

Radio **Com**munication



The Journal of the Radio Society of Great Britain

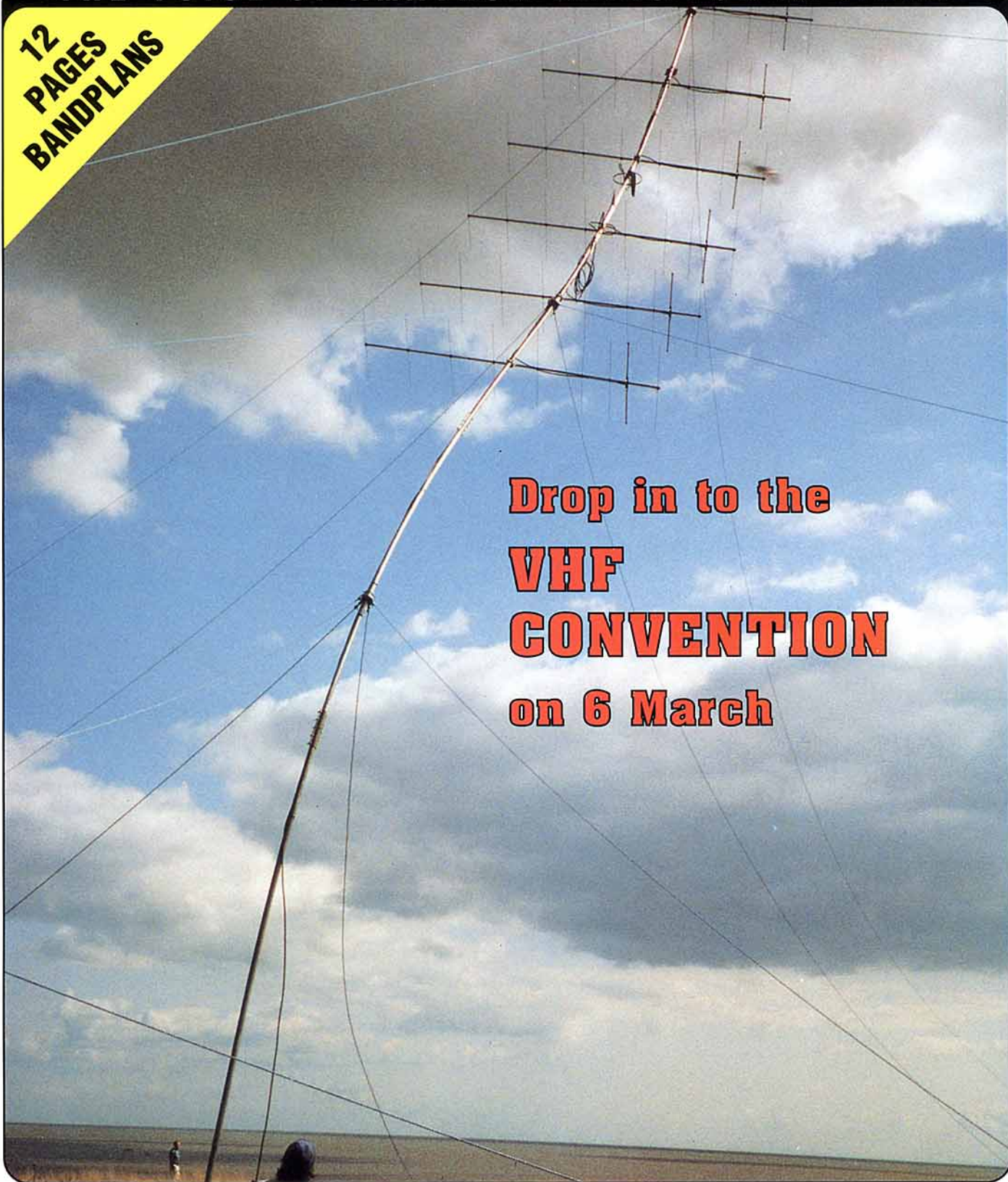
March 1993

Volume 69 No 3

THE VOICE OF AMATEUR RADIO FOR 80 YEARS

**12
PAGES
BANDPLANS**

**Drop in to the
VHF
CONVENTION
on 6 March**





Kantronics the digital leader

announces the availability of **Pactor** for the KAM (Kantronics All Mode). Maintaining its "state-of-the-art" status, Kantronics, in cooperation with the German developers of **Pactor**, has made the newest digital mode available as an option for KAM owners.

Pactor combines the best features of packet radio and AMTOR to provide robust digital communication for HF data transfer. Like packet, **Pactor** uses a 16-bit code (CRC) to insure error-free data transfer between stations. Features unique to **Pactor** include:

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- Memory-ARQ and optional Huffman data compression for increased throughput.
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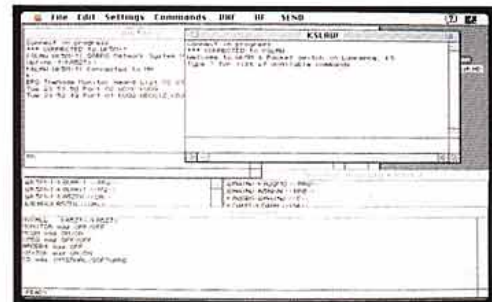
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The standard KAM is version 5.0. The new **Pactor** option (version 6.0) is available now for all KAMs, with or without version 5.0 firmware. Contact your favorite dealer or Kantronics today and join users world-wide who are enjoying **Pactor**.

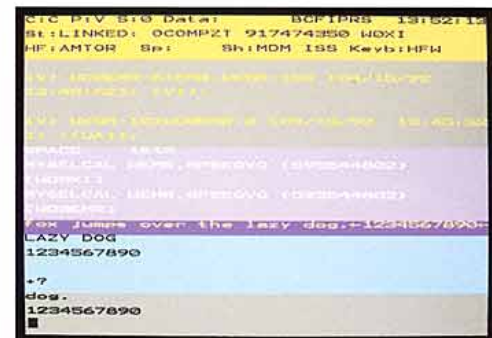
Kantronics KAM . . . the leader in all-mode digital communications.



Hostmaster on the PC



Hostmaster on the Mac

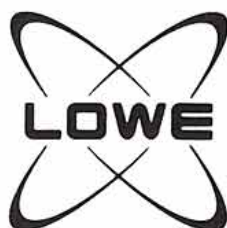


Hostmaster on the Commodore 64

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RSGB Switchboard
0707 659015

Radio Communication



In This Month's Extra 16 Pages:

- * Annual General Meeting Minutes
- * Amateur Radio Bandplans for 1.8MHz to 24GHz.
- * RSGB's Unaudited Half-Year Accounts.

NEWS AND REPORTS

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Ian Keyser, G3ROO, describes the construction of a simple 50Ω dummy load for low power operation. A colour feature.

28 100W HF MOSFET AMPLIFIER: Part two

In the concluding part David Bowman, G0MRF, shows how to test the amplifier and deals with power units and filtering. A colour feature.

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41 EUROTEK - ideas from abroad

Erwin David, G4LQI, presents an abridged translation of an article by OE9MKV in which a multi-purpose DC regulator is described. It first appeared in the Austrian magazine *QSP*.

60 POWER SPLITTER FOR 70CM

First published in *Oscar News*, this handy project allows the correct phasing of two UHF aerial arrays for satellite, moonbounce or DX use. It can be made simply and cheaply according to the author Peter Saul, G8EUX.

64 HOW BIG IS A BAD SWR . . . and how does it affect your transmitter?

There's an awful lot of bunk talked about SWR. Bob Pearson, G4FHU, presents the real lowdown. Part two is published next month.

67 EQUIPMENT REVIEW: MFJ-9020 20m CW Transceiver

QRP expert George Dobbs takes a critical look at this 4 watt mono-bander. A colour feature.

Radio Communication



COVER PICTURE:

It takes great presence of mind to pick up a camera when your 60ft contest mast is falling down. Thanks to John Lemay, G4ZTR, of the HADRABS and Windbreakers Contest Group for this month's cover which serves as a reminder for the VHF Convention. See page 18 for details of the UK's premier VHF event.

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RADIO SOCIETY OF GREAT BRITAIN

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

PATRON: HRH PRINCE PHILIP, DUKE OF EDINBURGH, KG

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

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UK associate member under 18: £15.00. **Family member:** £12.00
Corporate (Concessionary): £25.00 over 65 or full time student under 25.
(Applications should provide proof of age at last renewal date and/or include evidence of student status.)

Affiliated club or society/registered group (UK): £15.00 (including *Radio Communication*). (Subscriptions include VAT where applicable.)

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

Membership application forms are available from RSGB HQ

RSGB Main Switchboard:
0707-659015

The RadCom Leader

What Does the RSGB Do For Me?

I AM ALWAYS BEING ASKED my opinion regarding the value for money of the subscription and the services provided to our members, and the Amateur Radio Community at large.

The list below is designed to give you an insight into how the RSGB is working on your behalf. It makes interesting reading and I hope you will agree that membership of the Society is extremely good value for money.

Peter Kirby, General Manager

DIRECT BENEFITS (members only)

- Radio Communication
- Outgoing QSL Bureau
- 15% discount on books and newsletters
- Ability to enter RSGB Contests
- EMC advice
- Planning advice
- Technical advice
- Equipment Insurance
- Audio/Visual Library
- Reciprocal licence information
- Publicity of club events
- Members' Advertisements service
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SPONSORED ACTIVITIES

- Contests
- Awards
- Repeaters
- Beacons
- Packet radio
- Trophies
- Direction Finding
- Propagation studies
- Affiliated societies
- Regional meetings
- Club lectures

THE WORK OF THE SOCIETY

- Maintaining and improving licence conditions
- Publishing books
- Promotion to ensure the continuation of the hobby
- Publishing newsletters
- Microwave Components service
- National and International coordination of band plans
- Protection and expansion of international frequency allocations
- GB2RS News Bulletin
- GB2CW Morse practice transmissions
- Conventions, rallies and exhibitions
- County Liaison
- Morse Tests
- Novice Licence training
- Special event stations
- Packet radio Notices of Variation
- Special Research Permits
- Repeater/Beacon/ Packet Node Coordinating
- Intruder Watch
- Amateur Radio Observation Service
- Incoming QSL Bureau

Two Records Broken... and They Keep Going!

● A RESIDENTIAL course will be held at Kilve in North Somerset, 5 - 8 April 1993. It will be suitable as an introduction to amateur radio for the complete beginner or as a refresher in basic radio theory. Special event station GB2KRC will be active on all HF bands and 2m, using SSB, CW, SSTV and data. Details: Adrian Dening, G4JBH, 0935 74562 x 238 (daytime).

● STOLEN from the Goole Radio and Electronics Society: Yaesu FT730R (S/N 3C060105), Yaesu FT230 (S/N 4C220005), Clearstone Commando 4m FM crystallised on 70.350 and 70.375MHz and a Hanson Power Meter. Information to Richard Sugden, G0GLZ, on 0405 769968.

● AS A RESULT of contacts made during JOTA, a party of Scouts in Salisbury went to Czechoslovakia and a return visit is planned for this year. Salisbury Radio and Electronics Society is helping six Scouts take the Communications Badge. Two Venture Scouts have joined the club and are taking the RAE.

● NEW UHF VOICE repeater GB3TL became operational on channel RB14 from its site near Spalding on Sunday 24 January. GB3TL is operated by the Spalding and District Repeater Group. Details from G7JBA.

● STOLEN from a minibus in Cheshunt, Herts: TS130V (missing Anit Vox knob), home-brew 160m transverter in a die-cast box, and an SWR bridge. Information to Cheshunt Police on 081 366 1212.

● THE TIME restrictions on 2m repeaters GB3s BX, CF, MH and WK (reported Feb) will not apply to genuine emergency use on behalf of a User Service.

● SOUTH NOTTS ARC has a trip to Friedrichshafen 23 - 28 June costing £169. Call Julian, GOLXX, on 0602 211069 for details.

● JA1ACB HAS REACHED the DXCC Honor Roll using only RTTY.

More Phone Changes

WITH IMMEDIATE effect, there's only one RSGB phone number to remember - 0707 659015. The installation of a new phone system has allowed us to streamline operations and all calls will pass through our new switchboard.

SIR RANULPH FIENNES and Dr Michael Stroud have taken the record for the longest unsupported polar walk ever made. The previous record had stood since 1909, when the team used the Antarctic 'larder' supply by killing penguins and seals for food and fuel. Ran and Mike carried with them all their food in dehydrated form and have been reconstituting this with melted ice each meal time.

Their second record was snatched on Saturday, 6 January when the intrepid duo completed their unaided walk across the Antarctic Continent. Despite ill health and injury, the pair then decided to walk a further 350 miles to complete their journey to Scott Base.

This is a story of sheer guts and determination straight from the *Boys Own* comics of years ago, and is all the more admirable as it is being done to help raise £2M for Multiple Sclerosis research.

At the time of writing, they had walked for over 90 days and had completed more than 1200 miles. Pressure was on them to be air-lifted off the Ross Ice Shelf owing to their



Fiennes and Stroud pose briefly at the South Pole before resuming their epic journey. Each mile travelled raises more money for Multiple Sclerosis research.

deteriorating condition, and this is a distinct possibility in the next few days.

Both men have lost a third of their body weight and Ran Fiennes has a badly infected foot. They are still pulling sleds - which are now badly damaged but which still weigh over 200lb each. Only their determination to succeed is now driving them on. They have just over a week to reach Scott Base, where a ship will wait between 17 and 19 February to take them home.

