shown. Keep wires to the tuning gang short. All signal and control wires coming to the front panel should be gathered into a loom and routed down the left-hand side of the board away from the tuning components and VFO.

With the values shown, there is no need for precision trimming of phase shift or audio level circuitry. The two mixer balance controls are adjusted for a null at pins 12 of each mixer using an oscilloscope or millivoltmeter; this overcomes most of the 'Radio Moscow effect' and the odd effects associated with DC receivers. Where difficulty is experienced obtaining 2000pF capacitors, provision has been made on the board for fitting two 1000pF in parallel at C23 and C26.

THE SSB EXCITER

MICROPHONE AMPLIFIER IC1a feeds a third order Butterworth low-pass filter via a pair of clipping diodes (see **Fig 3**). These limit the maximum signal, obviating the need for

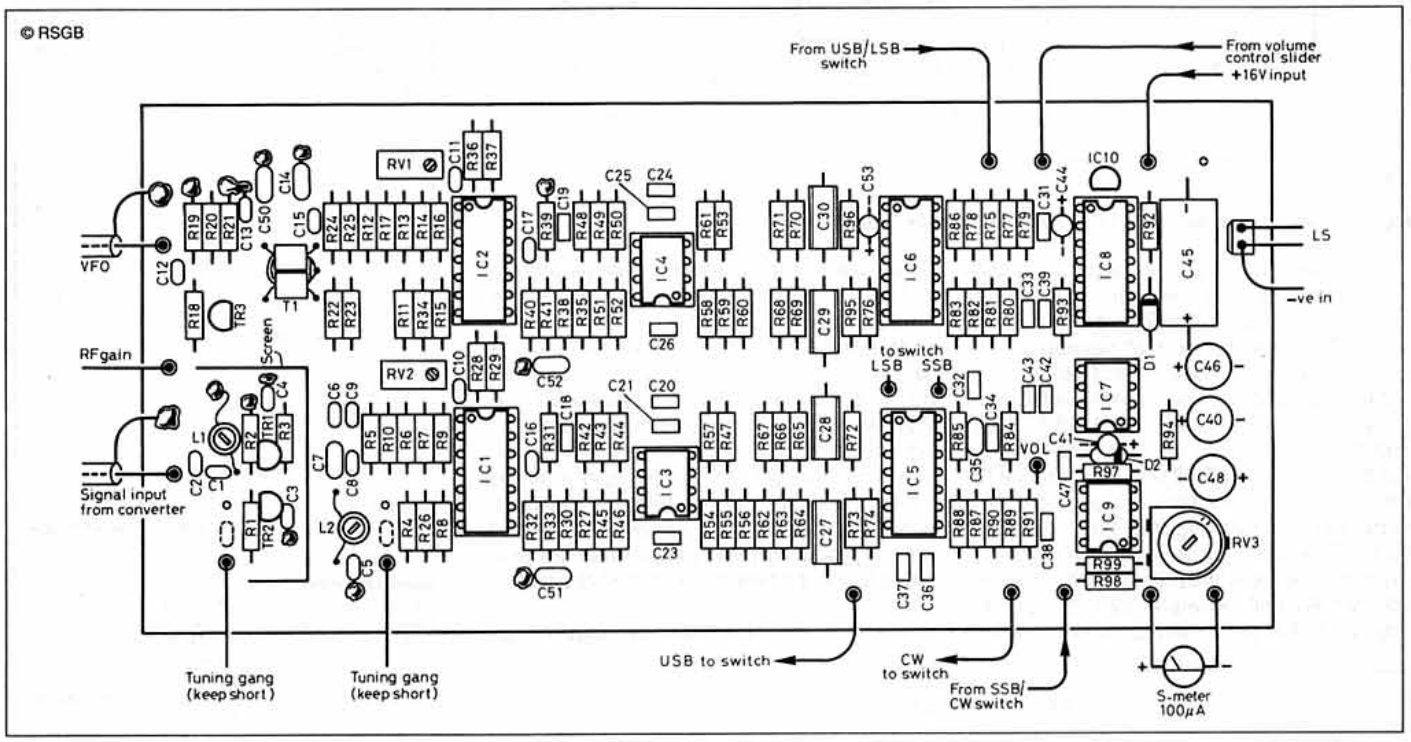


Fig 2: Layout of the phasing receiver board. Note carefully the orientation of the ICs.

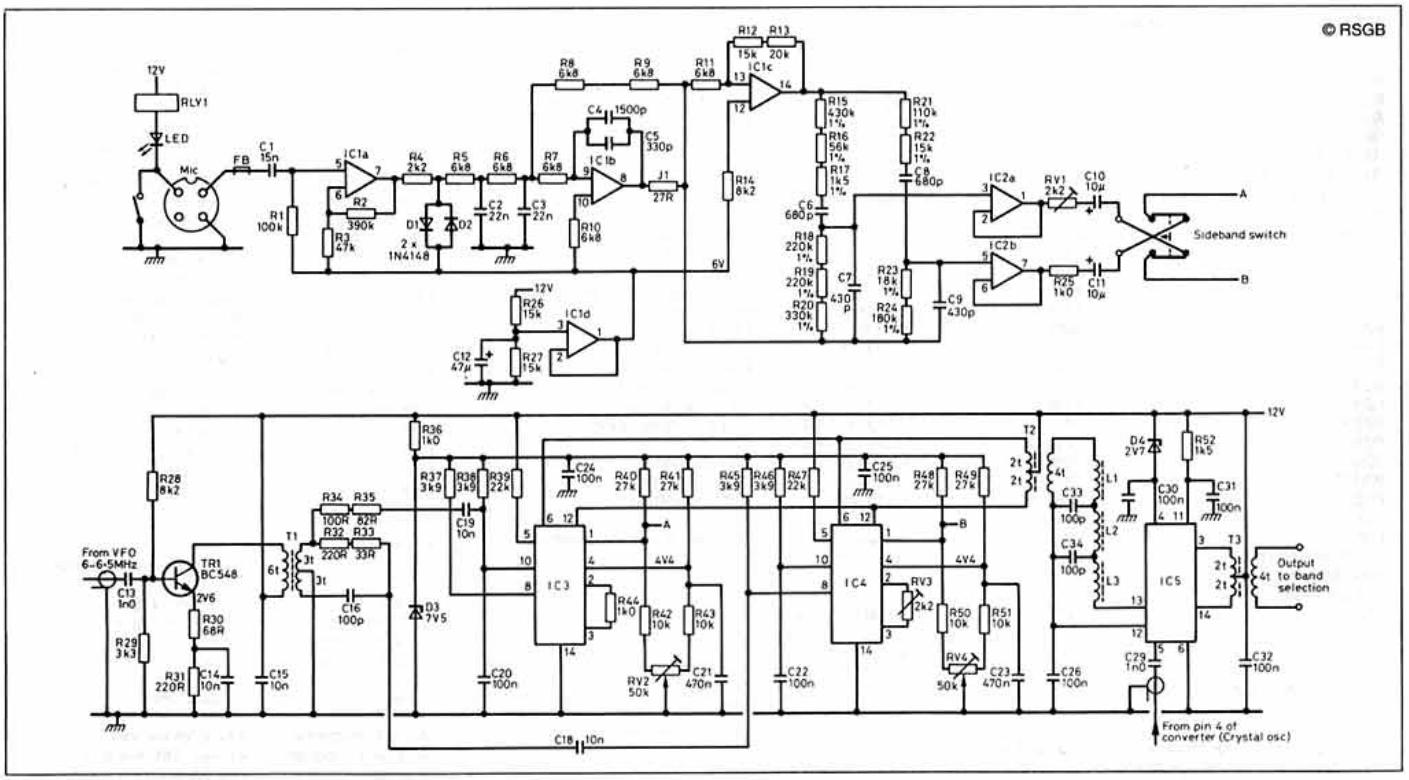


Fig 3: The exciter circuit generates audio signals with 90° phase shift. These are applied to mixers IC3 and IC4.

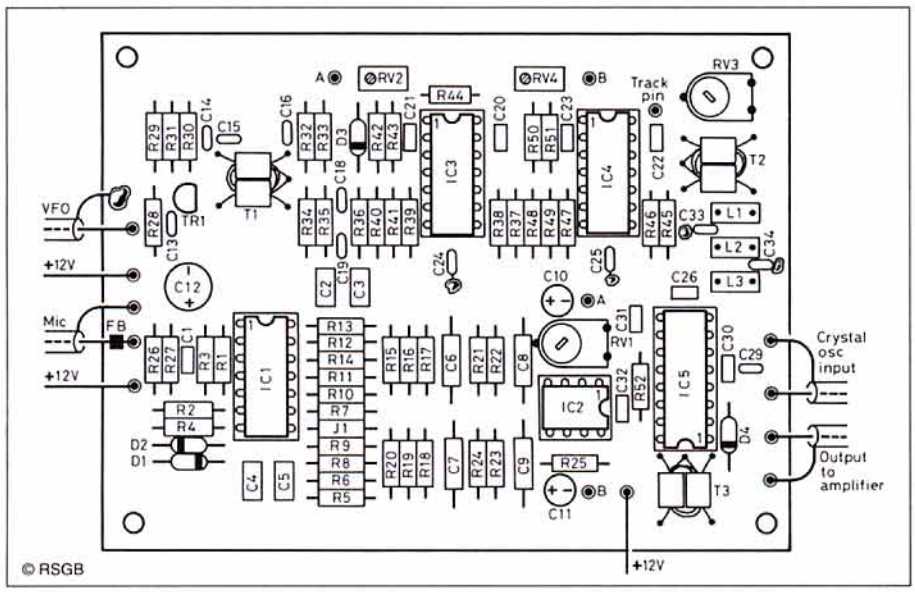


Fig 4: The phasing exciter board gives SSB output at the final frequency.

complicated ALC at a later stage. C1 is chosen for bass roll-off below 250Hz and the filter prevents out of band clipping products [2, 3].

The 90° audio phase shift networks R15-R24 must use 1% resistors and C6-C9 polystyrene capacitors. The peak-to-peak drive to each section is in the ratio of 3.5:1 - IC1b and IC1c furnish this requirement. Section IC1d provides a mid-rail bias or reference for the other three sections. Phase shift networks must look into high resistance terminations: IC2a and IC2b buffer the network outputs, and feed the two balanced modulators; R25 with RV1 enable equal audio drives to be adjusted. Changing over the two drives A and B cause the other sideband to be generated.

The 6 – 6.5MHz signal from the VFO is amplified by TR1. T1 drives the RF phase shift network R32 – R35 and C16, and the signal is then coupled into the two balanced modulators, IC3 and IC4. The pots RV2 and RV4 are carrier balance controls, and RV3 equalises gain slope characteristics. T2 combines the two sets of signals and a single sideband output results. Either a low-pass filter or a tuned circuit removes unwanted mixing products, (both possibilities are provided for on the board) and the SSB signal is

continued on page 41 ▶

EXCITER PARTS LIST

Resistors

All 5% 0.25W except where shown

R1	100k
R2	390k
R3	47k (see text)
R4	2k2
R5,R6,R7,R8,R9,R10	6k8
R11,R42,R43,R50,R51	10k
R12,R26,R27	15k
R13	20k
R14,R28	8k2
R15	430k *
R16	56k *
R17	1k5 *
R18,R19	220k *
R20	330k *
R21	110k *
R22	15k *
R23	18k *
R24	180k *
R25,R36	1k
R29	3k3
R30	68R
R31,R32	220R
R33	33R
R34	100R
R35	82R
R37,R38,R45,R46	3k9
R39,R47	22k
R40,R41,R48,R49	27k
R52	1k5
J1	27R

* 1% (or better) high stability resistors.

RV1,RV3	2k2 horizontal skeleton cermet
RV2,RV4	50k $^3/_8$in multiturn

Semiconductors

D1,D2	1N4148
D3	BZX79C7V5
D4	BZX79C2V7
TR1	BC548
IC1	LM348N etc
IC2	LF353N, MC1458, 4558 etc
IC3,IC4	MC1496
IC5	SL6440

Capacitors

C1	15n polyester
C2,C3	22n polyester
C4	1n5 polyester or polypropylene
C5	330pF polyester or polypropylene
C6,C8	680pF polystyrene
C7,C9	430pF polystyrene
C10,C11	10µ 16V tant
C12	47µ 16V elect radial
C13,C29	1n ceramic med-k
C14,C15,C18,C19	10n ceramic disc
C16,C33,C34	100pF ceramic plate
C20,C22,C26,C30, C31,C32	100n polyester
C21,C23	470n monolithic
C24,C25	100n monolithic

Please note, monolithic capacitors are sometimes known as multilayer.

Additional items

T1,T2,T3	2 x FX1115 ferrite beads
L1,L2,L3	See text
Tune switch	SPDT min toggle
Sideband switch	DPDT min toggle
LED	
4 pin mic socket	

RECEIVER PARTS LIST

Resistors

All 5% 0.25W except where shown

R1,R2,R47,R53,R55,R59,R78,R86, R95,R96	15k
R3	270R
R4,R11,R31,R39,R91	1k
R5,R12,R28,R30,R36,R38	470R
R6,R7,R13,R14,R32,R33,R40,R41	2k2
R8,R15,R74,R93,R99	22k
R9,R10,R16,R17,R54,R58	10k
R18	8k2
R19	3k3
R20	68R
R21,R24	220R
R22	100R
R23	82R
R25	33R
R26,R27,R34,R35	3k9
R29,R37,R92	560R
R42,R43,R44,R45,R46	6k8
R48,R49,R50,R51,R52	6k8
R57,R61,R79,R80,R81	6k8
R82,R83	6k8
R56,R60	20k *
R62	430k *
R63	56k *
R64	1k5 *
R65,R66	220k *
R67	330k *
R68	110k *
R69	15k *
R70	18k *
R71	180k *
R72,R73,R75,R76,R77,R87	47k
R84,R85	12k
R88	5k6
R89,R90	100k
R94,R97	1M
R98	68k

* 1% (or better) high stability resistors.

RV1,RV2	50k $^3/_8$in multiturn
RV3	10k horizontal skeleton type

Semiconductors

D1	BZX79C6V2
D2	1N4148
TR1,TR2	2N3819
TR3	BF494
IC1,IC2	MC1496
IC3,IC4,IC9	MC1458, 4558, LF353N etc
IC5,IC6	LM348N etc
IC7	SL6270
IC8	LM380N
IC10	78L12

Capacitors

C1,C6	120pF ceramic plate
C2,C8,C9,C12	1n Med-k ceramic
C3,C4,C5,C10,C11, C13,C16,C17	10n disc ceramic
C7	470pF Med-k ceramic
C14	470n monolithic
C15	100pF ceramic plate
C18,C19,C38,C39	100n polyester
C43,C47,C49	100n polyester
C20,C21,C24	22n polyester
C25,C31,C32	22n polyester
C23,C26	2n or 2 x 1n polyester
C27,C29	680pF polystyrene
C28,C30	430pF polystyrene
C33	2n2 polyester
C34,C36,C37	10n polyester
C35	2n7 ceramic plate
C40,C46,C48	47µ 16V elect (radial)
C41,C44	2µ2 16V tant
C42	4n7 polyester
C45	470µ 16V elect (axial)
C50,C51,C52	100n monolithic
C53	22µ 16V tant

Additional items

T1	2 x FX1115 ferrite beads
Sideband switch	SPDT min toggle
SSB/CW switch	SPDT min toggle
Volume control	10k log
RF gain control	10k lin
S meter	100µA (Cirkit)
Mains transformer	12V 2.5A toroidal
Reservoir capacitor	4700µF 25V electrolytic
Rectifier	Any 3A potted bridge type

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RADCOM TECHNICAL FEATURE

A No-Tune Driver for 432MHz

The following by Zack Lau, KH6CP, was featured in the March 1993 issue of the *QEX*. Reproduced by kind permission of ARRL, it provides an useful illustration of microstrip techniques and computer modelling.

IN LOOKING at the September 1991 *QST* write-up of a 432MHz transverter by Ed Krome, KA9LNV, I noticed he uses a Toshiba SAU-4 hybrid power amplifier module fed from a tuned MRF911 driver stage. While this works fine, it requires tuning of the driver. Since the power amplifier module is no-tune, it caused me to wonder if it wouldn't be useful to have a no-tune driver stage as well. Cheap plastic-case MMICs, such as the Mini-Circuits MAV-11, don't really provide enough power alone to drive this module properly, though they will work if you keep the system output power down to 10 watts PEP or less. The MRF559 driver described here (**Fig 1**) will produce 15 to 17 watts out before high-order IMD performance starts to really degrade .

The heart of no-tune designs is in the use of microstrip tuned circuits. Use of microstrip makes the built-in tuning dependent only on component tolerances and the accuracy with which the circuits are etched. But the challenge of low-frequency microstrip lies in keeping the line sizes manageable. A full quarter wavelength at 70cm on G-10 epoxy board is about 3.4 inches, a little larger than is desirable for use in a low-power amplifier. (It's fine for a high-power transistor amplifier - the heat sink prevents miniaturizing the amplifier anyway). With that in mind, I used relatively small matching sections for most of the design, although the MRF559 input network is nearly full size. An added complication was that I wanted the bandwidth of the amplifier to be as large as possible in an attempt to minimize the effect of variations in circuit board fabrication and components.

To minimize the effect of the biasing circuitry on the RF performance, I chose to make my DC connections at low impedance points of the circuit - the base of the transistor and the short-circuit side of an RF-bypassed stub (see layout **Fig 2 and 3**). This should also reduce the amount of radiation from the board, an important consideration if you are too lazy to mount everything in its own shielded box!

Since portable operation is a possibility, I wanted this circuit to run properly even if the battery voltage is a bit low. this was accomplished using a 9 volt regulator from Ocean State Electronics (see Fig 1). (They also have those 10 volt regulators used to drive X-band Gunn diode transceivers).

ACTIVE BIAS

TO ENSURE THAT THE circuit works over a wide temperature range, I used an active bias circuit. The typical shunt diode circuit attempts to use a thermally coupled diode to compensate for the transistor's gain variation with temperature. The active bias circuit instead monitors the MRF559 collector current as it passes through a 10Ω sensing resistor and adjusts the base current accordingly. The circuit should work fine from a supply voltage as low as 10.5 volts, though I haven't temperature tested it yet.

For those wishing to model the circuit on a computer, I have included a Microwave Harmonica linear analysis of this circuit (see **Listing 1** and **Table 1**). Keep in mind that many of the parasitics [elements] included in the model are approximate, rather than rigorously measured quantities. Some parasitics, such as the loss of the coupling and bypass capacitors, do seem to be negligible. For instance, I changed C5 and C6, which see the highest RF current, from cheap NPO chip caps to 100-mil ATC chip capacitors without seeing a significant change in performance. The MAV-11 input MMIC isn't included in the model, since its small-signal characteristics are well known.

CONSTRUCTION

THE BOARD IS STANDARD 1/16in thick FR-4 or G-10 glass epoxy. All parts are soldered to the top of the board. The MRF559 and the MMIC are mounted by drilling small holes in the board, bending the grounded leads against the

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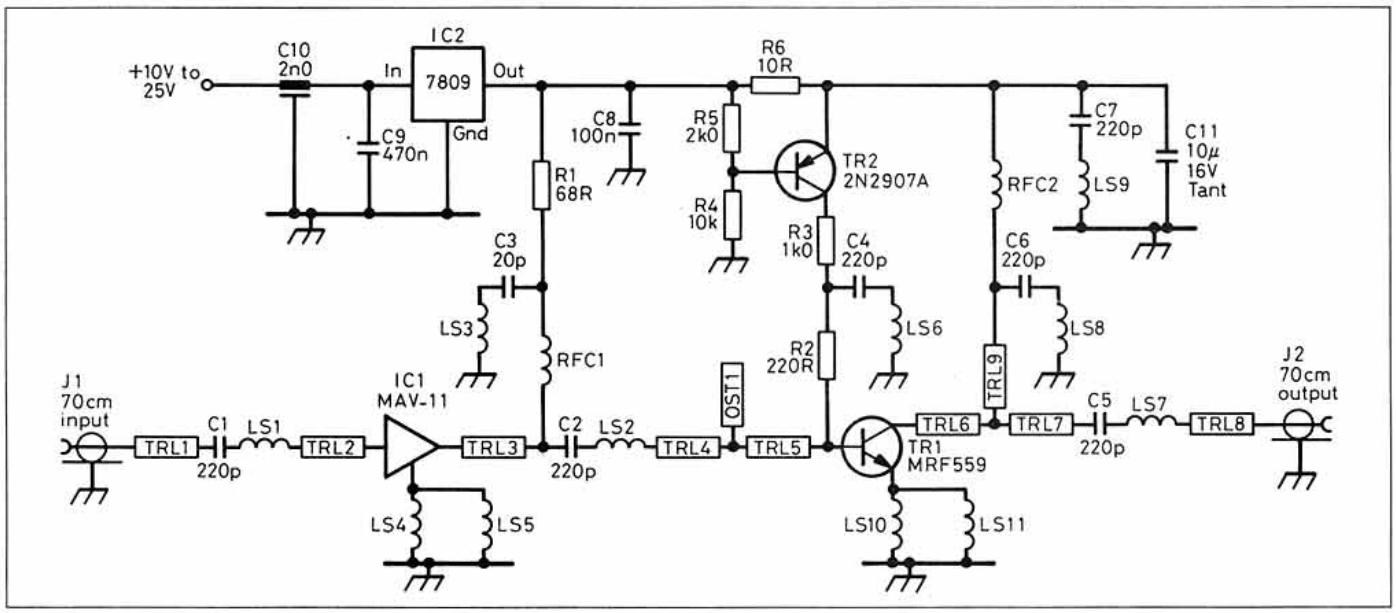

Fig 1: Circuit diagram shows the microstrip tuning elements used in the computer analysis.

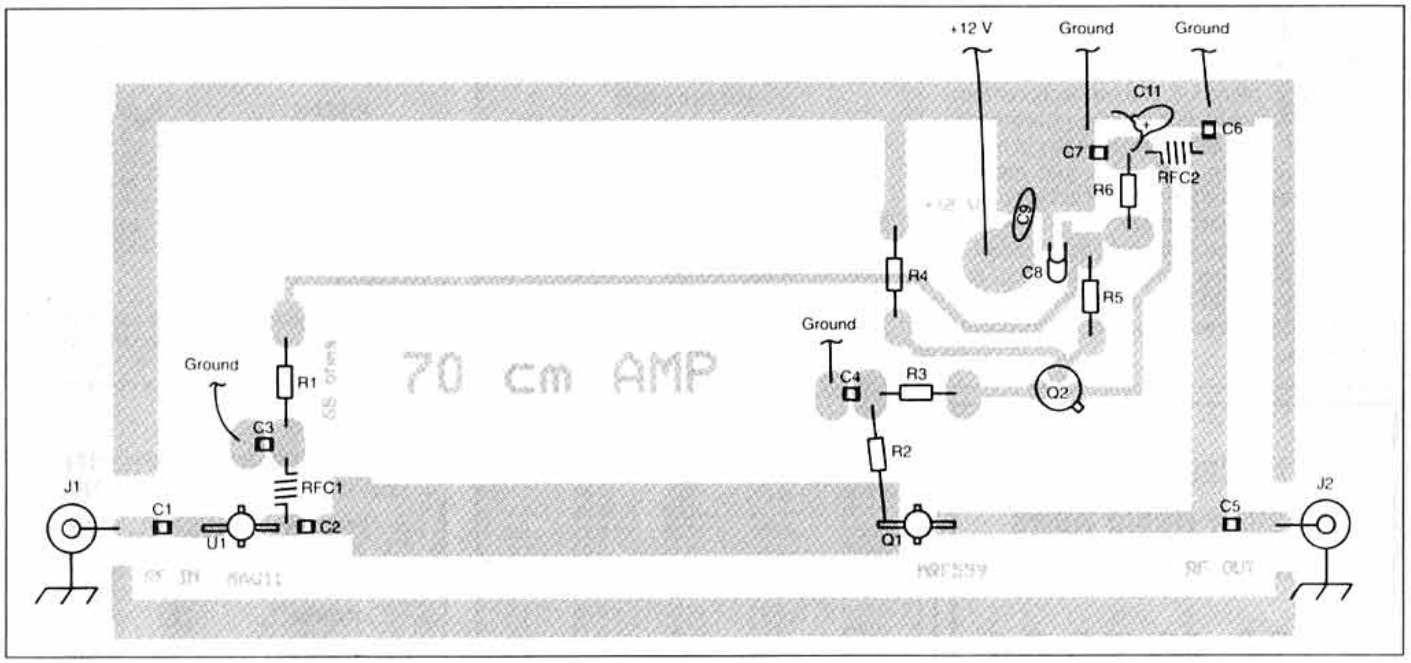

Fig 2: Parts-placement diagram of the amplifier.

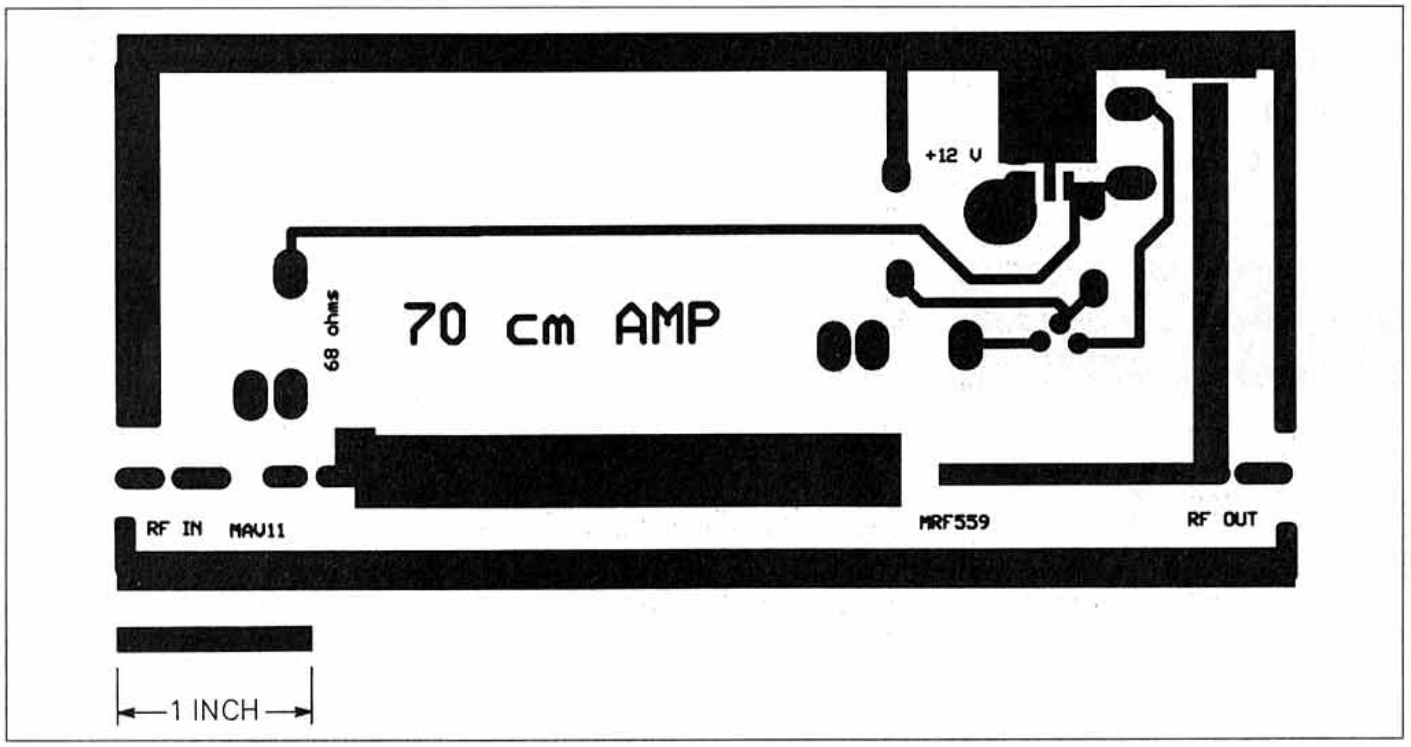

Fig 3: Circuit board layout of the amplifier.

430-450MHZ BROADBAND AMP USING THE MRF-559

```
* * 100mA at 10 volts
blk

* input matching

w50:109mil
w19:370mil
win:?200mil?
pin:?250mil?
wout:?175mil?
pout:?2000mil?

        trl 1 2 w=w50 p=300mil sub1
        slc 2 3 1=0.5nh c=220pf
        trl 3 4 w=w50 p=200mil sub1
        tee 4 5 6 w1=w50 w2=w19 w3=win sub1
        trl 5 7 w=w19 p=?2800mil? sub1
        SRL 7 77 R=220 L=5NH
        SLC 77 0 L=0.5NH C=220PF
        ost 6 w=win p=pin sub1

        two 7 8 100 mrf559

        wrap 100 0 A=50mil Leads
        wrap 100 0 A=50mil Leads

        trl 8 9 w=w50 p=?1400MIL? SUB1
        tee 9 10 11 w1=w50 w2=w50 w3=wout
sub1
        trl 11 22 w=wout p=pout sub1
        slc 22 0 1=0.5nh c=220pf

        trl 10 12 w=w50 p=100mil sub1
        slc 12 13 1=0.5nh c=220pf
        trl 13 14 w=w50 p=300mil sub1

        amp: 2por 1 14
end
freq
        step 250mhz 1500mhz 50mhz
        step 400mhz 500mhz 10mhz
end
data
        mrf559:motac file =
        \scompact\bank01\mot1.flp
        sub1: ms h=59mil er=4.8 tand=0.005
        *guessed tand?
        Leads:ms h=59mil er=4.8 met1=SN 10mil
end
```

Listing 1: Microwave Harmonica source file used to analyse the MRF559 amplifier.

39 body of the device (you only get to bend them once) and soldering these leads to the ground-plane foil. The connections from the pads to the ground are made by 'Z-wires'. (Actually, I find it easier to make them 'U' shaped). These are just resistor leads soldered from the top foils to the ground foil. I used half-inch brass sheet stock to make an enclosure that could be shielded.

The amplification available from this circuit, shown in **Table 2**, is sufficient to drive the SAU-4 or perhaps your favourite 70cm power amp circuit.

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MICROWAVE HARMONICA PC V5.1B
File: \ws4\rf\432drv.ckt
15-JAN-93 02:49:11

Freq GHz	MS11 dB AMP	MS22 dB AMP	MS21 dB AMP	K AMP
0.25	-2.64	-1.76	14.47	1.1
0.300	-3.03	-3.03	15.83	1.1
0.350	-4.60	-5.52	16.98	1.1
0.400	-9.01	-11.81	17.52	1.1
0.410	-10.51	-14.25	17.48	1.1
0.420	-12.24	-17.59	17.39	1.1
0.430	-14.02	-22.31	17.24	1.1
0.440	-15.35	-25.51	17.04	1.1
0.450	-15.46	-21.37	16.78	1.1
0.460	-14.38	-17.45	16.48	1.1
0.470	-12.86	-14.78	16.14	1.1
0.480	-11.37	-12.89	15.76	1.1
0.490	-10.08	-11.49	15.37	1.1
0.500	-9.01	-10.42	14.95	1.1
0.550	-5.75	-7.74	12.81	1.1
0.600	-4.31	-7.09	10.86	1.1
0.650	-3.60	-7.38	9.26	1.2
0.700	-3.24	-8.34	8.03	1.2
0.750	-3.08	-10.05	7.15	1.2
0.800	-3.03	-12.94	6.58	1.2
0.850	-3.04	-18.29	6.28	1.2
0.900	-3.05	-25.40	6.17	1.2
0.950	-3.03	-16.57	6.22	1.1
1.000	-2.97	-11.70	6.40	1.1
1.050	-2.93	-9.17	6.75	1.0
1.100	-3.03	-8.05	7.33	1.0
1.150	-3.41	-8.04	8.15	1.0
1.200	-3.96	-7.10	8.64	1.0
1.250	-3.10	-3.13	6.93	1.0
1.300	-1.82	-1.05	2.52	1.0
1.350	-1.30	-0.42	-2.49	1.0
1.400	-1.13	-0.21	-9.26	1.2
1.450	-1.10	-0.13	-18.53	2.8
1.500	-1.15	-0.12	-30.85	26.7

Table 1: Microwave Harmonica output file.

MRF559 GAIN STAGE AT 432MHZ

P_{in}(dBm)	P_{out}(dBm)
-6.0	9.9
-4.0	12.0
-2.0	14.0
0.0	15.9
6.0	21.5
8.0	22.9*

* 1 dB compression point

Note: With -8dBm of input, the output of the MRF559 gain stage drops from +8.0dBm at 420MHz to +7.7dBm at 450MHz. The output intercept of the single stage was measured at +32 to +33dBm.

TWO-STAGE AMPLIFIER WITH A MAV-11 DRIVER, -10DBM INPUT

Frequency	P_{out}(dBm)
350MHz	19.0
400MHz	18.0
420MHz	17.6
450MHz	16.7

Notes: the output intercept measures +33 to +36dBm. It gets better as you reduce output from the 1 dB compression point. The two-stage amplifier actually measures better than the single stage amplifier. A second sample of the two-stage amplifier showed a +22dBm 1 dB compression point and a +34dBm output intercept. The 1dB small signal bandwidth was 322 to 476MHz. Changing to a different MRF559 resulted in a +32dBm output intercept.

Table 2: Measured Performance

MULTI-BAND PHASING TRANSCEIVER

continued from page 36

now converted to the required band by the high level mixer IC5. Oscillator injection is taken from a buffer in the receiver's converters which means that the transmitted signal is now the same frequency as that received, and no offset adjustment is necessary.

As in the receiver, upper tracks are soldered only at the resistors. There are just two exceptions: C18 and C19 which are disc ceramics. Do not try to solder under the polyester capacitors or IC sockets - in every case a nearby resistor allows easy connection. There are two track-pins hidden under the modulator IC sockets and one adjacent to C22, allowing connection between upper and lower tracks. The PCB layout is shown in **Fig 4**.

The low-pass filter consisting of L1, L2, L3 and C33, C34 is shown on the circuit diagram Fig 3. L1 and L3 are 11.5µH, and L2 23µH. Ready wound inductors of 12µH and 22µH are obtainable from Cirkit and Bonex. However a simpler solution has been provided allowing a single tuned circuit at 6.25MHz to replace the filter. This is formed by L4, C35 as shown in **Fig 5**. L4 is wound with 14 bifilar turns (ie 28 turns in total), 32 to 36SWG; this enables a good centre tap to be made. The resonating capacitor is 120pF. Coupling to IC5 is from a nine turn link of 30SWG wound on top of L4. Transformers T1 and T3 (and T2 if used) are made from two FX1115 ferrite beads.

Next Month: Details of the VFO and Receive converters will be given.

Kit information will be given with the final part of this feature.

REFERENCES

[1] 'White Rose Radio' by John R Hey, G3TDZ, *RadCom*, February 1990.

[2] Technical Topics, *RadCom*, June 1991.

[3] *Sprat*, issue 66, Winter 1991.

REPRINTS

If you require photocopies of the original White Rose Receiver Project which appeared in *RadCom*, February 1990, please send a cheque or postal order for £3 to: RadCom, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE

Amateur Radio Techniques

Pat Hawker, G3VA

This long-awaited reprint of the classic 7th editon brings together a very large selection of circuit ideas and devices, information on antennas and related topics, plus many constructional and fault-finding hints, gathered during 22 years of writing the Technical Topics feature.

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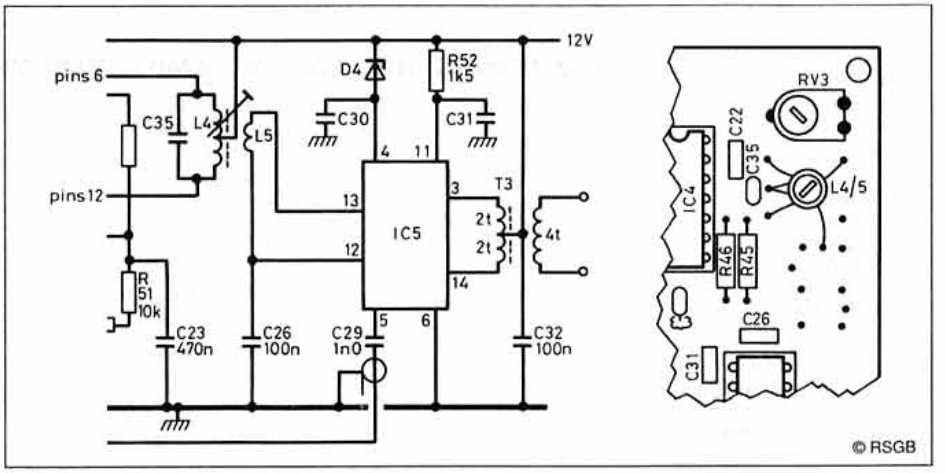

Fig 5: A bandpass filter can be used at the input to IC5.

RSGB National Mobile Rally

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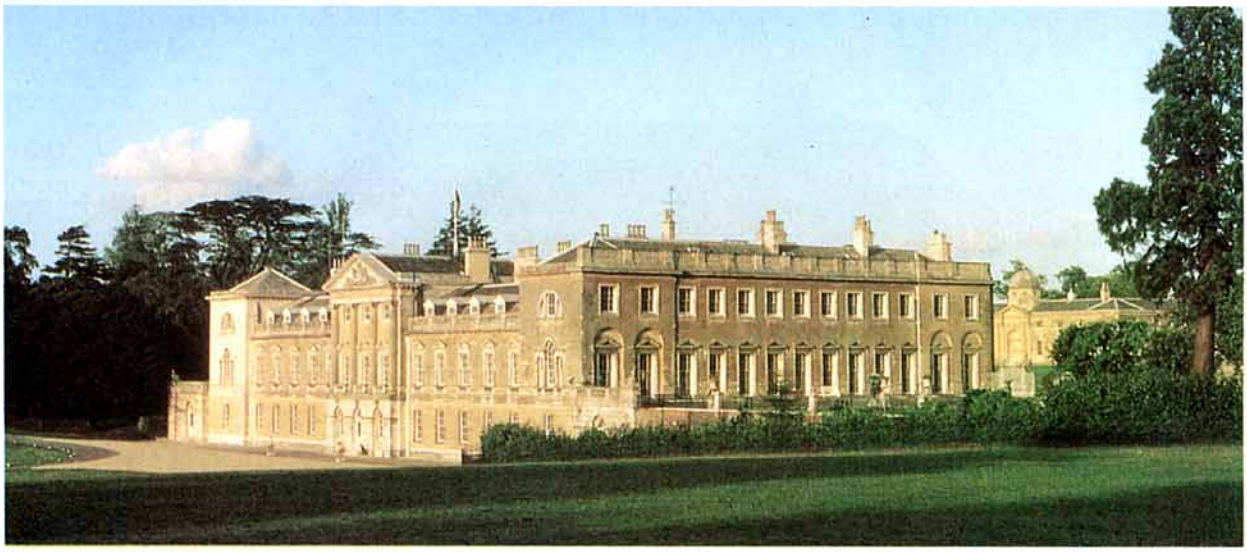

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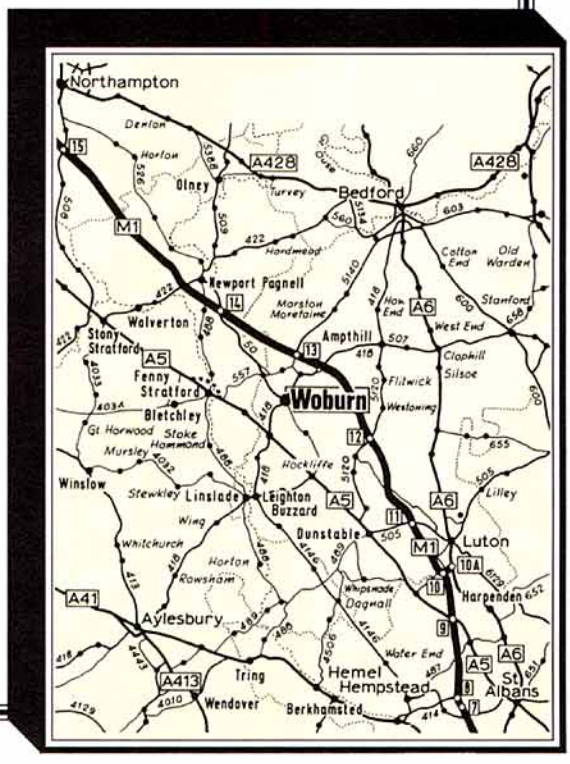

Members' Mart this year will be charged at £3 per hour per table which will enable members to sell direct. Tables will be offered on a first-come first-served basis. NO TRADING OUTSIDE OF THE MARQUEE PERMITTED.

The RSGB makes no charge for entrance to the rally but all visitors must pay for entrance to Woburn Park, in which the rally takes place, at £5 per vehicle, including passengers and £2.50 per vehicle with single occupant.

Limited overnight caravan stay at £4 per night. Booking forms available from Norman Miller, G3MVV.

All the normal Woburn attractions will be available at small extra charges. Various bars and cafes are available nearby.

HOW TO GET TO THE WOBURN RALLY

Via the M1 - leave the M1 from north or south at junction 13, not 12 as signposted, and there follow signposts through Husborne Crawley to Woburn Abbey.

Avoid routes signposted to "The Wild Animal Kingdom" or "Game Reserve". The rally takes place in Woburn Park, and correct routes are signposted to "Woburn Park" or "The Abbey". Also watch for RSGB signs.

All enquiries regarding this event should be make to Norman Miller, G3MVV, 180 Warley Hill, Brentwood, Essex, CM14 5HF, tel: 0277 225563.