VP8/GB4MSS

THE EXPEDITION'S communications officer RSGB Member Morag Howell, GM0MUV, has had to be air-lifted from her base at Patriot Hill as the

weather is deteriorating, so preventing further aircraft landings. She is now keeping contact with Ran and Mike from Punta Arenas in Chile. The expedition's only means of communication is via Morag, using their Yaesu FT70G, as the experimental satellite system they were using developed a cable fault. Morag also keeps in constant touch with the UK end of the expedition, husband Lawrence, GM4DMA, via a satellite comms link.

Our congratulations go to all concerned in this great achievement. The communications skills of Morag and Lawrence, developed through amateur radio, plainly contributed to the expedition's successful and safe outcome.



Providing vital communications was Morag Howell, GM0MUV, seen here with Mike Stroud.

● 27/28 March sees the First Clayesmore Morse Festival Weekend. It features trade stands, RSGB Morse Tests, lectures, food and overnight accommodation. For details, send an A4 SASE to: Clayesmore Morse Festival Weekend, Clayesmore School, Iwerne Minster, Blandford, Dorset DT11 8PH.

STOP PRESS STOP

On 11 February, starvation and frost-bite caused Fiennes and Stroud to call off the trek. As we go to press they are being air-lifted off the Ross ice shelf.

Turn to page 7 for Licensing News

Radio Amateur Relief Expeditions: Bosnia

A GROUP OF radio amateur volunteers from a newly formed group Radio Amateur Relief Expeditions (RARE) recently returned from an eventful journey to the Balkans. At the request of the Balkan Relief Organisation they provided radio communications for a relief convoy. The following is abridged from a first-hand report by Norma Sunderland, wife of founder member of RARE Don, G6FHM:

A team of eight radio operators and myself (co-driver, caterer, first aider etc) travelled on Sunday 27 December to Ramsgate to meet the rest of the convoy. We had with us a long wheel base personnel carrier loaned by Land Rover and Don's Mercedes 208 mobile communications vehicle.

We were to meet the rest of the convoy at Ramsgate dock at 1800 to become acquainted and to install the radio gear. By 2000 a mixed fleet of vehicles, most bearing the red Knights Templar Cross, were still awaiting the arrival of the leader. It was with dismay that we saw the state of some of the vehicles, some of which seemed to have been lucky to have got as far as Ramsgate.

Eventually the leader arrived. At last we would be able to get organised and get moving. We were to board the 2300 ferry if there was space - there was not! It looked like being a long night as we all waited for the 0900 sailing.

A New Leader

IT BECAME apparent that many people had misgivings regarding the competence of the leadership. By dawn, after many discussions, and phone calls to the Charity Trust, the expedition had a new leader, a retired major.

It was obvious there were too many radio operators, especially as some of the vehicles would definitely not be capable of making the journey. Unfortunately three operators had to be sent home. This was an agonising and disappointing time for those who, after all the time and effort spent preparing for the trip, and to face the fact that they would not be going after all. This included Geoff

and Robin Dellbridge, G0PMF and G0PMG, and Sid Richards, G0PPG.

The reduced convoy boarded the ferry twelve hours later, and assembled at Dunkirk at the start of a memorable journey. The lead vehicle was the Land Rover with Dave, G0KWY, on board. Radio operators, Gordon, G4ZUS, and Glyn, G0PGE, were placed in key vehicles to try and keep everyone in contact and the Merc communications vehicle brought up the rear with Norma, Don, and Brian, G6ZYI.

The journey was very eventful with vehicles breaking down frequently, or getting lost. Drivers soon became impressed with the advantages of having radios.

On the final day of 1992 we arrived in Croatia where we waited to board a ferry for the 12-hour trip down the coast to Split.

Suffering

WE BECAME aware of the suffering and conditions of the people. A boy soldier aged 16, who had been enlisted at 14, killed people at 15, and had witnessed atrocities against young children. He was returning, petrified, to the front line and was drinking himself into oblivion. There was also a young mother who had all she owned packed into assorted bags and boxes. She had got out of Sarejevo after her husband and family had been killed, and had



The radio operators stopped off at RSGB HQ en route for Ramsgate. Pictured are (l to r): Don Sunderland, G6FHM; Geoff and Robin Dellbridge, G0PMF and G0PMG; Norma Sunderland; Gordon Smith, GW4ZUS; Glyn Evans, GW0PGE; Brian Jones, GW6ZYI; Sid Richards, GW0PPG and Dave Davies, GW0KWY. Unfortunately, three operators were unable to go to Bosnia owing to poor organisation of the main convoy.

since lost her baby. She was trying to return to find her mother, but did not know whether she was alive. These are just a couple of many thousands of tragedies occurring daily all over the country. We all endured the trials of the journey to try and ease the lives of innocent people, if only in a small measure.

When the convoy reached Split, one truck had already gone on to Sarejevo, though the UN had advised this was not safe. Some of the aid was delivered to a UNHCR warehouse for distribution by them but two vehicles carried on to Mostar to make the delivery direct to the people of this devastated town.

At Split, it was easier to keep to radio schedules with the UK where GW4YIY and GW3RVG were doing a great job. Some contact had been made en route using a Yaesu 747 and a G whip aerial. At Rijeka we managed to

erect a Cushcraft R7 vertical. Contact was made with local amateurs and a visit made to one of Split's two radio clubs. There are about 500 radio amateurs in the area playing an important role in the war, collecting information on conditions and happenings which they relay to the UN commanders daily. They also find out information on the whereabouts and well-being of families and friends and try to give hope to those who do not know what has happened to their loved ones.

There followed three frustrating days trying to get the necessary documents and a booking on a return ferry.

Going Home

THE JOURNEY back was almost non-stop. The convoy arrived at Dunkirk just 30 hours after leaving Rijeka, and landed back on British soil at about 0200.

Much-needed aid was delivered and it was acknowledged that without the radio communications it would not have been possible. Everyone learned a great deal about running aid convoys and not all the experiences were bad. We now look forward to our next call for assistance in relief work. There will soon be a team of radio amateurs with various skills and experiences who will be well prepared for whatever will be asked of them. If you wish to become involved and think you can help, or would like more information, please contact Don Sunderland, G6FHM, 1 Allfield Cottages, Condoover, Shrewsbury SY5 7AP.



The expedition encountered bitter weather. One night in the Austrian Alps the temperature was -20°C .

Licensing News from the RSGB

Novice Licence Improved

THE Radiocommunications Agency has completed its review of the Amateur Radio Novice Licence scheme which it has been carrying out in consultation with the City and Guilds and the RSGB. Some substantial improvements have been made to the Novice Licence Schedule without compromising the incentives to obtain a 'full' Amateur Radio Licence. The changes are as follows:

- The 80m Novice band is increased by 5kHz to include the accepted QRP frequency. The new allocation is 3.560 to 3.585MHz.
- The 10m Novice band is increased by 40kHz, also to include the QRP frequency. The allocation is 28.060 to 28.190kHz.
- The whole of the 50 to 52MHz band is now available to Novices. Morse, Telephony and

Data is permitted over the entire allocation.

- The 432MHz Novice allocation is increased by a massive 6MHz. The new allocation is 432.0 to 440MHz. Television, both slow and fast scan, is permitted in the 435.0 to 440MHz sub-band.

These changes will give Novices better access to frequencies used by other amateurs and will improve the opportunity for contacts with them. The full revised Schedule appears on page 56.

A number of improvements to examination questions have already taken place. An addendum to the Novice Radio Amateurs Examination syllabus has been agreed and will take effect for preparations for the examinations planned for June 1993 onwards. This has already been made available to RSGB Novice Instructors.



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Mr J Bazley
Brooklands
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Worcs B95 5NW

Date 1 February 1993

Dear John

AMATEUR ALLOCATION AT 430 MHz

At a recent meeting between the RSGB and RA you expressed concern about statements made in the minutes of a meeting of the Low Power Radio Association. You explained that the minutes suggested that amateurs should lose their allocation at 430 MHz and as the meeting had been held at Waterloo Bridge House this was being misinterpreted as the view of the Agency.

I am pleased to confirm that this is not the view of the Agency. At our meeting I explained why this particular LPRA meeting had been held at Waterloo Bridge House and that RA had not been involved. The LPRA are entitled to express their opinion but 433.92 MHz has been allocated to low power radio keys for car alarms on a non-protected basis. The allocation was made to bring the UK into line with the rest of Europe as it is essential to have a harmonised frequency for this type of application. There was never any question of removing existing services from the band.

I hope that this letter has explained the situation and given you the assurance that you required.

Yours sincerely

VAUGHAN ASQUE

This self-explanatory letter was sent to the chairman of the RSGB's Licensing Advisory Committee. Along with other items on this page it serves to allay fears that we are losing our 430MHz band.

430MHz Restrictions to be Removed

FOLLOWING AN approach by the RSGB, the Radiocommunications Agency has agreed in principle to the removal of the prohibition on the use of the 430 to 432MHz band in the North of England. The restriction on stations within 100km of Charing Cross will remain. The implementation date has yet to be announced.

Special callsigns?

THE RSGB HAS again raised the question of special callsigns with the RA and the Society has been asked to put forward formal proposals.

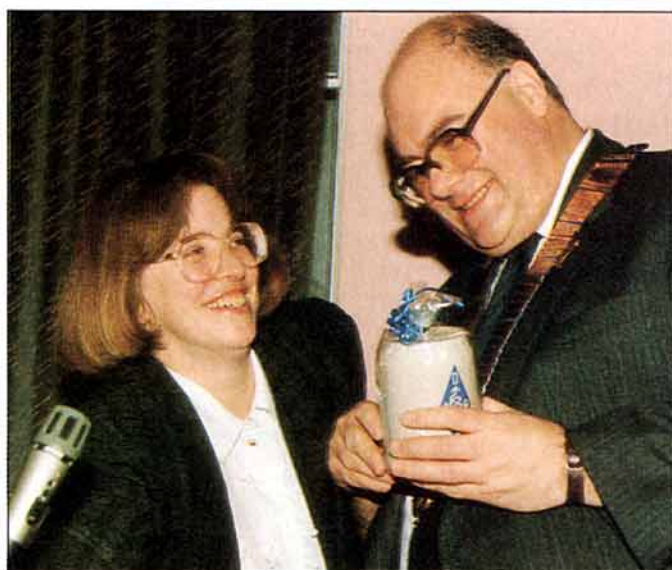
**The RSGB —
Working for
You**

Greetings Messages for All

THE RA HAS agreed to an RSGB request that greetings message facilities should be made available to all licensees, and not just those using GB or club calls. This should make it even easier for members to convey the fun of amateur radio to newcomers and shack visitors. It is expected that the licence change will be effective from about six months' time.

RadCom's growing

FROM NEXT month, your magazine will be bigger! There will be an additional 16 pages devoted entirely to amateur radio. New regular columns will include *Simply Silicon*, a look at a useful IC each month; *Contest Exchange*, all about contesting (but no tables); and the return of *In Practice*, sound advice from top technical writer Ian White, G3SEK. Plus more equipment reviews, even more construction articles, and many other goodies.



The Installation of the 1993 RSGB President, Peter Chadwick, G3RZP, took place at the Bonnington Hotel, Russell Square, London on 9 January. The President was showered with gifts, including a beer mug from the German national society. This was presented on behalf of the DARC by Angelika Voss, DF2XV (pictured above). The French society, REF, was also represented.

♦ ♦ ♦

Amongst those making complimentary speeches was Past President Len Newnham, G6NZ (left), who reported having been at Cranfield with Peter's father, Harold, G8ON.

The text of the President's acceptance speech was published in last month's *RadCom* on page 6.



Attention Morse Test Candidates

ROY CLAYTON, G4SSH, Chief Morse Examiner has issued the following reminder:

Would all Morse test candidates please note that as from 1 January it became a Radiocommunications Agency requirement that two recent passport-sized photographs must be produced at the time of the examination (see *RadCom*, Sep 92). The requirements state that failure to produce these photographs for identification will result in the candidate not being allowed to take the Morse test. Candidates no longer need to produce written proof of identity, such as a passport or driving licence.

Executive Vice President

AT THE COUNCIL Meeting on 6 January, Mr I D Suart, GM4AUP, was elected as Executive Vice President for 1993. Ian continues to represent Zone G.

Auto Logging?

HAS ANYONE experimented with the automatic logging of speech transmissions? The Society has been asked to advise on a project and anyone with such experience is asked to contact the Vice-Chairman of the Licensing Advisory Committee, Julian Gannaway, G3YGF, QTHR.

GB3GC QRT

THE EAST Yorkshire (formerly Humberside) Repeater Group is to decommission the Goole UHF repeater, GB3GC, "for operational reasons". For further details, contact Norman Bedford, G4NJP, QTHR.

Hants RLO

JOHN IRWIN, G4XJT, is the Acting RSGB Liaison Officer for Hampshire. His address is: 5 The Thicket, Fareham, Hampshire PO16 8PX; tel 0329 827051.

● IN OUR report on the IARU Region II Conference (*RadCom*, Nov 92), the venue should have been stated as Curacao and the photo caption should have made it clear that Willy Grovenhorst is President of the host Society VERONA. Apologies to all concerned.

● ARRL'S COMPUTER bulletin board can be accessed by telephoning 010 1 203 666 0578.



Council member Hilary Clayton-Smith, G4JKS, explains the Society's Project YEAR to some visitors from Cameroon.

RSGB Meets Science Teachers

THE SOCIETY was represented again this year at the four-day meeting of science teachers held at Loughborough University in January. Project YEAR Coordinator Hilary Clayton-Smith, G4JKS, put on a stand and introduced amateur radio to interested teachers, not only from the UK but from all over the world. Details of the Novice Licence went back to Cameroon, Somalia, Nigeria, Peru, the Maldives and India, as well as New Zealand and Australia. Promotional material information leaflets and back copies of *D-i-Y Radio* and *RadCom* are now installed in resource centres and libraries in schools all over the world.

Helping on the stand were Society members G3ORY, G0LBP and G8AYG who did a great deal to pass on their own enthusiasm to this receptive audience.

Radio Amateur Emergency Network Ltd - Affiliation

THE APPLICATION by Radio Amateur Emergency Network Ltd to affiliate to the RSGB was briefly discussed at the January Council Meeting, and in accordance with standard practice for applications from national bodies, was referred to the Chairman of the Membership Liaison Committee. He has informed the President and the Company Secretary that there are important points in this matter which he wishes Council to discuss, and has requested that the matter be placed on the Agenda of the February Council Meeting. No licence or permission for the use of the Raynet logo is granted to any group other than as stated on page 8 of the January issue of *Radio Communication*.

Peter E Chadwick, G3RZP, President
17 January 1993



Part of the Society's library of historical and contemporary publications. If you want to donate any books or periodicals to this library, the Society Librarian John Crabbe, G3WFM, would be very pleased to hear from you. He is at HQ most Tuesday and Thursday afternoons, or write to him QTHR. If you would like to make use of the library, please contact John first.

Free! RadCom for the Blind

SOME TIME ago, we announced that a scheme was to be set up whereby *RadCom* would be provided on a tape free of charge to our blind members. We are pleased to announce that from this edition, the service is now available. It is being coordinated by Enterprises by the Blind (Bedfordshire) on behalf of the RSGB.

Members requiring this service should contact: Roy Gerrard, G3LAZ, 46 Hadrian Avenue, Dunstable, Bedfordshire LU5 4SP; tel 0582 665017.

Russian Clubs Under Threat

FOLLOWING THE 1991 revolution in the former USSR, the considerable state subsidy given to operators and clubs has been withdrawn. The main radio club in Moscow is to be relocated to accommodate a police academy in its old HQ, and there is no longer free postage for QSLs.

Representing Russia's 30,000 amateurs is the new national society Soyuz Radiolyubitelei Rossii (SRR), presided over by UA6HZ. SRR has no funds; delegates from each Oblast paid their own expenses to attend the inaugural conference.

Young Amateur of the Year 1993

Now is the time to start thinking of nominations for the 1993 Young Amateur of the Year. This prestigious award, sponsored by the RA and the RSGB and supported by industry, is for outstanding achievement by an amateur radio enthusiast under the age of 18. The current award holder is Martin Saunders (17), G7JCJ, of Dorset. A number of prizes are offered to the winner and runner up. The closing date for applications is 31 July 1993. Further details will be published next month.

Repeater Closedown

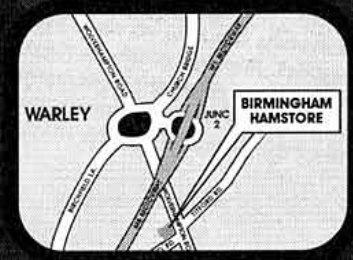
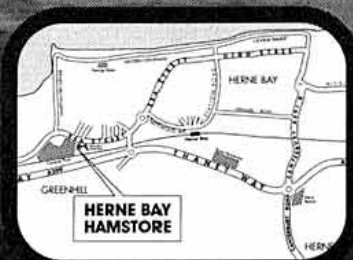
REPEATER GROUPS are strongly advised to make sure that their emergency closedown system works at all times. Particular attention should be paid to notifying HQ of any changes of operator or telephone number, and to reducing the possibility of all operators being unavailable at the same time.



RADIO HAMSTORES

PICKETTS LOCK RED HALL STAND-S MARCH 13/14th BE THERE WE WILL BE!

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NEW ICOM IC-W21ET DUAL-BAND HANDHELD
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As mentioned we also stock AEA, AKD, Alinco, AOR, Barenco, Comet, Cushcraft, Davis, Dee Comm, Diamond, Icom, JRC, Kenwood, Lowe, Microset, MFJ, RSGB Publications, Toyo, Yaesu, Yupiter etc. plus second-hand & ex-demo equipment.

Part-exchanges & payment by Access, Visa and Switch welcomed. Finance arranged (subject to status). Interest free credit is available on selected new ICOM products.

If you cannot visit a HAMSTORE in person, why not use our efficient Mail Order Service. Stock items normally dispatched within 24Hrs.

We give full warranty on all ICOM products bought from authorized ICOM UK dealers. In some cases the equipment will be replaced if the fault is deemed beyond speedy and satisfactory repair. ICOM equipment purchased from an unauthorized dealer is not covered by ICOM warranty.

Gordon G3LEQ & John G8VIQ at Birmingham, Chris G8GKC at Herne Bay and Doug G0LUH & Paul G7MNI in London are all looking forward to your visit.

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ALL STORES OPEN TUESDAYS TO FRIDAYS 09:00 - 17:00 & 09:00 - 16:00 SATURDAYS. N.B. Herne Bay closed for lunch 1300-1400

MARTIN

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Why Wait Nine Months When You Can Have It In

I've extended the buy now, pay over nine months with NO INTEREST for MARCH only. Why wait another nine months and see your new radio go up in price again? Come to Picketts Lock, (or phone or call in at the shop), bring some ID with you (a driving licence/phone bill will do), bang a deposit down and subject to approval from the gang at TRICITY FINANCE, you can take your 'new baby' home with you - and PAY NO INTEREST ON THE WHOLE DEAL!



THE NEW YAESU FT736R DX

A Lynch + muTek development which gives the standard FT736R the competition performance it deserves. Mike Dorset from muTek, will be present on Saturday at Picketts, to demonstrate the remarkable improvement his design and development team have spent months in the making. If you've got an FT736R, you won't want to use it without the new muTek Front-End Boards! Why not bring your FT736R along for modification - you'll be without it for 10 days, but it's worth the wait! FT225RDs taken in part-ex!



THE NEW MICROKEY

From Airwave Systems is a superb electronic keyer with a difference - it hasn't got 50 buttons on the front for programming! Using the 68HC705 chip, you tell it what you want, by the KEY ITSELF. Many in use by top CW enthusiasts, built in a sturdy, RF-proof case and assembled in the UK to commercial standards. See it demonstrated by Dave Bowman, the designer himself, at Picketts.

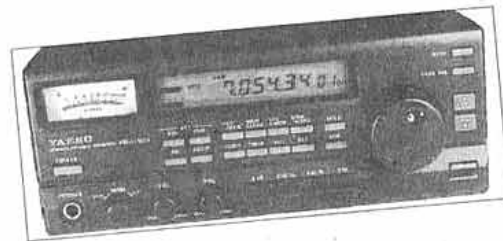
YAESU FRG100

At last a receiver to give the Lowe 225 a run for its money, the new receiver from Yaesu is already set to break all records for receiver sales. Remember it was Yaesu who bought you the FRG-7 back in the seventies, it had to be the equivalent 'Morris Mini' in sales for the Yaesu Musen Company. Come and see it demonstrated by one of the gang on Lynch's stand!



THE ICOM ICR7100HF MKIII

Has become the benchmark for Wide Band Receivers. Now in use by Government departments, commercial organisations and scanner enthusiasts, the HF conversion by Chris Parnell, has made the ICR7100HF the 'professionals' choice. Try it for yourself and speak to Chris - he'll be there for both days.



MARTIN LYNCH

G4HKS

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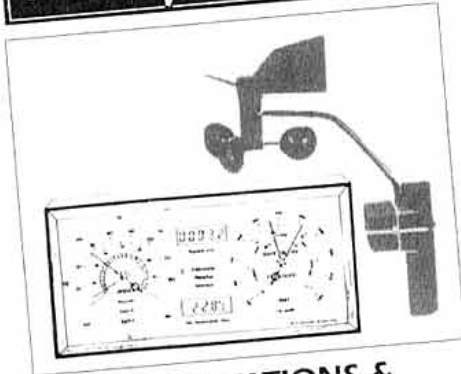
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WEATHER STATIONS & MONITORS

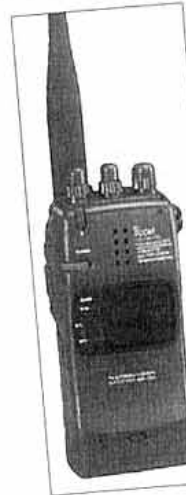
From R&D Electronics, the UK's No.1 meteorological equipment manufacturers, have a complete range of units suitable for monitoring all aspects of weather changes, local to your environment. From the simple WM-DS, indicating Wind Speed & Direction, including Gust at only £189.00, to the top of the range WS-Plus giving Barometer, Wind Direction/Wind & Gust Speed, Outside Temp. Max & Min, Rainfall, Sunshine + more, at £599.00. You can't be a serious DX'er without one! The full range will be on show at Picketts....

NEWSFLASH...NEWSFLASH... NEW HF MINI-MOBILE FROM KENWOOD DUE IN MARCH... PHONE FOR LATEST UPDATE.



YAESU FT530

Advertised for over six months, now finally available, the new DUAL BANDER from Yaesu. The only Handie with a remote digital readout Speaker Microphone available as an option! It's also available on my BUY NOW PAY LATER SCHEME.....



ICOM IC-W21

Well, what do yer know... Along comes another Dual Bander from ICOM! This one is very good - it must be, even I can demonstrate it! Don't want all the gizmos on offer by the competition, but want top grade performance at a sensible price? The boys at ICOM have done it and you can buy it on the 10% down - rest in three months scheme, only from MARTIN LYNCH.

DEWSBURY ELECTRONICS

The old ships captain, Tony Dews, won't be at Picketts this year, but his excellent range of Electronic goodies will be. Amongst the selection, will be the superb DM1000 Easy Reader. A self contained unit, the new Easy Reader will convert most of the funny noises on Short wave that you are hearing at present, (but just give you a headache!), into readable text on a video monitor. The DM1000 from Dewsbury, is a state-of-the-art converter that requires a simple Video monitor, (or TV with the optional modulator), a 12V supply and your receiver to instantly give you access to the world of DATA Transmissions - it's like starting SWL'ing all over again! My mate Tony might just pop along to shake a few hands....

SPECIAL OFFERS

Everything is on special offer at PICKETTS - EXTRA DISCOUNTS or FREE FINANCE, don't be afraid to ask - like my mum says, if you don't ask you don't get!!

YAESU:

The full range, including the FT990, FT890 and their new FRG100 receiver will be on very special offer. Part Exchange is definitely welcome!

KENWOOD:

Now Kenwood's in the UK, everything is OK! Direct from their massive Headquarters in Watford, the full range will be on show, with substantial savings. And there is sign of that new mini HF mobile...

ICOM:

Now these guys are really coming out with some nice kit. Yes, it does tend to be a little more expensive than most, but the advanced features and superb engineering command a higher premium. I may have some pre-price increase stock left...

ALINCO:

All the Alinco range of HANDHELDS AND MOBILE FM TRANSCEIVERS, including the NEW DJ580E are available at Picketts on the special

'BUY NOW PAY LATER SCHEME':

Don't forget to bring some ID and a Bankers Card, (if possible), to walk away with your new ALINCO MODEL at the show!

ELITE range of used equipment:

All used equipment sold by me is tested, cleaned and offered with a full money back guarantee. If it's not as described, you can have your money back. Nobody offers a better deal, or sells as much used equipment - over 6000 pieces in under 3 years!

I've been buying and selling secondhand equipment probably longer than anyone. My school teacher wrote on my junior report many moons ago, "If Martin stopped selling bits & pieces to the rest of the school he would do a lot better". I wonder where Mrs. Robinson is now? Anyway, suffice to say, if your selling for cash, you'll get the top price. Part-exchanging, the same applies and I still offer the SALE or RETURN Scheme. No commission, you tell me what you want and when it's sold I'll pay you that amount - it's easy!



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TM741E



Only
£599

Kenwood's flagship mobile, the TM741E, gives you much more than a simple dual band mobile.

It comes with 2m and 70cms as standard and you can add 10m, 6m or 23cms to give you more flexibility. It's got everything you'd expect from a top class transceiver — high output, cross band repeater and a massive range of receive options including airband and coverage of most of the VHF/UHF spectrum.

We've looked at this set very closely and have now come up with a superb Lowe "mod".

We have completely replaced one of its biggest features — **THE PRICE.**

It's now only **£599**

saving you a massive £160

It's probably the best mod we've done this year!

At this price you can't afford not to have one!