The Yaesu FRG100

When a manufacturer of Yaesu's reputation launches a new product, everyone has to take notice. As the UK's only manufacturer of short-wave receivers in the hobby market (and with our own growing international reputation!) we take more notice than most when that product is a short-wave receiver. Even before Peter Hart had chance to write his review, our own John Thorpe had the covers off our own sample to see what made it tick. We were impressed, and it takes a lot to impress our own designers! Yaesu are achieving much higher standards of design and quality of construction than they have in the past. All this makes for an excellent choice of receiver. Read Peter's impressions opposite then pop into your local Lowe branch and be impressed yourself

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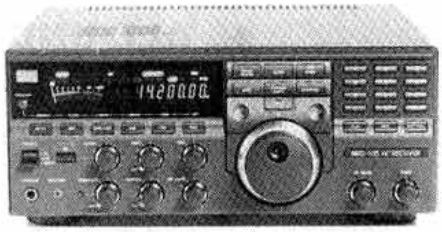

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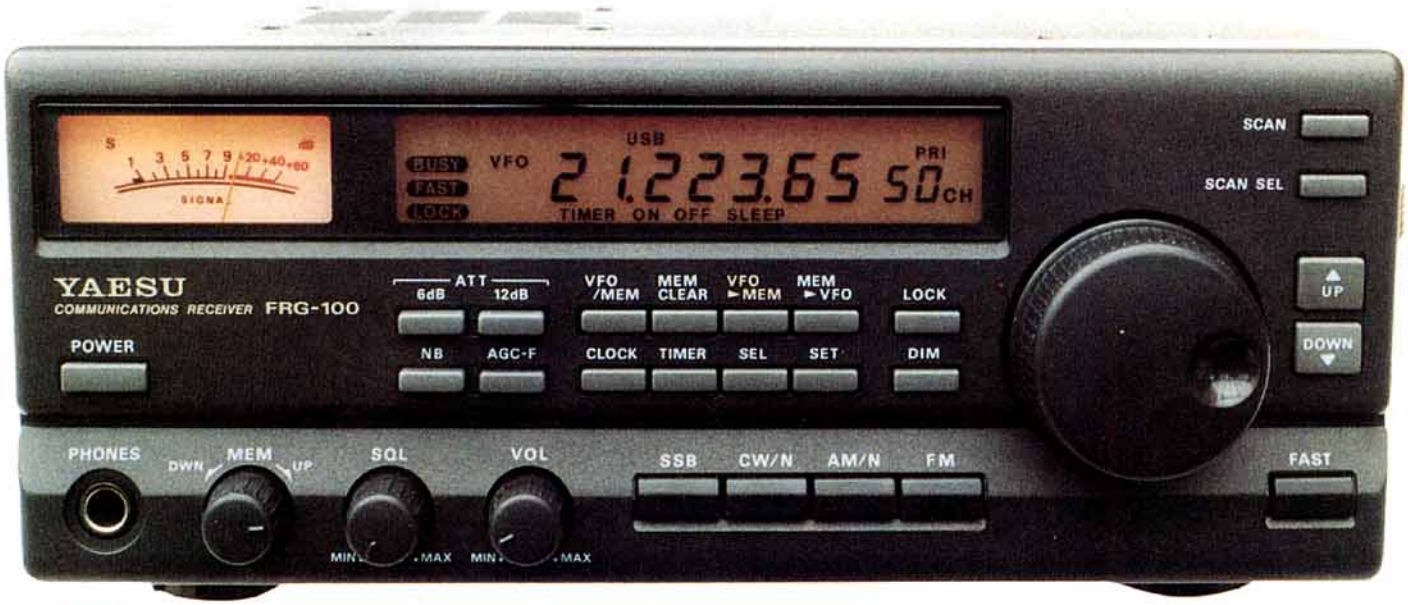
The Peter Hart Review

The YAESU FRG-100

HF Receiver



ALTHOUGH THE MAIN manufacturers introduce new transceiver models on a regular basis the launch of a new receiver is a relatively rare event and as a result HF receivers tend to be around for much longer. Yaesu have recently introduced a new mainstream HF receiver, the FRG-100, occupying the middle price ground with a good performance specification and plenty of features.

PRINCIPAL FEATURES

THE FRG-100 IS A 12V operated general coverage receiver covering the frequency range 50kHz to 30MHz. In the UK, the receiver is supplied with a small external mains PSU in a plastic moulded case (model PA-11C) but this may not be supplied in other countries. The PSU is shown as an option in the manual. The receiver covers USB, LSB, CW, CW-narrow (optional), AM and AM-narrow reception modes, plus FM when the optional FM unit is installed.

Tuning is via a 40mm diameter rotary tuning knob which tunes at a fixed rate independent of speed. This tunes in 10Hz steps at 5kHz per revolution on SSB and CW and in 100Hz steps on AM and FM at 50kHz per revolution. Pushing the FAST key increases the step size by a factor of ten and the tuning rate by a factor of ten or twenty, effectively giving up to 1000 steps per revolution of the knob. Apart from these default settings, the tuning step size in FAST mode can be programmed by the user for any increment from 100Hz to 100kHz in 100Hz steps. This may even be set independently for each mode! Hence the tuning step size could be set at 9kHz for the MW broadcast band, although the tuning rate would be rather fast at 4.5MHz or 9MHz per revolution of the knob!

UP/DOWN keys step the frequency in increments of 100kHz or 1MHz or alternatively may be set to step through the sixteen broadcast bands. In the broadcast band stepping mode, the last used frequency and mode is returned for each band. Unfortunately, there is no similar facility to step through the amateur bands.

> **A good balance of features and performance for . . . this price bracket**

Some very comprehensive memory and scanning facilities are built in. 52 battery-backed memories are provided, selected by a small click-step rotary control and the usual VFO/memory transfer and preview facilities are incorporated. The memories store frequency, mode and narrow filter selections. Direct tuning from the VFO is possible for all memories to anywhere within the tuning range of the receiver. A memory browse facility allows empty memory channels to be skipped when checking. Two of the memory positions are used primarily to store band scan limits and a power-on setting allows the memories to be re-ordered in ascending frequency order.

Scanning may be initiated between two programmable frequency limits, across all occupied memory channels or in selectable groups. In the selectable group mode, the 50 principal memory channels are split into five groups (A,B,C,D,E) with ten channels in each e.g. A1, A2, A3, B6, E9 etc. This can be regarded as a matrix and it is possible to scan this matrix along either axis, e.g. all group A or all number 3 etc. It is also possible to skip memory locations during scanning and to scan any of the 16 broadcast bands from beginning to end. In all cases there are two choices of scan resume; time delay or carrier delay. A priority watch facility is also included, whereby any selected memory channel can be checked every five seconds for activity whilst the receiver is used in normal VFO or memory mode.

Both wide and narrow filters are included for AM operation. Narrow CW (250Hz or 500Hz bandwidth) requires an optional filter. There is no variable bandwidth, notch or AF filter provided but CW has the ability to select reverse sideband mode if adjacent signals are a problem. The AGC speed is selectable as fast or slow and a noise blanker is provided for man-made impulse noise. For strong signal situations, a front-end attenuator may be switched in circuit, selectable to 6, 12 or 18dB. There is no RF gain control, the squelch

operates on all modes and the S-meter is a conventional analogue type.

The display is a back-lit liquid crystal panel with two settings for illumination. It is crisp and clear and indicates frequency to 10Hz resolution, time, memory channel number and various status messages such as mode, memory active, filter, scan and timer status etc.

The FRG-100 has two independently programmable clocks with 12 or 24 hour format *[why don't more rigs have this? – Ed]*. One can be set to local time and the other can be adjusted to UTC or any other time zone. The clock may be displayed in place of frequency and will also be displayed when the receiver is turned off provided it is still connected to a 12V power source. The FRG-100 can also be set to emit time pips at every hour, even with the receiver turned off, again provided the power is still connected. Timers are also provided, giving one on, one off and one sleep period. These will switch the radio on and off at the appropriate times and also, via a relay, a jack on the rear panel to control a tape recorder for example. This jack is also controlled by the squelch. Hence for the relay to be closed, the receiver must be on AND the squelch must indicate the presence of a signal. The clock circuits are battery backed and continue to function with the power removed.

There are many other lesser used functions provided in this receiver such as selectable CW beat-note, SSB carrier offset for best audio frequency response, variable beep tone and beep tone on/off, electronic setting and calibration of the reference oscillator etc. Many of the features such as step sizes, scan functions etc may be customised either at power-up or via a SET function.

Two antenna connectors are provided on the rear panel with a switch to select between them. There is a normal 50 ohm input and also an input for high impedance end fed antennas (450 ohm). Other rear panel connectors include power, external speaker, low level audio and remote switching. For use with a transmitter, the receiver may be muted by a short to ground contact. A computer control interface is provided conforming to the Yaesu CAT standard. This controls the usual VFO, memory, scanning and set mode functions and also includes clock, timer and reading of the S-meter.

A 39-page instruction manual is included together with circuit diagrams. A summary of all the operating functions is also contained on one side of a handy reference card which pulls out from under the radio. The other side of this card shows world time zones.

DESCRIPTION

THE FRG-100 IS A convenient size for a receiver; small and light enough to be used anywhere yet large enough to be ergonomically easy to use. The overall size is 238mm (W) by 93mm (H) by 243mm (D) and it weighs about 3kg. A steel chassis and back plate is used with a plastic overlay front panel and the circuitry is contained on three printed circuit boards. Two boards fit either side of the chassis plate. One board contains the RF, IF and AF signal frequency circuitry. The other board contains the frequency synthesizers and microcontroller. This board also contains the plug-in lithium back-up cell. The third PCB is mounted behind the front panel and contains the LCD and driver, keys and switches. A two-piece steel wrap around case is used with the 6cm diameter speaker mounted in the top section.

The receiver is a double conversion superhet with IFs of 47.21MHz and 455kHz. There is no RF amplifier and both first and second mixers comprise push-pull pairs of FETs. The front-end is filtered by one of eight switchable bandpass filters. The 47MHz IF filter uses a cascaded pair of small monolithic dual crystal resonators and the main selectivity is achieved with ceramic filters at the 455kHz IF.

The frequency synthesiser section uses a combination of single loop mixer PLL with direct digital synthesis (DDS) and a second DDS is used to generate the 455kHz carrier/BFO signal. Four VCOs cover the tuning range of the receiver. A single microcontroller is used for all functions with on-chip ROM and RAM.

MEASUREMENTS

PERFORMANCE MEASUREMEMENTS were made with the receiver powered from the PA11C power unit supplied and are detailed in the table with additional comments as follows:

SENSITIVITY

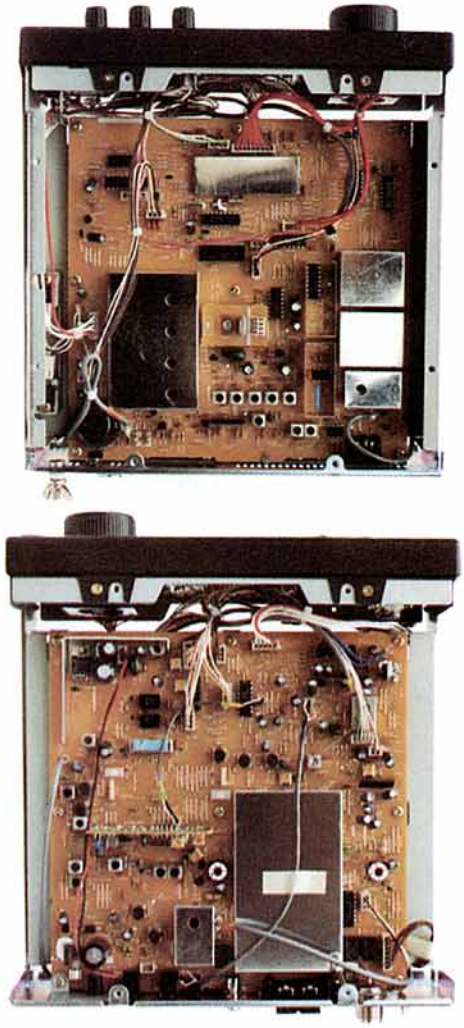
The receiver was slightly less sensitive than I would have expected. Indeed, the performance of the test model was marginally outside of the quoted specification above 20MHz. However, the sensitivity should be entirely adequate for all normal antennas.

S-METER CALIBRATION

The S-meter was considerable less sensitive than with most other receivers. Signals which are shown as S9 on most receivers would indicate S5 to S7 on the FRG-100. All modes, including FM, gave the same result.

AGC

The AGC action did not come into operation until 9uV, whereas most receivers are in the region of 1-2uV. This is probably due to a relatively low IF gain in the receiver and has the effect of making weak signals sound weaker than stronger signals. I personally do not mind this. The initial AGC attack time is fairly fast but had an extended tail taking up to 100mS to settle finally.



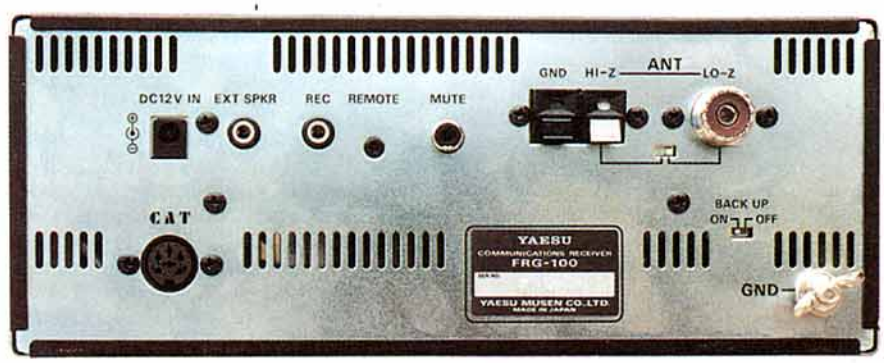
Top and bottom internal views.

SPURIOUS REJECTION

Rejection of the 47MHz IF was in excess of 85dB, the primary image better than about 70dB (see table) and all other responses in excess of 90dB. This includes the second mixer image and is a very good result. The manual lists four frequencies where internal 'birdies' may be found. In practice these were insignificant.

STRONG SIGNAL PERFORMANCE

The front end intercept and dynamic range are really quite good for a receiver in this price bracket. The close-in dynamic range degrades but is still acceptable as is the reciprocal mixing performance. The in-band linearity measured with 200Hz tone spacing was a



Sockets for coarse fed and long-wave aerials are provided, as is the YAESU CAT computer interface.

YAESU FRG-100 MEASURED PERFORMANCE

FREQUENCY	SENSITIVITY SSB 10 dB s+n:n	INPUT FOR S9	IMAGE REJECTION
1.8MHz	0.22µV (-120dBm)	560µV	69dB
3.5MHz	0.22µV (-120dBm)	560µV	71dB
7MHz	0.22µV (-120dBm)	630µV	69dB
10MHz	0.2µV (-121dBm)	560µV	74dB
14MHz	0.25µV (-119dBm)	800µV	72dB
18MHz	0.25µV (-119dBm)	800µV	88dB
21MHz	0.28µV (-118dBm)	900µV	87dB
24MHz	0.32µV (-117dBm)	1000µV	87dB
28MHz	0.35µV (-116dBm)	1000µV	86dB

S-READING (14MHz)	INPUT LEVEL
S1	10µV
S3	17µV
S5	40µV
S7	133µV
S9	630µV
S9+20	7.5mV
S9+40	42mV

AM sensitivity (28MHz): 1.6µV for 10dBs+n:n at 30% mod depth

FM sensitivity (28MHz): 0.7µV for 12dB SINAD 3kHz peak deviation

AGC threshold: 9µV

80dB above AGC threshold for +2dB audio output

AGC attack time: 3ms (see text)

AGC decay time: 0.3 – 0.5s (fast), 1.5 – 2.5s (slow)

Max audio before clipping: 1.5W into 8Ω, 2.4W into 4Ω

Distortion at above levels: <1%

Inband intermodulation products: –28 to –36dB (see text)

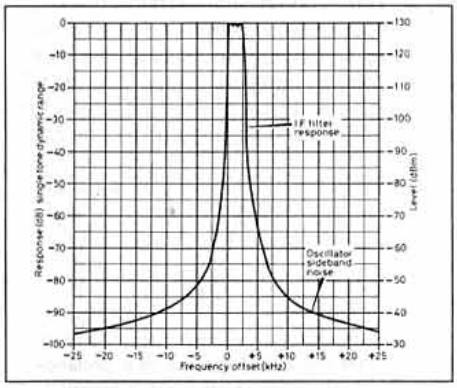
MODE	IF BANDWIDTH –6dB	–60dB
SSB, CW	2700Hz	6500Hz
AM	8730Hz	16.9kHz
AM(N)	7540Hz	16.0kHz

FREQUENCY	INTERMODULATION (50kHz TONE SPACING) 3rd ORDER INTERCEPT	2 TONE DYNAMIC RANGE
1.8MHz	+9dBm	93dB
3.5MHz	+8dBm	92dB
7MHz	+13dBm	96dB
14MHz	+14dBm	96dB
21MHz	+17dBm	97dB

TONE SPACING (7MHz BAND)	3rd ORDER INTERCEPT	2 TONE DYNAMIC RANGE
3kHz	–22dBm	72dB
5kHz	–13dBm	78dB
8kHz	+1dBm	88dB
15kHz	+13dBm	96dB
>15kHz	+13dBm	96dB

FREQUENCY OFFSET	RECIPROCAL MIXING FOR 3dB NOISE	BLOCKING
3kHz	75dB	–24dBm
5kHz	80dB	–22dBm
10kHz	87dB	–7dBm
15kHz	91dB	+2dBm
20kHz	94dB	+2dBm
30kHz	99dB	+2dBm
50kHz	105dB	+2dBm
100kHz	113dB	+2dBm
200kHz	121dB	+2dBm

NOTE: All signal input voltages given as PD across antenna terminal. Unless stated otherwise, all measurements made on SSB.



FRG-100 IF selectivity.

couple of decibels better with slow AGC than with fast.

I have recently been made aware of a problem prevalent in certain parts of the world where strong broadcast stations generate intermodulation due to the input filter switching diodes in the receiver. I checked the FRG-100 at 21.1MHz (test signals 11.6 and 9.5MHz) and 14.3MHz (test signals 7.2 and 7.1MHz). No response was obtained until input signals reached –20dBm, some 10dB better than the normal 50kHz spacing test. This seems a good result.

SELECTIVITY

The IF filter skirts seemed to widen rapidly below –50dB but reciprocal mixing limited measurement.

POWER REQUIREMENTS

In normal operating mode, the measured current consumption was about 760mA from a 12V supply. When switched off, with the clock and display active, the current consumption was about 140mA. The receiver continued to function down to a supply voltage of about 9.6V.

DIAL CALIBRATION

At room temperature, the frequency was within 30Hz at 28MHz.

ON AIR PERFORMANCE

THE RECEIVER WAS generally easy to use and performed very well on all modes and bands. Sensitivity was quite adequate on the now fairly quiet 28MHz band and the receiver coped well without strong signal problems on 7MHz and the lower broadcast bands. The audio quality was reasonable but I found it a little 'boxy'. The AM performance was good and the narrow filter about optimum. Many receivers use the SSB filter for narrow AM which I find is completely useless. The receiver also performed well down to VLF which is a sign of good synthesiser noise performance. Note that some early models were supplied apparently only tuning down to 130kHz. With these receivers, operation down to 50kHz can be permanently enabled by selecting SSB and FM at power-on.

Switching between broadcast bands was simple and rapid but, being primarily interested in the amateur bands, I missed not having a band change facility for these bands. As it had been done for the broadcast bands it could have been easily implemented for the amateur bands as well. One solution is to program the amateur bands into memory locations and use the memory tune facility, but this does not provide true band stores returning to the last used frequency on each band.

The tuning rate was about right but the tuning knob was a bit small for my liking. Implementing a full 1000 steps per revolution of the knob instead of 500 in normal tuning mode would have been even better. This resolution is available in fast mode. The synthesiser was click free with the exception of a 'muted pause' every 81.92kHz.

I very soon turned off the hourly annunciator for the clock. Over a period of 2 months, the clock gained 5 minutes.

CONCLUSIONS

THE FRG-100 RECEIVER is a useful all-round performer. It is available from the usual Yaesu suppliers at a price under £600. It is easy to use and has a good balance of features and performance for a radio in this price bracket.

ACKNOWLEDGEMENTS

I WOULD LIKE TO thank South Midlands Communications Ltd of Eastleigh, Hants for the loan of the receiver.

Peter Hart, G3SJX

RADCOM TECHNICAL FEATURE

The 7f Miniloop

by Dick Bird, G4ZU

COMPACT, SURE-FIRE antennas with 50Ω feed have many attractions for those with limited garden space. Or perhaps you need an easily transportable antenna, which can be pressed into use for operation from a holiday location, or a camping site.

ASSESSING ALTERNATIVES

MANY BEGINNERS ARE hesitant about installing a rotary beam antenna, partly because of cost, and partly because even a ten metre beam is a pretty enormous and complicated structure, (at least, when you lay it out on the little patch of lawn in your back-garden). A half-wave dipole requires a couple of supporting masts, and the direction of fire cannot be changed, unless it is made of dural tubing and has some sort of rotating mechanism.

During the past few months, therefore, I have been experimenting with a variety of different antenna structures to discover just how far one can reduce the dimensions without serious loss of gain. On 80 metres, when space is at a premium, we are often obliged to use inductively loaded verticals, and put up with a performance which will certainly be quite a few decibels down on a half-wave dipole. As we go higher in frequency, things become somewhat easier, and loop type structures in particular, begin to offer quite evident attractions.

I played around for a while with the so-called 'magnetic-loop', but decided that this was not the ideal solution, because of the indifferent performance, and the need for remote-controlled tuning and gamma match capacitors. I also tried various forms of 'mini-quads', mini delta loops and so on.

Finally I finished up with such a mass of data in my various antenna files and was forced to find some means of identification, so that I could quickly lay my hands on gain and bandwidth figures for any particular design. Coding by general shape seemed the simplest solution, so I decided to use Hexadecimal graphic symbols, a square for mini-quads, a triangle for delta loops, and so on. The Mini-loop I am about to describe is of triangular shape, and the antenna gets its name from the ASCII code for a triangle (hexadecimal 7F).

SHAPES AND SIZES

MEASUREMENTS FOR the '7F Mini-loop' are only about 1.5 metres x 3 metres, so it can be fixed to any convenient chimney, or even inside the loft space. For portable work, it can quite easily be folded up, and stowed on a roof-rack, just like a pair of skis. One major attraction of the Mini-loop is that it can be directly fed with ordinary 50Ω cable – complicated matching systems are not required. In addition, the cost is very low.

Electrically, the Mini-loop can be regarded as being more or less the baby brother of a full sized delta loop. A normal delta loop is generally in the form of an equilateral triangle, the total length of wire being just a little over one wavelength (around 10.5 metres for the ten metre band). It shows a modest gain over a half-wave dipole, and has a much wider bandwidth, so no critical tuning adjustments are required.

Some might choose to feed the delta at one corner, others in the centre of one of the sides. Alternatively, the whole affair could be mounted apex up, apex down, or even lying on it's side!

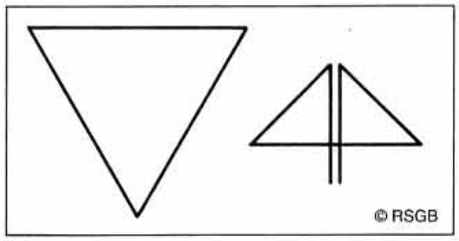


Fig 1: Delta loop (left) to the same scale as the 7f mini-loop (right).

Whatever the final configuration, the feed impedance for a full size delta loop tends to remain stubbornly around 120 to 150Ω, so some experimentation with a matching system is required to give a 50Ω feed impedance for a transceiver. You will no doubt be pleased to know that the feed impedance of the 'Mini-loop' is between 40 and 60Ω. This means that it can simply be fed with ordinary 50Ω coaxial cable via a 1:1 balun.

DESIGN PHILOSOPHY

THE PHILOSOPHY BEHIND the Mini-loop is as follows:

1) With the possible exception of business cars, swimming pools and TV sets, with size as a status symbol, the modern trend is undoubtedly towards compactness. This trend is particularly evident in the field of electronics, where transceivers, computers, etc, are packing more and more hardware into less and less space.
2) Even with antennas, (although the status symbol may still carry a certain amount of weight with the 'big boys'), most of us, (and our neighbours!), would welcome something more compact. However, we normally have a sneaking feeling, that you *must* lose *something*, when you cut down on the size of an antenna. That's the thousand dollar question! How *much* do you lose, and how far can you safely go?
3) If there are no resistive, or other losses, a modest reduction in size should not greatly reduce signal level. A drop of 1dB would normally pass completely un-noticed.
4) What else are we likely to lose? The simple answer is that radiation resistance decreases, which will make coupling to the transmitter increasingly difficult, and we will also lose out on bandwidth. In fact, if taken to extremes, only slow telegraphy would be possible, because the bandwidth would not support the 3kHz or more required for voice modulation!
5) I think it will be self-evident that, if we start off with something having more gain, more bandwidth, and more radiation resistance than a half-wave dipole, we should logically be able to effect a *moderate* size reduction, and still, at least, break even with the dipole.

It was thoughts along the above lines which led me to embarking upon the Mini-loop.

PRACTICAL POSSIBILITIES

THE DELTA LOOP HAS an exceptionally wide bandwidth *and* quite a high radiation resistance so I felt that I could safely 'scale down', until the radiation resistance fell from 130Ω to a convenient 50Ω, hoping that the bandwidth would not become excessively narrow. (I was not hoping for anything like 28 to 30MHz, but was prepared to be content with say, 28.3 to 29MHz.)

I didn't want to reduce size by means of loading coils, because of resistive and other losses plus the need for weather protection, so decided instead, to use a 'folding' technique. Thus I could retain around the same total length of wire as with a full-size delta loop. **Fig 1** shows, side by side and to the same scale, a normal delta loop, and the '7F' structure. I could have pushed the size reduction even further, but it seemed best to call a

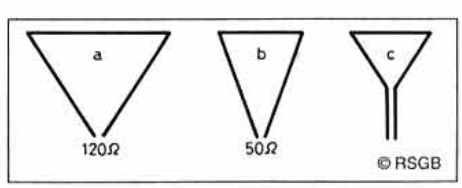


Fig 2: (a) Full size delta loop has an impedance of 120Ω. (b) Shortened top span gives 50Ω match. (c) Sloping sides pulled together at 90°.

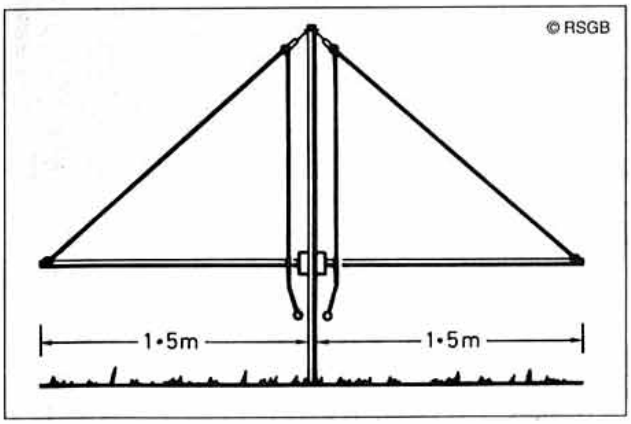


Fig 3: Practical implementation of the mini-loop for the ten metre band.

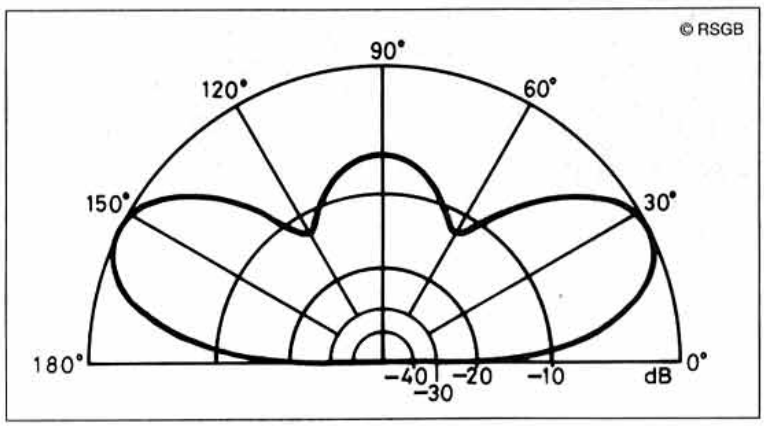


Fig 4: Polar plot of the 7f mini-loop.

halt when the radiation resistance had fallen to a convenient 50Ω.

How did I arrived at the magic 50Ω? I first strung up a full-size delta loop for ten metres, with the upper corners supported by a couple of nylon cords. Then I fed it at the bottom with 50Ω coaxial cable, via an SWR meter. As might be expected, the SWR was between 2.5 and 3:1, indicating an impedance of 120 to 150Ω. This was in complete accordance with the book. See **Fig 2(a)**

I then progressively shortened the top span down to around 3 metres, at which point, the SWR had dropped to not far off 1:1, indicating an impedance of around 50Ω. See **Fig 2(b)**. This was more or less in line with earlier experiments using a similar type of 'narrow-top' delta loop on the 20 metre band.

I next pulled together the sloping sides at a point around half-way up (**Fig 2c**), so as to form a lower apex of around 90°, with the rest of the wire hanging down like an open wire line. (There was no risk of short-circuits, as I was using plastic covered wire).

The final move was to invert the whole affair and mount it on a supporting structure as in **Fig 3**, with the 'open wire line' hanging below the the horizontal cross bar, to the point where it was terminated at the 50Ω coaxial cable feed point. Then I slightly adjusted the length of the 'open wire line' by a couple of inches or so, until I had minimum SWR around my normal operating frequency. A couple of days later, I mounted it on a five metre wooden pole and tried it out for half an hour or so during the *CQ* Contest. Running 'barefoot', I found I was kept full occupied with hardly a pause for breath. Obviously I was keeping my head above the QRM! A compute-plot (**Fig 4**) shows the theoretical polar diagram.

HINTS AND TIPS

HOPEFULLY, YOU NOW FEEL LIKE building the Mini-loop, so here are a few suggestions regarding appropriate materials. The horizontal 'spreaders' could be either a couple of bamboo canes, or two tapered fibreglass rods, butted together at the centre. The vertical strut could be in heavy duty plastic tube. For portable work, this latter item could be pushed into the top section of a tubular mast so as to permit elevation to a reasonable height (and rotation by hand, if required). The radiation pattern is bidirectional, rather like a dipole, but there are quite good 'nulls' off the side, which can be useful in suppressing QRM. It would certainly put out much more signal than a mobile whip!

Scaled down for 2 metres, it wouldn't measure much more than 30 x 50cm, and could probably be made self supporting in 16SWG enamelled copper. Construction time should be less than ten minutes, and it might be interesting to plug it in on your hand-held, in place of the 'rubber-duckie', just to see how it compares.

Some might like to try the '7F' on 15 or 20 metres. In this case I'd recommend that you mount the horizontal portion at about a half-wave above ground (if you are after real long-distance DX).

After all, the structure is so light that you needn't worry about a lattice tower! You could just throw a rope over a convenient tree branch and haul it up into place. At least, that's what I did myself, and managed to keep my usual long distance skeds. I kept mum about what I was using to avoid any psychological bias, and the only adverse comment received was a suggestion from one station that propagation seemed a bit down. However copy was 100%.

Note that the 10 metre model was constructed with *plastic-covered* wire. The plastic has a loading effect, which results in a total length of wire some 3% less than would be required with enamelled copper wire. Precise resonance in any desired part of the band can be achieved by slightly lengthening or shortening the lower end of the open-wire line. Also, for an exact 1:1 SWR, slightly increasing the size of the loop will raise the impedance, and conversely, a small reduction in size will lower the impedance. The approximate total length of wire required for any frequency, will be around 306/F in metres (allow a few centimetres extra to be on the safe side, and trim back as necessary).

FINAL THOUGHTS

FOR FIXED STATION WORK, it might be possible to install a ten metre Mini-loop in the roof-space. Alternatively, the really ambitious might like to try mounting a pair of loops on a pole with a cross-boom (**Fig 5**). This could form quite an effective, but low cost rotary beam.

No doubt interest in small antennas of this type will continue, but in the meantime I have included a computer plot to show (**Fig 6**) what might be expected, and perhaps whet your appetite!

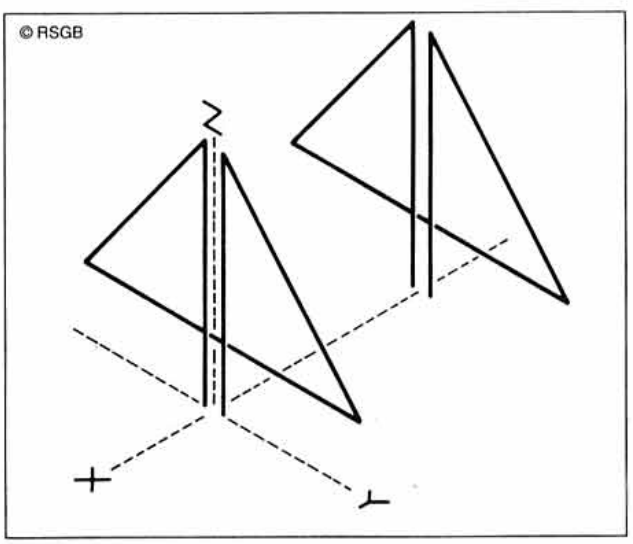


Fig 5: How about the above arrangement for a low-cost rotary beam?

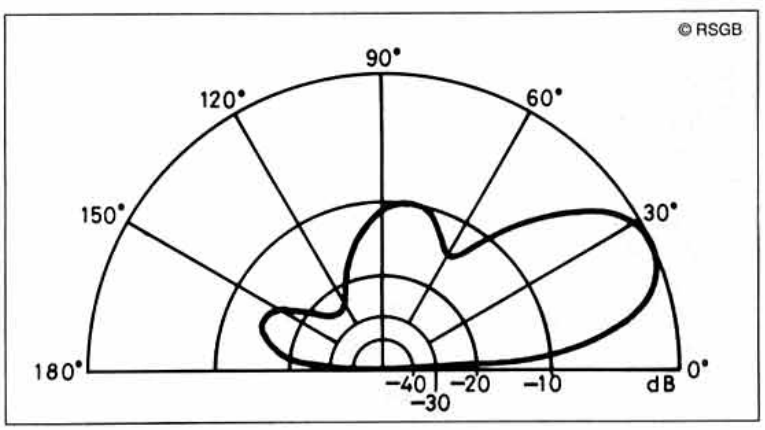


Fig 6: Polar plot of a two-element loop antenna.

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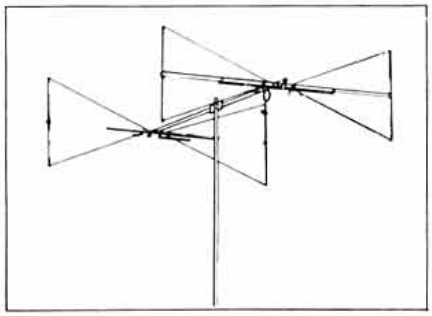

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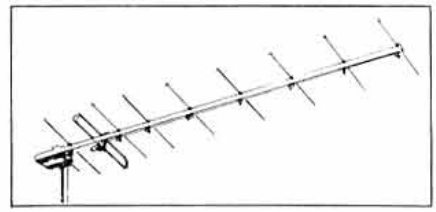

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Technical Topics

FIGHTING ANTENNA CORROSION

IT IS SOME YEARS since *TT* tackled the very real problem of the corrosion of aluminium antenna elements including verticals, yet this remains a perennial source of poor performance as shown clearly in the three-page article 'Fighting Antenna Corrosion' (*QST*, April 1993) by Scott Roleson, KC7CJ. He describes how just six months after installing a trusty Butternut antenna in the dry climate of inland California it suddenly ceased to work – "one day it was fine; the next it wouldn't load properly."

Initially he suspected a broken connection but finding that substituting a dummy antenna gave correct loading, he realised that the problem was at the antenna: "As I dismantled the vertical I noticed a fine, white powder at each joint, corrosion had crept into every connection although on installation I had tightened each clamp and bolt securely."

KC7CJ describes the basic physics of corrosion, showing how metal tends to return to the natural corroded state of the original ore by such processes as bi-metallic corrosion where an electrolyte is present at a junction of dissimilar metals, particularly where these are well separated in the galvanic series: see **Table 1**.

He writes: "Tin and gold are metals that illustrate how troublesome bimetallic corrosion can be. Both metals are commonly used to coat electrical connectors yet are galvanically remote. Sometimes, connectors with pins coated with these metals are inadvertently attached to each other. If the contact pressure is insufficient to keep out moisture, or if the metals are used in an environment where electrolyte forms easily, the tin surface oxidizes. I've seen this happen in personal computers, where plug-in cards with gold-plated edge connectors are plugged into tin-plated motherboard connectors. The resulting problems are usually intermittent and difficult to localize. Simply removing a card and reinserting it may remove enough oxide that the problem disappears – temporarily at least. After a while the oxide reforms and the problem returns."

KC7CJ continues: "Making and keeping good electrical connections in antennas is really simple – as long as you pay attention to the basics. The best way is to start with galvanically compatible materials, then clean all connections well before assembly. To make sure these connections stay good, seal all contact points so moisture can't enter the joint to form an electrolyte and start corrosion. In my case, I had done the first, but not the second."

In respect of mating surfaces, electrical contacts occur between microscopic bumps and points where the metals meet. Joint impedance is proportional to the number of points in contact. KC7CJ writes: "A smooth, clean surface ensures that there will be lots of these points and little between them to get in the way. For antennas, I've found it's best to first buff all joining parts with steel wool, emery cloth or a wire brush, then with a nylon scouring pad . . . . For metal tubing, it's important not to forget to clean the inside surfaces of telescoping parts. I wrap steel wool around a pencil or form it into a pencil-like shape so I can get to the tubing's inside surface. Finally, I use a clean rag to wipe off any powdered metal and oxide. I do my best to refrain from touching the mating surfaces and contaminating them with body oils. (Using cotton gloves during antenna assembly is a good idea).

"Pressure between mating surfaces is important. Oxides start to form immediately, so there must be enough pressure to break through the oxide layer. Furthermore, contact pressures must be high enough to ensure joints are stable and tight during normal flexing. A phenomenon called fretting corrosion occurs when a connection is repeatedly opened and closed. The closure breaks through a fresh surface oxide, so fresh metal is in contact with fresh metal. However, when the contact opens, this fresh metal is again subject to oxidation. With time, the oxidation builds up. Eventually, the contact pressure isn't enough to break through the oxide layer and the connection fails."

In a section on minimizing corrosion, KC7CJ advises the use of parts that are galvanically similar and assembled for minimum galvanic differences. Aluminium and copper are not very compatible but connection of copper wires to aluminium antenna elements is often necessary. This problem can be minimized by tinning or solder-plating the copper wire, forming a gas-tight seal between the copper and plating. Then use stainless-steel hardware to secure the connection since stainless steel is galvanically quite close to both tin and aluminium, and won't rust like other steel hardware. Use a stainless-steel washer between an aluminium surface and a tinned wire, or lug, connected to it. This should help the joint last longer if (or when) an electrolyte gets into the joint.

He adds that another way to form a gas-tight seal with hardware is to use star washers which break through oxides and cut into the mating surfaces under the pressure of the screw and nut used to hold them in place, so that fresh metal is in contact with fresh metal. This technique works best for hardware that is to go on once, or at most, only a few times since repeated assembly can damage a surface, possibly providing a path for moisture to enter the joint.

Special pastes, fluids, and other joint compounds help seal joints and inhibit electrolyte action (discussed in detail in 'Fluids vanquish intermittent contacts' by S Leibson in *EDN*, March 14, 1991, pp59-64). KC7CJ writes: "These compounds are squeezed away from the microscopic points of contact by mating pressure, but fill in around the points of contact to inhibit air and moisture passage. For aluminium antennas, I use pastes available for aluminium electrical wiring available [in the USA] at electrical-supply houses, hardware stores and building-supply outlets. A few antenna manufacturers provide an anti-oxidant compound with their antennas. The joint compound can be spread with a cotton-tipped applicator. Wire-brushing the surface after compound application helps ensure all quickly formed oxide is broken down and prevents a new layer from forming. Toothbrush-size wire brushes are available from hardware stores.

"Joint compounds, unfortunately, don't last forever. they harden and crack, or with time and temperature, simply flow away from joints. For this reason, some sort of finishing barrier or overcoat is needed, such as plastic tape, paint, or silicon rubber sealant (bathtub caulking). Choose a material that is flexible and resistant to ultraviolet light. Many paints and plastic tapes eventually harden and become brittle from exposure to UV light. Normal antenna flexing in the wind cracks them, and moisture seeps in through these cracks. This argues for regular maintenance. Plastic tape is easy to remove and replace. If you use paint, use a bright colour, red or yellow. If you need to disassemble a joint for cleaning, the bright colour is easier to see so you can tell if you've removed it all."

"Anodic End"
Magnesium
Zinc
Aluminium
Mild steel
Iron
50-50 lead/tin solder
Stainless steel (US type 304 & 316)
Tin
Nickel (active)
Brass
Aluminium-bronze
Copper
Nickel (passive)
Silver
Gold
"Cathodic End"

Source: KC7CJ, *QST* (April 1993)

Table 1: Relative galvanic series in sea water

SOLAR POWER AND RENEWABLE ENERGY

FOR MANY YEARS it has been easier to generate RF power than the AC or DC electric power needed to run a transceiver. Fortunately, most of us can draw upon the 240V AC mains supply power system, either directly or for keeping batteries charged. For mobile operation, the car electrics system normally provides all that is required. Handhelds are designed to be sufficiently low in power consumption to permit operation from batteries – preferably rechargeable nicads or compact lead-acid batteries. Disposable batteries have an energy cost some hundreds of times that of mains supplies. But for field events or for DXpeditions to remote areas, the question of suitable power generation looms large, as indeed it did for wartime clandestine and paramilitary radio links.

At that time many different forms of transportable electricity-generating and charging systems were pressed into use more or less successfully. They included conventional mains chargers, and both hand and pedal-

chargers. Amongst these was the ingenious 'beach chair' devised by the late John Brown, G3EUR – a tubular-metal 'deck' chair in which the user pedalled a generator with the chair capable of being folded up to form a backpack.

Then there were small dynamos that could be attached to the back wheel of a jacked-up bicycle, thermo-electric (1A) chargers using arrays of about 350 chromium-constantan cells heated in a charcoal, wood or gas fire, wind generators on collapsible 10ft poles, and 6V or 12V DC petrol-electric generators (eg 'Tiny Tim'). There was even a steam generator with a boiler suspended over a brazier – this had a flexible steam tube to a small steam engine (total weight about 70lb) which could charge a 6V battery at about 4A, again using a wood or charcoal fire.