We'll still do a good part exchange deal

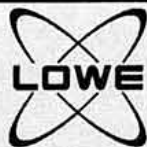
We'll still do our three month lay-away

We'll still do our now famous two year warranty

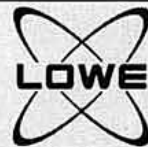
Colln G3XAS at
BOURNEMOUTH
27 Gillam Road,
Northbourne,
Bournemouth
BH10 6BW
Tel: 0202 577760



Dave G4KFN at
NEWCASTLE
Newcastle Airport,
Woolsington,
Newcastle Upon Tyne
NE20 9DF
Tel: 0661 860418



Tony G4CYE at
BRISTOL
79 /81 Gloucester Rd
Patchway
Bristol
BS12 5JQ
Tel: 0272 771770

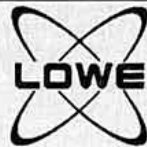


NEW

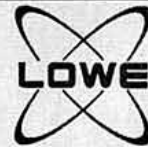
Fred G4RJS at
LONDON
223/225 Field End
Road,
Eastcote,
Middlesex
HA5 1QZ
Tel: 081 429 3256



Tony G4NBS at
CAMBRIDGE
162 High Street,
Chesterton,
Cambridge
CB4 1NL
Tel: 0223 311230



Sim GM3SAN at
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Cumbernauld Airport,
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Scotland
G68 0HH
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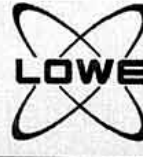
DERBYSHIRE

Here to help you are:

Rob G8MPT, Bill G8LXN
Beryl G7LME, Julie
Tom G6PZZ, Richard G3OQT
John G3PCY

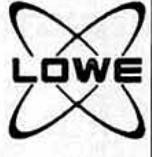
Chesterfield Road, Matlock,
Derbyshire DE4 5LE
Tel: 0629 580800
Fax: 0629 580020

Steve G6URJ at
KENT
Chatham Road,
Sandling,
Maidstone,
Kent
ME14 3AY
Tel: 0622 692773

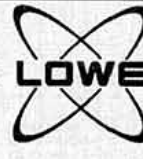


NEW

Tom G4LAR at
LEEDS
34 New Briggate,
Leeds
LS1 6NU
Tel: 0532 452657



Steve G1WSY at
HEATHROW
6 Cherwell close,
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HSWX1	2m/70cm, 4.5/7.2dB,	£74.95
HSWX2	2m/70cm, 6/8dB,	£82.95
HSWX290	2m/70cm/23cm, 3/6/8.4dB	£64.95
GPV55	2m COLINEAR, 2X5/8, 6dB,	£48.95
HS50V	50MHz VERTICAL	£39.95

ANTENNA ACCESSORIES

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MR1000	HF / VHF 200W	£52.95
MR2000	VHF/UHF 200W	£63.95
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SX600	1.8 - 525MHz, 5/20/200W,	£149.95
SX1000	1.8 - 1300MHz, 5/20/200W,	£175.00

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CX210A	2-WAY, SO239	£29.95
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TL100	100W	£54.95
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105TSX	Medium Duty 520kg/cm	£163.16
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HS2BN	2m TELESCOPIC	£15.95
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CF2Y	Coiled Coax / Dc Lead, Suits Yaesu & Alinco	£29.95
DC36F	Coiled Cigar Lead, Suits Yaesu / Alinco	£12.75
DC38F	Coiled Cigar Lead, Suits Kenwood / Icom	£12.75

MOBILE ANTENNA MOUNTS

BM5BC	Mag Mount, So239, 4m Cable Inc Bnc	£23.95
CLPM	"CLIPMAN" Clip Mount Inc Cable	£34.95
GSS	Heavy Duty Gutter Mount	£6.99
HSTMK	Trunk Mount Inc 4m Cable & PL259	£24.95
RG4M	Cable Harness 4m With PL259	£6.50
SFA4M	Cable Harness 4m (with Small Dia. Entry Cable) inc PL259	£28.50
SSB2	Boot / Hatch Mount 4m Cable & PL259	£27.95
FM101	Adjustable Boot / Hatch Mount	£20.50
FM202	Adjustable Gutter Mount	£19.95

MALDOL MOBILE ANTENNAS

CLEAR2E	2m 5/8 3dB, 6m 1/4,	£17.95
HS320	2m 1/4,	£4.25
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HSV2M	2m 1/2 3dB,	£22.95
VM2SK	2m 1/2 3dB	£19.95
VM720SKR	2m 1/2 3dB 70cm 2X5/8 5.5dB	£26.50
VM727E	2m 3/4 4.5dB, 70cm 3X5/8	£47.95
VM7SS	70cm 1/2 3dB,	£17.95
WT300	70cm /900MHz	£24.50
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WT1000	2m/ 70cm / 900MHZ	£49.50
WT1062	21-28 / 50 / 144MHz	£62.00
WT1500	50 / 144 / 430MHz	£57.00
WT1800	21-28/ 144 / 430MHz	£59.95

HF F-LAYER PROPAGATION PREDICTIONS FOR MARCH 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	24MHz	21MHz	18MHz	14MHz	10MHz	7MHz	3.5MHz
	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802
** EUROPE								
MOSCOW	...24554...	...467762..	...1788885..	...48888981.	1..777678962	754644445898	875321113588	+52.....25+
MALTA	...35542...	...677774..	...18888971.	...38888941.	32.77778985	886754456899	998521123689	+++52.....3++
GIBRALTAR	...33221..	...255554..	...5887871.	...7888894.	11.287778983	774765556899	998642223689	+++4.....3++
ICELAND	...111....	...12221..	...35564..	...677872..	...47778871	431265556787	886643223578	+++3.....24+
** ASIA								
OSAKA	...14.....	...361.....	...16741...	...2764211..	...263224431	...31..3673	.....361	.....3.
HONGKONG	14663	267752	377753	25656661	1.253236852	2.....3686	1...365	.....42
BANGKOK	267775	3788872	3577785	23656871	2...13236864	4.....3688	2.....367	.....44
SINGAPORE	267775	3788872	3577785	23656872	2...3236864	3.....3688	1.....366	.....43
NEW DELHI	267771	478883	457776	33556721	311..2236664	73.....3688	61.....378	3.....45
TEHERAN	3778861	5778882	6667786	1644568831	524311236876	963.....3689	851.....378	52.....45
COLOMBO	3778861	4778883	45677861	1.224568831	51...1236886	72.....3689	61.....378	3.....45
BAHRAIN	3788861	5778883	65577862	2.1533568843	6342..236887	973.....3689	851.....378	52.....45
CYPRUS	2888873	5999996	788889831	2.1877788963	744655567898	997422234799	8851...2578	+++2.....25+
ADEN	4888884	57788961	1.655678842	411522358975	8642..126899	984.....3689	861.....377	53.....45
** OCEANIA								
SUVA/S	...11.....	...1332...	...145543..	...2555651..	...25433572.	...431..361.	...21...3..	.....
SUVA/L	1...31...52	21..521..174	33.275321474	222575433773	..275322474.	...53...251.	...2...3..	.....
WELLINGTON/S	...2321..	...14542..	...466652..	...1665751..	...56333673.	...431..362.	...1...3..	.....
WELLINGTON/L	...12.....	21..2...23	331151...55	342362...265	1236631.1552	..143..252.	...2...3..	.....
SYDNEY/S	156442	2786641	5877764	58656771	...353236841	...2...3652	...2...33.	.....
SYDNEY/L	1.....	...21...22	1.531...54	111.7521..75	111263212474	...131..2551	...1...22.	.....
PERTH	378631	5887531	57776641	356567731	3...23236875	2.....3686	...374	.....4.
HONOLULU	...21.....	...21.....	...241....	...21.462..	...3321551.	..2431..23.	..231....	.....
** AFRICA								
SEYCHELLES	...3567754..	...56688761.	1..544678852	411322458976	853...126899	962....3689	84.....368	5.....45
MAURITIUS	...38888851.	...577889721	2..555778964	521423558987	9631..225899	962....3689	83.....378	5.....45
NAIROBI	...37788862.	1..577789842	31.654578975	631522258998	9852...25899	995....3688	872.....377	54.....44
HARARE	...267899731	2..477789963	52.655578987	851632258999	9953...25899	9951...2689	873.....367	55.....44
CAPETOWN	...77899852	1..287889974	51.576578998	841653357999	985621.25899	9973...2689	8851...368	5+2.....45
LAGOS	1..88++9852	31.187779975	65.375558998	882663236999	99773...4899	9985...1689	7872...368	4+4.....35
ASCENSION Is	1..78667752	22..88667874	651186445897	883384223899	998761...699	99863...389	7773...58	454.....25
DAKAR	...68888851	11..78778973	441.87556897	773285324899	998662..1699	99863...379	8773...58	544.....25
LAS PALMAS	...4888873.	...69999951	11..89889983	331288878996	886676556899	999753223589	888521..1368	+++2.....4+
** S. AMERICA								
Sth SHETLAND	...2889851	11...4889973	441.26778886	773246556788	898653223457	78863...1135	5673.....2	244.....
FALKLAND Is	...4988851	11..16888873	331.47776786	673266554578	998663221258	89863...26	7874...3	4+4.....
R DE JANEIRO	...8755751	1..8766773	331.27644686	663146422488	998531...169	99863...37	8774...15	554.....2
BUENOS AIRES	...5888851	...16877872	231.47755685	563166533377	9985632..147	89963...15	78731...2	4+4.....
LIMA	...87774	...877761	...21765454	232.42542236	77635321..15	798631...3	58741...2	2+4.....
BOGOTA	...77774	...877761	...1765464	221.13542246	67624321..16	898631...3	68741...1	3+4.....
** N. AMERICA								
BARBADOS	...487774	...6877761	...7755574	221.16532367	7763432...38	998631...16	88741...3	5+4.....
JAMAICA	...76674	...877751	...1765563	11..12543245	66413321..16	798531...3	58741...1	2+4.....
BERMUDA	...166674	...2777761	...4765673	11..5543466	66413421.147	898531...15	78741...2	454.....
NEW YORK	...35553	...57675	...1676663	11..3554465	553113221136	788431...14	58741...1	254.....
MEXICO	...5552	...7664	...276542	1...1.354333	453131221..2	488431.....	16741.....	..44
MONTREAL	...24452	...46664	...1676662	1...355565	552.13222246	787431...14	58741...1	254.....
DENVER	...231	...1442	...36541	1.....46443	331.2.123113	47643.....	15741.....	..24
LOS ANGELES	...231	...442	...17531	.....27431	331.2..25111	256331..2..	..3731.....	..4
VANCOUVER	...231	...11	...133	.....3541	22..1..15322	25543...21..	..2641.....	..3
FAIRBANKS	...231	...11	...11	.....11223.	21.132224553	233431..2322	..1331...1.	.....

The provisional mean sunspot number for January 1993 issued by the Sunspot Data Centre, Brussels was 59.1. The maximum daily sunspot number was 107 on 13 January and the minimum was 30 on 2 January. The predicted smoothed sunspot numbers for March, April and May, are respectively: (classical method) 74, 72, 70; (SIDC adjusted values) 81, 78, 75.

HF NEWS

JOHN ALLAWAY G3FKM
10 Knightlow Road, Birmingham
B17 8QB

CZECHOSLOVAKIA ceased to exist on 31 December 1992 and is now two separate republics - the Czech Republic and the Slovak Republic. The Central Radio Club (CRCC) has split into two new societies - the Czech Radio Club and the Slovak Amateur Radio Association. As far as amateur prefixes are concerned the Czech Republic will use OK and OL, and Slovakia OM. The former CRCC officers have suggested that for DXCC purposes Czechoslovakia should be deleted from 31 December 1992 and credit given to the two new countries for contacts on and after 1 January 1993.

The DXAC has voted for the removal of Abu Ail from the DXCC countries list and this now awaits consideration by the ARRL Awards Committee. *RSGB DX News Sheet* reports that there are now very long delays in processing DXCC applications and endorsements. In addition it seems that computerisation of the records has resulted in many errors being introduced and it seems to me to be a good idea for the time being to wait before sending in cards for whatever reason. The recent addition of several countries to the list resulting from the break-up of the former Yugoslavia, and with Czechoslovakian changes pending, can only have seriously compounded the problem.

RSGB DX News Sheet has publicised a suggestion made by G3XYP who suggests that the time has come to dispense with the QSL card as a requirement for DXCC applications. Recent events have shown just how vulnerable cards are in the worldwide postal services and many are going astray and funds enclosed being lost or stolen. If all major expeditions were asked to submit a complete log on computer disk to the ARRL the need for their QSLs for DXCC purposes would be done away with! Each DXCC member would be asked to make an annual contribution to cover the running costs. Expeditions could announce in advance if they were going to adopt this

system and QSLs could still be used by smaller expeditions and collecting cards could return to being fun - via the bureaux. However this view is not shared by all - DX'ing is not *only* about DXCC, many enjoy collecting cards and there would have to be a way to obtain one. Donations would no longer be enclosed with QSL requests, and there is the problem of slight inaccuracies in loggings. In the latter case it would be possible to have what appeared to be a solid contact but not appear on the disk sent to ARRL. No doubt there are many more points of view!

AWARDS

WORKED ALL SWEDEN AWARD - HF - WASA

Issued to members of national societies with verified QSOs with Swedish lans (counties) and callsign districts (SM0 - SM7) since 1 January 1988. For amateurs in Europe Class 3 requires all lans on two different bands, Class 2 the same on three different bands, Class 1 on four different bands, and a plaque is available if you have them all on five bands! Two way CW, SSB, phone, or RTTY endorsements are available. There are 25 lans with indicators A, B, C, D, E, F, G, H, I, K, L, M, N, O, P, R, S, T, U, W, X, Y, Z, AC, and BD. Send list of confirmations certified by an official of your national society plus 6 IRCs (for basic award) or 1 IRC for an endorsement. Record books providing complete lists of lans, locators, and fields are available from Sveriges Sandaratorer, Ostmarksgatan 43, S-12342 Farsta, Sweden, price four IRCs.

HEARD ALL SWEDEN AWARD - HASA

Rules as above but of course requiring verified reports.



Andrei Glurgea, Y03AC, at his home station.

NINE BAND TABLE NO 5

CALL	1.8	3.5	7.0	10	14	18	21	24	28	TOTAL
G3KMA	144	260	317	210	323	269	323	259	316	2421
G4BWP	136	265	302	198	326	267	323	241	308	2366
G4GIR	123	258	300	193	326	255	322	223	310	2310
G3XTT	175	233	286	187	320	246	313	222	291	2273
G3GIQ	71	214	278	121	325	231	325	209	311	2085
G3JXN	49	125	192	126	275	201	280	183	280	1711
G4OBK	123	155	210	111	281	161	256	155	232	1684
GM3PPE	69	164	188	148	259	212	245	167	216	1668
G3TXF	73	180	231	82	279	94	299	67	264	1587
G3NOF	5	103	107	-	321	170	323	197	295	1521
G3WGV	66	122	175	146	227	187	224	150	211	1508
G3JJG	52	103	195	142	231	161	257	140	199	1480
G4NXG/M	6	43	95	-	228	122	248	137	235	1114
AVERAGE	84	171	221	128	288	198	288	181	267	1825

NEXT DEADLINE - to reach G3GIQ by 8 April 1993.