At least some of the power needed to be at HT, or preferably 220 or 110VAC, to permit the use of conventional mains-powered transmitters/receivers. Most vehicle batteries of that era were 6V rather than the now universal 12V (or 24V for heavy vehicles and aircraft). For low-power loads, mechanical vibrator units were available which could have efficiencies of up to 90%. For larger loads, rotary convertors such as the series of American Dynamotors were used. 110V or 220VAC could be generated directly with petrol-electric generators (eg American ONAN) of about 150W to 2kW rating and these were used for signals vehicles. Some 150W units, for example, were used in Norway during the war, at sites where the give-away noise was unlikely to draw unwanted attention.

All such approaches have continued to be developed and improved during the post-war period and a pedal/hand generator capable of providing some 40W at 110VAC was, for example, part of the Mark 123 kit. However, the arrival of the low-voltage solid-state era and, in particular, the development of silicon solar (photovoltaic) cells have had a major impact. Battery technology has also progressed, although there is still room for improvement. Many of the developments have so far made less impact than expected and the main motivation in this field remains the electric car. For DC-DC or DC-AC conversion, solid-state invertors have replaced mechanical systems such as vibrator units and rotary converters, although the AC output tends to be either square-wave or 'stepped AC', waveforms which can cause problems with some equipment. Near sine-wave invertors are available but are more complex and cost more.

SIMPLE 3.5MHZ DIRECT-CONVERSION RECEIVER

NIC HAMILTON, G4TXG, has underlined that considerable care needs to be taken in the design and construction of direct-conversion receivers to obtain a performance, on the higher frequency bands, truly rivalling that from a well-designed superhet ('Improving direct conversion receiver design' *RadCom*, April 1991, pp39-44). This is particularly true in connection with keeping the local oscillator under control and reducing the effects of LO leakage, AM breakthrough, hum pick-up and microphony. However, on the lower frequencies such as the 3.5MHz band, reasonably satisfactory performance can usually be achieved with simple, easily-constructed designs.

Jeffrey Harrison in the 'Circuit & Design Ideas' feature of *Electronics Australia*, May 1993, p60, presents a simple design based on the ubiquitous NE602 chip as balanced mixer (product detector) and oscillator. A 50Ω input is stepped up to match the IC input by a balun transformer (2 turns primary, 10 turns secondary wound on toroid balun core). As shown in **Fig 1**, the input circuit is untuned on the presumption that with a double balanced mixer, strong even-harmonic signals will be rejected. However (in the absence of an ATU to provide the 50Ω line and act as a band-pass filter) strong signals on odd harmonic frequencies could prove troublesome.

Jeffrey Harrison notes that in these circumstances a single or, preferably, double tuned circuit should be connected across the input to the IC pins 1,2 (see for example the receiver input shown later, in the *TT* item on the 3.5MHz DSB transceiver).

The local oscillator uses the Colpitts arrangement tuning from about 3.3 to 3.8MHz. Pins 6 and 7 of the NE602 provide connections to the base and emitter of an internally biased transistor. For a stable fixed-channel stand-by receiver a crystal could be substituted for the tuned circuit.

The NE602 provides a gain of the order of 18dB with a balanced output across pins 4 and 5 which is amplified by a differential audio amplifier (741 op-amp) with a voltage gain of up to 500. This is followed by an emitter-follower to drive 32Ω headphones to ample volume. The 47nF capacitor across the NE602 output provides a crude low-pass filter (a sharper, narrower filter would be preferably for CW reception). With the high audio gain, the leads in the audio amplifier, including those to the gain control, should be kept as short as possible in order to prevent oscillation.

The 78L05 and red LED provide a regulated supply of about 7V, below the NE602's 8V maximum and ensures that pins 4 and 5 are biased to approximately half of the supply voltage. The power supply should be from 9 to 15V and must be well filtered because of the high audio gain.

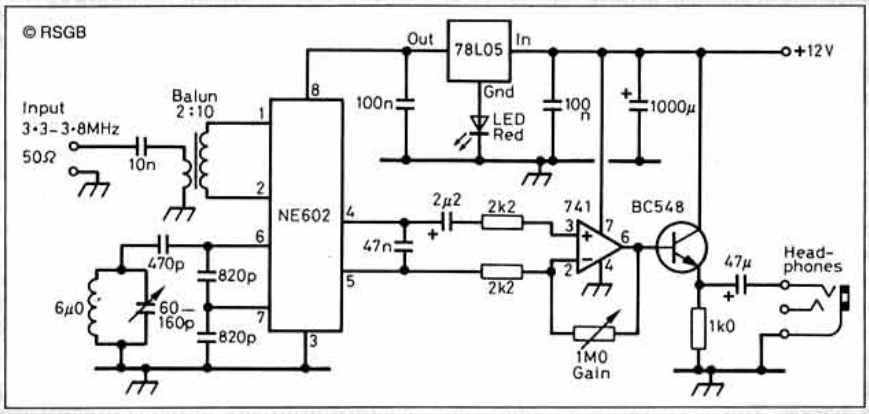

Fig 1: Simple 3.5MHz D-C receiver based on the NE602 chip as described by Jeffrey Harrison in 'Circuit & Design Ideas', *Electronics Australia*, May 1993.

Solar energy offers great promise for the two-billion or so people – 70% of the population of the developing world – who remain without mains electricity. An article 'Sunshine for light in the night' in *Nature* (22 April 1993) by authors associated with the Solar Electric Light Fund and United Nations Development Programmes emphasises that many rural regions remain hungry for electricity to meet even the most rudimentary of needs. For these, small solar-power systems (SSPS) are proving an appropriate technology.

To quote *Nature's* explanation of photovoltaic-based small solar-power systems (SSPS): "Solar cells convert light to direct-current electricity. Light impinging on single crystal or polycrystalline silicon wafers generates hole-electron pairs which are separated at a p-n junction fabricated into the wafer. The separation of charge by the junction creates a potential difference that produces a current in an external circuit. The current is used to charge a battery which, on demand, provides power for lights and other appliances. Individual solar cells are encapsulated and fabricated into multicell units, the solar panels.

"A standard roof or pole-mounted solar module, with typically 36 10cm diameter solar cells, charging a car lead-acid battery can provide enough power for both household fluorescent lighting and a radio and television set. For example, in the tropics, the average daily insolation will often exceed 5kWh per square metre. With a 40Wp solar module (a module producing 40 Watts at noon under direct sunlight), this insolation will produce enough electricity for three fluorescent lights each operating for three hours, as well as three hours of radio and three hours of television. The solar modules are generally mounted on roof tops or on poles which allow them to be turned to maximize daily charge near the Equator and to keep them cool. Car battery storage provides up to five days of power supply during overcast periods . . . . charge indicators and charge-discharge controllers are the key to long battery life . . . . High-efficiency fluorescent DC light fixtures using electro-polished aluminium reflectors and invertor ballasts minimize lighting power requirements with, for example, one 9-Watt

PROTRACTOR DIALS

ANOTHER OF THOSE USEFUL IDEAS that have turned up before in *TT*, but many years ago, re-emerges in a note from J D Bolton, G4XPP, who has been busy constructing an ATU with secure coil taps. He writes: "Once the ATU has been constructed with secure coil taps (see *TT*, May 1993, p57, Fig 10) there remains the problem of ensuring accurate settings of the variable capacitor(s) with band/frequency changes in order to reduce tune-up time to a minimum. Several ideas were tried without success. But then acting on a suggestion from G0PXQ the solution proved astonishingly simple.

"Buy a 360°, 100mm diameter, transparent plastic school protractor (available from W H Smith book shops). After removing the centre of the protractor, glue a piece of white card to its back. After giving time for the glue to set firmly, place the protractor over the centre spindle of the tuning capacitor. I placed it with the 0° point on the left of the centre spindle which in my case is at the right-hand side of the ATU. After lining it up carefully with the marks I had made for drilling the spindle hole, I marked off the 0, 90, 180 and 270° points and then applied glue to the back.

"The result (**Fig 2**) is an attractive finished look and an extremely accurate means of precise setting before tune up. Either 180° or 360° protractors can be used. Apart from my home-brew ATU for long-wire antennas, G0PXQ and I have used this approach for TM1000 and SPC3000D ATUs. Provided that settings for the various frequencies are carefully noted the first time they are used, then next time I find that I do not need to tune up for more than a second or two just to check that the VSWR is near unity."

I must admit that I still have, and use, at least one of those large knobs calibrated 0-180° that were popular for broadcast receivers in the early 1920s. Even when worse for wear, such a knob can be touched-up using white Tipp-Ex fluid. Many will recall the Eddystone 0-180° dial plates used for many years with their early slow-motion drives.

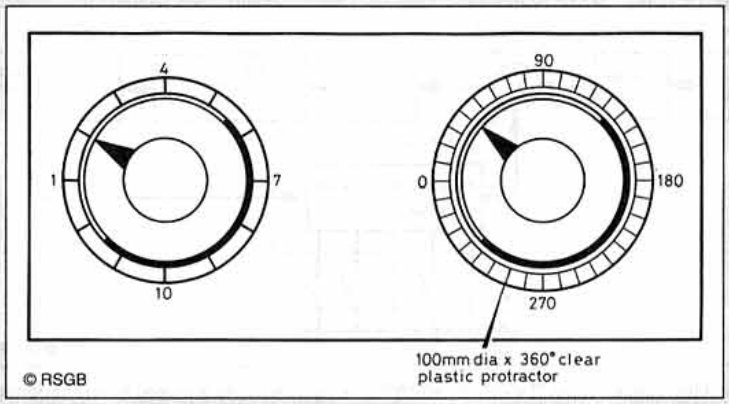

Fig 2: Accurate setting of G4XPP's ATU is made easy by the use of a plastic protractor as a dial plate.

fluorescent tube producing as much light as a 50-Watt AC incandescent bulb."

The *Nature* article reports that about 100,000 families, farms and businesses in the developing world are currently using solar-powered residential electric lighting and communications systems which currently cost from US$350-750 including shipping, tariffs and installations and have projected lifetimes of some 20 years.

"Typically, nearly 60% of the initial cost is in the solar module itself, another 25% or so in the battery and lights, 10% in wiring and circuitry and 5% in installation costs. (However, the recurrent cost of battery replacement can be higher than the original cost of the module over its 20-year life span.)" This presupposes that locally made car batteries with thick plates should last more than five years. With an SSPS the sun supplies the resulting electric power for free.

One of the big challenges, the authors stress, is to develop better methods of energy storage that would make possible higher power systems: "New methods of regulating both charging and discharging promise to lengthen battery life. Imported, long-life, deep-discharge batteries would be more desirable, but at present they are too expensive for most rural households. More efficient capacitive storage batteries will also be useful if the cost can be kept low. Eventually, it may be that other power-storage methods such as flywheel energy accumulators, pumped storage or solar-hydrogen energy systems will provide alternatives to batteries. But – and it cannot be over-emphasized – cost is the crucial consideration. Unless the improvement can be manufactured cheaply and in high volume, the people most in need of them will not be able to afford them . . . . but the success of SSPSs in the field shows that this technology works as it is."

It is clear that the growing use of relatively low-cost SSPS systems offers a significant improvement in the quality of life in tropical developing countries, including Zimbabwe, Sri Lanka, Kenya and the Dominican Republic. It also opens the way for more amateur radio activity in such regions, although clearly the prime need is for providing thin-line telecommunications and lighting in the villages. Even in the UK, where solar energy is significantly lower than in more sunny climes, solar cells can still provide an effective method of keeping lead-acid batteries charged during portable or field operation, although power for permanent installations, particularly in coastal or hill sites, may need to be supplemented by a wind generator.

TT, January 1983 page 44, described an experimental IBA installation at Bossiney on the Cornish coast where for a few years a four-channel UHF television relay station was run from 36 large lead-acid batteries with a total storage capacity of about 28kWh kept charged by an array of 24 solar panels, plus a wind generator. The 864 photovoltaic silicon cells provided an output of about 780W in peak sunlight, supported by a wind generator having an output of some 150W at a wind-speed of 7m/s: **Fig 3**.

In practice, after a few years, this experimental installation was replaced by the conventional mains supply mainly because it was found that on-site maintenance – with battery and wind-generator problems – was rather heavy. Thus the saving on bringing a mains supply to remote sites (which can cost many thousands of pounds) would seldom be really justified.

Last January at an IEE colloquium, Peter Best of British Telecom presented a paper 'Renewable energy supplies for radio systems serving rural customers'. He defined 'renewable energy sources' as those which do not consume a fuel, and included wind, solar, tidal and certain natural thermal sources. He noted that there are many different small wind turbines available on the market but that it is necessary to consider not just the (claimed) power output for the generator (quoted as a

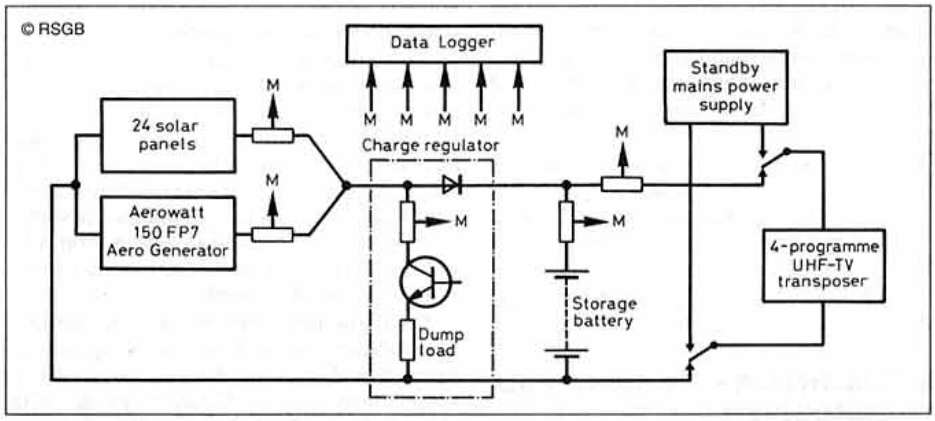

Fig 3: The experimental natural energy system used by the former IBA in the early 1980s to power a four-channel very low-power local television relay station at Bossiney on the north Cornish coast. The solar panels provided a maximum output of almost 800W in peak sunlight and were supported by the output from a 150W (7m/s) wind generator.

function of wind speed) but also its ability (ie mechanical strength) to withstand strong winds.

He pointed out that water power comes in many guises, including small-scale hydro-electric systems (such as the so-called 'Micro-hydro-turbine') which could be built in or around a stream or small river [but note there are strict regulations in the UK covering taking or diverting water from streams and rivers – *G3VA*]. Wave-powered or tidal-powered generators are also alternative sources of water power: "The biggest advantage of the micro-hydro-turbine is that it is the most predictable of renewable energy sources; most streams do not normally dry up .... however, water powered installations will inevitably require some degree of civil engineering, and each installation will be totally site specific, not only in terms of the power generated, but also in terms of the design of the installation."

Peter Best revealed that BT has used solar powered equipment for about 18 years, with three installations powering single-channel radio sets, but each representing an average power consumption of less than one Watt, requiring only a modest sized solar panel which float charges a small battery. However in 1992 a more ambitious hybrid wind-and-solar-system was installed in Norfolk for a 2GHz radio system which has a stand-by consumption of about 40 watts. During the planning of this project, it was found that a solar-only system would cost over 30% more than a hybrid system. As a further precaution, to ensure that the system would not go down during a protracted period of overcast weather with no wind such as can occur in coastal areas subject to sea mists, an aluminium-air fuel cell can be used to provide a high power output to recharge the batteries and then be switched off once they are fully charged.

In its regular 'Lab Notes' feature, *QST* (April 1993) concentrates on the provision of power for Field Day operation noting that the American Field Day rules include bonus points when a specific number of contacts have been powered from natural energy sources. It is noted that a typical 100W HF transceiver may represent a peak load on transmit of some 400 Watts and that power will also usually be required for a lamp (60W), a laptop computer (40W) and a hefty (outdoor) soldering iron say 100W, and possibly other appliances. These could well add up to a total peak load of some 600-800W, at an average Field Day station.

QST stresses that while conventional vehicle batteries are capable of providing the extremely high currents over short periods needed by starter motors, they are not intended for deep discharge applications, and will not tolerate many such cycles: "A deep-discharge lead-acid battery is better suited. It can be discharged repeatedly without damage, and will maintain full output voltage over much of its discharge cycle. They are not much more expensive than regular automobile batteries and are designed to deliver moderate current for long periods of time."

While it is possible to operate a 100W station from lead-acid batteries without continuous float-charging this represents a heavy drain. The battery is unlikely to last more than a few hours before it needs recharging – less if cold (cold batteries can lose up to 70% of their normal capacity). A typical deep discharge battery may have 1000Wh capacity but equipment is unlikely to function when the voltage drops below about 12V.

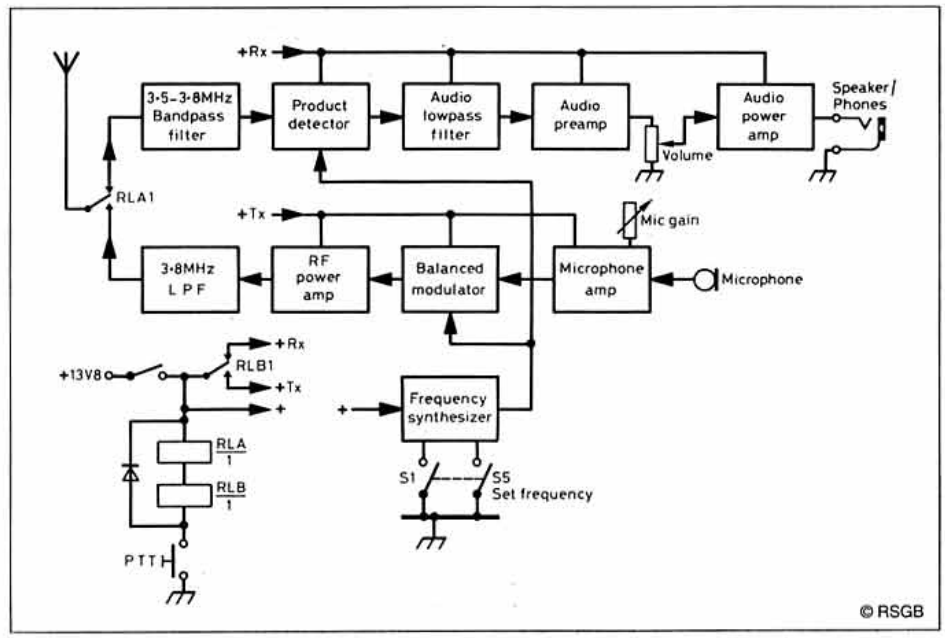

Fig 4: Block diagram of the low-cost 3.5MHz DSB channelised transceiver – a constructional project by VK2DOB in *Electronics Australia* (Part 1, May 1993).

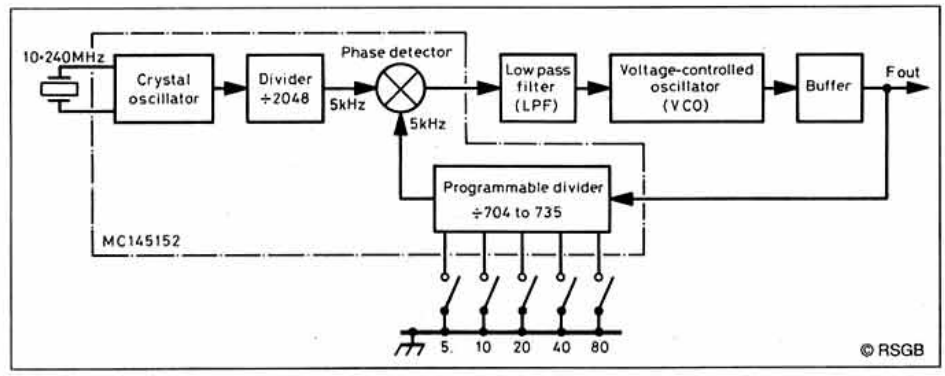

Fig 5: Block diagram of the frequency synthesizer in which five toggle switches are used as an economical way of setting the operating frequency in incremental steps of 5kHz. Based on the use of a Motorola MC145152 chip.

It is noted that solar panels with polarity protection diode as marketed in the USA can deliver 15-18V at 600-1500mA in full sunlight and will not damage a deep-cycle lead acid battery. More care may be needed with nicads and medium-capacity gelled-electrolyte lead-acid (1Ah to 50Ah) batteries which need regulated charging. If a gel-cell is charged too rapidly, bubbles can develop in the electrolyte, permanently damaging the battery. It is advisable to limit charging current to 10% of output rating in Ah as common practice for nicad cells.

DC-AC converters ('invertors') providing a square-wave or stepped-wave AC are available or can be built for ratings of 100-400W but note that some motors cannot be powered by square-waves, and it is advisable to check beforehand whether the system generates RF noise or overheats on full output.

A CHANNELISED 3.5MHZ DSB TRANSCEIVER

THE MAY 1993 ISSUE of *Electronics Australia* also presents the first of a two-part construction project 'A low cost 80m DSB transceiver' by Leon Williams, VK2DOB of which the introductory notes seem pertinent:

"One of the great advantages of an amateur radio licence is that it allows amateurs to build and operate their own transmitters and receivers. The last couple of decades, however, has seen the proliferation of 'black boxes' resulting in a rapid decline in homebrewing of station equipment. The satisfaction of finding all the bits and pieces and putting them together, and the thrill of that first contact is something that a lot of new amateurs unfortunately no longer experience.

"The arguments against home construction generally relate to the average amateur being unable to construct transceivers equal to those which are currently commercially available. This is generally true, of course, but what most people fail to realise is that it is not necessary to have a $3000 transceiver with a hundred knobs, computer control and 400 Watts output power to talk to friends across town or across the country."

The *EA* project covers the construction of a channelised, double-sideband, suppressed-carrier transceiver with 8W PEP output with a simple frequency synthesizer giving 5kHz steps between 3525kHz and 3675kHz (optionally with an extra switch above 3675kHz): see the block outline in **Fig 4**. No provision appears to be made for CW operation for

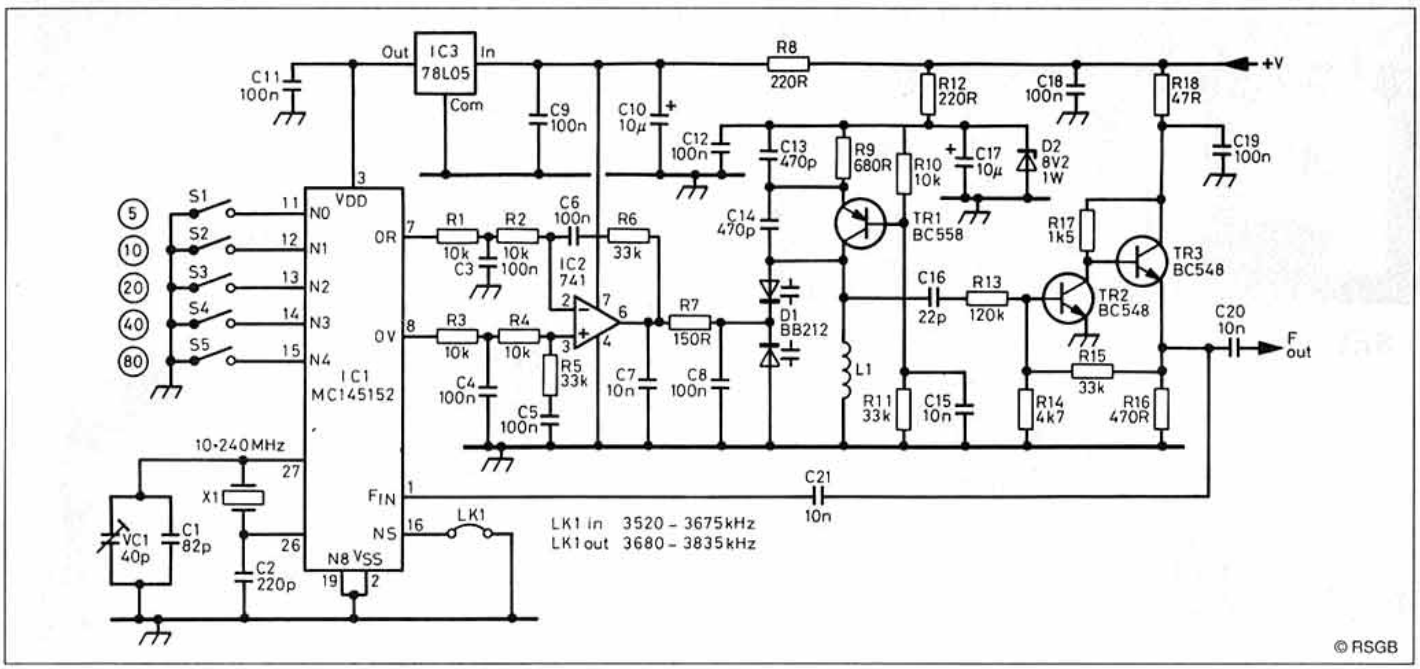

Fig 6: Circuit diagram of the frequency synthesizer. Link LK1 sets the tuning range.

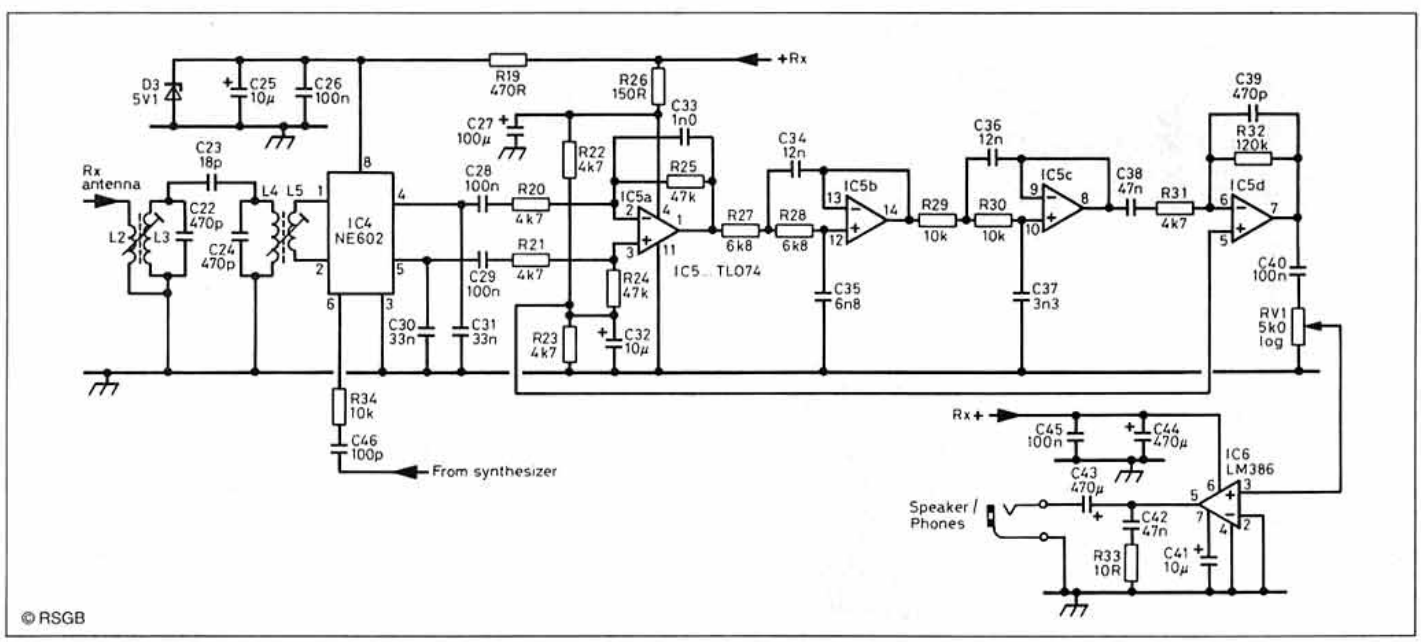

Fig 7: Direct-conversion receiver section of the 3.5MHz low-cost DSB transceiver uses three ICs, apart from the joint receiver/transmitter frequency synthesizer.

which the 5kHz steps would preclude netting.

A most unusual feature of the design is the use of a PLL (phase-locked loop) frequency synthesizer with 5kHz increments to eliminate the need to build a stable VFO suitable for suppressed carrier operation. It is pointed out that, over the years, there have been many designs for QRP transceivers published but with a few odd exceptions they have all been for CW operation: "This design fills the need for a simple voice transceiver that should provide a lot of satisfaction for those who build and operate it."

Figs 5 and 6 show the synthesizer which is set by panel switches marked 5, 10, 20, 40 and 80. With all switches off, the output is at 3525kHz but, for example, with the 5 switch off, the 10 on, the 20 and 40 off and the 80 on, the output would be 3610kHz. The direct-conversion receiver incorporates a bandpass input filter: **Fig 7**. The transmitter delivers about 7W PEP from a IRF511 power FET. The 20mW output from the synthesizer is amplified with a BC548, the carrier suppressed in a balanced modulator (2 x IN4148 diodes), a further BC548 and then a BD139 power bipolar providing voltage drive to the IRF511.

Clearly this is not a rig with the flexibility or performance of the black-boxes but is presented by *EA* with the recommendation: "Discover the thrill of talking to other radio amateurs with a transceiver you built yourself. Using a PLL frequency synthesizer for drift-free operation, this simple transceiver for 80m is compact, inexpensive and easy to build. It also operates from 13.8V DC making it suitable for portable operation if desired."

HERE AND THERE

ROBERT HAWES (Tel: 081 808 2838), editor of the Bulletin of the British Vintage Wireless Society, is currently restoring one of the compact MCR1 wartime receivers designed by the late G3EUR, destined for the Vintage Wireless Museum in West Dulwich, but it is minus four of its coil assemblies and lacks the mains unit. He would like to hear from anyone who might have these parts to spare. He is also seeking a Huntley & Palmer biscuit tin of the period since many of the sets were parachuted into occupied territory in these. The Vintage Wireless Museum is open by appointment (telephone first, 081 670 3667) and has gained world-wide recognition for its remarkable collection of broadcast receivers etc. It would be a fitting resting place for a fully restored MCR1. ***G3VA***

CORRECTION

A SMALL GREMLIN crept into the May *TT* and Pat Painting's callsign was given in the text as G3OEC. This should have been G3OUC. Our apologies to both amateurs – *Ed.*

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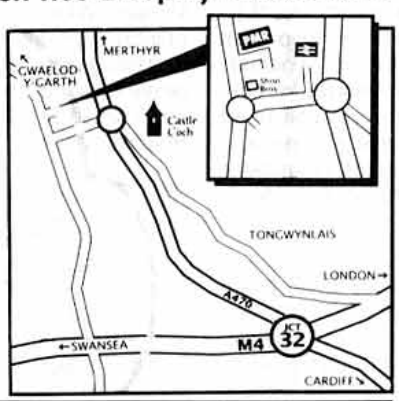

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RADCOM USER REVIEW

Roberts RC818

A Review by the *RadCom* team

MANY READERS WILL be familiar with the name Roberts, as the company has been making quality portable radios for a number of years. The RC818 described here is amongst the most advanced of the present range, and combines a VHF Stereo/MW/LW/SW receiver with a cassette recorder and clock/timer. For SSB and CW reception on the amateur bands, a BFO is included – in fact it all adds up to quite a sophisticated radio.

FIRST IMPRESSIONS

THE ROBERTS RC818 appears to have much in common with the Sangean ATS803A previously reviewed in *RadCom* (June '92). It has a black plastic case (no surprise here!) with retractable telescopic antenna, and carrying handle. The radio was surprisingly heavy – over 2.5kg with a full complement of batteries. While on the subject of batteries, the set was supplied with a mains adaptor and this was found useful – power consumption being fairly high in most modes. The manual was useful in explaining how to operate the main functions, but did not give a circuit diagram or details such as RF sensitivity, IF frequencies, etc which some users might find useful.

VERSATILE PERFORMER

THE AM/SSB BANDWIDTH did appear rather wide, so it seems likely that the second IF was in the 8 – 12MHz range. A switch provided the option of narrow or wide AM reception – this appeared to limit the audio response rather than the AM IF bandwidth.

Tuning is either by direct entry from the front panel buttons or by a tuning knob on the right hand side. The shortwave tuning is in either 1kHz or 5kHz steps, selectable by a switch on the side of the radio. This results in a tuning rate of 24kHz or 120kHz per revolution of the knob. Even on the fast tuning rate it would take a long time to tune from 1.8MHz to 28MHz, so fortunately there are 18 memory positions to store your favourite frequencies. If your main interest is in the amateur bands, a good arrangement would be to store frequencies which are in the CW and SSB segments of each of the nine HF bands.

For those interested in broadcast reception, it is possible to select these bands directly from the front panel. In general AM reception appeared good, with an excellent AGC characteristic to counteract fading. The synthesized tuning means that stations are always 'spot-on'. Just imagine – using the clock timer, you can wake up to Radio Moscow every morning! Nevertheless, when travelling abroad the ability to program a number of BBC World Service frequencies into the memory would be handy.

The receiver's own telescopic aerial can be substituted by an external antenna plugged into a socket on the side. As would be expected, this improves HF reception considerably.

AMATEUR BANDS

THE FRONT PANEL BFO control did not appear to switch in a narrower filter for SSB or CW reception. In fact the bandwidth appeared to be approx 7kHz, and the BFO could be tuned right across this range. The result was that it was easy to make an SSB or CW station intelligible, although 40 metres on a bad night was something of a challenge.

Also, we found it useful to tune across an amateur band in the 'wide' switch position, then adjust the BFO, and finally switch to the 'narrow' mode to reduce QRM. As well as the frequency display and clock, the front panel LCD display has a bar-graph signal strength meter which proved most effective. The receiver's 'Scan' function tended to stop rather too frequently on most bands, but proved a useful facility on 28MHz.

Unfortunately, the dynamic range of the RC818 leaves something to be desired. The front panel RF gain control was effective, but did not permit the input signal to be reduced to zero. However we did find that a sharply tuned external ATU and attenuator of 20dB or so gave a noticeable boost to performance when using a 20m dipole. In fact, the ATU was helpful to reception on most bands in the HF range.

Stereo reproduction from the RC818 requires either stereo headphones or an external amplifier as it has just one speaker. The sound was clear, although perhaps a little 'boxy'. Over 20 stations on the FM broadcast band. The Roberts gave an excellent performance on the FM band, and the cassette recorder too worked satisfactorily.

MARKS OUT OF TEN

WELL WE RECKON WE'D give it eight. There are areas where the performance could be improved, such as front end signal handling, but this would almost certainly result in a large increase in power consumption. As an introduction to the nine HF amateur bands or to keep in touch with broadcast stations around the world, the Roberts RC818 would be a good choice. And if they don't believe your tales of the ZL at 5&9+ – just play 'em a tape!

The Roberts RC818 is available from Roberts dealers price £199.95 inc VAT. This excludes batteries, but does include a mains power supply unit. For the address of your nearest dealer or for more information contact: PR Unlimited, 78 Embury Street, London SW1W 9QD. Tel: 071 730 7174

MANUFACTURERS SPECIFICATION

Semi Conductors:
1 LSI, 14 IC, 8 FET, 61 Transistors, 53 Diodes, 2 LEDS

Circuit:

FM:	Heterodyne
AM (LW, MW, SW):	Double-conversion heterodyne

Frequecy Range:

FM:	87.5-108MHz
LW:	150-519kHz
MW:	529-1620kHz
SW:	1.621-29.999MHz

Power Sources:

DC:	4 each "D" size batteries
AC:	6 volt DC (optional adapter)

Dimension:
296(L) x 192 (H) x 68(T)mm

IN PRACTICE

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

DECIBELS AND DBW

HOW DO I CALCULATE my output power in dBW? Doesn't the licence say I have to record this in the log?

NO, THE LICENCE DOESN'T say that you have to use dBW. Although you must log your RF output power, you have the option to use either watts or dBW. But even if you prefer to use watts, the power limits in the licence schedule are all stated in dBW, so you still need to understand the conversion.

Decibels are a way of expressing power ratios, or relative power levels, and 'dBW' means 'a power level measured in decibels relative to 1 watt'. The main problem is understanding decibels themselves, so here goes . . . .

10dB means 'ten times more power', so 10dBW means 'ten times more than 1 watt', ie 10 watts. 20dB means 'ten times more power, then another ten times more than that', so 20dBW means (1W x 10 x 10) = 100 watts. When you add power ratios in dB, it's the same as multiplying the power levels. The benefit of working in dB is that addition is a lot easier than multiplication when you don't want to resort to a calculator.

Every electronics engineer knows the formulas for converting the ratio between two power levels (P1/P2) into decibels and back –

$$dB = 10 \log_{10}(P1/P2)$$

$$(P1/P2) = \text{antilog}_{10}(dB/10)$$

– but the honest truth is that real-life engineers don't actually think that way! Instead, they carry around in their heads a few simple facts, such as '10dB equals exactly times 10' and '3dB equals times 2, within 0.01dB and that's good enough for me'.

Those two key facts about 10dB and 3dB reveal a second set of relationships that are equally accurate. The upper row of **Fig 1** shows how you can always remind yourself that 6dB = x 4 (because 3dB + 3dB = 6dB and 2 x 2 = 4), that 4dB = x 2.5, and that 7dB = x 5. All you need to remember is to add dB when you multiply power ratios, and subtract dB when you divide them.

Slightly less exact – but very useful indeed to remember – is that 5dB is 'times 3-and-a-bit', 2dB represents 'about 50% more' and 1dB represents 'about 25% more'. These are shown in quotation marks in the lower row of **Fig 1**, and although every column adds up to exactly 10dB you'll find that the multiplications aren't quite right. Still, they're so close that this is how most engineers think about decibels most of the time.

What does that tell us about RF power output limits? The limit of 26dBW on most bands can be broken down into (10dB + 10dB + 6dB) relative to 1 watt, and from Fig 1 that means (1W x 10 x 10 x 4), ie 400W. Referring to the caption of Fig 1 for more exact conversions of some of the other power limits, the 15dBW limit on most of the 1.81 – 2.00MHz band represents (1W + 10dB + 5dB), ie (1W x 10 x 3.16) = 31.6 watts; 22dBW on 70MHz is (1W + 10dB + 10dB +2dB), ie (1W x 10 x 10 x 1.58) = 158W.

Decibels are an essential part of RF engineering, and they're definitely in favour at the Radiocommunications Agency – so why not photocopy Fig 1 and keep it handy until decibels become second-nature to you, too?

RF FEEDBACK

PEOPLE ARE SAYING that my SSB transmissions sound very distorted, and sometimes when I stop talking the output power meter still shows an indication. What's happening?

QUITE POSSIBLY IT'S RF FEEDBACK, from the output of your transceiver back into the microphone input. The RF signal is being rectified into an audio signal, which modulates the transmitter and feeds back again as RF, turning the whole transmitter into a kind of oscillator. It's very similar to the audio breakthrough that you might inadvertently cause in someone else's hi-fi, except that this time you're literally getting your own back!

The cures for RF feedback are very similar to those for other kinds of audio breakthrough, and *The Radio Amateur's Guide to EMC* [1] gives lots of useful hints. Fortunately RF feedback doesn't involve anybody else's equipment, so you have much more scope to make changes. Curing the problem begins the same as always, with some logical detective work to identify exactly where the RF is getting in. If the problem appears when you've just made a change in your transmitting set-up, the first step is to reverse that change and then re-introduce it a step at a time. If you can't think of any kind of change you've made recently, you'll have to go all the way back to the beginning.

Begin by stripping all the accessories off the transceiver and operating it on SSB into a dummy load. Even with the MIC and DRIVE controls turned flat-out, there should be no problems because the manufacturers usually fit some RF-feedback suppression (**Figs 2a and 2b**).

If you do notice signs of feedback, for example croaking noises heard on a monitor receiver, or the power output doesn't drop completely to zero when you stop speaking, then you might suspect a broken ground connection in the microphone cable. Also check for a fault in the RF feedback suppression components themselves. Try connecting a 100pF – 1nF capacitor directly across the output of the microphone capsule, and also 1nF from the PTT switch to ground inside the microphone and again behind the microphone socket.

If all is well, connect the antenna and try again. Feedback can be caused by large amounts of RF current flowing back along the outer of the coax feedline; you may need to fit a balun or some other kind of feedline choke (*In Practice*, May 1993). Sometimes a few turns of coax on a ferrite ring where the feedline enters the house may do the trick. You may also need a better station RF ground connection [1], or you may need to move the antenna and the shack further apart – for instance a shack in the loft with an inverted-V suspended over the roof is asking for RF feedback problems.

If the feedback isn't directly related to the antenna, continue to connect up the other accessories until the problem reappears. Frequently this only happens when you add the power amplifier, because the RF feedback suppression wasn't designed to cope with the higher levels of RF.

RF feedback problems can also arise between separate HF and VHF rigs – in either direction – or when you connect a VHF transverter to your HF transceiver. Suppression components fitted to VHF transceivers may be far less effective at HF, or vice versa. The obvious answer is to add the necessary components to give wideband suppression on all of your rigs (**Fig 2c**).

Another common source of RF feedback is when you connect an audio accessory such as a pip-tone generator, external speech processor or packet TNC to the microphone input. Sometimes a ferrite ring on the audio input or output cable will solve the problem, or alternatively you can try adding the same kinds of suppression components as shown in Fig 2.

Ground-loops involving low-level audio leads are asking for trouble, because they allow induced RF currents to circulate alongside the audio signals. The loop may involve the power lead for the external accessory, and may go all the way back through your mains earth wiring (**Fig 3**). Sometimes a ferrite ring will successfully break the loop as far as RF is concerned, but I had one instance where the only cure was to physically eliminate the loop by powering a speech processor from an internal battery.

RF feedback can be a messy subject, but I hope this has given you a few ideas on how to cure it.

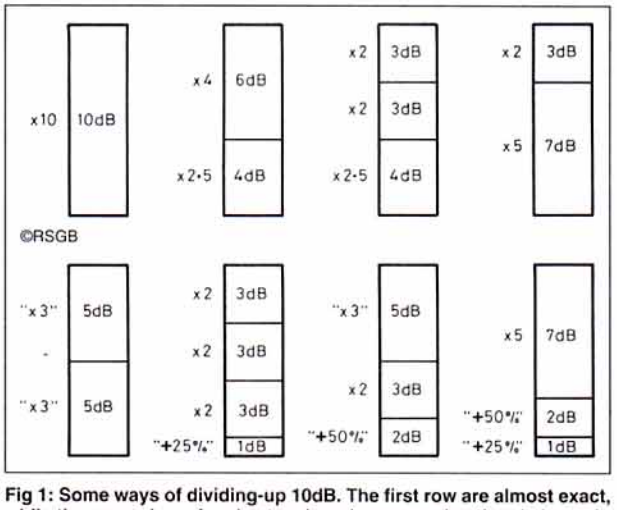


Fig 1: Some ways of dividing-up 10dB. The first row are almost exact, while the second row involve 'engineering approximations' shown in quotation marks. In fact 5dB = x3.16, 2dB = x1.58, 1dB = x1.26.