(Please note that entry level is 600 total. No need to work all bands.)

CONTESTS

BERMUDA AMATEUR RADIO CONTEST

0001 20 March - 2400 21 March

Open to amateurs in Bermuda, Canada, Germany, the UK, and the USA. Operating time not to exceed 36h with off periods logged and each to be of at least 3h duration. Single operator only and operating from own premises. 3.5 to 28MHz CW and phone. Exchanges for UK stations consist of RS/RST plus county abbreviation and they only work Bermuda, Canada, and the USA. VP9s will give parish, VEs province, and W's their state. Each completed QSO counts five points - the same station may be contacted on both modes on a band but there must be a one hour interval between the contacts. Multiplier is the number of Bermudan stations worked on each band added together (phone plus CW QSO with a VP9 station is two multipliers). QSOs with Bermudan novices count as two multipliers. A trophy will be presented to the winner in each country. Send logs to be received by the Contest Committee, Radio Society of Bermuda, PO Box HM 275, Hamilton HM AX, Bermuda, by 1 June 1993.

ARRL INTERNATIONAL DX CONTEST

0000 6 March - 2400 7 March

(See last month for details)

CQ WW WPX SSB CONTEST

0000 27 March - 2400 28 March

1.8 to 28MHz. Single-operator single or all band, multi-operator single and multi-transmitter. Low power (output not to exceed 100W), and QRP (less than 5W). Exchange RS plus serial QSO number (from 001). Contacts between stations in the same country count only for multiplier credit, between stations in the same continent one point on 14, 21, and 28MHz and two on 1.8, 3.5, or 7MHz. With stations in other continents three and six points respectively. The multiplier is the number of different prefixes worked and each counts once only. All entries must be postmarked no later than 9 May 1993 and go to *CQ Magazine*, WPX Contest, 76 N. Broadway, Hicksville, NY 11801, USA. Unfortunately, since the death of W1WY, *CQ Magazine* no longer sends me advance copies of the rules of its contests - but if my January 1993 *CQ* has arrived in time I will be happy to send photocopies in exchange for an SASE.

In the 1992 *CQ* 160 Metre DX Contest (CW) GM3YOR scored 170,448 points, G0NAA 169,119, G3XTT 159,390, G3SXW 65,540, G4ODV 63,336, G4BWP 31,196, G3BPM 28,992, GW3JI 12,974, GW3GWX 9,296, and G3ESF 9,072. In the SSB section G3NAS scored 12,845 points and GI0KOW 10,114.

BARTG SPRING RTTY CONTEST

0200 20 March to 0200 22 March

3.5 to 28MHz. Single operator single and multi-band, multi-operator all band, and listener sections. Exchange RST and message number (from 001). Multipli-

QTH CORNER

CRC QSL Bureau PO Box 69, 113 27 Praha, Czech Republic.
 KH1 expedition Mile High DX Ass'n, PO Box 1, Franktown, CO 80116, USA.
 P5RS7 via JA1HGY, Nao Mashita, 8-2-4 Akasaka, Minato, Tokyo, Japan.
 SARA QSL Bureau PO Box 1, 852 99 Bratislava, Slovak Republic.
 TRBJWH via G4TWT, H Holmes, 7 Parkland Crescent, Old Catton, Norwich, NR6 7RQ.
 VK9CB VK6LA, Allen, 189 Lockhart St, South Como, Western Australia 6152.
 VR6BB via JF2KOZ, Yuji Miura, Room 101 Main Haitzu, 7-3 Yanagigaoka, Tahara Atsumi-gun, Aichi 441-34, Japan.
 XU2ZP LA2ZP, Svein Flagtvædt, Stokkeg18, N-3100 Tonsberg, Norway.
 ZD8VJ via G4ZVJ, A Chadwick, 3 Park Villas, Monkhouse, Cheadle, Staffs, ST10 1HZ.
 9F2CW DK7PE, R.Klos, Kleine-Untergasse 25, D-6501 Niederolm, Germany.

ers are DXCC countries (including W, VE, and VK) plus W, VE, and VK call areas. Each QSO counts one point and final score is QSO points x multipliers x continents. Logs have to be received by 29 May 1993. Suitable log and summary sheets are available from the contest manager (please send an A4 size SASE) John Barber, 32 Wellbrook St, Tiverton, Devon, EX16 5JW. I can supply copies of rules (SASE please).

DX NEWS

IARU Region 3 says that China decided to permit individual amateur stations with effect from 22 December 1992. They will use the BA, BD, and BG prefixes. The China Radio Sports Association has worked for many years to achieve this result and deserves our sincere congratulations. A most exciting development was the appearance on the air of P5RS7 - believed to be Romeo Stepanenko together with other operators. This could be the first genuine amateur operation from the PDR Korea. Activities were confined to the HF bands and seemed to be restricted to certain frequencies and they were supposed to have only wire antennas.

John Holmes, G4VMG, who has been on the air for three years from Gabon as TRBJWH is returning home. He says that he recently received a bunch of QSLs from the Gabonese bureau for contacts in early 1990 and says that his QSL manager G4TWT is still able to answer requests. There could be another amateur in Angola - TT8SA was due to transfer there in mid-January. Elliot, N6QHO/D2, is located in the Cabinda enclave and has written permission to operate - he should be active for two more years. RSGB DX News Sheet says that XT2BW is the only resident amateur in Burkina Faso and hopes to get on the air more and cover the WARC bands and RTTY.

FINAL 1992 WARC BANDS TABLE

	10MHz	18MHz	4MHz	Total
G3KKJ	128	174	159	461
G3WVG	136	162	119	417
G4OBK	103	156	147	406
G3SXW	132	132	110	374
G2VJ	79	109	111	299
G3ING	83	100	73	256
G3JAR	69	97	59	227
G2AFV	69	72	42	183
G4MUW	-	71	44	115
G4NXG/M	-	70	31	101
G4XRV	99	-	-	99
GJ4GG	19	34	20	73
GM0KMJ	-	-	62	62
G0KDS	1	24	27	52
GW4RGT	13	21	16	50

The Radio Society of Kenya says that on 10 December 1992 the 18MHz band was released for amateur use in Kenya. At the time of writing T55C was on from Somalia, he is with CBS and his length of stay is not known. Andy Chadwick, G4ZVJ (ex-ZD7VJ, 3D2VJ, T20VJ, A35VJ, and 5W1VJ), will be active for about twelve months on Ascension Is between 26 January 1993 and early 1994. His callsign will be ZD8VJ and most activity will be on CW. TN1AT is reported by the Long Island DX Bulletin to be an almost daily check-in on the 14.256MHz net at 1700. He will make skeds for other bands. FC1FIC will be in the Seychelles Is as S79MD until the end of next year and is reported to operate on all bands.

VK6CPU and WK3D should be on the air from Pitcairn Is as VR6BB and VR6JJ. They hope to be active on all bands 1.8 to 50MHz using CW, SSB, FM, and RTTY with an impressive array of equipment said to include two TS690s, an FT-690, FL2100Z, HL-166V, Cushcraft R5, Butternut HF-2V, and a four element beam for 50MHz supplemented with wire antennas for the other bands. Power is only available for six hours each day but they are trying to take generators with them. There is a new station on Tonga. This is A35CT and he is said to be due to be there for several years and to be found sometimes on

BAND REPORTS

Not quite as many reports this time but that does not seem to be because of lack of DX and once again 1.8MHz has produced some unusual signals. Thanks to G2HKU, G3s GVV, KKJ, G4DJC, GW4KGR, G4s MUW, NXG/M, OBK, and the UK DX Packet Cluster (via G4PDO) and G0KDS. Stations listed in italics were using CW:

- 1.8MHz**
 0000 *TF3DX, UL7EAT.*
 0500 *HK7DSZ, VE5DX.*
 0800 *FK8CP, T14CF, ZL2JR.*
 1800 *RA9LE, UI8DAA.*
 2100 *RAEM, VK6HD.*
 2200 *JAGs HUG, IEF, PY1RO, TZ6VV, UF6QBA, UJ8JI, 5U7M, 9F2CW.*
 2300 *FG5BG, FM5WD, OH0MEP, OX3CS, 9K2MU, 9M2AX.*
- 7MHz**
 0000 *XU5DX.*
 0100 *C9RTC, PY0FF, 9X5HG.*
 0900 *FWY85JO.*
 1700 *HS0ZAR, 9V1WW.*
 1900 *FK8CP, VU3ASH.*
 2000 *WL7E, ZS6P, 3W4DK, 4S7EA, 9K2MU.*
 2100 *A71AL, HS1HSJ, 3B8CF, 9F2CW.*
 2200 *A22MN, BV4CT, HF0POL, PJ9JT, TR8NSY, 5R8DK.*
- 14MHz**
 0700 *SV2ASP/A, V73CT, VK9NS, YJ8RN.*
 0800 *KH0AC, V63OM, V73B.*
 0900 *P5RS7, VR6BB, ZL9/HB9TL (??).*
 1500 *S21B, S75S, VK6RI, VQ9AC, VU7API.*
 1700 *KH6CF, KL7S, S21ZC, T32VU, T55C.*
 1800 *KL7s, 5R8DK, 5W1ZY, 9F2CW.*
 1900 *D2/N4WBE, W4QM/T5, 3D2DM.*
- 18MHz**
 0900 *HZ1AB, JAs, ZL2AFW, 3X0HLU, 3W4DK, 9F2CW.*
 1100 *OH0MEP, P4/W1EKT.*
 1200 *FP5HL, HV3SJ, PJ2MI, 3W4DK, 7X2WAK.*
 1400 *T55C, XU5SE, 5Z4FM.*
 2000 *PJ8AD, VP8s GAB, GAV.*
- 21MHz**
 0800 *BV3BW, BZ4RBD, FK8CP, JU80C, P5RS7, P29WK, 7Q7ZZ, 9N1JAR.*
 0900 *A47RS, BY5RA, FK8CR, JT1BG, VQ9TW, XU7VK, XX9MD, 3X0HNU.*
 1000 *BV7CM, FK8CA, S21ZG, YK1AO.*
 1100 *P29DX, S21A, TZ6NU, VU7SF, 9X5AB.*
 1400 *KF6BL/T5, ZS9A.*
 1500 *AA4VK/KP5.*
 1700 *S79KMB, XQ0YAF, ZD9BV.*
- 24MHz**
 1200 *FP5HL, WA4DAN/KP5, 9F2CW.*
 1300 *FS4PL, J88AR, OD/SP1MHV, TG9IKE, 3W1D.*
 1500 *N0TG/KP5, US0U, VP8CMP.*
 1600 *V47N, ZF8AA, 4U1UN.*
- 28MHz**
 0900 *VK2-VK6, VS6WO.*
 1000 *FK8CA, HS0ZAD, JT1CS, TU4EG, VK9CB, VS6CT, XX9AS, 3W1D*
 1100 *C9RJJ, OA8K, S21ZC, V85PB, Y11AL, 9K2ZZ.*
 1200 *FR5DX, HH2PK, J28BG, J66AA, SU1CS, TZ6VV, VU7SF, 5U7M.*
 1300 *K6BL/T5, VK9CB.*
 1400 *FH8CB, FP/G3LMD, HC8VE, HK0TCN, TZ6RM, 5R8GW.*
 1600 *FG5FC, P40P, PY0FF, VP8BFH, W6-W7, ZF1A.*
 1700 *FM5DN, W6-W7, 8R1AK.*

14.219MHz at 0530. ZK1DT, who is also new, is thought to be on Penrhyn Is and to be likely to be there for several years.

The old Y series of prefixes formerly used in the German Democratic Republic was replaced on 1 January 1993 with calls in the DL1 - DL9 series. The Ukrainian society 'Radio Tlum' runs an information net on the first and third Saturday of each month at 0900 on 7.090MHz. It will accept information on amateur news, contests, diplomas, special calls etc and will translate and transmit on the net. Those with news should contact RB5NC, PO Box 4994, Vinnitsa 18, 286018 Ukraine.

IA0PS is located at Terra Nova Bay, Antarctica and to be found around 14.197MHz at 1830. ZX0ECF is situated on King George Is in the S Shetland Is.

There seems to be increasing activity from Cambodia. RSGB

DX News Sheet lists XU4OF who has been found on 14MHz SSB around 0900 and between 21.300 and 21.330MHz around 1500. XU2NU and XU3NU are Polish amateurs active on LF, and XU0NU is an Australian. XU7VK is Hungarian and XU5DX is expected to appear in May. XU2ZP has worked into the UK on 18MHz at around 1400. Bahri, DJ0UJ/TA2BK, is back in Turkey for a few months. He is expected to be active on the WARC bands.

PROPAGATION

THIS MONTH G8KG's report goes as follows: "Those who follow the day to day variations in solar activity know that superimposed on the slow rise and fall of the cycle are much shorter-term variations which are typically on a time scale of 100 to 200 days.

continued on page 20 ►

VHF/UHF NEWS

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

THE NEW YEAR got off to a good start with some reasonable tropospheric propagation, Quadrantids meteor stream activity and an exceptional sporadic-E opening on 6m. The postbag was larger this month as readers sent in their final table scores for 1992.