CAN'T CONNECT

I CAN SEE PACKET MESSAGES on the screen but I can't connect to anyone – what's wrong?

IF YOUR TERMINAL IS 'TALKING' both ways with your TNC and you're already receiving other people's packets on-screen, that narrows things down quite a lot. You must be using the correct TNC port, tones and baud rates, and in all probability many of the other TNC settings will be correct. To find out what's wrong, try working systematically through this list of possibilities.

1. **TNC won't transmit**. The TNC won't key the PTT line while it believes there's another station using the channel. Disconnect the antenna: if the **DCD** (data carrier detect) indicator is still lit, adjust the receiver SQUELCH setting until well past the point where the LED goes out. Before going any further, also check another obvious point – the TNC won't transmit unless its *XMitok* setting is ON!
2. **Radio problems.** Is the PTT line connected? Does the radio definitely transmit when the TX indicator on the TNC is lit? Have you left either the repeater shift or the toneburst switched on? Should the transmitter be on a higher-power setting?
3. **Incorrect deviation**. Many 'can't connect' problems are caused by incorrect FM deviation. On receive, most TNCs cope very well with under-deviation but cannot decode transmissions that are over-deviated and distorted. Every TNC has an internal transmit-audio level control which you must adjust before putting the TNC on the air – in most cases by turning it *well down*.

   Using a dummy load, command the TNC to *CXXXXX* and listen to the string of packets on a second receiver nearby. Check first for the obvious, namely no modulation because there's no transmit-audio connection from the TNC to the radio! Assuming that you can hear FM packets being transmitted, locate the transmit-audio control inside the TNC and turn it right down; then advance the control a little between each packet and the next. Beyond a certain point, the bursts of signal won't get any louder but will become extremely 'rough' and distorted. Turn the control back to a setting *below* the level at which the distortion first began. If in doubt, turn it down a bit further.

   If this solves the 'can't connect' problem, but you can't help feeling you had to turn the deviation down too far, the problem might have been a combination of over-deviation and a frequency error. Check the frequency of your unmodulated carrier using an accurate external frequency counter.
4. **Other incorrect TNC settings.** If the hardware now seems OK but you still can't connect, re-check all your TNC settings – see the April and May columns for hints. Note that many BBSs won't let you connect if you've forgotten to set *MYcall*. If all else fails, try again using a friend's TNC which does connect successfully.

One way or another, you should be able to isolate the fault if you approach the problem systematically. Special thanks to all the packet users who shared their experience of possible 'can't connect' problems.

Public service announcement: if you are an established packet user but haven't ever adjusted your deviation, please do it! Remember that under-deviated packet signals need far fewer retries than over-deviated ones. Using a monitor receiver isn't as accurate as using proper testgear, but it's a darn sight better than not bothering.

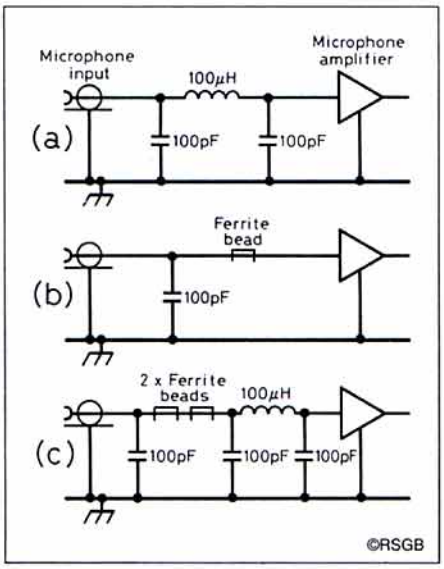


Fig 2: Typical RF feedback suppression networks for medium-impedance microphone inputs – (a) HF, (b) VHF/UHF, (c) wideband suppression; note the capacitor directly across the input of the microphone amplifier.

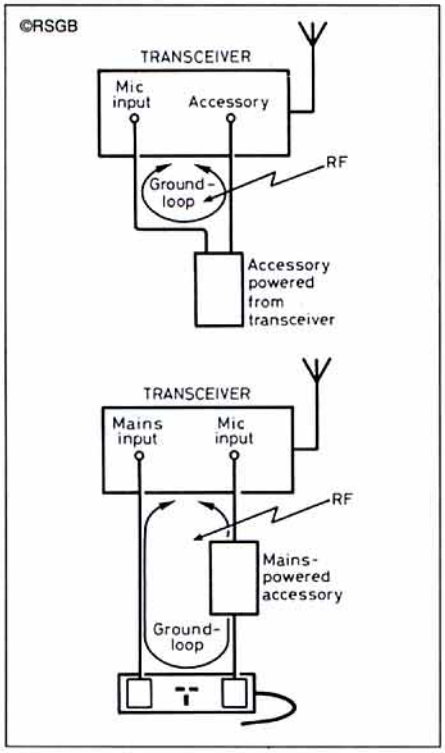


Fig 3: RF feedback can easily be coupled into ground-loops.

SELF-AMALGAMATING TAPE

DOES SELF-AMALGAMATING TAPE really need an extra wrapping of PVC tape?

THIS TOPIC SEEMS TO go on forever . . . In principle, self-amalgamating tape requires some form of protection because it deteriorates in sunlight - but I haven't found it essential in practice.

Even though the outer layer of tape may harden and crack, the layers beneath will continue to maintain a good water seal. On the other hand, the tape is not very strong and will not stand up to a great deal of rough treatment. So why not take the time to wrap on a few turns of PVC tape to provide extra long-term protection?

BEST BOOKS

MY INTEREST IN AMATEUR RADIO was largely inspired by *The ARRL Handbook* – as a teenager I read it so often that I could practically recite it from cover to cover! Partially updated every year, the Handbook almost doubled in size after a major revision in 1986. Any subsequent edition (available from RSGB Books, see page 94) can be highly recommended for a good grounding in real, practical amateur radio. Even the sections that only apply in the USA will teach you something and make you think.

The invitation's still open to pass on the good news about books which you have found valuable. Gerald Stancey, G3MCK, writes: "Apart from the obvious ones, my vote goes for *Solid State Design for the Radio Amateur* by Wes Hayward, W7ZOI, and Doug deMaw, W1FB. This book has it all – good designs, a nice level of theory and a marvellous section on receiver front-ends." Like Gerald, I'm delighted that ARRL have brought this 1977 classic back into print, and that it's available from RSGB Books. If you'd enjoy seeing the basic ideas in *Solid State Design* developed in greater depth, you may also like to read Wes Hayward in his professional guise [2]. More recommendations from G3MCK in a later column . . . .

REFERENCES

[1] *The Radio Amateur's Guide to EMC* (RSGB Books) gives details. Take special care about the safety of RF grounding in mains systems that use Protective Multiple Earthing (PME).

[2] *Introduction to Radio Frequency Design*, W A Hayward, Prentice-Hall, 1982. ISBN 0-13494021-0 (obtainable on inter-library loan from the National Lending Library).

IF YOU HAVE ANY COMMENTS on this month's column, or any new questions, I'd be very pleased to hear from you by mail or by packet (see head of column). But please remember what I said in the first *In Practice* column (April *RadCom*): I can only answer questions through this column, and they have to be on topics of general interest. Sorry, but regretfully I cannot give individual advice. *G3SEK*

RADCOM NEWS FEATURE

Samoan Crisis and Ham Radio

Abridged from an article by Reg Hardman, VK4XH

ON 7 DECEMBER, 1991, Cyclone Val struck Samoa and for five days pounded the islands with rain and winds that varied between 120 and 150MPH. At the end of this period 14 people had died, many were injured, thousands were homeless and many millions of dollars damage had been done to public buildings.

During this turmoil the people were confined to their gradually disintegrating homes and most did not have any hot food, lights, communication or sewerage.

There was no electricity and the only communication outside the country was via ham radio which provided health and welfare traffic for church groups, governments, disaster organizations, and individuals with specific problems. For a further eight days amateur radio operators helped provide communication links in the emergency rebuilding program until regular telephone and commercial channels were re-established.

The Start

SENIOR ADMINISTRATORS of the Church of Jesus Christ of Latter-Day Saints contacted members of the Mercury Amateur Radio Association of Australia (MARA) on 7 December. MARA comprised myself, ZL1BJU, VK2BWS and VK2CMT. Assistance was requested in contacting 5W1JL, the church club station in Apia, Samoa. Cyclone Val had struck Samoa, the telephones had gone out, the power had been switched off, and from the strength of the initial winds it looked like it was going to be serious.

7 December

WE ESTABLISHED communication with the operators Utai and Ed of 5W1JL on 20 metres. They related the fury of the storm to the net members. A roster was set up to monitor the frequency and learn of any changes. The cyclone was located 40 miles N/E of Savaii, Samoa's large island, and was travelling SE at 10MPH with winds of 90 - 120MPH. The situation began to look a little grim. Up to this point very little information was forthcoming so we arranged to make contact next morning.

Extensive damage was done to vegetation by wind and flooding.

8 December

UTAI AND ED reported winds gusting 150MPH and American Samoa was predicted to receive the full force of Val that night. Surprisingly little damage had been done to churches and public buildings but there was much debris on the roads, particularly on the ocean front. People were staying indoors to avoid the flying 'missiles'. The island of Savaii had been without power for 18 hours and Apia on Upolo had been without power for 10 hours. Telephones were breaking down and no aeroplanes were moving. We relayed Ed's report of conditions direct via phone patch to the Church in Sydney and arranged a daily routine of schedules at 0500Z and 2000Z until the emergency passed.

At 0500Z, 5W1JL reported a change in direction of the winds and that American Samoa could miss most of the storm. A few reports of missing roofing iron started to come through but there was no major damage and no reports of injuries. However, there was major damage to the banana and breadfruit which is part of the staple diet of Samoa, so islanders gathered up the fallen fruit - action taken from previous experience.

There was increasing concern over the lack of information from Savaii. The power company had managed to get power back to some points in Apia, though Ed was still on emergency power. He had acquired enough fuel for a further 14 - 15 hours of operation.

9 December

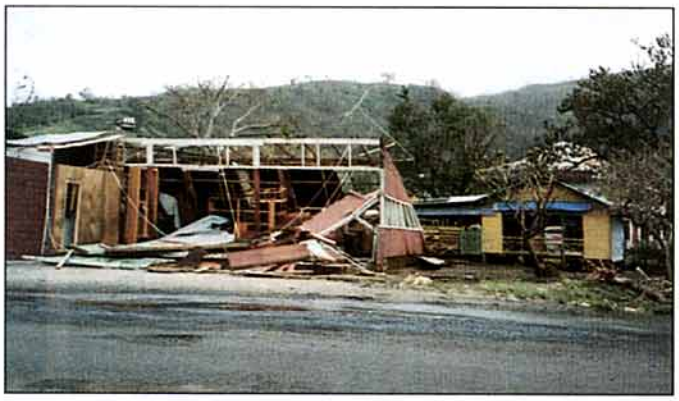
DURING THE 2000Z sked, Ed reported that conditions had deteriorated rapidly. The cyclone had stalled and from its stationary position it continued to pound the islands with heavy winds of 120 - 150MPH.

There was a great deal of flooding throughout Apia, many roofs were gone and there was extensive sea shore damage with many homes flooded as the rain came through windows and louvres. Some people moved into churches as their roofs were blown away. Tree foliage was stripped. The damage was now beyond that of Cyclone Ofa which had caused great devastation 18 months previously.

The New Zealand armed forces came up on frequency, stating that they had not been able to contact Samoa for some time and asked if we could get a message through. We relayed the information to 5W1JL as requested.

There was now a greater feeling of urgency as the destruction continued. Aid supplies would be imperative to this remote country when the devastation ceased, but the plight of Samoa had not surfaced on the world's news media. Phone calls to the press in Brisbane produced little interest or belief; if information hadn't come through the world service they didn't appear interested.

Later that afternoon we resumed contact with Ed and Utai. Damage was increasing as Cyclone Val remained stationary. More and more homes had been destroyed by flooding and rain, including the fire station and many other main street buildings in Apia. Many schools had lost their roofs and in some cases rafters and joists as well. It was hard to see a home or building that had not



"It was hard to see a building that had not suffered some damage."

suffered some damage; everyone was staying indoors.

Ed heard of a couple who had been in Samoa for a month. During the cyclone the back end of their house was destroyed, they then moved to the front section just in time to see their roof fly off. Like so many others they had moved into the local church which was so crowded that there was barely enough room to lie down.

The New Zealand High Commissioner in Samoa, unable to communicate with Wellington, used 5W1JL to pass traffic via the MARA net to New Zealand (the Military facilities were still out). ZL1BJU tape-recorded the High Commissioner's report and played it over the telephone line to the authorities in Wellington.

Utai and Ed started to ration generator time as they realized it would be a long time before power was restored. A report came through that an electrical worker had been electrocuted and two others were in hospital. This information was passed by phone patch to the Church in Sydney.

By 0500Z 5W1JL's signals were not so good as they were on batteries. The roof was starting to come off their own building and there was a great deal of water damage everywhere. They were unable to get into town because of flooding and there was no communication anywhere outside of the ham radio link and face to face. The other Samoan locations of Pago or Savaii may as well have been 10,000 miles away, as there just wasn't any communication.

Ed also reported that he checked out the airport which was obstructed with debris and was totally closed down. On the way back from the airport they found an injured girl under a roof that had blown off. They picked her up and took her to hospital.

By this time the net began to receive health and welfare messages and requests from the Australian Overseas Disaster Response Organisation (AODRO) and many other individuals particularly from New Zealand, Australia and the USA. As the Australian Government was unable to contact Western Samoa, AODRO turned to the Amateur fraternity for assistance. Due to so many projectiles being blown around it was frequently difficult to get information from the 5W1JL radio room to and from the third party. Despite this, most traffic was delivered.

The author, VK4XH, in his shack which was used as a lifeline for the storm-struck Samoan islanders.

10 December

AT 2000Z ED and UTAI came through on the net as usual. I wondered how the three-element beam could stand such a constant battering and still be intact. During the entire period it never missed a beat with the 120-150MPH winds, though it was rated at 85MPH.

With Val still stationary, 5W1JL reported the worst day so far, with more roofs falling from churches, halls and public buildings. There was real concern now for Savaii (the big island) as communications from there had been out for some time, but the island had received the full brunt of the storm. Utah and Ed were strictly rationing the fuel as their sources of supply dried up. The hospital in Apia was in desperate need of electricians as their emergency generator went on the blink.

11 December

GOOD CONTACT was re-established at 0500Z and Ed and Utai reported that the weather had started to improve a little but winds were still very strong. All buildings in Apia were damaged and hospital patients had been sent home because there was no power.

The Samoan Cabinet was to meet with all village mayors to discuss the immediate problem of food supply. The Prime Minister estimated that there was only about two weeks food available on the islands.

We passed the word to Ed that the Church in Sydney would be shipping 39 tons of food for immediate distribution that weekend provided the airport was open. A further 200 tons of food would be shipped by sea.

The hospital on the island of Savaii had been destroyed with four dead. It was apparent that it would take years to rebuild.

12 December

THE SAMOAN airport was now open. The flooding had subsided and there was no wind or rain, but the phones were still out. Ed commented on seeing a strange object in the sky - the sun which hadn't been seen for a week.

It was now a case of rebuilding under difficult conditions and coordinating the shipping of materials. The net received a transmission from FO5DO that another cyclone (Wala) had threatened Tahiti and caused some damage to homes in Bora Bora.

Information was now filtering through from Savaii that the island was devastated with most buildings destroyed. The hospital on the island of Savaii had been destroyed with four dead. It was apparent that it would take years to rebuild. Other deaths were now being reported as communication improved. Almost all stocks of rice on the island had been damaged by rain.

5W1JL received a visit from the Samoan authorities wanting to know what kind of equipment enabled them to operate throughout the emergency when other far more sophisticated equipment didn't make it. They found one Kenwood 430S and its PSU sitting on a small table. Nothing much was said.

13 December

THE SKED revealed that Savaii was a total disaster. A Wing Commander in the RAAF had remarked that the island looked like an 'A' Bomb had dropped on it. With their homes destroyed some people had climbed inside their water tanks to escape the fury of the storm. The Police Station, hospital, several schools, and many other buildings had been destroyed. It looked like there was nothing left.

The food and tarpaulins had arrived in Apia and there was pressure to make the food available immediately. Amateur radio was still the only means of communication and requests for tarpaulins, emergency generators, lanterns, water purification tablets, and more foodstuff were passed through the Church Headquarters in Sydney.

The Aftermath

CONTACT WAS made with 5W1JL every day for the next week, providing information on delivery of emergency supplies from Australia, New Zealand and the USA. A great deal of welfare traffic was passed for residents, visitors who found themselves stranded and friends and reatives who were living abroad. The phones did not come into operation until 19 December and the emergency communication program was then phased out. The NZ warship *Canterbury* arrived in Apia with much needed tarpaulins and the Australian Government began delivering emergency foodstuffs and supplies. The Canadian Government also made a donation of $50,000 for immediate relief.

Amateur radio has been used before in disasters, but what was different about this one was the length of time involved. There was no telephone communication for two weeks and no other radio communication for up to a week. The whole population relied upon amateur radio and in particular 5W1JL.

Many operators helped out during those two weeks. However, special thanks go to: VK2WBS, VK2CMT, VK3AKY, VK3ASY, ZL1BJU, ZL1BLR, W7YSO, K7FY and of course club station 5W1JL.

Mercury Amateur Radio Association

MARA IS a member of the Australian Overseas Disaster Response Organisation. It is made up of amateur operators from many areas around the world including New Zealand, USA, Canada, Fiji, Samoa, Tonga, Tahiti, and other countries in the Pacific Rim. The purpose of the association is to provide communication in the event of an emergency, specifically that of a Health and Welfare nature. Because of the experience with Cyclone Ofa some 18 months previously, 5W1JL had made some preparations to improve the antenna situation with an Emtronics 3-element beam supported by a Nalley self supporting tower. This equipment proved to be important over the next six days.

RADCOM TECHNICAL FEATURE

Design Of Active Butterworth Filters

Part 2 of an article by Dr G Brown, B.Sc, PhD, C.Eng, FIEE, G1VCY

THE APPENDIX PROVIDES sufficient of the theory to permit an understanding of the derivation of component values. This section quotes results from the Appendix, where relevant, to illustrate the factors governing component choice.

Before plunging into the filter design, it may be useful to address the obvious question "Why a Butterworth filter, and what does its 'order' signify?" There are two well-known filter types, Butterworth and Chebyshev. Both are based upon different mathematical polynomials (see Appendix), the behaviour of which can be produced by a handful of components and an operational amplifier. In a nutshell, a Butterworth filter is better when the application demands a flat pass-band, good impedance matching, and a well-behaved phase-shift characteristic. A Chebyshev design is capable of a sharper cut-off, but exhibits a well-known ripple in the passband, together with some impedance mismatch. There are also other differences which need not be considered at this stage.

The 'order' of a filter is defined as the value of the exponent n in the Butterworth Polynomial (see Appendix). In practical terms, it governs the steepness of the cut-off between the pass and stop regions of the characteristic. Thus, a second-order filter has a steeper cut-off than a first-order, and so on.

Fig 3 shows the basic circuit of a first-order active Butterworth filter. As can be seen, this is simply an operational amplifier in a non-inverting, high input impedance configuration, with a simple resistor/capacitor (RC) low-pass filter at its input. The second-order stage is shown in **Fig 4**, and may be recognised as a voltage-controlled voltage source (VCVS) circuit. Again, the operational amplifier is configured as a high input impedance device, but the initial RC filter is modified and now includes frequency-dependent feedback from the output.

Two points of commonality are worth noting. Firstly, the gain is set by the resistors R_a and R_b in Fig 3 and by R_a and R_i in Fig 4. For simplicity, R_a can have the same value in both circuits (although this is not obligatory), the gain then being set by the choice of R_b and R_i, as will be shown. Secondly, the cut-off frequency is determined by R_t and C, and is the same for all stages of the filter, irrespective of its order. Again, there is no need for these to be the same in the two circuits, or even for the two resistor-capacitor pairs to be the same in Fig 4 but the calculations are much simpler when this is so, and no loss of performance is incurred.

Although the gain and the cut-off frequency are independently controllable, the gain is not the same in each stage of a cascaded design. In contrast, the gain of a first-order stage is arbitrary (within certain limits), and can be chosen to suit requirements.

In both Fig 3 and Fig 4, the feedback network defining the gain is common, and the value of Ra has also been made common to simplify calculations. In Fig 3, the gain G, at zero frequency, is given by

$$\text{Gain} = (R_a + R_b)/R_a$$

and in Fig 4 by

$$\text{Gain} = (R_a + R_i)/R_a$$

For the first-order stage, R_b (and hence G) can be any reasonable value. R_a is chosen to be 10kΩ for the purposes of these illustrations, and thus a value of 10kΩ for R_b would give a stage gain of two (6 dB).

For the second-order stage, the gain must be set to give the correct steepness of cut-off for the order specified. The Appendix shows what the gains of second-order stages must be in a single or cascaded filter. These stage gains, A(i), are given by:

$$A(i) = 3 - K(i)$$

where i is the number of the second-order stage, and K(i) is a coefficient [see Glossary of Terms, in part one] of s as given in **Table 1**.

For example:

A sixth-order filter requires three cascaded second-order stages:

For the first stage,
i = 1 and K(i) = 0.518

For the second stage,
i = 2 and K(i) = 1.414

For the final stage,
i = 3 and K(i) = 1.932

The overall gain is thus:

$$\text{Gain} = (3 - 0.518) * (3 - 1.414) * (3 - 1.932) = 4.2, \text{ or } 12.5 \text{ dB}.$$

Incorporating this into the equation for the second-order gain given above, the value of R_i (i.e. the feedback resistor) in stage (1) becomes:

$$R_i = R_a(2 - K(i))$$

Thus, for the first stage of the above filter:

K(i) = 0.518, giving
R_i = 15kΩ where R_a = 10kΩ.

This is done for each stage of the proposed filter to evaluate the resistances and to determine the stage gains. All that then remains to be done is to derive values for R_t and C to determine the cut-off frequency. Since these values are common to all stages, whether first or second-order, it is performed only once. The equation governing R_t, C and the cut-off frequency f, is:

$$f = 1/(2.\pi.R_t.C)$$

or, expressed in a directly usable form:

$$R_t = 1/(2.\pi.f.C)$$

Notice that C is used as the independent variable here. The reason for this is quite simple. It is much easier to choose a value of C from available components and then calculate the nearest preferred-value resistor to R_t, than vice versa. Even making up odd values of resistance from preferred values is better than doing the same with capacitors.

That is all there is to it, but what has not been fully explained so far, is the high-pass version of the Butterworth filter. Knowing that the only frequency-dependent components are R_t and C gives a clue to the difference between high-pass and low-pass. In a simple RC low-pass filter, the resistor and capacitor are in series, with the output signal being developed across the capacitor, as in Fig 3 and Fig 4. In a high-pass RC filter, the resistor and the capacitor are still in series, but their positions are reversed, the output signal now being developed across the resistor. Thus the only change required, both in Fig 3 and Fig 4, is simply to interchange R_t and C. The calculation of the values is unchanged,as in the example below:

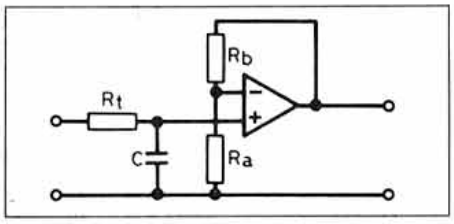


Fig 3: A first order active low-pass filter.

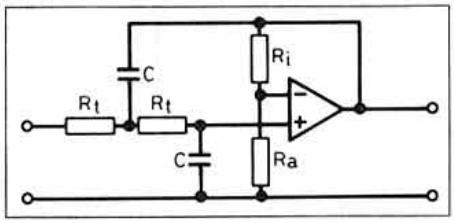


Fig 4: The second order low-pass stage.

Stage 1 of 3

Gain = 3 – 0.518 = 2.842

R_i = (2 – 0.518) * 10000
= 14,800Ω, for R_a = 10kΩ.

Choose C = 10nF.

R_t = 1/(2.π.f.C)
= 13,262Ω, for a cut-off f = 1200Hz.

Stage 2 of 3

Gain = 3 – 1.414 = 1.586

R_i = (2 – 1.414) * 10000
= 5,680Ω, for R_a = 10kΩ.

R_t and C as in stage 1.

Stage 3 of 3

Gain = 3 – 1.932 = 1.068

R_i = (2 – 1.932) * 10000
= 680Ω, for R_a = 10kΩ.

R_t and C as in stages 1 and 2.

Overall Filter Characteristics

Gain = 2.482 * 1.586 * 1.068
= 4.204, or 12.5dB.

Cut-off frequency = 1200Hz.

SUMMARY

THIS ARTICLE HAS GIVEN the design data for Butterworth filters up to eighth order. Some of the background information is presented, so that the design principles can be understood, and three application areas for such filters are described. A worked example has been provided for guidance. The Appendix contains the more indigestible parts of the design process, which should enable those suitably inclined to dig a little deeper into the fascinating world of filters.

APPENDIX

AN APPROXIMATION OF an ideal low-pass filter characteristic is given by:

$$V = 1/P(s)$$

where P(s) is an algebraic expression containing s. Active filters use operational amplifiers or discrete transistors as the active elements, with resistors and capacitors as the only passive elements.

A low-pass filter becomes a Butterworth type when the above equation is approximated by the use of Butterworth Polynomials, Bn(s), where n is the order of the polynomial [see Glossary of Terms in part one];

$$V_{out}(s) = V_{in}(s)/Bn(s)$$

Putting s = j.2.π.f gives;

$$|V_{out}(s)| = |V_{in}(s)|\,|V_{in}(-s)| \text{ where } j=\sqrt{-1}$$

$$= \frac{V_{in}^2}{1+\left(\frac{f}{f_0}\right)^{2n}}$$

From the last two equations, the magnitude of Bn as a function of f can be written as:

$$Bn(f) = \sqrt{1+\left(\frac{f}{f_0}\right)^{2n}}$$

The best way of appreciating the Butterworth response is to normalise the response to filter cut-off frequency, as shown in **Fig 5**. In this way, the response for any cut-off frequency can be mentally scaled from the diagrams shown. For example, a third-order filter with 1200 Hz cut-off, will have a response 18 dB down at 2400 Hz (ie at 2f).

Fig 5 illustrates very clearly that filters of all orders are 3 dB down at the cut-off frequency, and not only does a higher order filter produce a steeper slope, but it allows the passband to be flatter over a marginally wider range.

At this stage, there is a great temptation to work out component values for a first and a second-order stage, and think that cascading the correct number of these will produce a Butterworth filter of the required order. Unfortunately things are not that simple, but don't despair, it is not too difficult. Because it is a polynomial, the eighth-order form is not equivalent to the sum or the product of four second-order forms – it is a separate entity. This means that the polynomials must be known up to the order desired, and the components evaluated accordingly. All that is needed is a table of the polynomials in factorised form, and the required data may be picked out visually. **Table 1** gives the polynomials up to eighth order.

Order n	Polynomial Bn(s)
1	(s+1)
2	(s+1.414s+1)
3	(s+s+1)(s+1)
4	(s+0.765s+1)(s+1.848s+1)
5	(s+0.618s+1)(s+1.618s+1)(s+1)
6	(s+0.518s+1)(s+1.414s+1)(s+1.932s+1)
7	(s+0.445s+1)(s+1.247s+1)(s+1.802s+1)(s+1)
8	(s+0.390s+1)(s+1.111s+1)(s+1.663s+1)(s+1.962s+1)

Table 1. Butterworth Polynomials up to eighth order [1]. See Fig 5.

In the above table, the gain of each second-order stage is related to the coefficients of s in each of the quadratic [see Glossary of Terms in part one] factors (ie in each bracket). The reason for this is irrelevant for the present purpose, as all that is needed is the simple relationship for the in-band [see Glossary of Terms] gain, A, of each second-order stage given by;

$$A = 3 - K$$

where K is the coefficient of s in each quadratic factor (bracket). For example, a second-order filter alone would have a gain of 3 – 1.414 = 1.586, where the figure of 1.414 is the coefficient of s in the bracket on the line of order 2 in the table. Similarly, a fourth-order filter would have two second-order stages cascaded, the first with a gain of 3 – 0.765 = 2.235 and the second with a gain of 3 – 1.848 = 1.152. (From Table 1, order 4 gives 0.765 as the coefficient of s in the first bracket, and 1.848 as the coefficient of s in the second bracket). The gain of any first-order stage is arbitrary, and may be chosen to suit individual requirements.

Fig 5 shows the normalized frequency response for first to eighth order Butterworth filters.

This is all that is needed to specify the gain of separate stages in a cascaded filter. The remaining parameter is the cut-off frequency. This is quite independent of the gain parameters and is given simply by the effective response of a single resistor/capacitor filter as will be seen by referring to the main text.

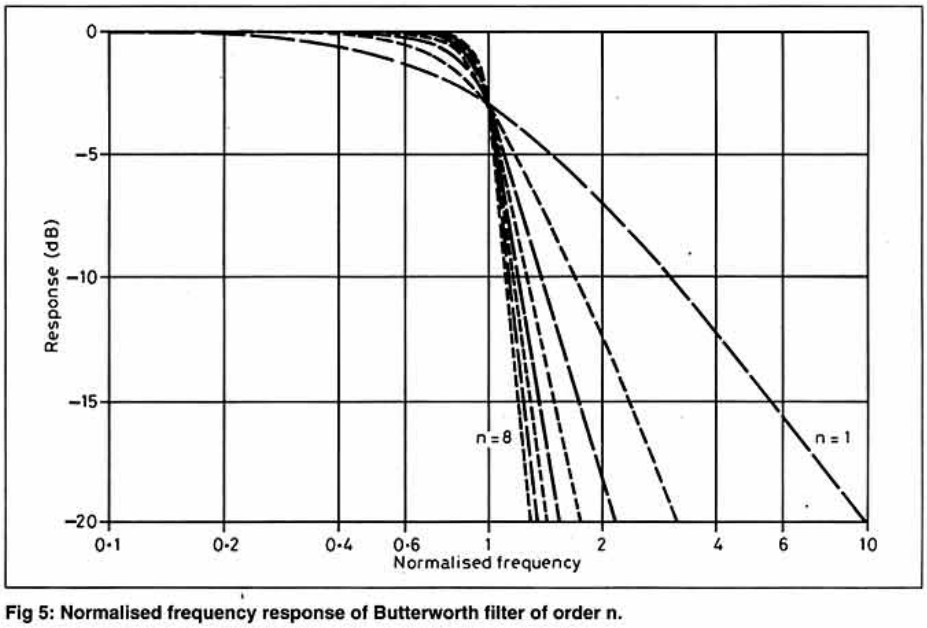
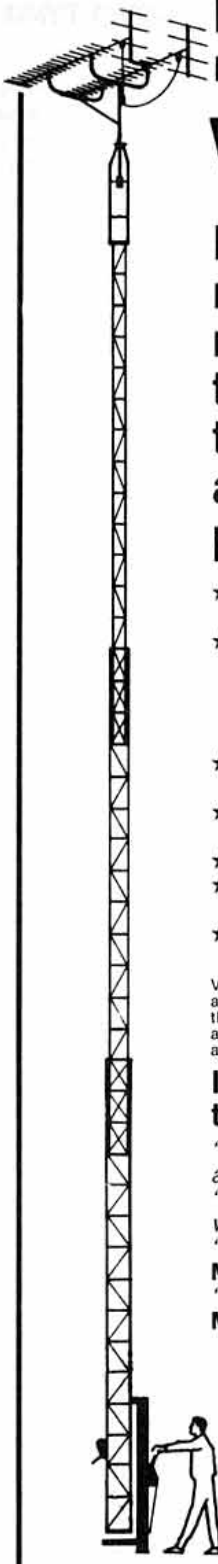


Fig 5: Normalised frequency response of Butterworth filter of order n.

FURTHER READING

[1] *Integrated Electronics* by Millman & Halkias,McGraw-Hill, 1972, pp 548-57.

[2] *Reference Data for Radio Engineers*, Howard W Sams & Co. Inc, 1977, Chapter 10.



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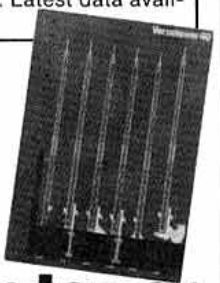

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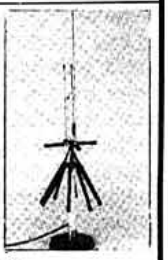

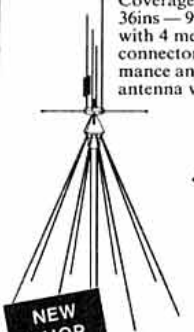

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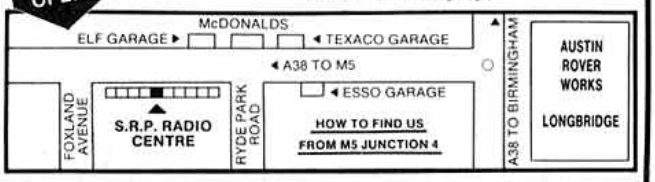

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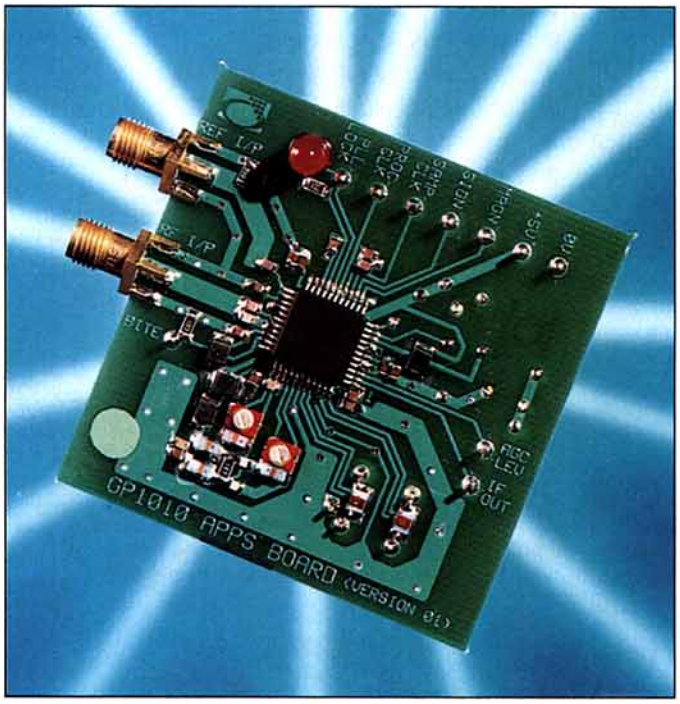
PRODUCT NEWS

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

GLOBAL POSITIONING systems are starting to become very popular, and they have a multitude of uses where geographical positions need to be transmitted and received accurately. Just think, before long you may not have to send your QTH - your rig will do it automatically! GEC-Plessey Semiconductors are amongst the leaders in Global positioning systems, and they have recently introduced the **GP1010-1 RF downconverter IC**. The photograph shows the chip mounted on a demonstration board, which can also be supplied by the company.

The RF input is at 1.57GHz and a 10MHz reference signal is also applied to the IC. The first IF is designed to use low cost LC filter components with a 3dB bandwidth of 20MHz. The second IF at 35MHz uses a GEC-Plessey DW9230 SAW filter which is claimed to give better than 40dB out-of-band noise rejection. All-in-all, an interesting example of the level of integration possible in modern RF devices.

Further details from: Ruth Harrisson, Action Desk, Lenvale House, Hollingworth Court, Ashford Road, Maidstone, Kent ME14 5PP.



THE WORD IS getting round about a new range of single band HF wire antennas for QRP use up to about 10 watts.

The Panther is a half-wave antenna and matching unit to suit a standard 50Ω feed. Each is supplied with its own test report, giving the SWR over the operating range. The antenna is supported by nylon cord at each end, and the tuning control (supplied) is adjusted for minimum SWR at the centre of the chosen band. Once this simple adjustment has been carried out, the SWR meter is no longer required.

Excellent results have been reported by enthusiastic users, and it seems an ideal antenna for portable use as well as for home stations.

The manufacturers say the very good performance is due to the the antenna being designed by professional engineers who know the specific requirements of the amateur radio enthusiast.

The Panther is priced at just £39 and this includes VAT and p&p.

Contact: Hesing Technology, Cromwell Chambers, 8 St John's Street, Huntingdon, Cambs PE18 6DD. Tel: 0480 433156.

IT'S ALWAYS NICE to see real 'state-of-the-art' technology used to good effect in amateur radio products. Digital signal processing is a case in point, and it is put to good use in the **W9GR DSP II Audio Filter**. This aroused considerable interest when it was first demonstrated at the Dayton Hamvention earlier this year, and looks a very impressive product. The unit has a front panel switch to select one of 11 different filters, and is claimed to be particularly easy to use.

Four of the filters are for use by SSB operators, to enhance the intelligibility of speech signals while reducing hiss, static, ignition and several other types of noise. For the technically minded it uses an enhanced Widrow-Hoff LMS adaptive filter algorithm, and has a multiple automatic notch filter designed to remove instantly up to four simultaneous heterodynes. A combination de-noiser and automatic notch filter position is available for general listening.

CW operators have four 'brick wall' linear phase 120th order FIR bandpass filters (no less!), to extract very weak signals from the QRM. 50Hz, 100Hz and 200Hz bandwidth filters are provided and the 100Hz filter is available at one of two centre frequencies. Other filters are provided for RTTY, HF Packet and SSTV.

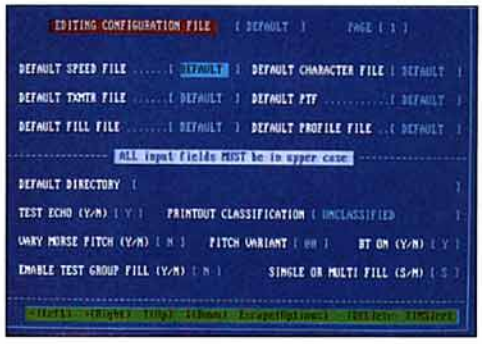
The DSP II filter has a ten segment bargraph display which monitors the input level, and a two watt amplifier to drive an external speaker. The unit is very simply connected to the speaker output of a receiver or transceiver, and is priced at $299.95 plus $15.00 shipping and handling for countries outside the United States.

Details from j-Com, 793 Canning Pkwy, Victor, NY 14564, USA. Tel: 0101 716 924 0422.

THE NEW SUMMER '93 edition of the **Cirkit Catalogue** is now out! With an extra 21 pages, 2 new sections and over 4000 product lines, the company say it's their best ever. New items for this edition include Kenwood 'scopes, new VHF receivers, low cost alarms and some new kits from Velleman. Cirkit can supply many of the components used in *RadCom* projects, so a copy of their catalogue should prove invaluable for home constructors. Available from larger newsagents at £1.90, or in case of difficulty from:

Cirkit Distribution Ltd, Park Lane, Broxbourne, Herts EN10 7NQ Tel: 0992 441306.

LEARNING MORSE? If so you may be interested to know of the **Instructor Morse** software package for the IBM-PC and compatibles. The program has a 'simulation' capabilty which can be extremely useful for demonstrating Morse procedures.



- Ability to receive Morse code, and respond via a keyboard, plus the automatic marking of such tests.
- Ability to create stylised/manual Morse.
- Soundblaster Pro 2.0 board compatible (Morse via headphones).
- Audio Visual capability (pattern recognition).
- User profiling facility (built-in artificial intelligence).

To accompany the software there is a comprehensive Instructor Morse user guide. Prices start at £49, and the system can be expanded in stages, by purchasing additional software modules.

Available from: Software Design Ltd, Elgin House, 42 Westgate, Sleaford, Lincs NG34 7PN Tel: 0526 833042

THE **MOTOROLA MC145152-P2 CMOS** synthesizer IC is particularly useful for constructors, as it has parallel programming inputs. This means that channels may be selected simply by rotary or thumbwheel switches. The MC145152 is primarily intended for use with a dual-modulus prescaler, which extends it's frequency range to the VHF and UHF spectrum.

The chip can generally be used with other prescalers such as the Fujitsu MB501 and GEC-Plessey SP8704DP. These have a higher divide ratio (eg 65) with the modulus control output low, and the lower divide ratio (eg 64) when this input is high. Note that some level shifting may be required if the MC145152 does not use a 5 volt supply.

It is also possible to use the IC without a prescaler, up to the frequency limits given in the table on the opposite page. This month's *Technical Topics* (see page 54) shows a practical application for the device.

MANUFACTURER'S DATA

INPUTS

f_{in} - Frequency Input

Input to the positive edge triggered ÷N and ÷A counters. f_{in} is typically derived from a dual modulus prescaler, AC coupled into the device. For larger amplitude signals (standard CMOS logic levels) DC coupling may be used.

RA0, RA1, RA2 - Reference Address Inputs

These three inputs establish a code defining one of eight possible divide values for the total reference divider. The total reference divide values are as follows:

Reference Address Code			Total
RA2	RA1	RA0	Divide Ratio
0	0	0	8
0	0	1	64
0	1	0	128
0	1	1	256
1	0	0	512
1	0	1	1024
1	1	0	1160
1	1	1	2048

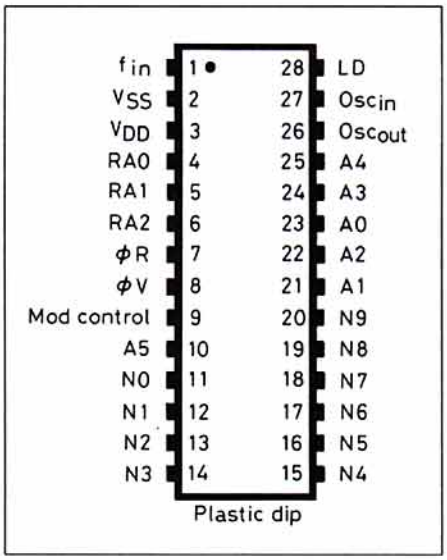


Fig 1: Pin connections for the MC145152-P2.