CONTEST NOTES

BRYN LLEWELLYN, G4DEZ, chairman of the Society's VHF Contests Committee, responded to some of the topics aired in the February column, as did VHFCC member Andy Cook, G4PIQ. On radial ring scoring, they mentioned the results of the survey carried out during last year's VHF Convention. This revealed that 10% of entrants do not use a computer to calculate distances and points, so this group tended to favour the retention of RR scoring.

1992 ANNUAL TABLE BREAKDOWN

50MHz Annual Table - 1992 Final Placings - Top Four

Callsign	Counties	Countries	Pts
GW6VZW	77	65	142
G6HKM	67	64	131
G4FCD	40	27	67
G7EWL	27	24	51

70MHz Annual Table - 1992 Final Placings - Top Four

Callsign	Counties	Countries	Pts
G1SWH	48	7	55
G0EHV	41	5	46
G4OUT	36	6	42
G0JBA	38	4	42

144MHz Annual Table - 1992 Final Placings - Top Four

Callsign	Counties	Countries	Pts
G4FCD	86	23	109
G8ESB	83	18	101
W0PZT	70	27	97
G7LJ	69	27	96

430MHz Annual Table - 1992 Final Placings - Top Four

Callsign	Counties	Countries	Pts
G4FCD	54	21	75
G1GEY	53	18	71
G4LDR	41	15	56
G6HKM	32	17	49

1.3GHz Annual Table - 1992 Final Placings - Top Four

Callsign	Counties	Countries	Pts
G4FCD	38	13	51
G6HKM	21	9	30
G8ESB	21	5	26
G0JBA	18	5	23

Concerning multipliers Bryn confirmed that, although GM3POI (OKE) reckoned he was disadvantaged geographically, he nevertheless came second in the Winter Activity contests. While Clive didn't get as many county multipliers, his average points per QSO was much greater than those of mainland participants. Bryn agrees that locator squares could be a sensible alternative to counties and countries in the minority of multiplier-type contests.

The VHFCC has amended General Rule 6 in respect of 50MHz contests with immediate effect. The present maximum of 25 points (650km) has been increased to 61pts (1550km), so that most Es contacts into the continent will now be scored at the 'formula' points.

The annual 144MHz Activity DX Contest - January p16 - is promoted by the VHF-DX-Gruppe DL-West. For full details, contact Guido Juenkersfeld, DL8EBW, at Geibelstr 13, W-5600 Wuppertal 11, FRG. The Danish SSTV Group is running a 48-hour SSTV contest from 0000GMT on 8 May. Details from the editor of SSTV; Carl Emkjær, Soborghus Park 8, DK-2860 Soborg, Denmark.

Some years ago, the Danish society, the EDR, sent details of the monthly Scandinavian VHF-UHF-SHF Activity Contests. The first Tuesday is for 144MHz, the first Thursday is for 430MHz and the first Monday is for the microwave bands 1.3 to 24GHz. All times are 1800-2200GMT. Send me an SASE if you want a copy of the rules.

SUMMER CAMP

JOHN PODVOISKIS, G0NPI, sent details of a Summer Camp organized by the Baltic DX Group from 24 July to 4 August, in the Lithuanian fishing village of Preila (KO05). Amateur radio operation on 6m, 2m, 70cm and 23cm is planned using the special callsign LY93BDX. Non-radio folk are to be well catered for, eg white sandy beaches. Contact John, QTHR, for full details. His evening telephone number is 061-793 5922, which is Manchester.

REPEATERS

A NEWSLETTER was received from the Edge Hill Repeater Group which runs UHF voice relay GB3EH on RB8. It gives technical information about GB3EH and has been mailed to 60 known users and past contributors to the group's coffers. It is signed by 'Paul and Peter' - no surnames or

calls, let alone addresses. Amazing!

The Aylesbury Vale Repeater Group is not so reticent. It controls VHF repeater GB3VA (R4) and UHF relays GB3AV (RB2) and GB3BV (RB1). Its January Newsletter, edited by Mike Marsden, G8BQH, includes detailed status information on the repeaters, a comprehensive editorial, membership details, technical information and a map and a list of all the UK UHF repeaters. Contact G8BQH (QTHR) for further details of the AVRQ.

BEACONS

THE DECEMBER Newsletter published by the Irish Radio Transmitters Society (IRTS) states that the 4m beacon EI4RF (70.130MHz) is now QRV on an experimental basis from a new 600ft ASL site in north County Wicklow (IO63VF). It runs 5W to a 4-ele Yagi beamed north of east. The antenna may be replaced by two Yagis switched between NE and SE, or an omnidirectional one. Please send reception reports direct to Bill Somerville-Large, EI9FK, or via packet to EI9FK @ EI7GM.

Jack Hum, G5UM (LEC), suggests that any closedown or change of status of any beacons should be mentioned on the Sunday GB2RS news bulletins, then subsequently repeated until "normal service is restored." This seems sensible but we have to rely upon beacon keepers informing HQ.

DUBUS

THIS POPULAR quarterly magazine is now in its 22nd year. Each issue runs to about 100 advertisement pages packed with a wide variety of technical and operating data. Contributions are bilingual - English and German - though the English versions can be rather quaint. The DUBUS editor-in-chief is Eddi Ramm, DK3UZ.

The 387-page manual *Technik III* is about to be published. It comprises bilingual reprints of DUBUS technical articles from 1986 to 1991. The price is £14.50 and the annual subscription to DUBUS is £13.50. The UK agent is G4IZW and cheques should be made out to 'Ken Hatton (Account 2)'. Ken is QTHR and apologizes for not sending out renewal reminders this year.

USA ON 144MHZ?

ALMOST ALL British Isles VHF operator would give their eye teeth

to hear, let alone work, a North American station on 2m in-band. So I was astonished to learn that Paul Beaumont, G4SXU (YSN), claims to have copied W stations on 2m on several occasions. He assures me he is satisfied that the stations were operating on the band. Some mentioned 2m when calling and one may have answered Paul's call with a "QRZ?"

He has heard these signals during the latter stages of, or just after, major auroras, by turning his antenna to the NW. The signals were weak and sounded a bit watery, but not auroral. His description is very reminiscent of the quality of those 2m and 70cm signals propagated between the Mediterranean and southern Africa and which have been well documented and verified years ago. I recall hearing recordings of them during a VHF Convention lecture.

Charlie Newton, G2FKZ, wrote: "I would not be surprised if a transatlantic contact did occur one day. As I tried to show in my book [Radio Auroras, see Bookcase pages - Ed] there is just as much particle precipitation between the auroral phases as there is during them. The difference is the electric field which collapses and reverses. So, if we can get the Harang discontinuity period in the right place, or a number of them over the Atlantic, then that could provide the electrons required."

He continued: "There are other ways precipitating electrons can get into the ionosphere. Some years ago I asked the satellite team at the University of Surrey to look for them with their UOSAT-2 spacecraft and they found them over the Atlantic. I believe they come from Jupiter and of course signals can skate along electron walls."

Paul has worked, and had confirmed by QSL card, a UA9 station during an Es opening on 2m, which may explain his comment that he: "... didn't think much of it..." when he heard the Ws! He has promised to make accurate loggings and recordings should he hear these mysterious signals again. As G2FKZ concluded: "What we want are good factual data; dates, times, antenna bearings, etc. Then we can get somewhere."

MOONBOUNCE

SINCE INSTALLING four 9-ele Tonna Yagis last summer, John Hoban, G0EVT (YSW), has worked 19 initials off the Moon, mostly on random. They are KB8RQ, SM2CEW, SM5MIX,

RSGB NATIONAL VHF CONVENTION

Sandown Exhibition Centre, Esher, Surrey

SATURDAY 6 MARCH 1993

- One Day Exhibition and Lecture Programme
- Specialist Groups
- Full Lecture Programme on VHF, UHF and Microwave Subjects
- Morse Tests (by prior booking)
- Presentation of Trophies
- Comprehensive Trade Exhibition

PROGRAMME

- 1030 Convention opens. Enter through main entrance.
Refreshments. Snack bar in the hall will be open from 1100 to 1800 and the licensed bar will be open throughout the convention.
- 1130 AGM 6m Group.
- 1330 Convention address and presentation of trophies by RSGB President P E Chadwick, G3RZP.

LECTURE PROGRAMME

Detailed Arrangement for Lectures will be Notified on Arrival

- | | A | B |
|------|--|---|
| 1415 | Log Periodic Aerials for 6, 4 and 2m.
<i>Mike Gibbings, G3FDW</i> | Operating on 24GHz
<i>Steve Davies, G4KNZ</i> |
| 1515 | Home Brew Moonbounce
<i>Pat Gowen, G3IOR</i> | Update of 10GHz Modules
<i>Charlie Suckling, G3WDG</i> |
| 1615 | VHF Committee Forum | Remote Imaging Group AGM
<i>Henry Neale, G3REH</i> |
| 1715 | Lecture Sessions End | |
| 1730 | Trade Exhibition Closes. Convention Ends. | |

ADMISSION

Admission will be by payment on entry as follows:

Convention and Exhibition £2.00	(over 65)	£1.50
	(under 18)	£1.00
	(under 14)	Free

ACCESS MAP TO SANDOWN PARK

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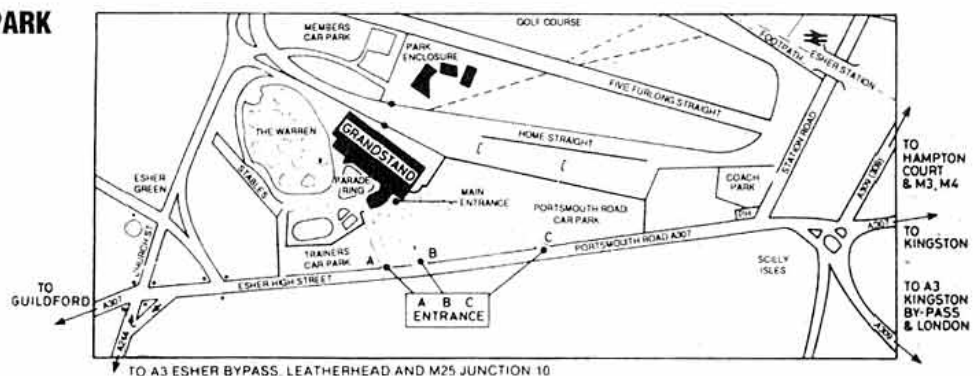
GB2VHF:
Channels S22 SU22

STAND BOOKINGS:

Les Hawkyard G5HD
Tel: 0409-281342

DETAILS:

Geoff Stone G3FZL
Tel: 081-699 6940



Map by courtesy of United Racecourses

N1BUG, PA0JMV, SM5FRH, DL3BWW, DL5MAE, SM5BAE, W5UN, IK3MAC, DL8DAT, I2FAK, VE7BQH, LA8YB, K5GW, AF9Y, OE5JFL and HB9CRQ. His best report is RST529 while he often hears W5UN and KB8RQ at a genuine 559.

Stuart Jones, GW3XYW (GNW), is currently QRV on 23cm using a W2IMV feedhorn to his 6.7m dish. January completions were: 2nd OE9XXI (SSB) and N21QU (CW); 9th I6QGA, IK4NMF and IK3GHY on CW, OE9ERC, OE9XXI, HB9SV and G3LTF on SSB, also ZS6AXT on CW and SSB; 10/11th IK3COJ and G3LQR on CW. Useful CW echoes were received at perigee using 30-50W output. He hopes to return to 13cm in March/April but points out the 'crossband' problem with G, DL and OE stations on 2.320GHz, while the rest of the active world is still on 2.304GHz, making random operation virtually impossible. The best EME weekend in March is on 6/7, coinciding with the 144/432MHz contest, unfortunately.

50MHZ

GEOFF BROWN, GJ4ICD, reported that G3KOX has sent a 25W amplifier to EH9IB and PA2VST a 100W one to the JX operators; the Z21SIX beacon was in its final stages of construction at 31 December; the 7Q7SIX beacon is now operating on 50.003MHz its keeper being 7Q7RM; 4N4VO's new QSL manager is 9A2AJ, and the craziest piece of news, the ARRL has

accepted G0KPW/EA8 for DXCC credit!

Neil Carr, G0JHC, joint editor of *Six News*, reported that the 50-52MHz band was generally released to all Polish licensees on 15 January - 10W maximum power, SSB/CW only but no restricted areas or antenna limitations. Ted Collins, G4UPS (DVN), advises that VE1KM frequently operates from St Pierre and Miquelon as FP/VE1KM running 10W to a dipole, and that 4L2FA (ex-UL7GCC) now has another new call, UL8GC; he is Mike Chirkov, Box 1, 480113 Alma Ata, Kazakhstan.

Pierre Pasteur, HB9QQ, wrote to Ted on 10 January categorically denying reports that Swiss amateurs now have 24 hours access to the band. Their transmitting permits have been renewed till December 1994 on the previous conditions, ie *operation only allowed outside TV hours*. Israeli Class A licensees now have 50.000-50.200MHz, while the Class B and D amateurs only have 50.100-50.150MHz. All are limited to 25W maximum on a secondary, non-interfering basis.

G5UM reports that the East Midlands FM net on 51.41MHz has been going for over five years from 1930 local time on Fridays. A change to vertical polarization has enabled more QSOs with mobiles to be made.

Tim Kirby, G4VXE, completed several single burst MS QSOs in the Quadrantids on 3 January. All were around 50.110MHz and he wrote: "The pretence of

50.350MHz being an MS frequency is farcical." G4UPS also worked and heard many stations via MS on the 3rd including DL, EH6/7, F, GJ, LX, OZ and SM.

16 January provided winter Es from 1000 to 2130. Countries/call areas worked by G4UPS included DL, EH2, 3, 5, 6 and 7, I1-4, IS0, LA, OE2, OK1, OM3, OZ, SM0, 6 and 7, S5, YU and 9A. Late afternoon on the 17th brought QSOs with SP5CCC (KO02) and SP4TKK (KO03). Ted continued his daily tropo skeds with G3CCH (IO93QO) around 0900. The only really poor day was the 17th.

70MHZ

A FEW readers operated on the band in the Winter Activity contests. Phil Borman's, G0JBA (KNT), best DX was G0EHV (IO94FW) at 425km. Bob Offer, G1ZJP (LCN), sent in a log of the Spalding and District ARS's contacts using the call G4DSP. They completed 32 QSOs over the four days for a claimed 2037pts. Best DX were G0EHV at 258km and G4FOQ (IO94ET) at 247km.

144MHZ

MANY CW operators worked GM3POI in the auroras on 28/29 December. G0EVT's best DX were SK5DB (JO89) and SM5MIX (JO78). Ian Cornes, G4OUT (SFD), couldn't raise the latter but did get GM4YHF/P (IO78). Regarding CW, G5UM reminds us that Monday night is CW night which provides an opportunity for operators to improve their skills.

Jack hears B licensees sending impeccable morse and evidently enjoying the mode.

The Quadrantids stream appears to have peaked around midday on 3 January. G0EVT found the shower quite good and John completed with 9A1CCY, OH6NVQ (KP13) and DL3YEL/P (JO74). Martyn Baker, G0GMB (BUX), completed with LH1KHA (JO49) for a new square but skeds with HB9SUL and UZ2FWA failed. Brian Underdown, G7LIJ (KNT), found the shower poorer than in 1992 with only five stations heard in two days on the unofficial 144.200MHz random SSB QRG. Arlen Pardoe, GM0HUO (FFE), noted a poor peak on the 3rd, 0000-0200GMT, the main one coming just after midday with good reflections from SM2EKM.

Bill Meinerts-Hahn, G3UOL (WMD), is enjoying QRP after 26 years on the HF bands running QRO. 2.5W from an FT-290 Mk2 and 9-ele Tonna Yagi at 7m AGL brought 11 countries on 2 January including DL, F, GD, GJ, GU, ON, PA and OZ. Best tropo DX so far is 855km to Denmark. The G4DSP station amassed over 84,000pts in the Winter Activity contest, best DX being F6OZA/P (JN05) at 829km on 27 December, and DG5NEX (JN49) at 771km next day.

Neil Underwood, G4LDR (WLT), contacted EA1TA (JN53) on 28 December. G7LIJ reckons 2 January brought the most activity he has heard since he was licensed, a nice start for the 1993 table, but Brian's antenna system was reduced to scrap metal by severe gales on the 10th. Rik Royall, G8ESB (YSN), liked the comments on older multimode transceivers - January p16 - and admits to using a TS-700G, FT-221R and IC-202S, all with MuTek front ends.

Operating from his portable site, Joe Ludlow, GW3ZTH, worked lots of continentals in the Christmas period. On 26 December he made 37 contacts in four hours including eight HB9s. Conditions were even better next day and between 0910 and 1601 he completed 143 QSOs. The SSB sub-band resembled 40m at its worst, so he advises people to use the whole 144.15-144.5MHz sector during major lifts. By the morning of the 28th, tropo conditions had faded somewhat but Joe did work some OZs and LA3TL (JO58).

430MHZ UP

SUMMING UP 1992, Don Stoker,

**ANNUAL VHF/UHF TABLE
FINAL PLACINGS AT 31 DECEMBER 1992**

Callsign	50MHz		70MHz		144MHz		430MHz		1.3GHz		Total Points
	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	Cty	Ctr	
G4FCD	40	27	-	-	86	23	54	21	38	13	302
G6HKM	67	64	-	-	66	23	32	17	21	9	299
G8ESB	10	11	32	6	83	18	36	10	21	5	232
G1SWH	15	29	48	7	72	12	33	10	3	1	230
G0NFH	18	29	28	4	56	15	32	13	7	5	208
G4LDR	15	20	27	5	56	20	41	15	-	-	199
G0JBA	-	-	38	4	62	19	35	12	18	5	193
G0EHV	-	-	41	5	64	17	33	12	-	-	172
G0EVT	8	38	21	4	35	31	2	5	2	1	147
GW6VZW	77	65	-	-	-	-	-	-	-	-	142
G6MXL	1	17	9	1	38	19	26	11	9	7	138
G7EWL	27	24	3	1	55	18	6	2	-	-	136
G8LHT	-	17	20	4	42	18	12	3	4	1	121
G3FIJ	-	-	14	2	51	9	29	5	3	1	114
G14OWA	17	32	-	-	40	23	-	-	-	-	112
G7CLY	15	28	-	-	47	12	2	1	-	-	105
G4OUT	-	-	36	6	46	12	-	-	-	-	100
GW0PZT	-	-	-	-	70	27	-	-	-	-	97
G7LIJ	-	-	-	-	69	27	-	-	-	-	96
G6ZWP	-	-	-	-	73	15	-	-	-	-	88
G6ODT	-	-	-	-	41	15	17	12	-	-	85
G3FPK	-	-	-	-	57	15	-	-	-	-	72
G1GEY	-	-	-	-	-	-	53	18	-	-	71
G7JAF	-	-	-	-	52	11	7	1	-	-	71
G3UOL	-	-	-	-	55	10	-	-	-	-	65
GU4HUJ	-	-	-	-	46	13	-	-	-	-	59
G0HDZ	2	6	-	-	15	6	-	-	-	-	29
G6AJE	-	-	-	-	8	2	-	-	3	2	15

British counties were those listed on page 65 in the January 1992 *RadCom*; 77 in all. Up to three different stations were allowed in all 12 GM regions. EI counties were excluded. Countries were the usual DXCC ones plus IT9. Deadline for the first 1993 entries is 1 April.



● Dave Evans, G3ZWL, said his QSL rates were as follows: 1987-82.9%, 1988-67.2%, 1989-72.7%, 1990-65.3%. Dave said he wondered if his good return rate was because most of them refer to CW QSO's and he wondered if CW operators are better QSL'ers. Now there's a thought!

● Mike Terentev, UC1AXI and RC2CB, wrote to tell me that anyone sending him a QSL card would be better to direct it via Penner Peter, Elpke 25,4800 Bielfeld, Germany. Mike goes on to say that post to Minsk is opened and the contents stolen. So beware!

● John Scully, G3GUR, wrote regarding VE which, according to his 1948 *GPO Handbook for Wireless Operators*, means 'under-

stood'. John came back on air in April 1992 after a long absence and has not yet received any QSL cards via the Bureau. That is not unusual - I reckon that it takes at least a year from the first QSO for the cards to start arriving.

● Jack Loader, G0SRX, was a regimental signaller with the 4th Dorsets TA in 1935 and was taught to use VE as 'I have a message for you'. Jack also says he cannot come to terms with the present phonetic alphabet and much prefers the old Ack, Beer, Charlie format. He says he still converts the alphabet in his mind. Just like I still mentally convert into pounds, shillings and pence to see how much things really cost - such are the signs of advancing years!

● I am told that a large number of cards for the special event station GB2IWM remain unclaimed. Half have to be thrown away because they have not been collected from the Sub Managers. This is not uncommon with GB-call QSL cards and is a waste of time and money as well as being grossly discourteous. The Sub Managers are extremely busy people and could well do without the extra problem of sorting cards

which are not going to be needed. Might I suggest that the problem could be approached in two ways. Firstly, that the GB operator asks at the time of the QSO whether the person wants a card or not. Secondly, if you work a GB call please indicate at the time of the QSO whether you wish for a confirmatory card. As one sub manager said to me recently 'under the present system the GB operator might just as well write out the cards and then throw 50% of

them away and save me the time of doing it later!'

● Danny Begg G3YXJ sent me the amusing photograph of Thatcham Post Office reproduced below after local villains had removed the C. Danny suggests it might be a suitable location for the bureau should it ever decide to move from Potters Bar. As the post office proprietor's name is Pope one assumes no cards would ever go astray!

John Hall, G3KVA



G1GEY (TWR), says he made 66 auroral QSOs on 70cm, best DX being SP9EWU (JO90) and RB5PA (KO21) on CW last May. The good tropo of 27-30 December produced lots of DX with Scandinavian, central European and nearer continental stations. Between 27/12 and 4/1 he made 151 contacts using 400W to two 21-ele Tonna Yagis with 0.5dB NF masthead preamp.

The Spalding Club station, G4DSP, scored over 25,000pts on 70cm in the four days of the Winter Activity contest. Their best DX on the 27th was DG9NBT (JN49) at 771km and on the 29th, OZ1JPT (JO54) at 725km. On 27 December G4LDR worked several stations in mid and south France and Neil's best DX on 2 January was OZ9IT (JO46). Karl Lamford, G6ODT (NHM), re-erected his two 21-ele Tonna Yagis on 13 December and next day worked OE5VHL (JN68), LX1JX (JO30) and several Germans. The period 26-29 December brought many more DL, HB9, ON, F and GW QSOs.

Still on 70cm, Shane Hogarth, G7EWL (NHM), using just 0.5W to an HB9CV antenna 30ft AGL, worked some good DX on 29 December including G1GEY and ON7EG (JO10SS). DL2KBB (JO30) peaked S7 at times but escaped. By now, G8ESB should

have installed a 150W PA which, with masthead preamp, ought to bring Rik some good DX this year. He currently uses a TS-780.

GJ4ICD took some time off over Christmas to 'play radio' and found 70cm and 23cm conditions fantastic with HB9AMH/P (JN37) S9-plus with loads of DLs right up to the Polish border. Even so, Geoff didn't work anything new. GW3ZTH/P also worked HB9AMH/P on 70cm on 26 December. Joe concluded that although the high pressure did not bring the hoped for ducting, it nevertheless brought 1992 to a fitting close. He thanks his wife for the thermal underwear which made his portable operation in freezing weather more bearable!

DEADLINES

NICE TO have reports on all bands this month. Please keep them coming. The **May** deadline is **1 April**, when I'll need your Annual Table scores, and for **June** it's **29 April**. The BT Gold mailbox is 76:MSX021, my CompuServe ID is 70630,603 - several readers are using that excellent E-mail system - the fax machine is on 081-668 5582 and the telex number is 9312111074(CN). See you at the VHF Convention.

HF NEWS

continued from page 16

The recovery in solar activity recorded last month looks like being in this category. Since the middle of December the 27-day average solar flux fell steadily from its peak of just under 150 sfu and by the end of the third week in January the daily figure had fallen close to 100 sfu.

It remains to be seen whether this decline will continue down to or even below the levels of the trough in mid-1992 but it has to be said that this is a distinct possibility."

EXPEDITIONS

THE **KINGMAN Reef/Palmyra** Is expedition should be on the air early in March. Hopefully twelve operators will be involved and they are scheduled to reach Kingman Reef about 5 March. Eight will land there and the other four continue to Palmyra. The operators will change over so that each can get on the air from both locations.

The operation is planned to last nine days (including two complete weekends). *RSGB DX News*

Sheet says that Europe will be a prime target (operators will include G0LMX, HB9AEE, HB9AHL, OZ1LGF, and PA3DZN), as will the LF and WARC bands. Donations are being sought and should be sent to G0LMX.

AA5AU and KB6GL will be operating from **San Andres Is** between 27 February and 7 March using CW, SSB, and RTTY. Callsigns will be HK0/AA5AU and HK0/KB6GL.

The Radio Club del Sur will visit Bermejo Island - 20 miles south of Bahia Blanca in the Atlantic Ocean. This is the first operation from the island (which has an IOTA reference SA-021) - the callsign will be L1DSR and it will take place from 2 to 4 April.

Frequencies to be used include 3.510, 3.690, 7.010, 7.090, 14.010, 14.190, 21.010, 21.190, 28.010, 28.590 and 29.000MHz.

THANKS

ONCE AGAIN to all contributors and to the editors of *DXpress* (PA3DZN), the *Long Island DX Bulletin* (W2IYX), *RSGB DX News Sheet* (G4DYO), and the *Lynx DX Bulletin* (EA2KL). Please send everything for the **May** issue to reach me no later than **25 March**.



SWL NEWS

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

THE CHRISTMAS and New Year Period produced some of the worst conditions on the amateur bands for a long time. There was little DX on the higher bands which closed early, while the low bands produced some good DX for those taking a serious interest in the bands for the first time. For the more established listener, the period provided sufficient time to log a few new countries on all bands thanks to the appearance of the new European republics - 9A, S5, 4N4. The disappearance of Czechoslovakia from the DXCC List on 1 January is likely to give rise to two new DXCC countries - the Czech Republic - OK1/2, and Slovakia - OM. The WARC bands did not produce much in the way of good DX either, but I should mention the RT5UN DX net which meets at 1400 daily on 24.945MHz. Recent additions on this net were CX, HC, J28, KG4, TL8, V2, 5T5 and 7Q7.

North Korea is also likely to be added to the DXCC list as a result of the appearance of P5RS7. Unfortunately, signals were weak and a number of listeners failed to add this new one to their All Time lists. Most reports were on 14MHz CW. However, now that Romeo (3W3RR) has 'broken the ice', we can hope that others will be able to mount an expedition before too long.