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- Dual modulus / parallel programming.
- Eight user-selectable divide-by-R values: 8, 64, 128, 256, 512, 1024, 1160, 2048
- Divide-by-N range = 3 to 1023, divide-by-A range = 0 to 63.

N inputs - N counter programming inputs

The N inputs provide the data that is preset into the ÷N counter when it reaches the count of zero. N0 is least significant digit and N9 is most significant. Pull-up resistors ensure that inputs left open remain at a logic one and require only an SPST switch to alter data to the zero state.

A inputs - A counter programming inputs

The A inputs define the number of clock cycles of f_{in} that require a logic zero on the modulus control output.

The A inputs all have internal pull-up resistors that ensure that inputs left open will remain at a logic one.

OSC_{in}, OSC_{out} - Reference oscillator input/ output

These pins form an on-chip reference oscillator when connected to terminals of an external parallel resonant crystal. Frequency setting capacitors of appropriate value must be connected from OSC_{in} to ground and OSC_{out} to ground. OSC_{in} may also serve as input for an externally generated reference signal. This signal is typically AC coupled to OSC_{in}, but for larger amplitude signals (standard CMOS logic levels) DC coupling may also be used. In the external reference mode, no connection is required to OSC_{out}.

OUTPUTS

fR, fV - Phase detector outputs

These phase detector outputs can be combined externally for a loop error signal. If frequency f_V is greater than f_R or if the phase of f_V is leading, then error information is provided by φV pulsing low. φR remains essentially high. If the frequency f_V is less than f_R or if the phase of f_V is lagging, then error information is provided by φR pulsing low. 0V remains essentially high. If the frequency of f_V = f_R and both are in phase, then both φV and φR remain high except for a small minimum time period when both pulse low in phase.

MODULUS CONTROL

Dual-modulus prescale control output

Signal generated by the on-chip control logic circuitry for controlling an external dual-modu-

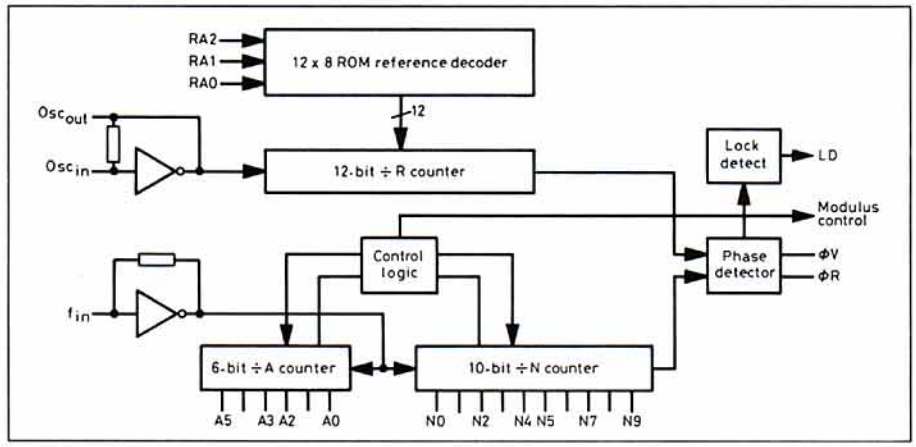

Fig 2: The frequency range of the chip may be extended with an external prescaler.

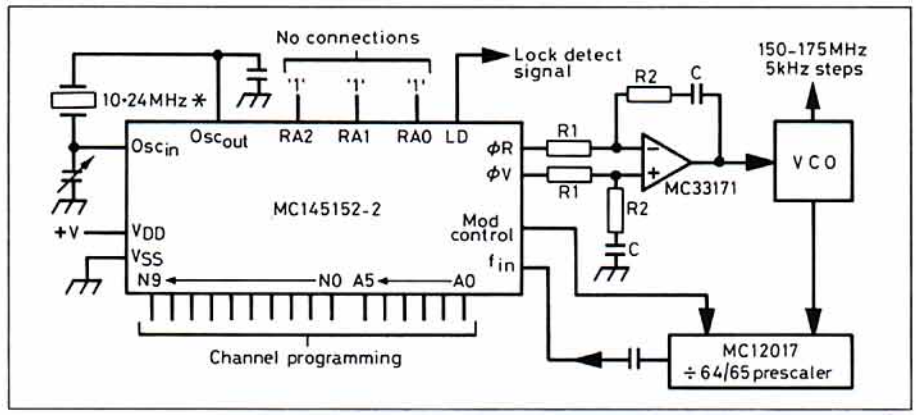

Fig 3: Valves of filter capacitors C will depend on reference frequency selected.

ELECTRICAL CHARACTERISTICS
(VOLTAGES REFERENCED TO V_{SS}, TEMP = 25°C)

Symbol	Parameter	Test Condition	VDD (V)	Min	Max	Unit
V_{DD}	Power supply voltage range			3	9	volts
I_{ss}	Dynamic supply current	f_{in}=OSC_{in}=10MHz	3		3	mA
	1Vp-p AC-coupled sine wave	5			7.5	mA
	R = 128, A = 32, N = 128	9			24	mA
V_{in}	Input voltage; f_{in}, OSC_{in}	Input AC-coupled sine wave		500		mVp-p
I_{OL}	Low-level sinking current – lock detect	Vout = 0.40V	5	0.51		mA

FREQUENCY CHARACTERISTICS
(VOLTAGES REFERENCED TO V_{SS}, TEMP = 25°C)

Symbol	Parameter	Test Condition	VDD (V)	Min	Max	Unit
f_i	Input frequency (f_{in}, OSC_{in})	R>=8, A>=0, N>=8	3	–	6	MHz
		V_{in} = 500mVp-p AC	5	–	15	MHz
		coupled sine wave	9	–	15	MHz
		R>= 8, A>= 0, N>= 8	3	–	12	MHz
		V_{in} = 1Vp-p AC	5	–	20	MHz
		coupled sine wave	9	–	22	MHz
		R>= 8, A>= 0, N>= 8	3	–	12	MHz
		V_{in} = V_{DD} to V_{SS} DC	5	–	22	MHz
		coupled square wave	9	–	25	MHz

lus prescaler. The modulus control level will be low at the beginning of a count cycle and will remain low until the ÷A counter has counted down from it's programmed value. At this time, modulus control goes high and remains high until the ÷N counter has counted the rest of the way down from its programmed value (N-A additional counts, since both ÷N and ÷A are counting down during the first portion of the cycle). Modulus control is then set back low, the counters preset to their respective programmed values, and the above sequence repeated. This provides for a total programmable divide ratio (N_T) = N*P + A where P and P+1 represent the dual modulus prescaler divide values respectively for high and low modulus control levels. N is the number programmed into the ÷N counter, and A the number programmed into the ÷A counter.

LD - lock detect output

Lock detector signal. Essentially a high level when loop is locked (f_R, f_V of same phase and frequency). Pulses low when is out of lock.

V_{DD}

The positive power supply potential. This pin may range from +3 to +9V with respect to V_{SS} (ground).

AVAILABILITY

THE MOTOROLA MC145152-P2 is available from Motorola distributors or from Cirkit Distribution Ltd, Tel 0992 444111.

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.

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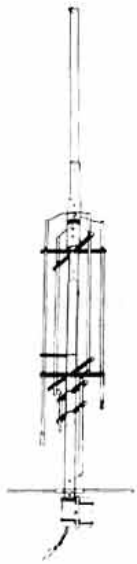

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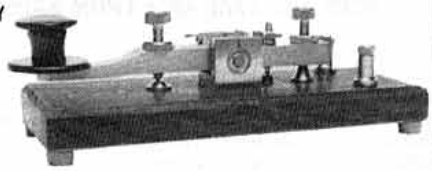

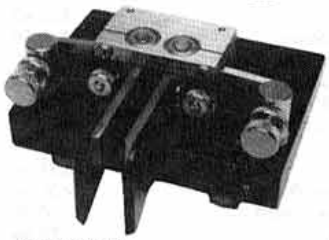

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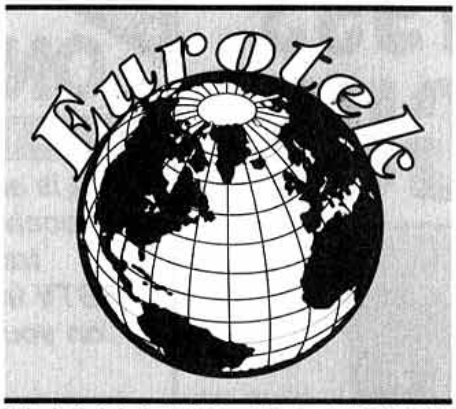

TRANSLATED AND EDITED BY ERWIN DAVID, G4LQI

In *cq-DL* 5/93, **Rolf Henn, DJ1IV** described a 47 – 860MHz FM scanner. The gadget behind the tuning knob, an **optical shaft encoder**, has not been seen as a home-brew project before.

FREQUENCY SELECTION in synthesized receivers and transmitters can be by direct keyboard entry, with up/down keys or by rotary tuning knob. For this project, the latter was selected. In conjunction with a fast/slow switch (1MHz/5kHz per step) it conveniently fills all tuning requirements. The encoder, (see detail below), was assembled from standard model builders' mechanical parts (no machine tools required) and a Siemens opto-electronic module SFH910, containing an LED infra-red light source, two light detectors and associated logic. A matching 96-sector disc is available. In the UK, *Electrovalue*, Staines, Middx, Tel 0784-442253, Fax 0784-460320, stock small quantities of the module and the disk (Siemens catalogue No. Q62702-P866 and Q62902-B166 resp.) **Fig 1** shows the detail.

The photograph shows the construction. The 6mm shaft is supported in two ball bearings; these are press-fitted into blocks which are bolted to one another and to the front panel. A diagram of the PCB and electronics is given in **Fig 2** – they are attached to the bearing blocks. Collars with set screws prevent axial movement of the shaft. The disc may simply be cemented onto the shaft or the shaft end can be drilled and threaded and the disc bolted on. An indent mechanism for the shaft was found superfluous.

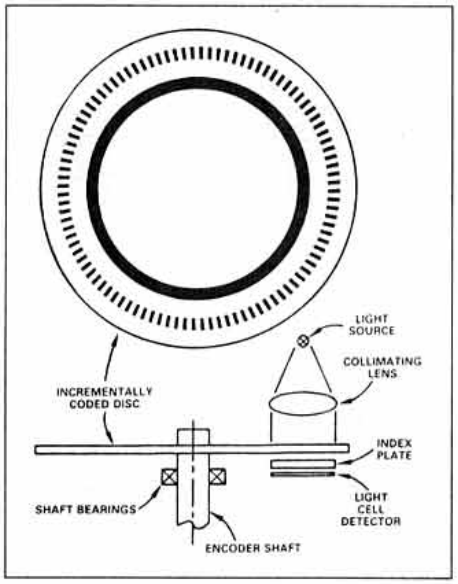

Fig 1: The incremental optical shaft encoder. In radios with digital frequency synthesis, the tuning knob turns the shaft and thus the disc which alternatingly places transparent and opaque sectors in the light path. Each pulse from the light detector increases or decreases the frequency by one step. Diagram courtesy Analog Devices Inc.

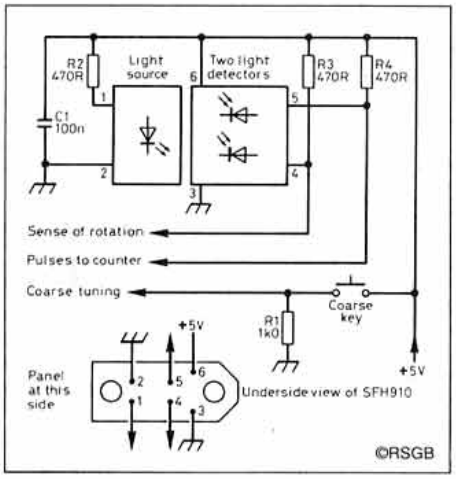

Fig 2: Connections for the Siemens SFH910 opto-electronic device

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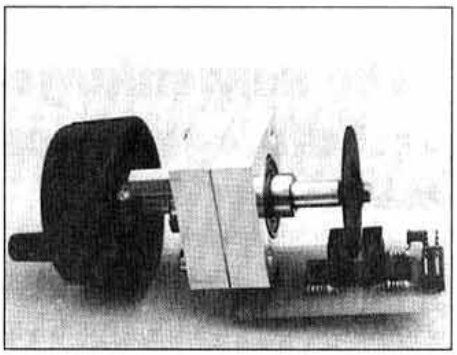
* Information from *The Analog-Digital Conversion Handbook* by the Engineering Staff of Analog Devices Inc., Prentice-Hall, 1986.



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Eire: Long Communications. 010-353 73 37152.

Essex: Skyview Systems. 0206-823185. Waters & Stanton Electronics. 0702 206835. Waters & Stanton Ltd. 0402 444765.

Fife: Jaycee Electronics Ltd. 0592 756962.

Hampshire: SMC Headquarters. 0703 255111.

Lancs: Holdings Amateur Electronics. 0254 59595.

Merseyside: A R Communications Ltd. 0925 229881.

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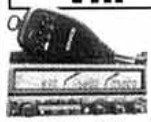

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Microwaves

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

MY APOLOGIES FOR the late reporting of the results of the 1992 Cumulatives. They arrived too late for inclusion in the May column. By now, of course, the 1993 Cumulatives are well under way, as is the 1993 Ladder!

The 10GHz results were adjudicated by G4KNZ and the 24GHz results by G3WDG: activity in both series of Cumulatives was slightly up on last year (1991). In the 10GHz series, the number of contacts and the scores are definitely up (by about 50%) on last year and, the trend to narrowband operation is emphasised with some 40 contacts at, or greater than, 200km. The winner, for the second year, was Mike Walters, G3JVL, operating from a fixed station. The May Cumulative attracted the largest number of participants, a total of 47 stations being logged in ten different Locator squares, activated by 28 portable stations and 19 fixed stations. The overall results are summarised in **Table 1**.

On the 24GHz band some 16 stations were logged as active, more than ever before, even though there were only three entries for the tables. G4KNZ managed to be active in all seven Cumulatives - this must be something of a record! **Table 2** summarises the results for this band.

One reminder to all operators active in this year's Cumulatives: most entrants sent in logs only for their three best periods. The intention was (and always has been) to submit logs for *all* active periods, indicating on the cover sheet which three (best) logs are to be used for adjudication. Only by analysing as many active period logs as possible will we be able to gather valuable data from which to assess the true overall levels of activity - and the effectiveness of that activity!

The Microwave Newsletter, April 93, shows a simple analysis of the logs which were submitted for the most active period. It is very useful to other operators, to know in which squares activity appears most likely to occur, from either portable or fixed stations and it would be possible to be far more definitive with more logs submitted! Check logs are, of course, always welcome.

Again I would make the plea for 'seasoned' microwave operators to offer help and guidance to newcomers whether they are Novices or otherwise! If you no longer operate wideband, why not lend your old wideband gear to a beginner and help them to partake in the fun?

NOTABLE 10GHZ CONTACTS

FIG 1 IS A SKETCH map prepared for the *RSGB Microwave Newsletter* by one of the editors Peter, G3PHO. It shows the most notable 10GHz contacts (those in excess of 200km) attained during the last year. Note that most of them are from fixed station locations with contacts from the UK into France, Belgium, Holland, Germany, Switzerland, Denmark, Norway and Sweden.

It does not include the remarkable EME contacts between the UK and Sweden and the USA achieved by G3WDG and G4KGC. It goes almost without saying that these days, given the right conditions, such results are almost easier to get than to work the same paths on 2m or 70cm!

With such results in mind, the Microwave Committee, in conjunction with the VHF Committee and VHF Awards Manager (Ian Cornes, G4OUT), are proposing to introduce two new operating awards similar to those for the 24GHz band. That is, a 'standard' award for a distance exceeding 150km (as now), an 'intermediate' award, for a distance exceeding 300km and an 'advanced' award for a distance exceeding 600km.

These were agreed at the most recent Microwave Committee meeting and represent, we believe, distances which are not impossible to achieve but will require a good degree of operating skill - maybe coupled with some lucky breaks!

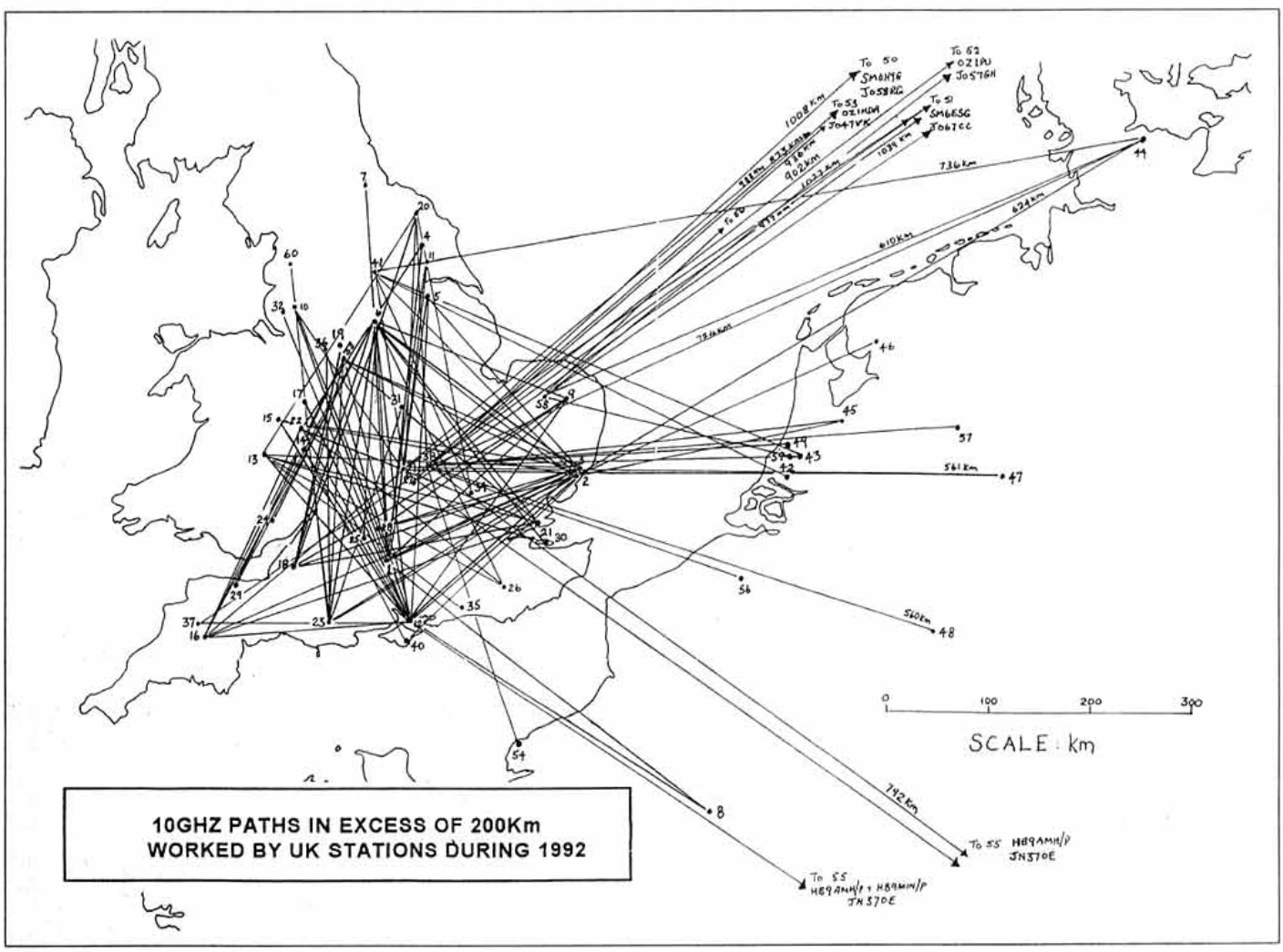


Fig 1: Contacts over 200km made on 10GHz. The map was first published in the *Microwave Newsletter* where an explanation of the numbers can be found.

WARC '92 AND IARU '93

WARC '92 PROVED TO be something of a 'milestone' for amateur microwave activities in that it highlighted rapidly growing professional (Primary) user interest in the frequencies above 1,000MHz. I believe it was probably in the 1920s (maybe earlier) when amateurs were given free access to "all wavelengths below 200m" which were thought to be useless for long distance communication! A similar situation seems to be coming about in the microwave bands, insofar as 'bids' are being made for Primary uses for the amateur (Secondary) allocations at 2.3, 3.4, 5.7 and 10GHz - ie we *are* being squeezed!

Most of these pressures have been discussed in outline in both the January 1993 and the March 1993 columns (which see for details). Since then there has been no diminution of pressure, although there has been some little relief outlined in the CEPT document *Detailed Spectrum Investigation - First Phase, 3400MHz to 105GHz* - DSI for short. Although the review body indicates that it cannot, at the moment, alter the status of the amateur microwave allocations, it recommends that each member country's regulatory authority should, in its bandplanning, leave the narrowband (weak signal) sub-bands free from interfering signals in order to facilitate amateur research into long distance (narrowband) propagation experiments - such as the contacts outlined in earlier paragraphs. I believe these recommendations represent a sort of 'set-aside' policy.

I have no doubt that this will be discussed and agreed at the September IARU meeting in Belgium. In summary, the recommendations in the DSI are to keep clear the following 'key sub-bands':

3,400 to 3,410MHz to the Amateur Service

5,660 to 5,670MHz to the Amateur Service

5,660 to 5,670MHz to the Amateur Satellite Service (earth to space)

5,830 to 5,850MHz to the Amateur Satellite Service (space to earth)

10.36 to 10.37GHz to the Amateur Service

10.45 to 10.46GHz to the Amateur Service

10.45 to 10.50GHz to the Amateur Space Service

None of these proposals prevents either of the Amateur Services using the recommended 'windows' in either the 5GHz or 10GHz bands, nor do the Secondary allocations appear to be affected. There are complete, proposed bandplans all the way from 3.4GHz to 105GHz - and the target date for implementation is the year 2008.

3.456GHz may continue to be used although the move to 3.400/3.402GHz is supported and similarly 5.760GHz may continue to be used (although there is a move from DARC, again, for a change to 5.668GHz which we would consider a long-term objective). The use of 10.36GHz will continue, together with an option at 10.45GHz. The use of 24.192GHz as an alternative to 24.048GHz will be sought (again by DARC). A request for the use of 24.192GHz for unattended operation is already with the RA for consideration. At the same time we have submitted a paper to IARU recommending the continued use of 24.048GHz. If this looks a little ambivalent, it is! We intend to back certain options both ways!!

FROM HERE AND THERE

This month I'd like to have moan! There have been complaints that this column is becoming a "10GHz column". What about those of you who operate on the other bands - yes, even as far down as 1.3GHz - reporting your activity! I can't write about what I don't hear about. And that includes technical snippets, ideas and circuits as well as operating news.

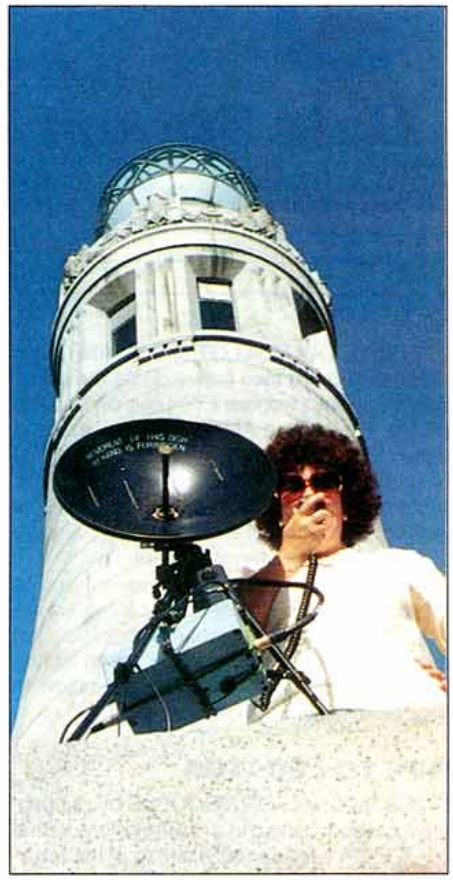
Lastly this month, one little bit of good news is that Sam's, G4DDK, revised 1.3GHz source seems to be arousing quite a good deal of interest in packet circles: not before time, if I may say so! A 23cm 'high-speed national trunk' might, at last, start to take shape. Talking of which I noticed that in the 1993 *ARRL Handbook*, [available from the RSGB – see pages 94/95 – *Ed*] there is a design for a 2 Megabaud 10GHz link. Now that is going some!

Pos	Call	Points	QSOs	Locator(s)	Power	Antenna	Best DX	km
1	G3JVL	12612	85	IO90MS	20W	0.9m	G3PHO/	333
2	G8KQW/P	10769	85	IO91GI	50W	1.4m	F6DKW	390
3	G3FYX/P	10528	71	IO93BA, 81PH, 91GI	3W	0.9m	G3NWU/P	364
4	G3PHO/P	9571	59	IO93EH	0.2W	0.6m	G6XM/P	338
5	G3ZME/P	8710	69	IO82QL, 82NN, 82RQ	0.8W	0.8m	G3LQR	292
6	G4BRK/P	7513	65	IO91FN	0.3W	1.2m	G3PHO/P	234
7	G4JNT/P	7113	53	IO80UU	10W	n/a	G3LQR	295
8	G0API/P	6719	50	IO80UU	0.1W	0.5m	G3LQR	295
9	GW4MAP/P	6578	44	IO82JG	0.2W	0.6m	G8KQW/P	295
10	G4FCD	4250	39	IO91JV	6W	0.6m	G3PHO/P	210
11	G3JMY/P	3640	35	IO81PH	0.3W	0.5m	G3PHO/P	211
12	G3JMB/P	2414	29	IO90TV	0.1W	0.6m	GW4MAP/P	245
13	G8DKK	2328	25	IO91VX	12W	0.3m	G3PYB/P	275
14	G3LYP(/P)	1628	21	IO91OO, 91MP	20W/0.3W	0.4m	G3ZME/P	164
15	G0API	1167	12	IO80XS	0.1W	0.5m	G4MAP/P	184
16	G8AYY/P	280	5	IO93AD, 93AF	0.01W(WB)	0.5m	G3ZME/P	84
17	G4KNZ/P	169	4	IO90MX, 83LC, 93UK	0.001W	0.5m	G3PHO/P	85

Table 1: 10GHz Cumulative Results, 1992

Pos	Call	Points	QSOs	Best DX	km	Power	Antenna
1	G4KNZ/P	483	8	GW4JJW/P	90	50mW	18indish
2	G8AYY/P	211	4	G4KNZ/P	86	7mW	12indish
3	G3PHO/P	202	5	G4KNZ/P	85	7mW	20indish

Table 2: 24GHz Cumulative Results



Meg Robinson, G7FRE/N2NQI, operating on 10GHz from Mount Greylock, the highest point in Massachussets at 3,500ft. The lighthouse behind her has been reassembled here 150 miles from the sea as a war memorial.

TECHNICAL CORNER

A SMALL, BUT IMPORTANT, error in one of the designs in the Microwave Handbook has been brought to our attention. This concerns the high-performance low-noise 1.3GHz GaAs FET receive preamplifier shown in Fig. 14.16, on page 14.10 of Vol 3. The correct overall length of the input line, L1, should be 35mm (not 30mm as shown). However all other dimensions are correct. Our apologies for this error which went unnoticed despite careful checking and rechecking! [In fact there are very few errors considering the size and nature of this most useful book - see *BookCase* pp 94/95 and order your copy today! - *Ed*]. In the unlikely event of readers spotting another error, they are most welcome to drop a line to me (QTHR) or any other Microwave Committee member.

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Data Stream

RICK STERRY G4BLT
1 Wavell Garth, Sandal Magna, Wakefield,
West Yorkshire WF2 6JP

I RECEIVE QUITE A LOT of 'snail mail' from readers who are also active on data modes. Why use post, I wonder? You can contact me via the Packet and AMTOR mail forwarding network (G4BLT @ GB7WRG.#19.GBR.EU) or on the PACTOR mailbox DK0MHZ. The system may not be 100% reliable, but it works well enough most of the time, and I always acknowledge messages individually.

When using post, please remember to enclose a stamp or SASE if you require an acknowledgement or reply respectively. In fact, this is a good general rule, when writing to any person or voluntary organisation in connection with our hobby.

NGR TO LOCATOR

I WAS ASKING FOR TROUBLE by publishing a program listing in the May column. First of all, there was a small mistake in the error-trapping routine in line 100. The final statement should read GOTO 170 instead of GOTO 150. Luckily, this mistake only causes a problem if you enter an invalid NGR.

Secondly, some versions of BASIC produce locators which have one or more characters 'a step too high'. To take an extreme case, JO94TP might be printed instead of the correct IO83SO. This is caused by unexpected rounding up when non-integer values are used in the CHR$() expression (which I concede is rather bad practice), and the main culprits seem to be QBASIC and GWBASIC. This can be cured by use of the INT expression in the final statement of line 1020:

```
:L$=L$+CHR$(T+INT(E))+CHR$(T+INT(N))
```

Also, if you do need to include line 20 to specify the value of PI, you can as an alternative use the expression PI=4*ATN(1) as this will calculate PI to the internal accuracy of the BASIC being used.

Thanks especially to John, G3HQX, Norman, G4KGK, and Alan, G3XOI.

OH, FRACK!

YES, "FRACK!" WAS THE exclamation made by a little caveman character in an old computer game of the same name. Well, I have had good reason to shout "Frack!" myself.

Ian White, G3SEK, featured some recommended TNC parameter settings in April's *In Practice* column. Since then, I have discovered that Kantronics TNCs appear to implement the FRack parameter rather differently to other TNCs. Normally, a TNC sends a packet then waits for the time specified by FRack, (eg 7 seconds), for an acknowledgement. If no acknowledgement is received within that time, a Poll packet is send to check that the link is still present.

Where TNCs like the KAM differ, is that the FRack timer is suspended during any period when DCD (Data Carrier Detect) is present. In other words, the waiting time is not an absolute 7 seconds, but an accumulated total of 7 seconds of received 'silence' on the frequency. Therefore, at busy times of day, a KAM with a FRack setting of 7 seconds is extremely reluctant to transmit, making BBS access etc almost impossible.

Now, I am all in favour of parameter settings being 'polite', but a TNC that doesn't transmit at all is not what I had in mind! Therefore, check the explanation of FRack in your firmware manual, and if the vital statement about the timer being "suspended during DCD" is there, try the default FRACK setting of 4 seconds, as 7 is certainly much too long.

PARAMETER NIGHTMARE?

THERE SEEM TO BE MORE and more subtle, and some not so subtle, differences in TNC firmware, so that it is getting harder and harder to make general recommendations. The manuals supplied with new TNCs and controllers can be very daunting indeed, and there is a tendency for users to set parameter values on a random trial-and-error basis.

It seems crazy to me to expect users to be able to understand and optimise all these complicated and interactive parameters. It is time that a leaf was taken out of the TCP/IP book, and TNCs had firmware which automatically adjusted critical parameters dynamically. This, I understand, is just starting to happen, and thank goodness for that. In my view, the more the system can be intelligently self-adjusting, and the less possibility there is for manual tampering, the better.

One even hears horror stories of BBS and Node ports with PERSIST set at 255, and similarly excessive settings of PACLEN and MAXFRAME. Happily, these do not seem to be typical, but perhaps self-adjusting software will avoid such abuse altogether.

Having said all that, I believe that most abuse of packet comes about through ignorance, rather than through any conscious desire to make life harder for everyone else.

AMIGA RADIO USER GROUP

THE USER GROUP FOR the Commodore Amiga range of computers, the Amiga Amateur Radio User Group (AARUG), was formed in May 1988, and seems to be enjoying great popularity. Recent interest has been so great that the organisers cannot write individual replies to everyone enquiring about the group.

So, what they have done is to assemble onto disc all the things you wanted to know about AARUG but were afraid to ask. If you would like a copy, please send them a blank formatted disc, plus the correct return postage. I would suggest that you also enclose a self-addressed return label, or outer wrapper, to make it as quick and easy as possible for the organisers to deal with your enquiry.

Send the disc to either of the following: Surnames beginning with A to M - Reg Thomas, G1TEY, 14 Montgomery Street, Hove, East Sussex BN3 5BF. Surnames beginning with N to Z - Bob Perks, G0LBQ, 120 Cranes Park Road, Sheldon, Birmingham B26 3ST.

OTHER USER GROUPS?

IF YOU HAVE INFORMATION about user groups for other computers, or indeed, other items of datacomms equipment, please let me have the details.

Packet radio can help in running informal user groups, so it's always worth looking out for bulletins addressed appropriately in the TO field. Examples are ARCHIM, AMIGA, ATARI, BBC, DOS and IBM. To reveal these, use the L> command, eg L> AMIGA (don't forget the space). In some cases where the TO field only shows ALL rather than AMIGA etc., you can usually search the SUBJECT field for a string of characters. Eg on FBB BBS software, you can use the LS command, eg LS ATARI.

PACTOR - EARLY IMPRESSIONS

I'VE BEEN USING A PACTOR controller on a daily basis for some weeks now, mainly for accessing the DK0MHZ mailbox. I haven't come to any firm conclusions, but here are some initial impressions.

First of all, the firmware in the controller is very eccentric. I am using the licensed PacComm unit, which has basically the same firmware as the original German PTC unit. It is not nearly so friendly as the average TNC or multimode controller, and there are many curious inconsistencies between the commands and facilities used by AMTOR/RTTY and those for PACTOR. However, once the terminal software is configured appropriately, the controller does work rather well, though I have yet to see the much-vaunted memory-ARQ feature working. (Perhaps the green Error LED is faulty, HI.)

Given a reasonably clear frequency, so that PACTOR can use 200 baud, the throughput is certainly substantially better than AMTOR, (about 16 characters/sec I would estimate, as against about 6), and of course the full ASCII character set is available with no speed penalty. However, where there is bad interference, and the speed has to drop to 100 baud, things aren't nearly so clear-cut. The repeat (retry) rate increases substantially as the QRM gets worse, and I have the gut feeling that the shorter block length of AMTOR, combined with the less stringent error-detection, could actually enable it to exceed the PACTOR throughput rate. I have heard similar comments from other users, though I won't pretend that this is an objective or scientific assessment. However, I have no regrets, and am enjoying using the new mode, as well as AMTOR and good old RTTY.

One advantage of PACTOR is the ease of monitoring other ARQ QSOs. Getting AMTOR to synchronise under those circumstances is rather fiddly, as it tends to get into a false 'lock' if IDLE characters are being sent at the time, so needs manual commands to force resynchronisation.

CHOOSING A PC?

IN A NEW VERSION OF an old adage about playing cricket, it is said that the world is divided into those people who use IBM-compatible PCs, and those who do not. On that basis, I am a heretic twice over, but there is no denying the vast wealth of cheap hardware

and excellent software available for the PC range. A thorough article about PCs would take up an entire issue of *RadCom*, but at least I can start this month with a few words of explanation about the processor (CPU) chips used. I haven't covered all possible variants, but have concentrated on the common ones.

Many prospective buyers of PCs, either new or second-hand, are confused or uncertain about the different processor chips used by PCs. There is no point in spending a fortune on a very powerful and fast machine, if something half the price will do the job perfectly well.

8088 MACHINES (IBM XT)

The original IBM XT machine used an Intel 8088 processor running at 4.77MHz clock speed, and I shall use it as the basis for a very crude processing speed index; on this scale an XT is 1 (this doesn't translate exactly into overall machine speed, but it at least gives a rough comparison).

These are now available very cheaply indeed second-hand, even with a hard disc fitted, and can offer a bargain entry point into the PC range. Although slow, a great deal of amateur radio software will run satisfactorily on these machines. Many of the clones produced by other manufacturers are referred to as XTs, although of course this is strictly an IBM model type.

Later ones had a faster clock speed of 8 or 10 MHz, with a proportional increase in speed to about 2 compared with the original XT. A useful increase in speed can be also obtained by replacing the 8088 with an NEC V20 processor chip. Text-based programs will run quite well, though anything involving the drawing of graphics on the screen (as opposed to text characters) is likely to be painfully slow. Note that some machines were based on the 8086 processor, and had performance similar to an 8088 machine.

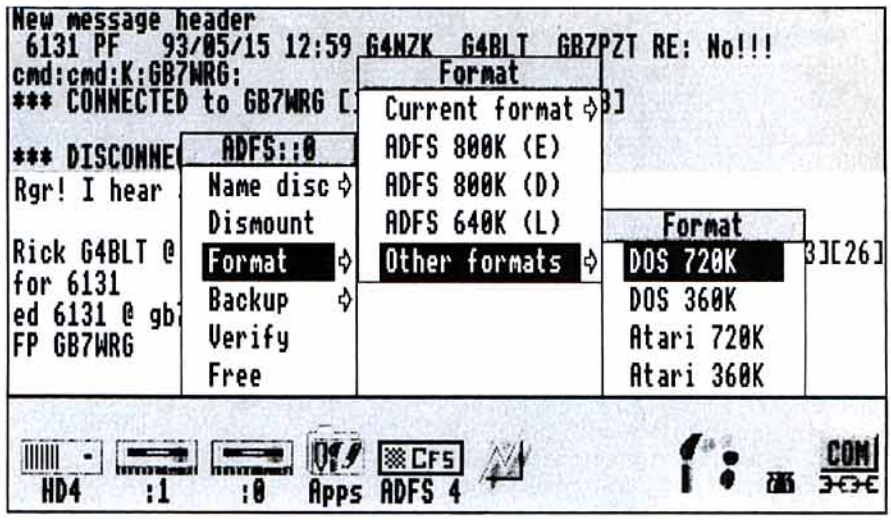
Also, the original Monochrome graphics adaptor, and especially the colour CGA graphics adaptor, give very crude resolution of graphics. The 'Hercules' high resolution monochrome adaptor is much more satisfactory, as is the EGA colour adaptor. The original green-screen IBM XT monitors have very long-persistence phosphor, which makes scrolling text quite difficult to read.

Looking around at a recent rally, I found second-hand systems with monochrome monitor and hard disc from as low as £100.

'286 MACHINES (IBM AT)

The IBM AT machines were based on the 80286 processor, with a typical clock speed being 12MHz. This has a 16-bit data bus, as against the 8-bit of the 8088 chip, and has a speed index of about 8. This is a substantial increase over an 8088, and the vast majority of amateur radio software will run on a 286 machine. Indeed, many GB7 packet mailboxes are running on 286s. 'Clones' are still available new, but perhaps do not represent good value for money compared to 386SX machines. However, many good bargains are available second-hand, and if you can afford the extra cost over an XT then it is certainly worthwhile.

Many will probably have an EGA or the better VGA, (colour or mono) adaptor fitted, or perhaps even the very nice super-VGA.



An example of a 'desktop' multitasking graphical user interface (GUI or WIMP). A 720k DOS disc is about to be formatted, while a packet terminal and other applications run simultaneously. This 'snapshot' shows only a small part of the total screen area. This subject will be covered in a later column.

However, for amateur radio use an EGA adaptor or mono VGA should prove quite satisfactory.

I found rally prices for a system starting from about twice that of an XT; ie £200.

'386 MACHINES

The 80386SX processor, though 32-bit internally, 'talks' to the rest of the machine through a 16-bit data bus, like the 286. This gives a speed of about 12 on my index, based on a typical 25MHz clock frequency. The more expensive 386DX machines are true 32-bit, and the speed index is about 25 for the same clock speed.

The 386 has much better memory expansion capabilities than the earlier machines, and this makes it a very popular choice for more demanding applications. Many GB7 packet mailboxes use 386 machines, and even an SX is well up to the task of running the busiest BBS. If you wish to use any programs that use the multi-tasking Windows 3.1 desktop environment, then a 386SX is a minimum requirement.

Second-hand machines are not so common, and prices very greatly, due to the very wide range of specifications. Those with very large capacity hard discs and SVGA colour adaptors and monitors can be very much more expensive than more modest machines, which you might find from about £400 or so.

'486 MACHINES

These use 32-bit processors, which are more efficient than a 386DX, and so can execute about twice the number of instructions in a given time. An 80486SX running at 25MHz is about 60 on the speed index, which really is very fast indeed. The 486DX is similar, with a built-in Maths co-processor chip which very few programs can make use of. However, the clock speeds are often very high, and at 50MHz the speed index is about 120. The 486DX2 machines are similar.

For amateur radio use, the 486 machines are complete 'overkill', and are really only worthwhile for intensive use on highly demanding multitasking graphic applications such as Computer-Aided Design (CAD), object-oriented drawing, DTP (Desk Top Publishing), and so forth. However, when the next generation of Intel processors arrive, (to be called Pentium rather than 80586, for copyright reasons), prices of 486 machines may possibly drop, making them more attractive to the amateur.

Such machines are rare second-hand, and prices are unlikely to start much below £1000.

BSX2 TNC TIMEKEEPING

AS WELL AS THE CLKadj parameter, which affects the accuracy of the internal software real-time clock, there are other factors. Dave, G4WRW, suggests that running the TNC at the lower clock speed of 2.4576MHz may reduce accuracy, (the word 'clock' is used in a somewhat different sense here), as the TNC may be too 'busy' at times to service the updating of the real-time clock. Using the higher speed of 4.9125MHz may help. However, I have never been able to persuade my own BSX to run at the higher speed with the Siskin firmware, though it runs other firmware such as THENET quite happily.

Alan, G0LGX, has reminded me that there is a small 60pF trimmer capacitor which alters the crystal oscillator frequency slightly. Though originally intended for moving any annoying 'sproggies' away from the frequency in use on the station receiver, it can also be used to fine-tune the timekeeping once it is set as near as possible with CLKadj.

CLOVER - JUST HYPE?

I HAVE NOT BEEN ABLE to obtain any further reports on the performance of Clover, only unsubstantiated rumours making wild claims either in its favour, or against. Its introduction has certainly been surrounded by much hype, but whether it can measure up to this in practice is still unknown. There are three main problems: first, it is only available from one manufacturer, (HAL communications), second it is still only available as a PC card, and third it is very expensive.

As a result of these factors, there are relatively few users at the moment. Meanwhile, the more modest PACTOR is being used more and more every day, so Clover will have to offer a quantum leap in performance if it is stand any chance of widespread acceptance. This could be an exciting battle!

Satellites

ARTHUR GEE G2UK
21 Romany Road, Oulton Broad, Suffolk
NR32 3PJ

THE FOLLOWING LETTER is typical from those wishing to get involved in satellite activities, but who find difficulty in getting the necessary information on how to get started.

"I would like to get on the satellite bands, but do not know where to start. Could you advise me on a receiver and transverter for satellites. And what else I might need to get me on the band. Hope you can help."

It occurred to me that it would not be a bad idea to make this topic my contribution to this month's column. My reply went somewhat along the following lines:

First of all get in touch with AMSAT-UK's Hon Secretary, Ron Broadbent, G3AAJ, at 94 Herongate Road, Wanstead Park, London E12 5EQ. He will send you a 'packet' of literature etc, giving you details of how to join AMSAT-UK and lists of publications telling you just how to go about 'getting on to the satellites'. Ask specifically for a copy of *Satellites for the Beginner*, written by myself! It tells you just what you want to know.

I would suggest you start by listening for the Russian satellite RS12. It has an 'uplink' of 21.210MHz – 21.250MHz and a 'downlink' of 29.410 – 29.450MHz. You can use your normal amateur radio transmitter or transceiver and your normal aerial for the uplink and you'll need a separate 10 metre receiver for the downlink with a simple 10 metre dipole – preferably – or any other 10 metre aerial.

To start with, look for the beacon which is on 29.408MHz. This is a good, strong signal sending the call RS12 and lots of data etc. Once you have found this you're half-way to getting on satellites. The easiest way of finding out when this satellite is in 'radio view' of your station, is to get a copy of the *Orbital Calendar* from Ron and the *AMSAT-UK Polar Projection Map and Plotting Sheet*. You'll be able to purchase these together with literature on using them. You don't need to know anything about computers to work out the times and orbits of this satellite. And you don't need to have a rotary beam aerial system. So try this simple set-up first and the rest can come on as you gain experience.

You may find that once you come into contact with more experienced satellite enthusiasts you may be given the impression that working with such methods as outlined above is simple and you're missing a lot of the fun. Well, looking back through my log for RS12 activity for the past few months, I find I've worked the following: G3FBN, G4HHV, G0MHC, G0LKB, G3IRW, GW2DPD, G2QY, G3IOR, G3IFB, GM3JSX, GM3KIG, G3DEE, GM3GNM, G3ABU, G3JTK, GM3KPD, EI7HF, F8EV, F6GOY, F6DJW, DJ5XO, UB50A, UA1NA, HA5AFB and PA0BUJ, which represents quite satisfactory 'satellite activity'.

Amateur radio satellites have come a very long way since the first ones some twenty-five years or so ago. From the very simple battery operated one sending the single code 'Hi Hi' to the present day sophisticated Microsats which can even send pictures back to earth, the pace of development has been fantastic. There is still room for the simple communication ones such as RS12, so get started on that and you'll soon get the 'know-how' and enthusiasm to go on to all the other satellites which are being launched pretty well continuously nowadays. There is an endless series of ever more sophisticated satellites appearing which will keep those who like technical experimentation happy for years ahead.

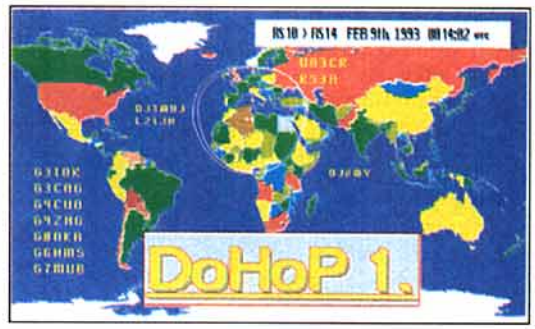
If you can time your satellite activity to fit in with a more or less 'overhead' pass, you will, of course, get the best conditions, but an orbit or two either side of this gives acceptable results. Signals from RS12 are usually steady and of good strength, a little QSB at times and some QRM from 21MHz band users who are operating on the 'satellite frequency' without realising it. So, to any reader who may not have tried 'getting going on the satellites', just have a go at RS12. I'm sure you won't find it as complicated it sometimes appears to be.

SAREX

THE AMATEUR RADIO contacts with the STS-56 Shuttle were very successful on its final orbit. At the time of writing, brief accounts from schools participating are coming in, telling of their excitement at making successful QSOs [see 'Guildford School Seen in Space', *RadCom*, Jun, p5 – *Ed*]. Similar projects were mounted by schools around the world, particularly in the USA. One such report received on the Packet network from Greenbelt, USA, illustrates the satisfaction such contacts produced. Frank Bauer, KA3HDO was cited for special commendation in a message which read: "Frank's efforts in Greenbelt are definitely increasing the school SAREX success rate nation-wide and beyond!" Another similar message read: "I heard Discovery answering your Hudson, Wisconsin School questions this morning from my home in Bowie, MD. Congratulations. You did a great job! Hudson Elementary should be proud of you. Please remember to emphasize the lasting excellent science program in place at the school over the contact with the Space Shuttle" – WD0BWE de WD8LAQ.

One of the major goals of the SAREX part of this shuttle mission was to hold class room discussions with school children all over the world. More than eighteen schools were involved in these question-and-answer sessions with the shuttle astronauts. Children from Portugal, Australia and South Africa as well as the USA and Britain took part. Three British stations made contact via Packet radio: G3RWL, G0NKA and GU6EFB.

The spacecraft MIR has also been involved in SAREX projects. Last April, a slow-scan TV picture of the crew was successfully sent to the Royal Grammar School of Guildford's Radio Club Satellite Station. Help was provided by members of the University of Surrey's Space Department and Roddy Clews, G3CDK, whose previous successful SSTV contacts with earlier SAREX missions will be recalled.



A computer printed QSL card marking the first coordinated Double-Hop tests. See 'DoHop'.

DOHOP

IN THIS COLUMN for November 1991 I outlined the experimental work being done by Dave Rowan, G4CUO, for investigating the possibility of using two or even three satellites to pass signals from one satellite to another as they come within 'radio distance' of each other, This enabled communication to take place over much greater distances than possible using one satellite only, where the communication path is limited by the height of the satellite above the earth's surface. The mode has been designated DoHop – Double Hop.

Dave has been continuing these experiments ever since and he has just come up with the results of tests carried out with the cooperation of UA3CR and the Russian amateur satellite control centre RS3A. A series of tests was organised between a number of stations and this was so successful that Dave can now claim that DoHop can now be regarded as an acceptable mode of communication. The crux of the system is of course having two satellites in the right position for intercommunication. After months of patient waiting and much calculation of orbits, success was had with a QSO via RS14 to RS10. On 9 February 1993, at 0012.35UTC, the first successful QSO took place. By changing RS14 (now designated AO-21) satellite to its RM-2 analogue transponder mode B and using the 70cm uplink to AO-21, a link on 2 metres to RS-10 and downlinking on 10 metres, the experiment was successful, with six stations linking together as the two satellites passed each other. Timing had to be accurate as the time available before the satellites had passed out of range of each other was only 3 mins 11 seconds.

RS15 LAUNCH DELAY

IN THE MARCH COLUMN, I gave details of the new Russian satellite RS15 which we said would be launched early in 1993. As so often happens with satellite launches, this did not take place and our latest information is that the launch will not be until early in 1994!

Leonid, UA3CR, let me know that he had been admitted to hospital for an operation on his throat and was likely to be out of action for at least two months. We do not know if the postponement of the launch and his operation are connected but in any case we extend our sympathies to him and wish for a speedy recovery.

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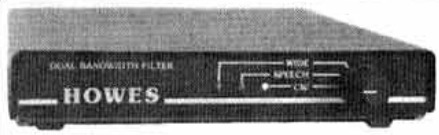

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73 from Dave G4KQH, Technical Manager.

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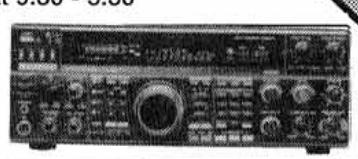

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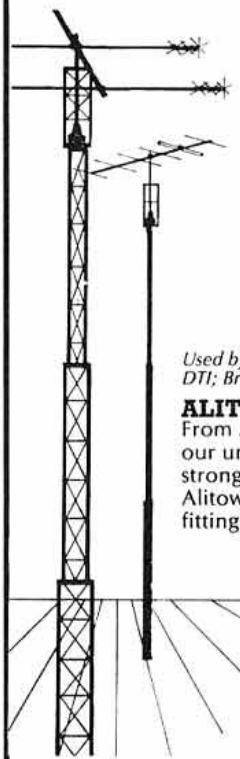

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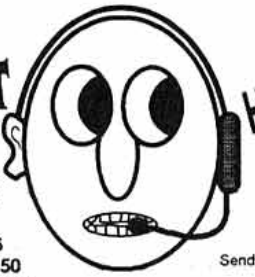

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The RadCom Book of the Month

Reviewed by George Dobbs, G3RJV

W1FB'S QRP NOTEBOOK

(Second Edition)

by Doug DeMaw, W1FB, ARRL.

M F 'DOUG' DEMAW became known to amateur radio constructors during his long period with the ARRL for his lucid and accessible technical article in *QST*. Since his retirement from the ARRL, Doug has produced a number of handbooks for the constructor and the beginner in the hobby. His *QRP Handbook* published in 1986 has gained a place in the library of keen amateur radio constructors with its wealth of circuits and advice. The second edition, retitled *W1FB's QRP Notebook* has recently been published and is available from the RSGB [members price £5.70 plus P&P – *Ed*].

The good news for those who already have a copy of the *QRP Notebook* is that this is a complete re-write of the book. It is a larger work, 174 pages, and about two-thirds of the content is new, including many new complete construction projects. The foreword begins: "As I prepare for my retirement from article and book writing . . . ." Doug DeMaw is now retired to his late father's farm in Northern Michigan and is keenly involved in black powder rifle shooting and hobby woodworking and claims this may be his last amateur radio work. Let us hope that this is not so. Amateur radio will have lost a singular author.

The book begins with a general introduction to QRP and a comprehensive section on construction and workshop techniques. The rest of the material is divided into five sections: Receivers for QRP, QRP Transmitters and Techniques, QRP Accessories and Technical Bits and Pieces. The style is that of the friendly 'Elmer' guiding the constructor along the way with advice, rules of thumb, circuit ideas and complete projects to build. The text gives the feel of a designer thinking aloud on paper distilling the experiences of a lifetime of experimentation and building amateur radio equipment.Dotted through the book are a series of 'universal circuits'. These designs give a circuit and a printed circuit board for a project which can be used on more than one band or for more than one application.

Alongside the projects are tables of values for the various bands or uses and useful standardised circuits which can form the basis of the reader's own project.

I have only had my review copy for a little over a week and I have quickly read through the whole book. It is a book that I will come back to often and which ought to find space on any constructor's bookshelf.

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● Circuit diagrams required for **Wavemeter Type W1649** Ref No. 10T/6045 and **Avo** Signal Generator (50KHz to 80MHz) by Mr R W Hilton, G1LKH, 8 Hogshill Lane, Cobham, Surrey KT11 2AQ.

● Simon Robinson, G8POO, needs to obtain an integrated-circuit chip type **KB4417**, Speech Processor as used in the 'Talkbox' project. Any one able to help, write to:- 23 Jameson Drive, Cragside, Corbridge, Northumberland NE45 5EX.

● Vladimir Anisomov, UW6HFQ, is looking for British amateurs interested in **DXpeditions to rare QTHs**, oblasts, etc. His group members are aged about 20 and are very active in this field. He wants to exchange information etc. Please write to him at CCCP (Russia), Stavropol-44, 355044, Box 999, Vladimir Anisomov, UW6HFQ.

● Circuit diagram and/or other information of a Graphic Equaliser which is discarded but still has serviceable inductors in the audio-frequency sections, especially a **BSR Type FEW 111** or similar. Please write to S Ainsworth, G0HTP, 494 Overpool Road, Ellesmere Port, South Wirral, L66 2JJ.

● Circuit diagram/manual or any other details, required by Vin, G4JTR for two receivers, **AD108** (Marconi?) and **Redifon R-146**, to help an Indian Amateur, VU2KBX. Please write to Vin Robinson, 4 Milltop Road, Cavensham, Reading RG4 7MK, or tel: 0734 476873.

● Circuit diagram/operating instructions required for **Technical Associates audio filter**, circa mid 70s. Information to G4CJY, QTHR.

● Circuit diagram and technical details of a **phase Converter** with speed control to run a 3 phase motor from a single phase 240 volt supply with speed control. Information to G4EGB, QTHR.

● Robert Fletcher, G0HXJ (EA7GYB), is seeking a club or group of owners of **Yaesu FT102s**. Any information appreciated. Contact at PO BOX 91, CP 11080, Cadiz, Spain.

● Chris Foulkes, G3UFZ, requires an Operating Manual or copy thereof of the General Radio **R-F Bridge type 1606A**. All costs will be reimbursed. He is QTHR, or tel: 0803 845304.

● Instruction/service manual for the **FXR Spectrum Analyzer (Model 2800A)**, together with its S-Band head (Model S-900B). Also any information on FXR, address, tel no and if still trading? Any info send to Pierre Dehez, ON4IV, 10 Chaussee de Wavre, 1370 Jodoigne, Belgium, or tel: 32 10 813882

● Circuit diagram for Micron **EPROM** Programmer, manufactured by HCR Electronics of Chelmsford. Company has ceased trading. Alan, G8CJM can be contacted on 0634 847280 or QTHR.

● A Handbook is required by Tom Chapman, G0MKA, for a **TR2300** Portable. Any postage or costs will be refunded. Tom's address is 17 Trevor Road, Swinton, Manchester, M27 3AH.

● Information of any 12 volt **DC Rotator** for Portable work required by Andrew Jeffery, G8SIG. If anyone can help please contact Andrew by tel: 0298 27568 or QTHR.

● Paul, G8HWZ, has a PC Type **Citizen PRO 286**, and needs the CMOS set up program on disk, type number for hard disc configuration (looks like 40Mb Quantum) and jumper configuration for Motherboard, NORMEREL type 286-2. Contact him on 0827 872171 home or 021 377 7000 x3722 work.

● Len Butler, G3WBO, is trying to trace **Bob Watson (SWL)** who served in Bulawayo with the RAF for four years during WW2. Bob was last known in Truro. Len also needs any information on the Nylon cord set-up for the **Ten Tec, Century 22**. Contact Len on 0403 264606 or write QTHR.

● A manual/circuit diagram is required by John House, G7JAI, for a Heathkit Digital Multimeter, model **IM2202**. All help appreciated and costs will be reimbursed. Please write QTHR or tel: 0926 54556.

● Circuit diagram/manual is required for a **Toshiba** Stereo Amplifier type SB445 by S Cook, G8ZLK. Expenses will be reimbursed. Please write QTHR or tel: Medway 814146.

● Any information on the **R103A** WW2 Receiver, which Service used and the manufacturer? Rx has a Muirhead tuning dial and covers 1.7-7.5MHz in two ranges. Set has no data plate or serial No. Any information to T Moore, G3AJD, QTHR or tel: 081 449 0877.

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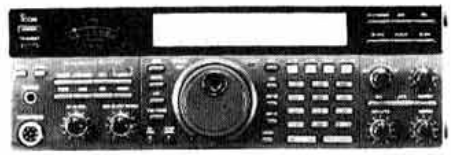

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CONTEST CLASSIFIED

All rules should be read in conjunction with the General Rules published in *Contest News* January 1993

HF RULES

2ND SLOW CW CUMULATIVE

1. General: The aim of this event is to provide training and encouragement for those less experienced in CW and contesting. It is intended primarily for Novices and those newly licensed or just getting their feet wet in the world of CW contesting. *Please note that rules 3 and 6 have changed since the last event.*

2. The General Rules for HF Contests, as published in the January 1993 issue of *RadCom*, will apply.

3. Sections:
(a) Transmitting
(b) Receiving

Single- or Multi-operator entries will be accepted in section (a). There is no limit to the number of operators in a team, nor need they be the same for each session.

Section (b) is Single-operator only.

4. Eligible Entrants:

Section (a) All operators must be members of RSGB.

Section (b) Individual RSGB Members who do not hold a Class A Full or Novice licence.

This contest is open only to stations in the British Isles (excluding Eire). Stations outside this area may not be contacted or logged for points.

5. Dates/Times: 5 sessions, each from 1900 to 2030GMT on:

Mon 6 September 1993
Tue 14 September 1993
Wed 22 September 1993
Thu 30 September 1993
Fri 8 October 1993

6. Frequency/Mode: CW only between 3.540MHz and 3.580MHz

7. Exchange: RST and First Name (in full, with correct spelling). Multi-op stations must send only one name during any particular session, regardless of who is operating, although different names may be used during different sessions.

8. Maximum Power: 3 Watts RF output for Novices, 10 Watts RF output for holders of Full licences. There is no restriction on the method of generation.

9. Speed Limit: No faster than 12WPM, and never faster than the other station is sending. Please join in with the spirit of the contest . . . . don't use a keyer; don't use a computer - get out that straight key and keep your log on paper (at least during the event!!).

10. Scoring:

Section (a) Any UK station may be worked once for points during each session. Any contact with a novice callsign at either or both ends scores 20 points. Contacts between two Full licence-holders score 5 points. The overall score is the total of the best three sessions.

Section (b) Listeners may log for points only stations actively participating in the contest. Each novice logged scores 20 points, each Full callsign counts 5 points.

11. Logs: Entrants are requested to submit logs for all sessions during which they are active, in order to assist with the adjudication. Full details of the correct format, and the address to which logs must be sent are given in the General Rules. The name of the operator worked/heard should be recorded in column 5. Logs must be postmarked no later than Monday 25 October 1993.

12. Awards:

Section (a) Certificates of Merit to the leading Novice and Full licence-holder, and also to the highest placed station entering any RSGB HF CW Contest for the first time (please note on your Cover Sheet if you qualify for this last award).

Section (b) Certificate of Merit to the leading listener.

At the discretion of the Contests Committee, additional certificates may be awarded if there is sufficient support.

SSB FIELD DAY

1. The General Rules for RSGB HF Contests, published in the January 1993 issue of Radio Communication will apply. This is a 'Portable' contest.

2. When: 1500GMT 4 September to 1500GMT 5 September 1993.

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. Please note that the 10-minute QSY rule has been deleted.

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 . . . . 2 points, **(b)** any station outside IARU Region 1 . . . . 3 points, **(c)** a portable/mobile station in IARU Region 1 . . . . 5 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 **22 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

1ST 1.8MHZ 1993

Conditions for this contest were great with a lot of activity from both the UK and Europe. Scores were high and competition was very tough. The number of UK entries was slightly down on last year, but there was an encouraging increase from overseas. Unfortunately there were no entries for the Receiving contest.

Both this and the November 1.8MHz event coincide with other contests running in Europe, which provide a useful pool of extra stations to work. There is no need to badger them for a serial number if their contest does not require them to send one . . . . merely log the exchange they send, give them whatever extra data they need and say 'Thankyou!' One entrant expressed vehement opposition to this and felt the date should be changed. If anyone has any strong feelings either way, the HFCC would like to know.

Congratulations to Ron Stone, GW3YDX, for his handsome victory over G4BUO. Ron managed to work twenty-three State-side calls. Another well deserved pat on the back goes to Chris, G3SJJ, for third place with a perfect log. The Maitland Trophy, for the GM with the best aggregate score in this event combined with the 2nd 1.8MHz Contest 1992, goes to D Crook, GM0RHP.

On the whole the standard of logging was very high (for the second year running there were no unmarked duplicates) although there were a few artistic variations on familiar callsigns. Most of the top ten operators used computer logging. EI5DI's 'Super Duper' was especially popular and is becoming a serious challenger to the G3WGV software. It would be nice to see more logs coming in on disk, as this can save the entrant and the adjudicator a lot of time.

Some stations sent in entries for the Bingo Table. This was originally intended to be an award which those in the middle orders could fight over. It turned out that the contest leaders were winning the Bingo as well and so it was discontinued at the end of 1992.

The HFCC thanks all those who took part, and extends an invitation to join in battle again in the Summer 1.8MHz Contest in late June. *G0HSD*

CLUB CALLS CONTEST 1992

There were noticeably more Club Stations active this year with more than 45 Affiliated Society callsigns appearing in the logs submitted. A Southerly bias in activity made it harder for those stations further North to be competitive. We welcome our first Novice entrant in this event: Ian Ross, 2M0ACI, who battled against various odds including those who insisted on logging the prefix as GM (no loss of points to Ian). 2W0AGD also appeared in several entries. There was a good spread of experience amongst the 96 operators listed including 28 G3, 29 G4, 28 G0, 10 Class B and 1 Novice.

Clear winner of the Ariel Trophy this year was Evets Communications ARS, G0JBX, operated by three brothers-in-law: G3NKC, G4CBQ and G4FPH. Operating from an impressively high repeater site overlooking Derby, they used two dipoles, one at 120ft and one at 80ft. In second place was G0IVZ, with an error free entry of 132 contacts.

With a few notable exceptions, the standard of logs was good, although presentation of the received information and the claimed points varied. I have reproduced a few lines to show a useful method of logging:

2000	G3LQS	001	001	RAF Coningsby	CS	25	3
00	G4AYM	002	001	Gloucester ARS	CS	25	3
01	G0JNZ	003	001	Plymouth	CM	5	3

(note all reports 5:9 unless otherwise stated).

Two other points worthy of mention: (i) the Band Cover Sheet HFC9 is not required as this is used in NFD only, when the logs are distributed to individual band adjudicators; (ii) an alphanumeric dupe sheet is one where all G0s are listed alphabetically, then G3s, then G4s etc.

A high efficiency high angle radiator is necessary to obtain a good contact rate in this contest and a centre-fed halfwave dipole is probably the best at achieving this aim. An apex of 18m is probably the lowest competitive height with noticeable increases for each extra 6m.

The 1993 event will be one hour shorter, finishing at 2300 and the HFCC look forward to even more activity.

G3SJJ

Psn	Call	Status	QSO	Score	
1	G0JBX	C	169	1875	*
2	G0IVZ	M	132	1726	a
3	G4RFR	C	136	1657	*
4	G6RC	C	122	1631	a
5	G3WAS	C	129	1606	*
6 =	G3PRC/P	C	113	1593	b
6 =	GW5NF	M	117	1593	
8	G0OCE/P	C	114	1576	
8 =	G3VRE	C	119	1576	
10	G4GFN	N	133	1563	
11	G3VER/P	C	138	1533	
12	G4DDC/P	C	118	1526	
13	G3WOI/P	C	95	1503	*
14	G0OLE/P	C	107	1484	
15	G4PDQ	M	95	1445	
16	G4WKS	C	89	1431	
17	G4AYM	C	96	1399	
18	GW4CC	C	92	1398	
19	G0JJN	C	107	1383	
20	G4NOK	C	84	1349	
21	G3LRS	C	87	1319	
22	G4OGB	M	87	1317	
23	G0FDX	C	92	1272	
24	G4LSF/P	C	70	1237	
25	G3ZBU	M	66	1204	
26	G4NHT/P	C	81	1180	c
27	G3XKD	M	81	1140	cd
28	G0SCR/P	C	66	1131	
29	G4OYY	M	55	1080	a
30	G8CA	C	73	1011	c
31	G8TB	C	59	1006	
32	G3LQS	C	65	1003	
33	G3RR	C	50	981	
34	G3ASR	C	56	960	
35	G3UFY	M	46	952	
36	G0BRC/P	C	50	935	a
37	G3ULT/P	C	47	827	b
38	GM0JKF/P	M	37	679	
39	G4LRT	M	33	544	cde
40	2M0ACI	M	22	495	
41	G4ALE	C	23	488	
42	G3HAL	M	20	435	a
43	G3GMM	M	28	390	
SWL	RS20249	N	81	1308	
CL	GB5HQ	HQ	36		
CL	G4WSM/P	C	32		

* Dipole height > 25m
a Error-free log
b Appalling spelling
c High error rate
d Unmarked duplicate
e Wrong summary & logs

UK TRANSMITTING

Posn	Call	QSOs	Bonus	Eqpt	Score
1 +	GW3YDX	227	70	4C	1031
2 *	G4BUO	203	77	4C7	994
3 *	G3SJJ	199	69	4C6	942
4	G3KDB	190	72	4C9	930
5	GM3POI	177	69	4C2	876
6	G4BJM	182	65	4C7	871
7	G4BWP	175	62	2C	835
8	G0IVZ	167	62	2C5	811
9	G3VER	155	60	4C9	750
10	G0FDX	149	59	4C3	739
11	GW3JSV	125	62	4C5	680
12	G4OFR	121	62	4C5	673
13	G3HEJ	129	57	4O5	672
14	G3RSD	119	56	3C	637
15	G4KJD	114	57	4G	627
16	G4OGB	115	54	2C5	615
17	G2HLU	101	47	3C2	585
18	G4CZB	105	53	4G	580
19	G3KNU	103	52	2W	569
20	G3TBK	101	53	4C6	568
21	G3YAJ	103	50	4C	559
22	G3BPM	94	55	3C	552
23	G3LQI	90	50	3W	550
24	G0JQN	91	47	3W1	508
25	G3AWR	91	45	3W	498
26	GM0RHP+	88	46	3C	494
27	GW3JI	72	46	4C	446
28	G3MCX	76	42	3C3	438
29	G3LIK	76	41	3C	433
30	G3GLL	71	43	3C/G3	428
31	G3VNG	72	42	4C	426
32	G3ZBU	67	42	3W3	411
33	G3MXH	67	41	3C4	406
34	GM3UM	64	39	3W8	387
35	G3GMM	50	35	2C	325
36	G0HZG	52	32	4C	316
37	G0LKX	51	32	4C	313
38	G3BGM	47	34	3C3	306
39	G3FVW	46	29	3W	283
40	G4UXG	36	28	4G	248
41	GM0JKF	37	25	3W	236
42	G3SQX	25	22	2C3	185
43	G3ZGC	26	20	2W	178
44	GW3SB	22	18	3W	156

The third character of the Equipment Code (No of Antenna Elements) has been omitted.

OVERSEAS TRANSMITTING

Posn	Call	QSOs	Bonus	Score
1 *	EI4HM	80	48	465
2 *	EI6GF	77	42	449
3 *	LA2UA	56	37	350
4	OK1DFF	57	35	346
5	DF3OL	52	37	341
6	DL9WH	48	33	309
7	UA3LID	42	31	281
8	LA1IE	37	28	251
9	OK1JST	29	25	192
10	YU7LS	26	22	186
11	UV3DRU	26	21	183
12	SP8GYO	21	19	158
13	LA8NC	21	17	148
14 =	UA1NDY	16	15	123
14 =	SP5GKN	16	15	123
16	OK2PBG	10	10	80
17	LA5AP	9	9	72
18	UB5ZKG	9	8	67
19	UB5ZME	6	6	48

\+ Trophy Winner
* Certificate Winner

RSGB ARDF NATIONAL FINAL 1992

Seventeen teams assembled at Matcham View Point, high up in the New Forest, for the start of the RSGB National Final organised by the Salisbury Radio Society.

About 50 drivers and navigators headed for the C station, G4XWP/P, hidden in thick undergrowth in Holmsley Inclosure 10km SE of the start, followed by the B station, G4KBB/P, in dense undergrowth at Kings Garn Gutter 18km NE of the start.

Only half of the entries found the A station, G4MDF/P, way out in the west, beyond Bournemouth/Poole, deep in Hardy's country 24km south west of the start. John Case, GW4HWR, past president of the RSGB spoke about contests and ARDF, and awarded prizes. Thanks go to the competitors who represented the best of this years qualifying events, and the members of the Salisbury Radio and Electronics Society who operated the hidden stations, and monitored its smooth running. Thanks also for the excellent tea arranged by Pam and helpers which was held at Downton Memorial Hall.

Pos	Name	Club	Time of Arrival at Transmitters A	B	C
1	A Collett	Colchester	15.48	14.03	14.47
2	C Plummer	S Manchester	15.57	14.45	13.56
3	C Wells	Mid Thames	15.58	14.46	13.57
4	B Bristow	Mid Thames	15.59	14.47	13.57
5	P Lisle	Mid Thames	16.21	14.46	13.56
6	R Brocks	Chelmsford	16.22	15.45	13.43
7	A Simmons	Mid Thames	14.42	15.41	16.28
8	M Hawkins	Chelmsford	16.29	15.25	14.15
9	T Gage	Mid Thames	-	14.01	15.23
10	G Nicholls	Banbury	14.42	15.57	
11	J Hall	Ripon	-	15.42	13.57
12	D Gething	Mid Thames	14.06	-	15.43
13	G Foster	Mid Thames		15.43	14.13
14	A Mead	Chelmsford	-	15.50	14.23
15	D York	South Manchester	-	16.09	14.14
16	D Holland	South Manchester	14.00	16.17	

One competitor failed to find any of the transmitters

DIRECTION FINDING

SOUTH EAST ENGLAND QUALIFYING EVENT

Date: 25 July 1993

Map: 187 (Dorking, Reigate and Crawley)

Assembly: 1300 for start at 1320

Location: Car park on west side of A22 near Ashdown Forest, NGR 438298

Competitors requiring tea should notify Colin Merry, tel: 0322 523729, no later than 18 July.

HF CONTESTS CALENDAR

1993	
3/4 Jul	*Venezuela SSB*
10/11 Jul	RSGB SWL Contest (p21, July)
10/11 Jul	*IARU Championship*
17/18 Jul	*SEANET CW*
17/18 Jul	*HK DX CW*
18 Jul	Low Power Field Day (May 93)
24/25 Jul	IOTA SSB (Mar 93)
24/25 Jul	*Venezuela CW*
1 Aug	RoPoCo-2 (note change of date) (Feb 93)
7/8 Aug	*YO DX (CW/SSB)*
14/15 Aug	*WAE (CW)*
4/5 Sep	SSB FIELD DAY (Jul 93)
4/5 Sep	*JARL AA SSB*
5 Sep	*LZ DX CW*
Sep/Oct	QRS Cumulatives (Jul 93)
11/12 Sep	*WAE SSB*
18/19 Sep	*SAC CW*
25/26 Sep	*SAC SSB*
25/26 Sep	*CQ WW RTTY*
2/3 Oct	*VK-ZL SSB*
3 Oct	21/28MHz Telephony (Apr93) (note date changed)
9/10 Oct	*VK-ZL CW*
17 Oct	21/28MHz CW
30/31 Oct	*CQWW DX SSB*
1/7 Nov	*HA-QRP*
13 Nov	Club Calls (CCC)
12/14 Nov	*JARL Int'l DX SSB*
13/14 Nov	*WAE RTTY*
14 Nov	*OK DX (Mixed)*
20/21 Nov	2nd 1.8MHz CW
20/21 Nov	*All Austria CW*
27/28 Nov	*CQWW DX (CW)*
4/5 Dec	*ARRL 160m*
12 Dec	*ARRL 10m*
1994	
Jan/Feb	LF Cumulatives
7/9 Jan	*JA International DX CW (LF Bands)*
9 Jan	AFS (CW)
15 Jan	AFS (SSB)
15/16 Jan	*HA DX CW*
15/16 Jan	*AGCW-DL QRP*
29/30 Jan	*CQ WW 160m (CW)*
29/30 Jan	*UBA SSB*
29/30 Jan	*REF CW*
12/13 Feb	1st 1.8MHz CW
12/13 Feb	*PACC*
19/20 Feb	*ARRL CW*
25/27 Feb	*CQ WW 160m (SSB)*
26/27 Feb	7MHz DX
26/27 Feb	*REF SSB*
26/27 Feb	*UBA*
5/6 Mar	*ARRL SSB*
12/13 Mar	Commonwealth
19/20 Mar	*Bermuda*
19/21 Mar	BARTG Spring RTTY
26/27 Mar	*WPX SSB*
2/3 Apr	*SP-DX SSB*
3 Apr	ROPOCO-1
8/10 Apr	*JA International DX CW (HF Bands)*
17 Apr	Low Power
23/24 Apr	*Helvetia (Mixed Mode)*
7/8 May	*ARI DX (Mixed Mode)*
14/15 May	*CQ-M (RSF [Russia] Mixed Mode)*
21 May	County Roundup SSB
22 May	County Roundup CW
28/29 May	*CQ WPX CW*
4/5 Jun	NFD
18/19 Jun	*All Asia SSB*
25/26 Jun	Summer 1.8MHz CW

RSGB 1993 VHF/UHF CONTESTS CALENDAR

3/4 Jul	VHFNFD (Mar 93)
24 Jul	144MHz Low Power (Feb 93)
25 Jul	432MHz Low Power (Feb 93)
22 Aug	2nd432 MHz Fixed (Feb 93)
31 Aug	144MHz CW Cumulative (Feb 93)
4/5 Sep	144MHz Trophy (Feb 93)
15 Sep	144MHz CW Cumulative
19 Sep	70MHz Trophy (Apr 93)
30 Sep	144MHz CW Cumulative
2 Oct	1296MHz Trophy
2 Oct	2320MHz Trophy
2/3 Oct	432MHz-24GHz & IARU Contest. (Apr 93)
5 Oct	1.3/2.3GHz Cumulative (Apr 93)
13 Oct	432MHz Cumulative (Apr 93)
15 Oct	144MHz CW Cumulative
20 Oct	1.3/2.3GHz Cumulative
28 Oct	432 MHz Cumulative
31 Oct	2nd 1296/2320MHz Fixed
1 Nov	144MHz CW Cumulative
4 Nov	1.3/2.3GHz Cumulative
6/7 Nov	144MHz CW, Marconi/6/24 hr
12 Nov	432MHz Cumulative
18 Nov	1.3/2.3GHz Cumulative
29 Nov	432MHz Cumulative
5 Dec	144 AFS / Fixed
6 Dec	1.3/2.3GHz Cumulative
14 Dec	432MHz Cumulative
26,27,28	
29 Dec	70/144/432MHz Fixed

For details of rules for European contests, contact G4PIQ, QTHR.

VHF RESULTS

DEC '92 FIXED & AFS 144MHZ

Conditions were reported as either average or poor with deep, slow QSB making life difficult at times. Even so, some stations managed to produce page after page of continental QSOs. The standard of the logs varied greatly from the almost perfect to the almost unreadable (one log appeared to have been written in 'real time' during the contest!). Several stations lost many points when unmarked duplicate QSOs were found in their logs Congratulations to Martlesham DX and Contest Group for winning AFS, to G4ANT for winning the Multi-operator section and to G4PIQ for winning the Single Operator section. Congratulations also to the runners up in each section, the zonal winners and the growing number of foreign entrants; certificate this time to ON1ALJ/A.

Ian, G0FCT

AFS SECTION

Pos	Group	Score	Zone	Callsigns
1	Martlesham DX & CG	17020	C*	G4PIQ,G4WFR,G4HUP,G4SWX,G3XDY
2	Spalding & DARS	8792	B*	G4DSP,G4NPH,G4NBR,G0NWU,G4DHF
3	Colchester RA (A)	5713	C	G4TZM,G4ZTR,G0EGX,G0HKG,G1OGY
4	Sutton & Cheam RS	5161	C	G3OLX,G3WHK,G0CPE,G7DNY,G4ERW
5	Scunthorpe ARS	3571	B	G0PQY,G8XFY,G0NYL,G4EQD
6	Harwell ARS	2878	D*	G0ADH,G3NNG,G0LCB,G0MCN,G7MSI
7	North Luffenham ARC	2833	B	G6RAF
8	Lowestoft RC	2028	C	G8VPE,G0JDL,G3JRM
9	Rugby ATS	1893	B	G7GAB,G4SSW,G4DDW,G8LYB,G7APD
10	Wythall RC	1556	B	G1WAC,G4VPD,G7BZD,G4TVR
11	Harwich ARIG	1438	C	G7EIG,G0DVJ,G7MOT,G1LBM
12	Crawley ARC	1387	C	G3WSC,G3YVR,G7KMM
13	Telford & DARS	1141	B	G4ZJY,G6ZWP,G8PAW
14	West Kent ARS	1079	C	G0GCI,G0HAX
15	Clifton ARS	1073	C	G0PPO,G7BKH,G0HUZ,G7LMP,G0JOZ
16	Newport ARS	1002	E*	GW1NRS
17	Mid Sussex ARS	980		G3JMB,G0APZ
18	Farnborough & DARS	959	D	G8HHI
19	Aylesbury Vale RS	925	D	G0MHZ,G0ODQ,G1VBL
20	Maidenhead & DARC	649	D	G1RDX,G8FUO,G3TWG,G3WQG
21	Felixstowe & DARS	616		G4RHR
22	Bracknell ARC	602	D	G0GJV,G1COW
23	Colchester RA (B)	487	C	G3FIJ,G0OLM,G0PFV,G0OSR
24	Mid-Cheshire ARS	415	A*	G3ZTT,G0IRA,G6HXU,G6DQO,G7DSA
25	Sheffield ARC CG	387	A	G0HSA
26	Wakefield & DRS	332		G0ISJ,G3WWF,G3WRS,G7NAP
27	Bredhurst R&TS	210		G0MIF,G0LJD

* Denotes zonal certificate winner

SINGLE OPERATOR SECTION

Pos	Callsign	Score	QSO	Loc	Zone	PWR	Ant	Best DX	Dist
1	G4PIQ	5713	492	01MU	C*	400	4x15+19	DL8CMM	742
2	G4WFR	3987	328	01OV	C	400	4x9	DL8CMM	730
3	G4HUP	3342	309	02PD	C	400	2x18	DF4UE	670
4	G4SWX	2433	238	02PB	C	400	4x16	DK4VT	682
5	G4ZTR	1977	193	01LV	C	400	17	DJ7OF	647
6	G4TZM	1954	245	01NW	C	195	2x14	DJ7OF	636
7	G4DHF	1854	211	92TS	B*	340	4x9	DL5YEE	609
8	GM4AFF	1702	115	87VA	G*	400	4x17	G3SHK	672
9	G8XFY	1649	179	93RN	B	300	2x17	DL9OBD	698
10	G4NPH	1621	236	02BI	B	200	9	DF2VJ	583
11	G3XDY	1545	198	02OB	C	300	14	DH4SAN	648
12	G3NNG	1329	170	91EP	D*	400	17	DL8YET	637
13	G4APA	1317	197	83TD	A*	300	2x17	FC1AIS	551
14	G4NBR	1213	133	92VU	B	400	4x9	DL8OBQ	629
15	G3JRM	1086	106	02UL	C	100	17	DJ7OF	599
16	G3WSC	1069	173	91VC	C	90	19	GM4ZUK/P	674
17	G0NYL	1031	169	93QN	B	100	8	GJ7AOG/P	488
18	G8HHI	959	163	91OH	D	400	2x15	GM4ZUK/P	646
19	G4EQD	883	140	93QN	B	80	8	DL8OV	598
20	G0EGX	809	130	01IT	C	50	8	GM4AFF	608
21	G0MYE	787	153	91PV		400	10	DF2VJ	609
22	G0GCI	752	122	01ED	C	160	13	DL8OBQ	608
23	G0APZ	718	114	90WW		25	8	DJ2JA	624
24	G0RRC	714	100	02MB	C	100	14	GM4AFF	590
25	G8MNY	683	159	91XI		200	8Q	GI4OWA	533
26	G8ZRE	620	104	83NE	A	100	8	ON1ALJ/A	562
27	G0LCB	563	110	91GO		60	9	GM4ZUK/P	608
28	G0ODQ	543	105	91NQ	D	100	9	GM4AFF	599
29	G4SSW	542	124	92II		70	4Q		
30	G0HKG	540	97	01IV	C	130	9	DF2VJ	523
31	G8VPE	534	74	02TP	C	80	17	GD4IOM	446
32	G1WAC	530	106	92BJ	B	100	18	DK5WO	576
33	G6ZWP	517	93	82SQ	B	100	17	GM4ZUK/P	486
34	G0GJV	500	120	91OK	D	400	8	DL2EAA	531
35	G4ZJY	452	90	82SQ	B	100	10	GM0GMD	400
36	G1OGY	433	93	01GR	C	75	14	GD4IOM	438
37	G0ADH	414	102	91KO	D	50	13	PA3FJY	519
38	G0JDL	408	62	02UL	C	100	9	EI3GE	526
39	G4VPD	398	79	92BJ	B	100	18	DK5WO	576
40	G4TVR	386	89	92BJ	B	150	15	GM6AFF	515
41	G0PPO	354	108	91XL	C	60	10	GD4IOM	472
42	G7HTS	351	71	81TT		25	16	GM4ZUK/P	583
43	G0HAX	327	69	01ED	C		17	DJ2JA	589
44	G0MCN	315	71	91IO		80	2x5	GD4IOM	353
45	G8JWF	297	39	81VH		50	12ZL	GD4IOM	401
46	G3FIJ	294	68	01KV	C	10	9	GD4IOM	448
47	G8LYB	287	88	92JI		400	16	GM4AFF	522
48	G3JMB	262	58	91WA		20	7	FD1LOJ	322
49	G7MSI	257	56	91IT	D	25	9	ON1ALJ/A	355
50	G1RDX	249	81	91OO	D	60	7	ON4KST	376
51	G7BZD	242	50	92CJ	B	25	8	ON1ALJ/A	410
52	G1VBL	209	59	91KV	D	80	13	ON1ALJ/A	347
53	G0MHZ	173	41	91OT		60	8Q	GD4IOM	364
54	G8PAW	172	38	82TM	B	25		GM4ZUK/P	504
55	G0OLM	171	39	01KX	C	35	8	G7JEQ/P	363
56	G0LJD	169	40	01FJ		80	9	DC4FD	543
57	G7KMM	164	52	91UB	C	25	8	G0ISJ	303
58	G8FUO	161	35	91OL	D	10	14	GM7GUC/P	554
59	G3YVR	154	28	91WD	C	100	13	GM4AFF	667
60	G4ERW	147	51	91UJ	C	10	5	G0NYL	242
61	G3TWG	144	38	91PN	D	50	5	G4JLG	245
62	G0ISJ	140	47	93FQ		70	8		
63	G3WWF	103	47	93GS		30	4Q		
64	G1COW	102	36	91OJ	D	85	9	G4SWX	162
65	G3WQG	99	48	91PO	D	25	2x8	G4APA	205
66	G7MOT	97	28	01MW	C	15	8	DB6BX	424
67	G0MIF	41	19	01FJ		10	5/8	ON1ALJ/A	226
68	G7NAP	31	32	93FQ		25	9		
69	G0IRA	22	10	83RQ		1	5/8	G8APB	66
70	G6HXU	21	5	83RF		30	6Q	G4HUP	285
71	G6DQO	21	13	83QF		2.5	1/4	G0NYL	138
72	G7DSA	19	13	83RE		5	V2000	G6ZWP	56
73	G0PFV	16	10	01JX	C	3	9	G4ANT	88
74	G0PQY	8	8	93QN	B	60	8		
75	G0OSR	6	6	01LV	C	2.5	1/4	G4RHR	26
76	G0JOZ	3	3	01AJ	C	10	VERT	G0HUZ	15

* Denotes zonal certificate winner

MULTI-OPERATOR SECTION

Pos	Callsign	Score	QSO	Loc	Zone	PWR	Ant	Best DX	Dist
1	G4ANT	3938	345	02QQ		400	1.5x17	DF4UE	719
2	GD4IOM	3241	253	74QD	A*	400	4x9	FC1AIS	736
3	G4DSP	3006	286	92WS	B*	400	2x9	DL0WH	767
4	G6RAF	2833	355	92QP				Y26QV/P	758
5	G3OLX	2091	315	91VH	C*	400	17	GM4ZUK/P	651
6	G3WHK	1333	240	91VJ	C	150		GM4AFF	639
7	G3KMI	1274	182	90HW		200	4x17	GM4ZUK/P	684
8	G0NWU	1098	144	92XX	B	250	16		
9	GW1NRS	1002	127	81MO	E*	100	10	DK1JB	660
10	G0CPE	979	203	91PF	C	90	10	GM4AFF	651
11	G7EIG	845	103	01OW	C	100	17	DJ7OF	642
12	G7DNY	683	156	91VH	C	80	9	GM4ZUK/P	651
13	G8EDH	627	134	01CO		100	9	DF2VJ	539
14	G4RHR	616	82	02PA		25	10	DB6BX	541
15	G7GAB	560	138	92IJ		170	14	GM4ZUK/P	
16	G4DDW	504	130	92KK		400	17	GM4AFF	514
17	G0DVJ	424	74	01MX	C	40	5	DF2VJ	509
18	G0HSA	387	71	93GI	A	180	8	GM4AFF	
19	G3ZTT	332	54	83QE		10	9	ON1ALJ/A	500
20	G7BKH	317	87	01AK	C	15	19	GD4IOM	435
21	G0HUZ	258	76	91XM	C	25	5	GD4IOM	427
22	G7LMP	141	45	01AK	C	50	4	G0KTQ	274
23	G1LBM	72	27	01OW	C	30	5	DF7KF	389
24	G3WRS	58	37	93FQ		25	10		

* Denotes zonal certificate winner

FOREIGN ENTRIES

Pos	Callsign	Score	QSO	Loc	Zone	PWR	Ant	Best DX	Dist
1	ON1ALJ/A	2091	167	JO10SS	150	4x7		GI4KSO	764
2	PE1EWR	403	46	JO11SL	10	10		GD4IOM	625
3	PE1NNX	260	22	JO22JN				G4APA	485

CHECK LOGS: Many thanks to the following stations who supplied check logs.GM7GUC/P, GM4ZUK/P, G7JEQ/P

DISQUALIFIED: G3ZDM, G4JLG, G8APB, G7LYS, G3LRS, G4SJX, G0LMB, G8FCQ, G6ISM RULE 2. G7APD RULE 15

432MHZ FIXED, AFS, SWL

The number of entries this year was almost identical to those in '92. Conditions marginally favoured the eastern side of England with near coast continental activity recorded in several logs. Further inland the going was decidedly tough with many stations reporting poor to flat conditions with deep QSB. GD4GNH reported that it was frustrating listening to G4PIQ working continentals "like shelling peas" without hearing any trace of them himself. In reality, the numbers of continentals logged was not as great as may have been thought and was certainly down on last year's event. However, activity within G was quite high and many contestants said how much they had enjoyed the event. Congratulations go to G4PIQ for winning the single operator section by a very convincing margin and to G6HKM as runner-up. The multi operator section was won by the Spalding and District Amateur Radio Society (G4DSP) with G4NPH (a member of the same club) as runner-up. They therefore also win the overall AFS section. It is somewhat embarrassing when the adjudicator's club wins the contest, but the margin was very convincing and the logs have since been indepentently scrutinised by the Contest Committee. Congratulations to all the zonal winners and to G5UM who wins a certificate of merit for being the leading station with 25W or less to a single antenna.

G4DHF

SINGLE OPERATOR FIXED STATION SECTION

Pos	Callsign	Zn	Pts	QSO	Loc	Ant	Pwr(W)	Best DX	Km
1	G4PIQ*	C	1300	148	JO01	4X17	300	DJ5JK	604
2	G6HKM*	C	687	97	JO01	23	100	DL3NQ	632
3	G1GEY*	A	618	60	IO94	2X21	400	G8JXV	426
4	G8FBG	C	592	102	IO91	4X33	400	GI0GDP	516
5	G1GHA*	B	590	97	IO92	21	100	PE1OPF	453
6	GD4GNH	A	563	51	IO74	4X21	25	G4PIQ	456
7	G8NTD	B	538	103	IO92	2X21	250	GI8AYZ	379
8	G1LSB	B	387	61	JO02	21	100	GJ7AOG/P	426
9	G0ODQ*	D	336	62	IO91	21	100	G8PNN	396
10	GW6ZUQ*	E	326	49	IO81	21	100	PA3FPS	514
11	G4JLG	A	324	55	IO83	88	100	G6YXT	352
12	G8PNN		269	28	IO95	21	250	G8FBG	446
13	G8EGG		265	50	IO91	48	50	GD4GNH	427
14	G3YSX	C	249	51	IO91	21	50	G1GEY	423
15	G8ZQB	B	245	56	IO92	19	30	G8PNN	298
16	G0RRC		224	42	JO02	21	100	GD4GNH	443
17	G8JXV	C	221	45	IO91	48	70	GD4GNH	444
18	G0MYE	D	218	49	IO91	24	400	GD4GNH	362
19	G1RDX	D	188	53	IO90	27	100	PI4ZVL	337
20	G0MLY	B	186	36	IO92	8/8	75	GI0GDP	342
21	G1HLT	B	172	28	IO93	48	40	GI0GDP	348
22	G0GCI	C	157	29	JO01	21	120	G8XVJ	319
23	G3UBX		149	32	IO82	68	60	GI0GDP	341
24	G5UM*		114	27	IO92	18	10	GD4GNH	283
25	G3FIJ		106	18	JO01	19	10	GD4GNH	445
26	G8ACJ		70	18	IO91	48	8	G3CKR	273
27	G0MIC		64	22	IO91	11	10	G1LSB	174
28	G0SWC		47	13	IO91	19	20	G4DSP	173

MULTI OPERATOR SECTION

Pos	Callsign	Zn	Pts	QSO	Loc	Ant	Pwr(W)	Best DX	Km
1	G4DSP*	B	883	110	IO92	88	400	DJ5JK	722
2	G4NPH*	B	766	102	JO02	8X18	140	DL6NQ	676
3	G0GZQ*	C	548	94	IO91	30	50	GI0GDP	532
4	G3WHK	C	539	99	IO91	24	100	GI0GDP	526
5	G8LMW	B	466	84	IO92	2X19	70	PE1OPF	418
6	G3OLX	C	421	85	IO91	30	50	GD4GNH	433
7	G8ZTT*	A	200	34	IO83	16	50	G4PIQ	289
8	G5LK	C	155	39	IO91	24	80	G8XVJ	291
9	G0FCT*	D	152	36	IO91	14	40	G1GEY	396
10	G1LVY	B	80	22	IO92	18	10	G1GEY	288

AFFILIATED SOCIETIES SECTION

Pos	AFS	Ops	Total	Zn
1	Spalding & Dist*	G4DSP(883):G4NPH(766):G1LSB(387)	2036	B
2	Martlesham RS*	G4PIQ(1300):G0RRC(224)	1524	C
3	Sutton & Cheam	G0GZQ(548):G3WHK(539):G3OLX(421)	1508	C
4	Rugby ATS 'A'	G8NTD(538):G8LMW(466):G8ZQB(245)	1249	B
5	Reigate ATS	G3YSX(249):G8JXV(221):G5LK(155)	625	C
6	Mid-Cheshire ARS*	G8ZTT(200)	200	A
7	Guildford & Dist	G8ACJ(70):G0MIC(64):G0SWC(47)	181	C
8	West Kent ARS	G0GCI(157)	157	C
9	Bracknell ARC*	G0FCT(152)	152	D
10	Colchester RA	G3FIJ(106)	106	
11	Rugby ATS 'B'	G1LVY(80)	80	B

LISTENERS SECTION

No entries

Checklog gratefully received from PE1EWR

Certificate winners*

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AP8	80-10m ¼w Vertical
A50-5	6m 5 element Beam
17B2	2m 17el Boomer
13B2	2m 13el Boomer
124WB	2m 4el Boomer
ARX2B	2m Co-linear
ARX450	70cm Co-linear
AR270	2m/70cm Vertical
A430-11	70cm 11el Beam
LAC1	Lightning Arrester

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TH7DX	20-15-10m 7el Beam
TH5DX	20-15-10m 5el Beam
EXP14	20-15-10m 4el Beam
TH3JR	20-15-10m 3el Beam
TH2mk2	20-15-10m 2el Beam
DX88	80-10m Vertical
14AVQ	40-10m Vertical
66DX	6m 6el Beam
64DX	6m 4el Beam

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2M14C	2m 7XY Oscar
432-30	70cm 30el Beam
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440-6	70cm 6el Beam
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2M12	2m 12el Beam
EB144	2m Eggbeater
432-13WL	70cm 39el Beam
432-9WL	70cm 28el Beam
EB432	70cm Eggbeater
23CM35	23cm 35el Beam
2M2P	2m 2w Power Divider
2M4P	2m 4w Power Divider
70CM2P	70cm 2w P.Divider
70CM4P	70cm 4w P.Divider
23CM4P	23cm 4w P.Divider

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B2516G	2m 25-160w g/f rx
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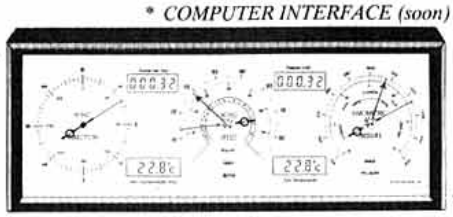

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MML Transverter 2m in, 6m out, 20w o/p, ex Condx, manual: £130. G7JAI, QTHR. (Kenilworth) 0926 54556.

MUTEK TV HF230C Transverter, 2m M/mode in with 9 HF Bands at 10w o/p. VGC with manual and leads. Sensible offer secures. Phone Ron, G4SRD after 6pm. (Melksham) 0225 706362.

OSCILLOSCOPE Beckman 9020 20Mhz Dual Trace with component Tester: £250. Ring Vince after 6pm.(London) 081 531 0716.

PACKET Radio TNC, DRSI DPK-2, boxed, manual, up tp 9600Baud, 32K CMOS, Alinco DJ580 cable: £60 plus £10 P & P. (Weybridge) 0831 688733.

PACKET TNC DL Mk iv with DCD state machine: £75. MacPac CWID boards built and working: £10 each. Datong D70 Morse tutor: £25. G4ENA 160m SSB Transceiver: £15. Royal 1300 25-1300Mhz Discone: £30. Ring (Stroud) 0453 828011.

PC CLONE , VGA Colour Monitor, 40Mb H/disk, 3.5 floppy drive, 2 Serial/1 parallel and 2 printer Ports, with Packet Software: £240. (Bodmin, Cornwall) 0208 76492.

PCBS (issue 5) for G3TSO Miniature Transceiver, suitable 80m or 160m: £12. Ready built Tcvr 80m, 20w. See RadCom June 91: £140. (Cirencester) 0285 750532.

RADCOM issues 1970, 1971, 1989 and 1990. Also Short Wave Mag 1970 to 1974 incl. All in Binders. Offers please to John. (Minehead) 0643 703217.

RECEIVERS CR100, CR150, BC348, BC453: £80 the Lot. Buyer Collects. (Bangor, Gwynedd) 0248 354829.

REMOTE Antenna Tuning Unit boxes. Ex-GPO cast aluminium box, near new condx, completely sealed, weatherproof, silica gel container, two cable glands, designed for outdoor use. Outside dimensions 11x7x3. Four fixing lugs: £10each. Post extra. John Teague, G3GTJ, QTHR. (Somerset) 0963 24319.

SHACK CLEAROUT. 15 valve Radio's, 1947 to 1957, mains/battery, good condt, complete but untested: £5 to £20 each. Two scrap radio's £3 each. Grundig TK819 Reporter Tape Recorder: £25. Practical Wireless magazines, Jan 1983, March 1992 incl: £25. Radiogram Radiophile Magazines, No1 1985 to No31 1991 incl: £15. Pye PF1 Rx chassis, scrap: £3. Details, ring Oliver, G1FXD, QTHR. (Bodmin) 0637 880404.

SIGNAL Generators. Marconi TF2015 10-520MHz, all solid state, gwo: £80. Philips PM5326 0.1-125MHz with Digital display: £80. John, G8BXH. (Watford) 0923 234924.

ST-5C RTTY TU (late model with Data lights & 13.8v option) plus Toni-Tuna Mk3 (6 shift): £50 the pair. David, G5HY. (Harlow) 081 954 9180.

TEN TEC Argosy Two 525D Tcvr 50w pep, exc condt, complete with matching PSU, Mic, DC leads, orig packing: £395. (Plymouth) 0752 773238.

TEN TEC Omni V1 outfit, mint, latest model, all four filters plus special RTTY filter, matching Electret Desk Mic and Power Pack. Freq Annunciator available, all manuals. Buyer collects. Phone Ellice, G3LYD, QTHR. (Isle of Wight) 0983 840588.

TEN-TEC Corsair 2, 250Hz filter, PSU, 705 Desk Mic, manual: £550. Wanted Jaybeam MM3 HF Mini-Beam. David, G4ERW. (Surbition) 071 257 3573 (work).

TONNA 70cm DX Array - 8 x 21 ele: £220. Jaybeam 2m DX Array - 4 x 16 ele: £140. Transverters: 10m-2m, 10m-4m, 10m-6m: £65 each. Pocketfone 70 (ideal novice): £50. 6m Linear Amp 0.5-15w: £50. 2m G/P Ant: £10. Buyers inspect & collect. Tele: Keith. Absolutely No offers Please. (Melton Mowbray) 0664 822555.

TOWER Altron CM35, wall mounted, can be post mounted. Complete with winch cage, G400RC Rotator , control unit, cables plus JBeam Mini Max Tribander 10, 15, 20. Inspection invited, under no obligation. Can supply photo's: £550 ono. G0FRM. (Welwyn Gdn City) 0707 322682.

TOWER STRUMECH P60, 60ft 3-section Tilt over, complete. Base post and ropes, needs attention: £450 ono. Hy-Gain TH3-Jnr, 3 ele Tribander 10-15-20. Needs cleaning, otherwise complete: £100 ono. Owner moving house, and cannot take it with him. Phone, ask for Robert. Buyer collects. (Newport, Gwent) 0633 255286.

TOWER Teliscopic 60ft, buyer to remove: £150.KLM KT34XA 6 ele Beam: £250. RCA ET4336 Transmitter, complete with speech amp and an AR88 with Q5 Double Superhet conversion: £400. Labgear LG300 Complete: £100. Very rare Halicrafter DDI Dual diversity Rx complete with original manual, poorley stored: £100. Large amount of WW2 equipment. Phone Mike, G4EJM. (Stoke on Trent) 0782 644534.

TRIO TL911 Linear, new valves, excellent condx: £325. Drake R4C with CW filter +WARC, improved PSU, Audio and Demod, general coverage RF Scale fitted, excellent Rx: £175. Buyers inspect and collect. G3GGK, QTHR. (Cambridge) 0954 210374.

TRIO TR2300 2m FM portable, new Nicads: £95. Bearcat 800XLT Scanner c/w Discone: £95. Matsui AM/SSB Short Wave Portable Rx MR4099: £80. Kenwood MC50 Desk Mic: £20. Phone GW4TPG, QTHR. (Hengoed) 0443 862177.

TRIO TR9130 25w 2m Multimode, boxed, manual, mint: £295. Elonex PC 386SX 40Mb, two Floppies, software: £650. Scope: £45. GM0HRT. (Kilbarchan) 05057 5582.

TS 830S ex condx, with hand Mic, YG455CN crystal filter and handbook, spare set valves: £550. GD4HOX. (Isle of Man) 0624 673264.

TS440S internal ATU-VS1, SP230, PS53, MC43S: £1000. Tokyo Hy-Power HG400L: £100. Imaculate, manual boxes. Buyer collect. No split. (Sheffield) 0742 320008.

TS520SE with CW filter and Phones: £330. Old FT220 and PSU: £75. Buyer collects. (Staines) 0784 450600.

TS830S super cond, need mobile so will swap for TS430S or FT757 with PSU or sell: £595. (Haverford West) 0348 881346.

TS940S with Auto ATU, all Lowe Mods incorporated, also tuning upgrader and memory bank controller fitted, SP940, Mic, handbook, Technical and workshop manuals, original packing. All indistingishable from new: £1400. No offers. B88 Bandscope Unit for SM220: £70. Elliott Chart Recorder: £50. GW3TMP.(Nr Mold) 0352 771520.

TWO METRE 4 Element Beam: £10. Microwave Modules Morse Keyboard MM1001KB, sends Morse, four buffers, costs £120, now :£37. Microwave Modules Morse Talker MMS-1: £60. VHS Video tapes, top quality E180(10), E240(3), E150 and E120 Lot: £12.50. G3IJL, QTHR. (London) 081 749 1454

VERSATOWER 40ft + Heavy duty lattice galvanised crankup tilt over, CDE HAM3 Rotator, Hygain TH3 Mk3 3 ele Beam 10,15,20m: £700 ovno. Brian, G3WCY.(Ruislip, Middx) 0895 677017.

WIRELESS WORLDS 1949 to 1971, 1973, 1975 to 1979, complete. 1972 and 1974 three missing. Offers? G4PHD, QTHR. Buyer collects. (Malvern) 0684 574534.

YAESU ATU FC757, boxed, mint condt: £160 ono. (Nuneaton) 349156.

YAESU FLDX400/FRDX400 Transceiver or seperate Modes. Both in A1 condx, appearance and performance, Mic, cables: £200 cash. Buyer collects. Original packing available. G3PTN, QTHR. (Leeds) 01132 654644.

YAESU FLDX400/FRDX400 Transceiver or seperate Modes. Both in A1 condx, appearance and performance, Mic, cables: £200 cash. Buyer collects. Original packing available. G3PTN, QTHR. (Leeds) 01132 654644.

YAESU FRG8800 Gen Coverage HF Rx, good Cond, boxed, recent overhaul: £350. (Tewkesbury) 0684 293818 after 6pm.

YAESU FT-One Tranceiver, very good condx, with manual, mic and power leads, FM fitted: £650. (Eastriggs) 0461 40378.

YAESU FT101Z as new condx, fan, Mic, probly the best at cheapest price: £300. Ted, G4TLY, QTHR. (Malmesbury, Wilts) 0666 822935.

YAESU FT290R Mk1, completely standard, hardly ever used, immac cond, with soft case: £220 ovno. Rx R107T Working order, needs slight attention, Free, Buyer collects. Wanted. Circuits, handbook, etc for KW Valiant Tx. G8EFJ, QTHR. (Burnham on Crouch) 0621 785134.

YAESU FT726 Transceiver, 6m, 2m, 70cm + satellite unit, handbooks, desk mic, boxes: £750 ono. G8FMH, QTHR. (Basingstoke) 0256 23979.

YAESU FT727R 2m/70cm FM h/held tcvr, 5w max o/p, nicad battery, charger, soft case, handbook, little used, g.c, boxed: £210. G8PNX.(Sheffield) 0742 667730.

YAESU FT767 Mk2, all mods, gd condx: £1400 ono. 2 Metre Tono 150 Linear: £120 ono. MM144-100S Linear/Preamp: £100 ono. 6M 3ele Beam: £25. 4M 4ele Beam: £30. 70cm 21ele Beam: £25. 70cm 13ele Free to Novice. 2M 9ele Tona: £25. PK232 latest h/ware + software: £200. Free Dumb Terminal. FT101ZD DC-DC converter, also AM unit, offers?. FT690-2, boxed with 10W PA + Nicads: £375. Owner emigrating. Day + evening. (Worthing) 0903 877254.

YAESU FT767 Mk2, all mods, good cond: £1400 ono. 2 Metre Tono 150 Linear: £120 ono. MM144-100S Linear/Preamp: £100 ono. 6M 3ele Beam: £25. 4M 4ele Beam: £30. 70cm 21ele Beam: £25. 70cm 13ele Free to Novice. 2M 9ele Tona: £25. PK232 latest h/ware + software: £200. Free Dumb Terminal. FT101ZD DC-DC converter, also AM unit, offers?. FT690-2, boxed with 10W PA + Nicads: £375. Owner emigrating. Day + evening. (Worthing) 0903 877254.

YAESU FT901DM HF all Mode Tcvr with YD148 Desk Mic, Spare o/p valves, filters and service manual: £450. Phone Les. (Maidstone) 0622 687275.

YAESU FT901DM very little used, excl condx: £475. G4YMS, QTHR. (York) 0904 768686.

YAESU H/held Rechargable batteries, 2x FNB11, 2x FNB14, 1x NC29 charger , hardly used: £160. Also Cambridge Computers Z88, c/w mains adaptor, 128k Ram, Printer lead: £120. (Kingston) 081 390 2407.

YAESU 767, 2 years old, exc condx. All Modules (6m, 2m, 70cm) fitted: £700. Off new at: £1350, possible P/X Kenwood 790E. Also MM 100w Linear for 2m and 50w Linear for 70cm: £80 each. 2m 13 element Elite: £30. (Ampthill) 0525 840415.

WANTED

AP1086 Issue 1 (RAF Radio Stores Ref No's) Also Air Publications relating to Radio, Radar equipment. Exc price offered. Would purchase Post-War to current Magnetrons, Klystrons, T/R cells, Photo-Multipliers, Microwave and special CV types. Required Static or Rotary Inverter, AC or Dc I/P with O/P of 80/115v 1500/2000 Hertz. Also Rx Type R1355 10D/13032 unmodified. Please phone any time. (London) 071 511 4786 or 071 790 2846.

WANTED for RCA AR88D Receiver. Original RCA DB Tuning Meter and Metal Case crackle paint, must be in good condx. Tel: after 4pm. (Deeside) 0244 810547.

ADDRESS of Retailer of Adhesive backed copper strip of various Widths. Mislaid mine. (Plymouth) 0752 551052.

ARGONAUT 515. Must be in gd condx, £200 to £300 offered. Could collect or pay carriage. Call Peter, G4PAC, QTHR. (Kingsclere) 0635 298537.

CODAR T28 Rx, must be good condx. Write with details to Stuart, G4GTX, QTHR.

COLVERN & EDDYSTONE Four Pin Coils. Bernard Litherland, G4IMT, QTHR. Tel anytime. (Chippenham) 0225 891254.

DRAKE B1000 Balun for Drake MN7 Aerial Matching Unit. (Bristol) 0275 393398.

FL2100Z Linear Amp or similar with WARC Bands. Full details of what you have and condx to George, GM3NVU, QTHR. (Falkirk) 0324 813349.

FLDX 400 Tx in Gd condx, no mods. Change of direction since previous advert. Bob, G3JJU. (Fleet) 0252 615831.

FT102 Yaesu Service/maintenance Manual urgently required, plus any other usefull info. G3AVL, QTHR. (Wirral) 051 327 7149.

FT102 Yaesu Service/maintenance Manual urgently required, plus any other usefull info. G3AVL, QTHR. (Wirral) 051 327 7149.

FTV-107R 70cm and/or 6m Modules for Yaesu FTV-107R. Good prices paid. G3YBY, QTHR. (Swindon) 0793 770838.

HEATHKIT SB610 Monitor Scope, any condx, but must be GWO. Fair price paid. Please ring after 8pm. (Stakeford) 0670 811950.

HF-5B BUTTERNUT Butterfly Beam in gd condx. G0DBT, QTHR. (Bradford) 0274 635703.

HRO MX, HRO 5T with coils: 50KHz - 30MHz. PSU and Speaker not essential. Also 'SCRAP' HRO for Spares. WHY? Phone during office hours, or write E. R. C. Owen, 28 Chartfield Road, Reigate, Surrey, RH2 7JZ. (Crawley) 0293 520172.

JOYSTICK ANTENNA With or without tuning unit, working or not. Write G4EZG, QTHR. All replies acknowledged. Sensible price paid.

KENWOOD TI922 HF Linear required, must be in GWO, with or without valves. G4OBK, Not QTHR. (Scarborough) 0723 370532.

MULTI MODE 2 metre must be full working order and good condition, complete with manuals Etal. G1CMH, QTHR. (Gloucester) 0452 714961.

OUTPUT Transformer for QUAD II Amp KT66s in Push-Pull also EM34 Valves. (Wolverhampton) 0902 781726.

QRM ELIMINATOR for HF Bands. GM3CFS, QTHR. (Thurso) 0847 62932.

QTH 4+ Bedrooms Detached house. Amateur licence 'Educated' neighbours. Preferably West aspect. One hour Rail/Air London. All replies acknowledged. John Lawrence, P O Box 5231, General Post Office, Hong Kong.

RACAL TA349 Linear Amp, complete with cabinet and wiring trays. Any Racal Cabinets Table top and 'Picture Frame' types with ventilation grills. Parts for TA127 Transmitter, Creed 75 Teleprinter, parts or complete units. Looking for information about Racal Communications Ltd and Creed Company. Would like to hear from former employees. Write: Nigel Boyd, 2 Church Close, Lower Willingdon, Eastbourne, East Sussex, BN20 9QY.

SPECTRUM ANALYSER HP192/8553 or similar specification. GWO essential. Maintenance/calibration history desirable. Market price for right one. G3HRH, QTHR. (Winchester) 0962 714990.

STILL WANTED: GR1606 RF Bridge. Can anyone find me one? G3WDY, 27 Cintra Park, London, SE19 2LQ. (London) 081 653 4738.

TEMPO 2002A 2m Amplifier. Contact Tim, GI4OPH. (Co Down) 02477 58425.

TRANSVERTER 144/1296, prefer SSB elects - would consider M/M or RN. GWO essential, price to reflect condx. G1RMN, QTHR. Eves only. (Eastbourne) 0323 504194.

VHF/UHF EQUIPMENT.Yaesu FT736R with 6m and/or 23cm options. Icom IC271E with Mutek, Icom IC471H or 475H. After 6pm weekdays. G0DKM, QTHR. (Western-S-Mare) 0934 815239.

WANTED 405 Line TV Cameras, Monitors, etc. (Not Receivers) for Working Studio set-up. Andrew Emmerson, G8PTH. Please ring. (Northampton) 0604 844130.

WANTED Instruction Manual for Philips N4515 Reel to Reel Recorder. Any expenses paid in loan for copying. Contact Sid, G0HTP, QTHR. (Ellesmere Port) 051 355 2833.

WAVECOM W4010 or any other Data Decoder, not requiring a Computer. G7JAI, QTHR. (Kenilworth) 0926 54556.

YAESU SP901 Speaker, must be clean and in full working order. G0STV. (London) 081.

EXCHANGE

BBC B Micro with Double 40/80 D.D, sideways Ram, much software; packet, W.P. for Mobile 2M Rig, mimimum 25w o/p. (Rainford) 0744 884244.

FISHER 1235X The Treasure Hunters power tool Metal Detector, cost £400 will exchange for Radio equipment WHY? (Co Antrim) 0266 878385.

HF OUTFIT FT707, FP707, FV707DM, Manual Mic and leads. GWO: £500. ERA Microreader Mk2 with computer terminal giving pages of text, as new, inc demo tape, manual and leads: £150. Exchange for UHF/VHF Multimode D/Bander or separates. Cash adjustment either way. (Castleford) 0977 552862.

QUAD 2 (pair) vgc with 22 Control Unit. Exchange for Yaesu FTV901R Transverter. Must be vgc unmodified. Buyer collects. GW3GWA, QTHR. (Wrexham) 0978 266760.

CLUB NEWS

DEADLINE - Items for inclusion in the September 1993 issue must be sent to HQ marked "Club News - DIARY", to be received by 21 July 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

SOUTH BRISTOL ARC - 7, talk 'Destabilising of Vertical wooden artefacts'; 14, 10m Activity; 21, Bring & Buy:-perfect or junk; 28, Discussion of recent Questionnaire; Aug 4, 70cm Activity. Details 0275 832222 Wednesday eve only.

BEDFORDSHIRE

SHEFFORD & DARS - 8, BBQ; 15, Mobile DF hunt. Details 0462 700618.

BERKSHIRE

BRACKNELL ARC - 14, Bring and Show. Details 0344 420577.

MAIDENHEAD & DARC - 1, Fox Hunt. Details 0628 25952.

NEWBURY & DARS - 28, talk 'Computers in Amateur Radio'. Details 0635 863310.

READING & DARC - 8, Talk by Peter Chadwick, G3RZP RSGB President 1993; 22, talk 'DX Packet Cluster System' by John Linford, G3WGV. Details 0734 476873.

BUCKINGHAMSHIRE

CHESHAM & DARS - 7, NFD Review and Discussion; 14, Tech. Topic 'Wire Antennas' with Ron, G3NCL; 21, Mobile DF Hunt on 2m FM; 28, Talk on EMC by Dave, G8KBV. Details 0494 676391.

MILTON KEYNES & DARS - 12, Talk by Castle Electronics on Servicing and Amateur radio equipment; Aug 9, Talk on RAYNET by G4NUG. Details Chris Billington, 5 Lamers Rd., Ramridge Estate, Stopsley, Luton, LU2 9BL.

CAMBRIDGESHIRE

CAMBRIDGE & DARC - 2, Preparations for VHF Field Day; 9, ATV Project update by G6FKS & G3KKD; 16, Microwave Evening; 23, HF operating. Details 0763 243570.

CHESHIRE

CHESTER & DARS - 6, Radio ideas and discussion; 13, Annual Grand BBQ; 20, talk 'Radio Survival; 27, talk 'Intro to Packet Radio'. Details 0244 336639.

MID-CHESHIRE ARS - 7, talk 'Power Supplies' by Alan, G8OJQ; 14, Activity/On-Air; 21, talk 'Microwaves' by Mike, G3PFR; 28, BBQ at Cotebrook; Aug 4, Equipment Night. Details 0606 331210.

STOCKPORT RS - 14, talk 'Basic Research' by Keith Twort, G8CHY; 28, Talk by Castle Electronics. Details 061 439 4952.

CLWYD

CONWAY VALLEY ARC - 1, Construction Display evening. Details 0492 530725.

WREXHAM ARS - 6, Quiz; 20, Field evening; Aug 3, Equipment Testing. Details 0978 845858.

CUMBRIA

EDEN VALLEY RS - 29, Fox Hunt 7.30pm Southend Road car park. Details 07683 52106.

DERBYSHIRE

BOLSOVER ARS - 14, Fifth DF Hunt. Detail 0246 822856.

BUXTON RA - 13, JOTA Discussion; 27, Bring & Buy Sale; Aug 10, Aerial Topics. Details 0298 25506.

DERBY & DARS - 7, Junk Sale; 14, BBQ, Drum Hill Scout Camp, Little Eaton; 21, 2m DF practice - Allestree Park; 28, technical talk; Aug 4, Rally preparation evening. Details 0773 856904.

DEVON

APPLEDORE & DARC - 19, Treasure Hunt (assemble Club car park) & Social Evening. Details 0237 477301.

EXETER ARS - 12, Talk 'Engineering for Hams', Baz, G0FGE; Aug 9, BBQ. Details 0392 214204.

EXMOUTH ARC - 7, Home Constructed equipment evening; 21, talk 'Introduction to transistors' by G0ETZ. Details 0395 279574.

TORBAY ARS - 16, Talk 'HF DXing' by Bob Whelan, G3PJT. Details 0803 526762.

DORSET

DORSET POLICE ARS - 1, Visit by Hampshire Police Amateur Radio Society. Details from PC 915 Newton, Ferndown Police Station. Tel: 0202 229351.

EAST SUSSEX

CROWBOROUGH & DARS - 22, Visit to Breadhurst for equipment testing; August ***NO MEETINGS***. Details 0892 661807.

HASTINGS E&RC - 15, talk 'Fox Hunting' by G4BCO; 24, Junk Sale(venue to be announced). Details 0424 830454.

SOUTHDOWN ARS - 5, BBQ. Details 0323 412699.

ESSEX

VANGE ARS - 1, Junk Sale; meets every Thursday at 8pm. Details 0268 552606.

FIFE

DUNFERMLINE RS - 1, Talk 'Early days in Radio' by Tom Hughes; 8, HF operating; 15, VHF operating; Sun 18, Visit to Black Hill VHF/UHF Transmitter Site. Details 031 331 4340.

GRAMPIAN

MORAY FIRTH ARS - Club meets every Thursday at 7.30pm. Details 0343 86395.

GREATER LONDON

ACTON, BRENTFORD & CHISWICK RC - 20, Post, Low Power Field Day. Details 081 749 9972.

BROMLEY & DARS - 20, 2m DF Hunt. Details 081 777 0420.

COULSDON ATS - 12, Inter Club Team Quiz. Details 081 684 0610.

CRAY VALLEY RS - 1, The 'Camel' Trophy 1992 and 93. Details 081 850 1386.

KINGSTON & DARS - 21, Talk 'DXCC' by Roger, G3LQP. Details 081 398 1128.

SURREY RCC - 5, Talk 'Amateur Remote Imaging' by John Tellick; Aug 2, talk 'Measurements in the Shack'. Details 081 660 7517.

SUTTON & CHEAM RS - 8, Informal; 15, talk 'RF Hazzards' by Fred, G1HCM; 17, BBQ at Palfreys, Picquets Way, Banstead, Surrey. Details 081 644 9945.

THAMES VALLEY ARTS - 6, Talk 'Winemaking' by G3GN. Details 0483 284279.

WIMBLEDON & DARS - 9, Book Fair; 30, Annual Camp Briefing; AUGUST *** NO Meetings***. Details 081 397 0427.

The RADIO S of HARROW - 9, talk and demonstration of Photo CD & Multimedia PC's by Nick Crawford; 30, Summer Junk Sale & Social Evening. All welcomed. Details 0895 632377 eve.

GREATER MANCHESTER

ECCLES & DARS - 6, Lecture 'Retinitis Pigmentosa' by G8PMX; Aug 3, Discussion 'SSB Field Day Contest'. Details 061 773 7899.

SOUTH MANCHESTER RC - 2, Field Day preparation; 9, Aerial Clinic; 16, Talk 'Equipment Specifications. Details from G7FQY on 061 969 1964.

GWYNEDD

DRAGON ARC - 5, video 'The History of Aluminium'; 19, Mr D. Roberts, GW0GHG talks about his adventures in New Zealand; Aug 2, Evening of Amateur Radio videos. Details 0248 600963.

HAMPSHIRE

BASINGSTOKE ARC - 5, Performance Racing Cars(real ones, Not models) with vehicle to support the presentation; 25, 2m DF Competition - OS175, Fox: Dave, G4NIP; Aug 2, Talk 'Commercial Satellite Communications' by Jim, G4BEZ. Details 0256 25517.

ITCHEN VALLEY ARC - 9, talk 'HF Prediction & Forecasting, Part 2' by Nigel Gerdes, Royal Signals; 23, Open meeting; August **No Meetings**. Details 0703 732997.

SONY BROADCAST ARTG - 26, talk 'A Home Built Tcvr for 40m' by G3MEV. Details from G4SZC, 0256 483103.

SOUTHAMPTON ARC - Club now reactivated. Meets 1st Monday of the month at Millbrook Community School, Green Lane, Maybush, Southampton. Details G1UWL, QTHR or SARC, PO Box 249, Southampton, SO9 7SU.

SUBMARINE ARC - Meets on Thursday evenings at HMS Dolphin, Gosport, Hants. Details 0329 283646.

WINCHESTER ARC - 16, talk 'Capacitors' by John, G3JHL. Details 0962 860807.

HEREFORD AND WORCESTER

BROMSGROVE & DARC - 9, talk 'Short Wave Listening' by Arthur Miller. Details 0562 710010.

BROMSGROVE ARS - 13, 2m DF hunt; 27, Technical topic; Aug 10, Talk 'Safety in the Shack'. Details 0527 546075.

DACORUM AR & TS - 20, talk 'VHF DX hunting' by G3VZW. Details 0442 259620.

HEREFORD ARS - Club meets 1st and 3rd Friday of each month at the Civil Defence HQ, Magistrates Court, Hereford. Details Mr E G Robinson, G4MET, QTHR.

VALE OF EVESHAM ARC - 1, Visit to Wyre Mill, nr Pershore, combined with night on the air from the Mill. Meet at Mill at 7.30pm. Details 0386 41508.

HERTFORDSHIRE

CHESHUNT & DARC - 7, Junk Sale; 14, Members forun & natter nite; 21, Open Air meeting - Bass Hill Common; 28, natter nite; Aug 4, Talk 'Starting up in Amateur Radio' by G3WFM. Details 0992 464795.

DACORUM AR&TS - 20, talk 'VHF DF Hunting' by G3VZW. Details 0442 259620.

HODDESDON RC - 22, talk 'Detection' by Pat, G1NPU. Visitors welcome. Details 081 804 5643.

STEVENAGE & DARS - 6, talk 'Simple Synthesisers - Rubber Rocks' by G8IUG; 13, talk 'The Novice Course' by 2E1ARU; 20, talk 'Satellites - the conversion of BSB dishes and Decoders' by G2BKZ; 27, talk 'RAYNET - who they are & what they do' by G0ETA. Details 0438 350882.

WELWYN-HATFIELD ARC - 5, Fox Hunt. Details 0920 462241.

HUMBERSIDE

GOOLE R & ES - 9, Logfill; 16, Video night; 23, Rally planning; 30 Social evening. Details 0405 769130.

GRIMSBY ARS - 9, Junk sale; 22, talk 'The Dayton Hamfest' by G3RXP & G3JKB; Aug 5, visit to Humberside Fire Brigade HQ, Hessle , Hull at 7.30pm. Wives and older children invited. Details John, G3DOT, QTHR.

KENT

BROMLEY & DARS - 20, DF hunt. Details 081 777 0420.

EAST KENT RS - 10, Annual BBQ at G4LQI, QTH. Start 6pm. Details 0227 364606.

HILDERSTONE RS - Starting late September, Canterbury area, RAE course run by G3JIX for Examination in 1994. Details 0843 869812.

MEDWAY AR & TS - 23, DX Quiz night (radio and geographical skills) by G4VFG. Details 0634 710023.

SEVENOAKS & DARS - 19, talk 'Radio Control of Models' by Mr Weston; August: ***NO MEETINGS***. Details The Sec, Sevenoaks & DARS, c/o Sevenoaks District Council, Argyle Road, Sevenoaks, TN13 1HG.

SOUTH EAST KENT (YMCA) ARC - 7, Novice evening; 14, DF preparation and mods, G3ROO; 21, Committee meeting; 28, Fox Hunt. No meeting at YMCA during August - but other activities will be held. Contact G7NOR on 0304 852030 for details.

WEST KENT ARS - 2, Informal meeting; 16, Homebrew Equipment & Constructional Technique; August ***NO MEETINGS***. Details G3OHV, QTHR.

LANCASHIRE

BURY RS - Meets still at Mosses Community Centre, Cecil Street, Tuesday evenings. Details 0204 883212.

HESKETH ARC - 6, Battle of the Atlantic; 20, Temperature Measurements; Aug 3, Electrostatics. Details 0704 63344.

THORNTON CLEVELEYS ARS - 5, Bar-B-Q; 12, Family Roots by Jack, G4BFH; 19, Club on air/ Construction; 26, Surplus Equipment Sale. Details from G4BFH, QTHR.

LEICESTERSHIRE

CHARNWOOD ARCC - 11, Bar-B-Q; Club meets First & Third Sunday in the Month at The Albion. Details 0509 232927.

LEICESTER RS - Club meets every Monday night. Details Leicester 762241.

LOUGHBOROUGH & DARC - 6, Queens Pk. arrangement; 13, Canal Bar-B-Q. All welcome; 20, DF 8pm start; 23/26 SES, GB70CT from Carrillon; 27, 'Charnwood Water' with John's submarine. Details Loughborough 218259.

LINCOLNSHIRE

GRANTHAM RC - 6, Discussion night; 20, talk 'Training Guide Dogs' by G3IWC; Aug 3, talk ' The Secret War' by G4MHB. Details 0476 65743.

LOUTH & DARS - Club meets on 3rd Tuesday in month at The Wellington, Louth. Details G1XWD, QTHR.

MERSEYSIDE

LIVERPOOL & DARS - 6, DF Hunt; 13, GX3AHD on the Air; 20, L & DARS 80th Birthday, OldTimers night; 27, Surplus Sale. Details 051 722 1178.

NORFOLK

ARC of FAKENHAM - 3, GB2SRH, Sue Ryder Home Fete Snettisham; 6, talk 'How the RSGB QSL Bureau operates' by Dave, G4DCJ; GB2DFF St Nicholas Church, Dersingham Flower Festival; Aug 3, Amateur Radio Video 'DXpedition VP8SSI'. Details 0485 528633

NORFOLK ARC - 7, Mobile DF hunt; 14, Informal; 21, NARC rally final briefing; 25, NARC Rally at Hewitt school; 28, Report on rally. Details 0603 618810.

NORTHAMPTONSHIRE

NORTHAMPTON RC - Club meets every Thursday 8pm, 2 Hervey Street, Northampton. Details 0604 401098.

NOTTINGHAMSHIRE

ARC OF NOTTINGHAM - 1, talk 'Narrow Band TV' by Doug Pitt; 8, Forum; 15, Foxhunt No4 activity; 22, Junk Sale; 29, Construction. Details 0602 501733.

MANSFIELD ARS - 12, Talk by Weatherman John Bound. Details 0623 755288.

SOUTH NOTTS ARC - 2, Open forum - members only; 9, Talk 'SWR, Facts and Fallacies' by Ron, G0HNZ; 11, Third DF Fox hunt; 23, Construction at Fairham College; 25, Fourth DF Fox hunt; 30, Planning for FD & BBQ. Details 0602 211069.

POWYS

POWYS ARC - 1, Fox Hunt; 15, Jon Seal, ex RIS, talks on the lighter side of his job; 25, Fox hunt. Details GW3JSW, QTHR.

SHROPSHIRE

TELFORD & DARS - 14, First of two, 2m & 70cm DF hunts. Details 0952 588878.

SOMERSET

WEST SOMERSET ARC - 6, Visiting speaker; Aug 3, Bring & Buy. Details G4AJU, QTHR.

YEOVIL ARC - 1, From 27 to 144MHz by G7LNJ; 8, Simple milli-watt Phone Tx by G3MYM; 15, 2m DF by G3ICO; 22, Further ideas on the Yeovil Rig by G3PCJ; 29, Natter night & Committee meeting; Aug 5, Operating and controlling Nets by G0NMM. Details G0JVG, QTHR.

SOUTH GLAMORGAN

BARRY ARS - Change of Club venue. Now meets at Sully Sports Pavilion, Burnham Avenue, Sully on Thursday evening. Details 0222 512959.

CARDIFF RSGB G - 12, Demo of AR3000A Scanning Receivers by Dave, GW3RWX; Aug 9, Discussion on future Group Activities. Details 0446 773212.

SOUTH YORKSHIRE

BARNSLEY & DARC - 5, talk on Car Crime inc video; 19, talk on Contest & Awards by John, G4RCG; Aug 2, Talk on Radio Astronomy by Malcolm, G8RWN. Details 0226 203448 6-8pm, except Monday 6-7pm only.

MALTBY & DARS - 2, On Air - try 50 or 70Mhz; Computer Night; 16, DF Hunt; 23, Video Night; Kite Night; August 6, On Air - Packet & RTTY. Details 0709 814135.

WAKEFIELD & DRS - 6, 2m DF Fox Hunt; 13, VLF/Cave Radio; 20, Construction evening; 27, Treasure Hunt. Details 0924 893321.

STAFFORDSHIRE

STOKE ON TRENT ARS - Club meets every Thursday 7.30pm, The White Swan, Honeywall, Penkhull. Details 0782 638801.

STRATHCLYDE

TELEGRAPH RC Longriggend - Club meets every Tuesday 7.45pm. Details GM0RSF 0506 31645.

SUFFOLK

FELIXSTOWE & DARS - 5, talk 'Data Made Simple' by G7ANH; 19, Visit to Suffolk Ambulance HQ, Bramford, Ipswich; Aug 2, Talk 'Amateur TV in Suffolk' by G4DDK. Detail 0394 273507.

IPSWICH RC - 14, BBQ at Hallowtree; 31, VHF Low Power Contest at Otley. Details 0473 742072.

LEISTON ARC - 6, talk 'Radio Data Services' by Alan, G4LWA; Aug 3, Constructors night - bring something along. Details 0986 874800.

SURREY

ECHELFORD ARS - 8, talk 'Oscilloscopes' by Peter Hale, G2HS. Details 0344 843472.

THREE COUNTIES ARC - 7, Prep for FD and BBQ weekend; 21, Talk; Aug 4, Computer night. Details 0428 642930.

WARWICKSHIRE

MID-WARWICKSHIRE ARS - 13, Presentation on PMR by Castle Electronics; 27, Fox Hunt 7pm start (Hor FM on 145.350). Details 0926 424465.

STRATFORD UPON AVON & DARS - 26, Construction Contest. Details 060 882 495.

WEST GLAMORGAN

PORT TALBOT ARC - 1, Planning for Field Day. ***NEW SECRETARY*** Ted James, GW0NKF 1 Pellau Road, Margam, Port Talbot, SA13 2LF. Details 0639 892311.

SWANSEA ARS - 1, Treasure Hunt, organised by GW6JGE, finishing up at the Swn-y-Mor. Details GW3SIY, QTHR.

WEST MIDLANDS

MIDLAND ARS - Every Wednesday RAE & Morse classes; Every Thursday evening On-air Activity; "nd & 4th Monday in month PC night. Details 021 628 7632

SOUTH BIRMINGHAM RS - 7, Demo by Ward Electronics; 8, Visit to West Midlands Police, Birmingham - book via G4IVJ; Aug 4, Maxpak Demo by G1DKI. Details 021 458 1603.

STOURBRIDGE & DARS - 5, On Air; 19, Treasure Hunt, curtesy Clive, G4IEB; August ***NO Meetings***. Details 0384 374354.

WEST YORKSHIRE

DENBY DALE ARS - 7, Home brew Test Equipment by John, G3BBD. Details 0484 429238.

HALIFAX & DARS - Meets on 1st and 3rd Tuesdays in Month. Details 0422 202306.

KEIGHLEY ARS - 8, Questions & Answers; 29, talk 'Alignment' G3TQA. Details 0274 496222.

WILTSHIRE

DEVIZES & DARC - 3, Bar-B-Q. Meets weekly at Hare and Hounds Inn, Hare & Hounds Street, Devizes. Details 0380 724533.

TROWBRIDGE & DARC - 7, Transceiver Surgery with G3UUR & G8NEY. 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'.

4 JULY

KINGS LYNN ARC Rally - Cattle Market, Kings Lynn. Details 0553 841189.

NEWPORT ARS - 1993 Junk and Boot Sale. Brynglas CEC, Brynglas Road, Newport, Gwent. Open 10.30am to 1pm, 10am for disabled. Talk-in on S22 by GC1NRS. Details from GW7BSC, QTHR or Tel: 0633 262488

YORK RADIO Rally - Tattersall Building, York Racecourse. Doors open 11am, 10.30am for disabled visitors. All the usual favourites, bring & buy, Morse tests, amateur radio, electronics & computers. Arts and crafts. Ample car parking. Refreshments. Talk-in on S22. Details from Andy, G0GXI 0904 708164.

10 JULY

CORNISH RALLY - Penair School, Truro. Doors open 10.30am, 10am for disabled visitors. Usual traders, ample parking, refreshments. Details from Barrie, G0NNR on 0872 862046.

11 JULY

GALWAY Radio Experimenters Club - Annual Radio Rally. Convent of Mercy, New-Townsmyth, Galway. Doors open 12 noon. Large trade show and large bring & buy stall. Lots to interest the entire family. Free parking and refreshments available. Talk in on 2m. Details EI7DIB on 091 53592.

HORNCASTLE AR Electronics and Computing Fair - Queen Elizabeths Grammar School Sports Hall, Horncastle, Lincs. Bring and buy, club stands, catering by Horncastle Youth Club Staff and Members. Talk-in on 2m. Further info and booking forms from A E Nightingale, G6CZV, 0507 522482.

SUSSEX AR&C FAIR - Brighton Racecourse. Start 10.30am. Trade stands, bring and buy stall. Picnic area, refreshments, car parking. Free shuttle to Brighton sea front. Details Ron, G8VEH 0903 763978 or 0273 415654 office hours.

18 JULY

RSGB WOBURN Rally. Details from Norman Miller, G3MVV, 0277 225563.

25 JULY

COLCHESTER Radio & Computer Rally. St Helena School, Sheeper Road, Colchester. Adjacent to Colchester inner by-pass, Avenue of Remembrance. Sign posted from A12. Doors open 10am. Easy access for wheelchairs. Wide range of radio and computer traders and component suppliers. Amateur radio car boot sale. Bring and buy stall. Refreshments and licensed bar. RSGB Morse Tests on demand, bring two passport photographs. Talk in S22. Ample parking. Details Frank, G3FIJ, 0206 851189.

NORFOLK ARC & Hewett School Radio and Electronics Group Rally. Doors open at 10am. Trade stands, bring & buy, displays. All the family welcomed. Details Sheila, G0KWP, 0603 618810.

EAST YORKSHIRE Radio Rally at Beverley Racecourse, North Humberside. Doors open 11am, 10.45am to disabled visitors. Trade and special interest groups, bring & buy stall, space for car bootsales and table for for Amateur Radio or allied products. Events start at 12noon with Morse Tests, 2pm East Yorks TV Repeater group lecture, 3pm RSGB RLO meeting, 4pm RSGB questions and answers. Further details from Peter, G4EJP on 0964 550397 home or 550921 working hours.

RAIBC Romsey Picnic at Broadlands - All members, families, friends and supporters welcome. Grand draw, junk sale and refreshments. Talk-in on S22. Details John, G4COM 0703 693017.

SCARBOROUGH Radio Electronics & Computer Rally.******1993 RALLY CANCELLED **** APPEARED IN ERROR IN JUNE RadCom **** Venue and Date for the 1994 event: Scarborough Spa, 29 August 1994, Bank Holiday Monday. Details from Ross, G4ZNZ 0723 514767

29 JULY/2 AUGUST

AMSAT-UK Colloquium - The Annual Colloquium for all users of Amateur Radio Satellites will again be held at the University of Surrey, Guildford between 29 July and 2 August. On Friday 30th the Opening ceromony will be performed by RSGB President Peter Chadwick, G3RZP. All welcome. Details from G3AAJ 081 989 6741.

1 AUGUST

McMICHAEL Rally and Car Boot Sale. - Haymill Youth and Community Centre, Burnham Lane, Slough (near Burnham railway station). Start 10.30am, admission £1.50. Car boot sale(no adv. booking) is £6 per pitch on the day. Talk-in on S22. Details Neil, G0SVN or Roy, G4XYN, 0628 25952. (This rally was originally scheduled for 18 July).

8 AUGUST

DERBY & DARS Mobile Rally - Littleover Community School, Pastures Hill, Littleover, Derby. School is on the A5250 just off its junction with the A38 South side of Derby. Usual attractions, including the monster junk sale. Details from Martin Shardlow, G3SZJ on 0332 556875 or via packet @ GB7LTN.

FLIGHT REFUELLING ARS Hamfest'93 - Flight Refuelling Sports Ground, Merley, Wimborne, Dorset. 10-5pm. Usual mix of traders, bring & buy, craft exhibitions, car boot sale and field events. Overnight camping facilities available for Saturday 7th. Talk-in on S22. Details Richard Hogan, G4VCQ 0202 691021.

WIRRAL AR & Computing Rally - Masonic Hall Manor Road, Wallasey. Doors open 1100z. For further information contact D G Clifford on 051 639 5922 or D Roberts on 061 476 3076.

15 AUGUST

SOUTHEND & DRS Rally - Rocheway Centre, Rochford, Nr Southend-on-Sea, Essex. Start 10am. Bring & buy, car boot sale - £5 per pitch, ample parking, refreshments. Details G0DFE, 0702 202216.

22 AUGUST

WEST MANCHESTER RC Summer Rally. Details: G1IOO, 0204 24104 (evenings).

28/29 AUGUST

NORTHERN LIGHTHOUSE Weekend. Radio Amateurs in Scotland and the Isle of Man will activate 11 stations at lighthouses through Scotland and the Isle of Man. Details from Mike Dalrymple on 0292 443127.

29 AUGUST

GALASHIELS & DARS Open Day - Doors open 11am. Usual trade stands, bring and buy, club stalls, raffle, and refreshments. Details John, GM0AMB 0835 22686.

TORBAY ARS Mobile Rally - Northern Telecom(was STC) Social Club, Brixham Road, Paignton, Devon. Doors open 10am. Bring & buy, refreshments, ample free parking. Details G3HTX 0803 526762.

30 AUGUST

HUNTINGTON ARS Annual Bank Holiday Monday Rally - New Town centre venue - St Germain Street, Huntington. Just off the ring road. Starts at 10.00am. All pitches and car parking on hard standing. Entry £1, car parking free. Pitch £5 per car, £9 for transit van or car & trailer. Refreshments available. Talk-in on S22, or via GB3OV on 433.125MHz. Details David, G7DIU on 0480 431333.

5 SEPTEMBER

BRISTOL Radio Rally (incorporating Bristol Computer & Electronics Fayre) - Brunel Centre, Temple Meads Station, Bristol. Doors open 10.30am, 10.15 for disabled visitors. Forty plus trade stands, large bring & buy, under £25 bring & buy, refreshments. Ample under cover parking. Talk-in on S22. Details G4YZR 0275 834282.

MILTON KEYNES & DARS 7th Annual Radio Boot Sale - Cranfield Airfield, Cranfield, Beds. Off jun 13 or 14 M1. Details Ray, G1LRU, 0908 660798.

TELFORD Radio Rally - Telford Racquet & Exhibition Centre, Telford, Shropshire. Details from Bob, G7BWQ 0952 770922.

VANGE ARS Annual Rally - Laindon Community Centre, Laindon High Road/Aston Road, Laindon, Basildon, Essex. (Short walk from Laindon BR Station - Fenchurch Street to Shoeburyness Line.). Doors open 10.30am. Trade stands, bring & buy, raffle and refreshments. Talk-in on S22. Details Mike, G4NVT 0268 543025.

11 SEPTEMBER

SCOTTISH AR Convention (SARC93) - Cardonal College, Glasgow. Full programme of events. Details Tom Hughes, GM3EDZ, 041 882 5753.

12 SEPTEMBER

BARTG Rally - Sandown Exhibition Centre, Esher, Surrey. 10 min from M25, jn 10 and not far from M3, M4 and M40. Doors open 10.30am. Over 250 tables, exhibitors, special interest groups. See latest in radios, computers, computer periherials, s/w, books, kits, test equipment, a bring and buy plus much more. On-site catering, hot and cold meals, snacks, beverages and bar. Details Peter Nicol, 38 Mitten Avenue, Rubery, Rednal, Birmingham B45 0JB, 021 453 2676.

LINCOLN SWC Hamfest - Lincolnshire Showground and Exhibition Centre. Four miles North of Lincoln on A15 Lincoln to Scunthorpe road. Doors open 10.30am. All the usual trade stands, large bring & buy stall. Refreshments available. Lots of attractions for the whole family. Caravans welcome by arrangement. Talk-in on S22. Details from Denis, G1XZG 0522 684214.

18 SEPTEMBER

ISLE of WIGHT Rally - National CEM Wireless Museum, Arreton Manor, Nr Newport, IOW. Free entry for visitors and trade stands also free parking. Bring and buy stall. Refreshments. Covered accommodation if wet. Talk-in on S22. Details G3KPO, 0983 567665.

19 SEPTEMBER

PETERBOROUGH R&ES East of England Rally. East of England Showground, Peterborough. Access from A1, A47 and A605. Doors open 10.30am. 10.00am disabled visitors. Dealer access from 7.30am. Modern hall and large marquee. Traders, large carboot and flea market area. Bring and buy stand. Additional on site attractions. Full catering + bar. Talk-in on S22. Entrance £1. Free car parking. Details from Mike, G0CVZ 0733 222588.

26 SEPTEMBER

HARLOW AMATEUR RADIO RALLY & COMPUTER SHOW - Harlow Town Sports Centre, off Fifth Avenue, Harlow. Easy access off M11 Jn 7 and A414. Doors open at 10.30am Disabled parking and lifts available. Varied selection of traders, both new and old to the event, massive bring and buy stands. Catering and bar within the Soprts complex. Talk-in on S22 and SU22 by G6UT. Details from Mike, G7BNF 0850 487863.

THE THREE COUNTIES Rally - The Three Counties Show Ground, Malvern, Worcestershire. Open 11.00am (10.30 for disabled). Trade stalls, bring & buy, book stall, radio & computer accessories, refreshments and free car parking. Further details from Eddy Cotton, G4PQZ, 0905 773181.

NORTH WAKEFIELD RC Rally - Outwood Grange School, Outwood, Wakefield. One mile from M1 & M62. Doors open at 11.00am. Bring & buy, electronic and computer dealers, repeater groups and Novice stand. Refreshment available. Talk-in on S22. Details from John, G4RCG, 0924 362144.

3 OCTOBER

GREAT LUMLEY Radio Rally. Details Barry, G1JDP, 091 388 5936.

BLACKWOOD & DARS Rally - Details from Norman, GW0MAW, 0495 227550.

WINCANTON RALLY - Details Norman, G4YXX 0749 850432.

8/10 OCTOBER

RSGB International HF Convention - NEW DATE : The Beaumont Conference Centre, Old Windsor, Berks. Talks, latest amateur radio software, ladies' programme; Young Amateur of the Year award; invited traders and Special Groups; overseas visitors' reception. A full convention prospectus will be published by April which will include an advance booking form. Send SAE to: HF Committee, PO Box 599, Hemel Hempstead, Herts HP3 0SR. Details G4BWP, 0638 552080.

9/10 OCTOBER

THE ALL IRELAND INTERNATIONAL Radio & Hobbies Exhibition. - Details from GI8RLE on 0762 870423 or EI8CZB on 010 353 42 32641.

10 OCTOBER

KIDDERMINSTER & DARS - NEW DATE, NEW VENUE: Stourport on Severn High School. Details: Malcom, G8JTL 0384 894019 or Jeff, G0RJP 0299 822206.

16/17 OCTOBER

36th JAMBOREE ON THE AIR. Details from Activities Office, The Scout Association, Gilwell Park, Chingford, London E4 7QW, 081 524 5246.

17 OCTOBER

HORNSEA (East Yorkshire) Radio Club Rally. Details Duncan, G3TLI 0964 532588.

17/18 OCTOBER

SCOTTISH TOURIST BOARD RG - Launch of 1993 Airdrie MOD - GB2STB. Airdrie MOD is the 101st Annual Gaelic Festival held in a different town in Scotland each year, to promote the culture and heritage of the Scots nation, through its language, drama, music, dance etc.

29/30 OCTOBER (FRI/SAT)

LEICESTER Amateur Radio Show - Granby Halls. Details G4PDZ 0533 871086.

31 OCTOBER

BISHOP AUCKLAND Radio Amateur Clubs Rally. Details Mike, G0PRQ, 0388 766264.

6/7 NOVEMBER

7th NORTH WALES Radio & Electronics Show. Details GW7EXH, 0745 591704.

14 NOVEMBER

BARNSLEY & DARC AR Rally. Details Ernie, G4LUE, 0226 716339 (6pm-8pm please).

BRIDGEND DARC Amateur Radio Rally. - Details Mike, GW7NIS 0656 722199 or GW3RVG on 0656 860434.

MARS/STOCKLAND Radio Rally. Details Norman, G8BHE 021 422 9787.

21 NOVEMBER

WEST MANCHESTER RC Winter Rally. Details 0204 24104 (eves).

5 DECEMBER

LEEDS & DARS (Pudsey Rally). Change of Venue: now Allerton High School, Kings Lane, Leeds 17. Details 0532 552344 or FAX 0532 393856.

12 DECEMBER

CENTRE OF ENGLAND CHRISTMAS Radio, Satellite Computer & Electronics Rally - NEW VENUE. Details tel: 0952 598173.

23 JANUARY 1994

OLDHAM ARC Radio Rally - Details 061 652 8617 home or 061 633 0550 work.

6 FEBRUARY

SOUTH ESSEX ARS Radio Rally - Details G0BBN, 0268 755350.

IF YOU are currently enjoying reading someone else's copy of *Radcom*, why not get your own by joining the RSGB. There are other benefits too!

GB CALLS

The list below shows all special event stations licensed for operation during this month and up to 8 August. It was taken from the HQ computer on 6 June. These callsigns are valid for use from the date given but the period of operation may vary from 1-28 days.

JULY 1	
GB0AMY	Amy Johnson
GB0PHS	Pens Hurst School
GB0SI	Summer Isles
GB0TTS	Tyne Tall Ships
GB2DTS	Dagenham Town Show
GB2GMM	Guglielmo Marconi Memorial
GB2PK	Porthcurno Telegraphic C/Sign
GB2SMR	Sussex Mobile Rally
GB2TR	Tusker Rock
GB4EYR	East Yorkshire Rally
GB4JUL	July 4th Celebration
GB4LPS	Langley Primary School
GB4SSC	St Swithun's Church
JULY 2	
GB0BC	Bromsgrove Carnival
GB0CFC	County Family Camp
GB5FDC	Forest of Dean Cubs
GB6BCB	Base Camp Barnswood
GB6BS	Buckinghamshire Scouts
JULY 3	
GB0CDL	Crosby & Dist Lions
GB0CPS	Colerne Primary School
GB0MDS	Montgomery District Scouts
GB0OPS	Otford Primary School
GB1WC	Ware Carnival
GB2SRH	Sue Ryder Fete
GB4WAS	Winterton Agricultural Show
JULY 4	
GB0GPS	Gildersome Primary School
GB2CHG	Cupar Highland Games
GB2EGS	East Grinstead Scouts
GB4BHB	Barking, Havering & Brentwood
GB4RAF	Royal Air Force
JULY 5	
GB2RST	Radio Scouting Team
JULY 6	
GB4FT	Fordown Tower
JULY 7	
GB2SWC	Saffron Walden Carnival
JULY 8	
GB4NWC	Neale Wade College
JULY 9	
GB0HNG	Humberside North Guides
GB2RCC	Radio Caravan Club
GB2USA	Great Britain to USA
GB8SAC	St Augustines Church Camp
JULY 10	
GB0GT	Great Tower
GB0SDC	Sudbury & District Celebration

EVENTS DIARY

GB0TTW	Tenby Town Wall
GB2ASP	All Saints Primary
GB2BBC	British Broadcasting Corp
JULY 11	
GB2JWS	John Warner School
JULY 12	
GB2WSR	Weeting Steam Rally
JULY 14	
GB2STI	St Tudwal's Island
JULY 15	
GB0CDP	Charles Dickens Playcentre
JULY 16	
GB4ATC	Air Training Corps
JULY 17	
GB2SGS	Suffolk Guides
GB4PCP	Pembrey Country Park
GB4VAL	Valley
JULY 18	
GB8RT	Royal Tournament
JULY 22	
GB70CT	Carillon Tower
JULY 23	
GB2CPC	Castell Penrhyn Castle
GB2OLV	Olave - Lady Baden-Powell
GB2OOO	Manchester's Olympic Bid
JULY 24	
GB0AU	Adventure Unlimited
GB0CDV	Coastal Defence 'V'
GB0FMS	First Martlesham Scouts
GB5RH	Sherwood Inter Scout Camp
GB1FAB	Forrest at Bolesworth
GB2SLB	Skegness Lifeboat Station
JULY 25	
GB2DFF	Dersingham Flower Festival
GB4JGU	Jamboree Glan Usk
JULY 27	
GB2PC	Project Countryside
GB4FAB	Forest at Bolesworth
JULY 28	
GB2WGP	Windsor Great Park
JULY 30	
GB2SL	Shaw Library
JULY 31	
GB0SFP	Sca Fell Pike

SILENT KEYS

WE HAVE BEEN advised of the deaths of the following radio amateurs:

G0CON	Mr G Stables	
G0FEW	Mr W C Pearce	22.04.93
G0OHP	Mr J King	08.04.93
G0PSR	Mr J J Barratt	
G1YWB	Mr W E Meek	13.03.93
G3CHN	Mr R Thorn	
G3DDG	Mr G Cowey	17.08.92
G3DHJ	Mr A B Ormston	17.03.93
G3ESO	Mr A Underwood	11.04.93
G3LBT	Mr R G Storey	
G3LSD	Mr E Diggle	01.03.93
G3LUR	Mr G Normanton	31.03.93
G3NJR	Mr A V G J Robinson	Feb 92
G3OXC	Mr S Crabtree	17.03.93
G3RDY	Mr J G P Butler	11.05.93
G3SL	Mr T N Lloyd	
G3TDP	Mr T Groombridge	17.03.93
G4AKL	Mr D Newman	30.12.92
G4BTR	Mr N B Heaton	
G4EIF	Mr W R Owen	10.05.93
G4EVV	Dr J H Moseley	
G4KSV	Mr J D Smith	
G4LHB	Mr H Barnes	20.04.93
G4LZB	Mr J Pugh	21.03.93
G4RPQ	Mr T G Barker	27.02.93
G4WHW	Mr J Evans	05.02.93
G4XDS	Mr J L R Mack	28.04.93
G4XSQ	Mr J Friesner	24.01.93
G5OB	Mr G H Johns	
G6DZ	Mr D A Weale	May 93
G6JQ	Mr W W Storer	05.03.93
G6PAQ	Mr L J Harris	Nov 93
G7LKD	Mr M Wood	
GD3TIU	Mr A Ussher	14.04.93
GJ4TAF	Mr E Lloyd-Jones	06.04.93
GM4MF	Mr N E Holden	01.04.93
GM5VG	Mr W J Miller	
GW3FVK	Mr A E Heath	Feb 93
GW3LJP	Mr W Mills	
GW4JAO	Mr D T Hughes	26.04.93
PA3EWU	Mr J C Houttuin	
RS94914	Mr R Kennedy	26.04.93

NEW
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KITS

★ For 40, 30, 20, or 15m (80 & 10m available soon)
★ Up to 7 watts output — variable
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Send 1st class stamp or 2 IRCs for our FREE CATALOGUE of low cost SSB/CW and Rx kits.

40M TCVR Boards & comps. £85 Case and hardware £29.99

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PORTABLE RECHARGEABLE BATTERY PACK

Capacity ■ 4 A/hrs 12V, 8 A/hrs 6V, 48 Watt/hrs
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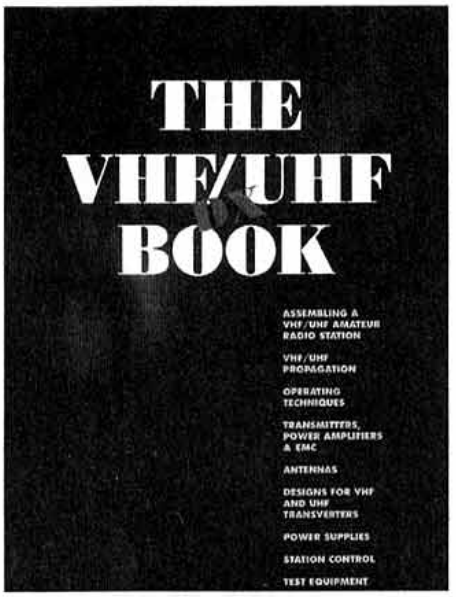

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Council, Committees and Honorary Officers

The Society has a large number of volunteer experts available to help and advise members on a wide variety of subjects. Each month we will be focussing on a different section of the volunteer workforce, whilst still giving brief details of the main office-holders. See also the Information Directory section of the *RSGB Call Book*.

• RSGB 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):

John Allen, G3DOT, 4 Philip Avenue, Waltham, South Humberside, DN37 0QD. Tel: 0472 825899.

Zone C (SE England and East Anglia):

Neil Lasher, G6HIU, 61A Stile Hall Gardens, London W4 3BT. Tel: 081 747 4045.

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. Tel: 0846 665034.

Zone G (Scotland):

Ian Suart, GM4AUP, 37 Meldrum Mains, Glenmavis, Airdrie, Lanarkshire, ML6 0QG. Tel: 0236 765937.

• For general advice and details on local clubs, or if you don't know who to contact:-

Your RSGB Liaison Officer. See the *RSGB Call Book*, your membership card or *RadCom*, May/June 93.

• 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:

HF Awards Manager – Bill Ricalton, G4ADD, QTHR.

IOTA (Islands on the Air) Awards Manager – Roger Balister, G3KMA, QTHR.

VHF (and Microwave) Awards Manager – Ian L Cornes, G4OUT, QTHR.

• Band Plans and operating practices:

See the *RSGB Call Book* or March 93 *RadCom* for latest bandplans. For policy, contact the appropriate spectrum manager or committee chairman:

HF Manager – Martin Atherton, G3ZAY, 41 Enniskillen Road, Cambridge CB4 1SQ.

HF Committee Chairman – David Evans, G3OUF, PO Box 599, Hemel Hempstead, Herts HP3 0SR.

VHF Manager – Dave Butler, G4ASR, Yew tree Cottage, Lower Maescoed, Hereford HR2 0HP.

VHF Committee Chairman – Peter Burden, G3UBX, 2 Links Rd, Penn, Wolverhampton, WV4 5RF.

Microwave Manager – Mike Dixon, G3PFR, Woodstock, Gaze Bank, Norley, Warrington, WA6 8LL.

Microwave Committee Chairman – Steve Davies, G4KNZ, 14 Herondale, Birch Hill, Bracknell, Berkshire RG12 7ZT.

• RSGB Contests:

First contact the contest adjudicator (see the contest rules). For policy, contact the respective Committee Chairman:

HF Contest Committee – Dave Lawley, G4BUO, QTHR.

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.

National helpline: 0533 593449.

• Emergency Communications:

Emergency Communications Officer – John Irving, G4XJT, QTHR.

• Exhibition & Rally Committee:

Organises trade shows at NEC, VHF Convention and Woburn Rally.

Chairman: Norman Miller, G3MVV, Tel: 0277 225563, QTHR.

• Intruder Watch (IARUMS):

Non-Amateur Service operation in exclusive amateur radio bands.

Co-ordinator – David Owen, G0OES, QTHR.

• IEE:

Liaison Officer – Prof Peter Saul, G8EUX, QTHR.

• Licensing:

Licensing Advisory Committee Chairman (RSGB Policy) – John Bazley, G3HCT, 'Brooklands', Ullenhall, Nr Henley in Arden, Warwickshire, B95 5NW.

Renewals – Subscription Services Limited, PO Box 885, Bristol BS2 8RH.

• New Licence Applications:

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• Membership Liaison:

Membership Liaison Committee Chairman – Clive Trotman, GW4YKL (see Zone E above).

• Morse:

GB2CW Co-ordinator – Post Vacant.

Chief Morse Examiner – Roy Clayton, G4SSH.

• Novice Licence/ Project YEAR:

Hilary Claytonsmith, G4JKS, 115 Marshalswick Lane, St Albans, Herts, AL1 4UU. Tel: 0727 859318.

N.B. For details of training courses and examinations, write direct to RSGB HQ, quoting your postcode.

• Packet Radio:

Datacomms Committee Chairman – Ian Suart, GM4AUP. (See Zone G above).

• President:

Peter Chadwick, G3RZP, 'Three Oaks', Braydon, Swindon, Wilts, SN5 0AD.

• 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 submanager (see *RSGB Call Book*).

• Repeaters:

Repeater Management Group Chairman – Geoff Dover, G4AFJ, QTHR.

• Spectrum abuse:

Amateur Radio Observation Service Co-ordinator – Geoff Griffiths, G3STG, QTHR.

• Technical queries:

Technical and Publications Committee Chairman: Dick Biddulph, G8DPS, QTHR.

• Trophies:

Trophies Manager – Bob Harrison, G4UJS, QTHR.

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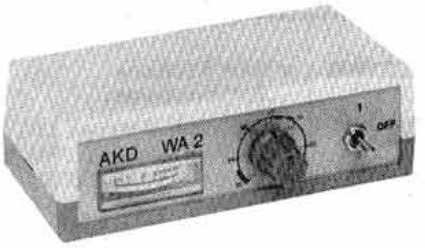

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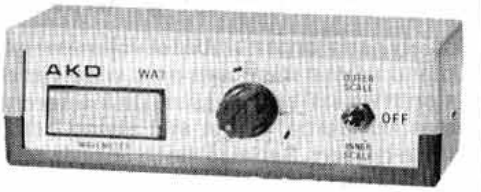

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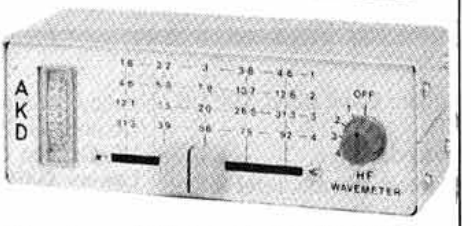

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RSGB

The LAST WORD

MATCHING VIEWS

Regarding his comments on my article 'How Big is a Bad SWR' (*RadCom*, April), I am happy to reassure Mr Todd, G2KV (*The Last Word*, June), that I, too, prefer to consider transmitter loading entirely in terms of load impedance and that was indeed the theme of the article. However, most operators employ a reflectometer to check the degree of impedance mismatch and it is fashionable to scale these instruments in terms of SWR. It was an important objective of the article to show how impedance magnitude and phase angle are related to SWR for this very reason.

Regarding $P_C = I_C.V_{CE}$; this is correct as it appeared in the discussion of static transistor characteristics. The more complicated dynamic relationships were presented both algebraically and in graphs later in the article.

Bob Pearson G4FHU

10WPM BARRIER?

The letter from Harold MacIntyre, G3FLJ, (*The Last Word*, June) on teaching Morse to National Servicemen stirred memories. I am, as you see, only recently licensed but I must be of his generation.

In my NS days I was required to work closely with Royal Signals operators who could take 25WPM or better. Although it was not required of us, my colleagues and I mostly learned to read 5 - 10WPM - somewhat on the lines of 'never ask a man to do something you daren't do yourself'.

Senior NCOs in the Signals with experience of instructing were agreed that at around 10WPM there is a psychological barrier and quite a lot of persistence and tedious practice is needed to get past it. Beyond that, speed develops fairly rapidly with quite minimal experience.

Was it perhaps at this stage that the quoted 85% drop-out rate occurred? I don't recall any stories of this sort of thing in the Signals, but as far as I know all the people I am talking about were volunteers (for a special category) whereas Harold gives us the impression that his people were 'pressed men' and probably less motivated or less carefully chosen.

I have never seen mention elsewhere of this 10WPM 'bar' but my own experience over the last year seems to bear it out. Do others agree?

Gerald Batty G0THB

WHAT IS DBW?

Why do the Radiocommunications Agency - alone in the world compared with other amateur radio licensing authorities as far as I know - have to quote maximum authorised power in 'dBW'?

What is dBW anyway? My transceiver barefoot will put out 100W maximum, my amplifier about 900W maximum. Fine. My Spanish licence clearly states I am permitted to put out up to 800W on the HF bands. But my British licence says "Maximum Power level (in dB relative to one watt) PEP 26dBW." Why so complicated? What is the advantage?

Manufacturers of transmitters quote output power in watts. Hams say "I am running 100 watts" (or more!) Why can't we have the world-wide accepted measurement of RF power in our licences? It does seem to me it's a bit like the proud parents at the Passing Out Parade: "There's our Jack, and he's the only one in step!"

Stanley Ingram G6ZY (and EA6ZY)

PS. Congratulations on the new layout and general brightening up of RadCom *- I like it!*

[For an explanation of dBW and why it's a useful way of expressing power, see this month's In Practice *column -Ed]*

THE OLDEST RALLY?

Many thanks for the entry in *Rallies and Events* this year. May I pass on my thanks to all our friends and helpers who again made this year, the 36th in a long series of Northern Mobile Rallies, a very successful event.

Having been NMR Rally manager for a mere four years, I am keen to find out more about the early days back to its start in 1958 or so. I have on occasion met one or two amateurs who have filled in some gaps but a lot of information remains lost. Has anyone got any old programmes etc, or can they provide any further information? I have been told this event is the oldest continuous one of its kind in the UK - is this true?

Mike Stockdale G0MKK

RED LINE PROPAGATION

Thank you for printing the red lines on the propagation predictions for me. As I could find no explanation in the copy may I explain to readers what this is all about? I read selections from *Radcom* onto tape for blind and invalid people who are members of the *Reading Rattle*. One of the difficulties I have experienced for many years is how to convey the large amount of information within the predictions into sound without reading every figure in every column. By dividing the columns into blocks of 'before breakfast' and 'after early tea', I can see at a glance that for example nothing is happening at all in a block, or levels peak at this period or that. In this way I can convey the sense of the whole page in under ten minutes of a ninety minute tape.

Reading Rattle is a long established tape magazine for blind and invalid radio operators who are members of RAIBC. It is run by Graham Bedwell, G3XYX, who edits the tapes, copies them and organises the despatch. Graham has several readers working with him to do *RadCom*, *Practical Wireless* and *Short Wave Magazine* and these we supplement with anything interesting that comes to hand, from cars and planes to the environment and personal experiences. Just like on the air rag chewing. Our readers include housewives and broadcasters as well as licensed amateurs. The *Reading Rattle* works both ways with the members sending back taped info, giving news, asking questions and commenting generally. It is a very good project which I am sure gives as much pleasure to the senders as it does to the receivers.

We are now tackling the difficult bits like descriptions of your pictures, diagrams and drawings, and dealing in greater depth with such things as how to deal with interference on the car radio.

Alan Lovegreen G4FLX

[When you first wrote to us, we liked your idea and thought that others might benefit from the increased readability the lines give. Nice to discover that those working with the disabled can teach the rest of us a thing or two about clear presentation. Keep up the good work - Ed]

BELIEVABLE LOWES

What a pleasure to buy from Lowes at Matlock. I bought a rig that wasn't suited to my needs, contacted them 48 hours later and swapped the rig for another, without any hassle or fuss.

Tim Raven G4ARI

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.

GONE DOTTY

With reference to the difficulties of learning Morse, perhaps the following true anecdote may be of interest.

During the war in 1945 I was a trainee radar mechanic at RAF Yatesbury. Being already an NCO I had to share some of the station NCO duties. One evening I found that I was in charge of the guard on the psychiatric ward at the camp hospital. On reporting for duty I was told that my services were not needed as the ward was empty. The nurse in charge then told me that with the radar course they had hardly any patients, but previously when the school trained radio operators the ward was usually quite full.

To allay any fears among aspiring A licence amateurs, I would say that the RAF operators' course at that time was far more intense than anything required for the amateur A licence.

P B Etchells GD0TFY

CONTEST CONVERT

Just to say how much I enjoyed having a go in the RSGB's County Roundup on 15/16 May. Up to now I've always hated contests, especially those ghastly all-weekend events full of screaming Italians and raspy Russians clogging up the bands to the virtual exclusion of those of us who don't.

But this one was different: a refreshing three hours only each way - SSB on the Saturday, CW on the Sunday. Surely more than enough time for any station to prove their worth? And there was a very gentlemanly approach on the part of everybody I bumped into. On 40m SSB at least, there even seemed to be a genuine demand for 'common-or-garden me' in down-town Avon - an event in itself. Here's looking forward to it all again next time round.

Martyn Phillips G3RFX

SHELTERED BUT ACTIVE?

I am 85 years plus and my wife and I are fast approaching the time when we may have to give up our home and go into sheltered accommodation. My amateur radio activities (mild as they are) are dear to me and I don't want to be excluded from them. Have any amateurs similarly placed found a solution to the problem? I operate on HF with an FT102 and 2m with a dual-bander.

J W Dainty G4PDN

2'S MORE COMPETENT

I am in my 34th year as a licensed radio amateur (sometime G3NYA, sometime G6WTO) and am writing in praise of the 2E0 novices who are newly practising Morse code, especially on the 80m band.

Here we have a case of operators necessarily copying signals that are often near the noise level of the band. I find that when I transmit a low-powered signal, a Novice will take the time to listen at a time when I am ignored by longer-established and more experienced operators.

In this case experience has been proved to be *no* measure of competence, and the Novice Licence appears to be breeding a generation of more competent operators. Well done!

L D Strange, G3NYA

SYMBOLIC RESISTANCE

Would someone please say who introduced that silly rectangle as a schematic resistance symbol, and why? It appears to have been foisted upon us quite undemocratically, without reference to individual members of electrical engineering institutions by the BSI, so it seems, and then slavishly copied by official, semi-official and other organisations.

Someone said it was for ease of computer manipulation, but that's nonsense. Rectangles are rather less than chicken-feed to any computer worth its salt. Another said it represented the outlines of a resistor's side elevation, but that's also nonsense. None of my resistors exhibits that outline. In fact the outline, be it such, more nearly represents that of small tubular capacitors and small inductors. Furthermore it clashes with the rectangular symbol used in drawings representing 'microstrip' components.

If the EC is behind this, 'nuff said! I'm told that they are about to issue a directive to vegetable growers to grow straight cucumbers for ease of packing! I would suggest that as a stage further in this regard cucumbers should not only be straight but have a square cross section. This would make packing even easier!

Alan B Pidgeon G6CBP

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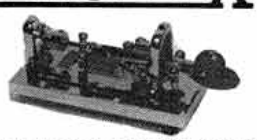

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NEXT COPY DATE

The display advertisement copy date for our September 1993 issue will be **12th July 1993**

HANDHELD HEAVEN

IC-P2E/P2ET

The picture below shows the IC-P2E 144MHz FM transceiver, typical of ICOM's new wave of handhelds, the IC-P2ET has extended functions and is keypad operated. Both of these compact radios have AI (Artificial Intelligence) a unique feature that allows instant access to previous functions. The IC-P2E and P2ET will evaluate your operating capability and memorize the order of functions used Other features include; 100 memory channels, programmable call channel, ergonomic design, system clock with timer and lots more.

IC-P4E/P4ET

The IC-P4E and P4ET (pictured) are 430MHz FM transceivers visually similar to the IC-P2E range.

Features include: compact and ergonomic design, 100 memory channels, 5 watt power output with 13.8VDC, cartridge-type battery pack, full programmed and memory scan features, a variety of tuning steps, simple 1750Hz tone call, auto power-save and frequency lock function. The durable splash-resistant body measures 49W x 105H x 38D mm. and weighs a mere 280g. We think you will agree that these compact handhelds will prove to be winners.

IC-2iE/4iE

These two new, ultra-slim and rugged handhelds have got to be the smallest transceivers around. Even including battery pack these radios will fit snugly into your shirt/jeans pocket or handbag. The IC-2iE operates on 144 - 146MHz FM and the IC-4iE on 430 - 440MHz UHF FM bands. Both of these radios feature: maximum 5 watt output (with 13.8VDC battery), output miser to conserve battery power, 10 memory channels, scanning, power-save function and dual tuning steps. A full range of practical accessories are also available to make these pocket pals even more fun to operate.

IC-W21E

The IC-W21E offers dual-band 144/430MHz simple operation using few switches and independent volume / squelch for each band.

The ergonomic and splash-resistant design makes the IC-W21E a snug fit in the palm of your hand. Features include; cellphone-style 'whisper' function. This allows cross-band full duplex use via the mic-equipped battery pack, and easier repeater operation with repeater memory. Every time you access a repeater all settings are automatically memorized in a repeater memory.

IC-W21ET

The W21ET has the same dual-band performance characteristics as the IC-W21E but sports a command keypad and relocated back-lit display (manual operation is also available). Features are as the IC-W21E and include: battery capacity indicator, remote control via an optional HM-75 speaker mic, 70 channels, dial select steps, monitor function, high-speed scan functions, frequency-lock function, external DC power jack for mobile use, auto power-down to allow last minute operation before battery fades, giving you the most from your IC-W21ET.

IC-2SRE/4SRE

The distinctive appearance of these two handhelds is bound to start the tongues wagging. You can enjoy the advantages of a handheld transceiver with a wideband receiver allowing true reception of FM Broadcast, Air and Marine bands. Until now this was only achieved by purchasing separate equipment. The IC-2SRE is a 2m FM transceiver with wideband receive and the IC-4SRE is its 70cm companion. Other great features include; selective calling, 30 ham memory and 60 wide-band receive memory channels plus loads more.

N.B. Photographs not to scale.

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