Looking in a little more depth at the low bands over the festive period, listeners seem to have spent most of the early mornings in their beds so missed all the DX which had been on the bands. Reports start around 0800, when the best DX at the top end of 80 metres had seen signals from FK8, JA and ZL. East coast W's and VE's had been audible up to 0900. During afternoon hours - at our 'grey line', N7UA had been the most consistent signal from the west coast. JT1CS and several ZL's had also been heard at around 1630. During the evenings a number of DX stations had been heard in Europe but the best were reserved for those keen enough to monitor the bands up to and past midnight. Three of the best

were 7Q7XX, 9M2DM and 9V1XQ. After midnight the band provided some strong signals from Stateside and the Caribbean.

Turning to 7MHz, 0800 also saw ZL's plus VK's, while the DX net on 7.184MHz provided some good Caribbean and Pacific DX. Indeed, Robert Small, BRS8841, mentioned T32 and VK9. JA's had been heard at 1520, while the band seemed to be at its best for DX at around 1900. VK4MZ was a consistently strong signal, and FK8CP was heard, too. There was too much other DX reported during evening hours to mention, but stations from Africa and Asia were very prominent. Later in the evening, signals from South America had been good, with a particularly good one from CE8ABF.

With all this DX on 3.5 and 7MHz, one or two reporters monitored 1.8MHz. Surprisingly, RM8NA, TA1AL, TZ6VV, 9K2MU plus W and VE were logged. Elsewhere, the ARRL 28MHz contest in early December saw superb conditions. Philip Davies, G1EMD, heard 45 states. Other interesting facts from the period saw Finland using OG. There were a number of special stations to be heard using the 'FIN' suffix. VA1S commemorated the 90th Anniversary of the East-West transmission of signals by Marconi from Nova Scotia to Europe on 15 December 1902. E28DX caused something of a stir from Koh Samui Island, Malaysia. It is this type of operation - using a callsign from an unfamiliar callsign block - which causes confusion to many. The rule is to 'log it first and worry about it later'.

SWL REPORTS

AT THE time of writing, all cards for 4SOUK and 4S7DGG had been answered. Cards for 4S7VLG were expected within a few days. If any SWL heard any of these three stations, I have the logs and a supply of QSL cards. If any other DXpedition would like to use my QSL services for SWL reports, please drop me a line.

While dealing with the cards, a few points were noticed. In making your reports DO:

- quote the correct time of the QSOs you are reporting;
- ensure that you quote the correct band or an accurate frequency;
- include the callsign of at least one station worked;
- use 'RST' not 'SINPO'.

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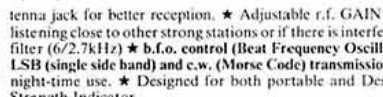
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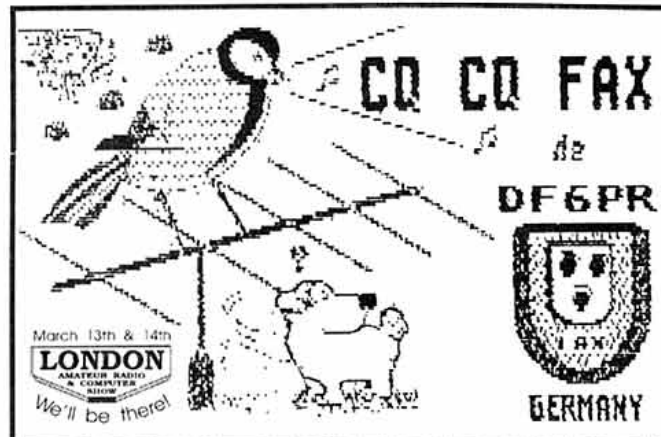
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THE G-QRP CLUB has a number of award schemes and each one must be earned using low power. QRP is defined as not more than 5W output (CW) or 10W PEP (SSB).

I am sure you will agree that, given these restrictions, to earn any of their Awards is a real challenge. Add to this, a time limit and the CW Novice Award becomes a prize to treasure.

This award is available to any amateur who, during the first twelve months of holding a licence, contacts fifty different stations while using CW. A declaration that power was not increased during the contact must accompany the application along with a copy of the log and three first class stamps. The award is also open to full Class 'B' licensees without the power limitation.

Keith, 2M0ACT, has applied for and been granted a Class 'A' Novice CW Award. Using his Novice 3 watt power allocation, his fifty contacts included 12 DXCC countries. He made seven contacts with North America and Canada and two with Indonesia. Congratulations Keith. Very well done. Keith is enjoying his involvement in the hobby - as this award shows - but there is more. Because distant lands are no longer merely maps in an atlas, he is finding that Geography lessons have a whole new meaning. He is finding the subject far easier to understand. It must be rather nice to hear of a country and think of the conversation you had with a resident!

Another bonus is the ability to practice speaking French to the French as he does on 80 metres. His dad Stuart, G0CAQ, sent the information to the G-QRP Club and Dave, G0NEZ, the Novice Services Manager passed it to me. I have heard only praise for Novices and the standard of their operating abilities, and mention is made of four Novices who make good use of the key. They are: Ian, Jenny, Phil and Carl. If you hear 2E0AAU, ABC ABI and ADH, you know that you have found them - in that order!

Membership of the QRP Club is not a condition so, new licensees, why not see what you can do? If you let me know when you achieve the award, I will spread the word.

LIFEBOAT

AS REPORTED both in this column and elsewhere, the Worked All Britain group are trying to raise £20,000 - the cost of an inshore lifeboat.

To recap - amateurs are invited to work the special event stations which will be running throughout the year. Work ten such stations and you can apply for an award certificate by sending the relevant details and a £3 donation. Donations in excess of £3 will not be refused.

Denby Dale ARC are hoping to mount a four-day special event over the Easter weekend operating two stations per day at a location on the East coast. I hope to give full details in next month's column.

Meanwhile, if you feel that you would like to know more - perhaps with the idea of going along to give a hand for as long (or short) a period as you can - ring Kevin, G1FYS, on 0484 547553 or using Packet contact him on GB7FYS.

A WELCOME TO AMATEUR RADIO

HOW DO INTERESTED people learn about the possibilities of the Novice licence? How can we advertise the hobby so that anyone who would like to know more can find a source of information? This has been a problem from the very beginning.

Various ways have been suggested and tried - with obvious success as is demonstrated by the number of Novice call signs - by now around 1000 of them. Yet, there must be many more individuals who would welcome the opportunity to join the amateur

ranks if only they knew enough about the hobby.

An excellent means of spreading the word has been found by Steve, 2E1AHA. He is a Development Worker in Sheffield where centres are run to help unemployed people to gain skills. Although his interest is really in computers he saw a close connection between this and amateur radio. His next step was a licence. A five-week crash course provided the technical half of the RAE, a Novice course provided the ability to set up stations and demonstrate. Other amateurs have advised and helped, and a group is now involved in Novice training along with Steve - who is an Instructor. Like 'little Topsy' the project grew and now there are Novice courses, Packet stations in schools and elsewhere, demonstrations in schools and groups of teachers interested in taking Novice courses themselves - and further spreading the concept of amateur radio.

To achieve wider publicity early on, Steve hit on the idea of advertising within the Community. The method he chose is very effective and free. He supplies the following information.

Many municipal libraries mount topical displays and are usually only too willing to give space to any theme which may interest visitors to the library. When you consider the numbers who would see such displays, you are looking at a large number of people. A phone call or a visit will probably ensure that you are welcomed with open arms.

When the display is as attractive as the one at Rowmarsh, you can guarantee that it will be given more than a passing glance - even if the welcoming arms are not always there! Five year old son Thomas is needed elsewhere!

Material for display can be obtained from RSGB or possibly the Chief Instructor for your area already has some. A Novice stand

at a rally will have leaflets to show what is available - and may have some spare ones that you could have. Is there a talented artist in the club?

So, how to set about it? Ask at the desk. The librarians are usually most helpful. When they realise that you will be mounting the display (they are busy people) they should offer space, advice and probably the offer of display stands. Discuss the idea at the club. There will probably be members who have a little spare time, who can collect and mount posters. When a date is settled and the material is ready, a couple of hours at most should be enough to set up an attractive display area. If any club member has time to spend nearby - answering questions and explaining - it would be a bonus.

Please give it some thought and if you feel that you would like to put a little back into the hobby, this is a way that you can - while making it possible for someone else to share your enjoyment.

If you need further advice - or encouragement - please let me know. There is of course a condition. The story of your venture would be appreciated.

Steve has invited me over to Sheffield to see for myself what is going on - which I shall be doing shortly. A further report will appear in this column after that visit. Is there anyone out there who has an equally interesting story? If so, please share it.

TODAY'S NEWS - TODAY

PLEASE SEND anything of interest directly to me at the address at the top of the column. This saves a great deal of time.

Remember that items leave me about six weeks before they appear on your doormat in *RadCom*. So there is always a time-lag, even if there is room for a particular story in a particular month. Occasionally there is not sufficient space, but there is always the following month.

A few clubs send me a copy of their news sheets as a matter of course, some send one when there is anything of possible wider interest - a special event station in the offing perhaps, a presentation to Novices, some special achievement. If you have something to share with readers of *Novice News*, just the barest details, on the back of an envelope in just readable scrawl could result in fame if not fortune - and the knowledge that you have perhaps given someone else an idea. Remember, this is *your* column.



The attractive stand which Steve, 2E1AHA, put up in Rowmarsh Library.

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leading transceiver.

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KENWOOD

Novice NOTEBOOK

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

DO YOU have a 50Ω dummy load/power meter, for the shack. Well, it's a most useful (some would say essential) item when building an amateur transmitter. In Novice applications we only need a five watt dummy load, but it's a piece of equipment which is likely to be useful for a long time if built to last. Possibly, you may be surprised that a piece of gear will last that long. Well, I could show you several coaxial cables with special RF sockets on them that are over 25 years old and still in use. Also an adaptor with a six volt lamp mounted in the end - its just broken after over thirty years!

Once you obtain you're full license, you may find it useful for the dummy load to handle 100 watts for a short period, say one minute. This means you can use it for short tests on higher power. Also a detector circuit with a meter showing power output is very helpful when adjusting a transmitter. This month's project does all this for you without breaking the bank!

Packet Radio Primer

by Dave Coomber, G8UYZ
and Martyn Croft, G8NZU

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LET'S GET GOING

RESISTORS OF 100 watt rating at 50Ω tend to be expensive items if bought new but if you keep a keen eye open at rallies you'll often find one for a pound or so. That's fine, but if you can't wait that long here is the place to start. A cheap way to construct the load is to use a bank of higher value resistors in parallel. Twenty 1kΩ 1W resistors in parallel will give the required 50 at up to 20W continuous dissipation. Remember that it's possible to run considerably more power into the load for a short time.



To test the unit, I ran 100 watts into it for three minutes when the SWR (Standing wave ratio) suddenly increased from 1:1 to 1.2:1. This was caused by a fault as the resistors were now being severely overloaded, and I quickly removed the power. Too much power means you will eventually burn out one or more of the resistors so be careful.

However at Novice power levels there should be no problem, and the tests proved that 20 one-watt resistors will be fine, even at quite high power, provided sufficient time is allowed for cooling.

CONSTRUCTION

I HAVE USED some boards which I designed several years ago, but

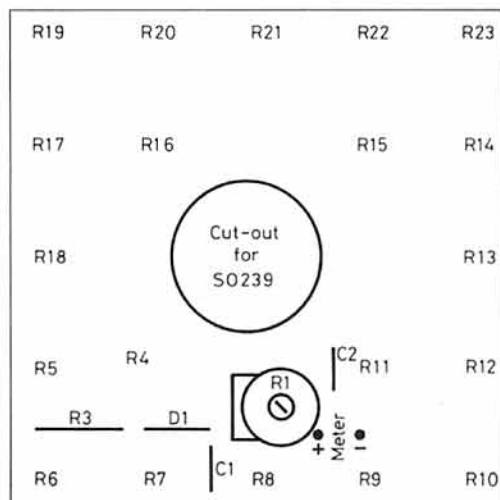
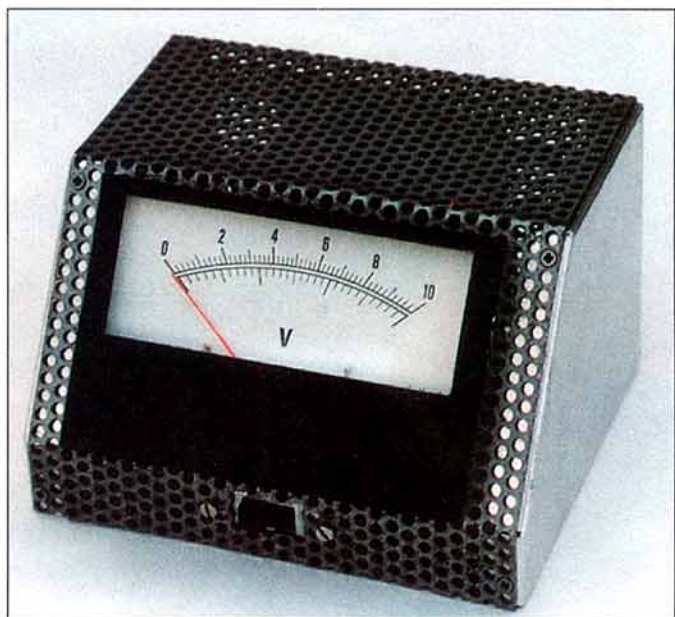
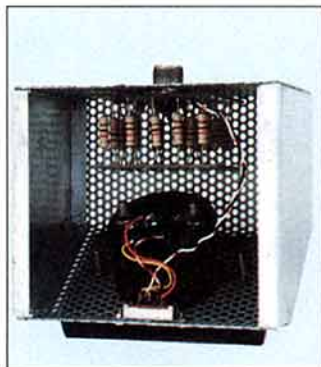


Fig 1: Location of the resistors and other PCB components.



as you can see from the photographs, it would be easy to use two pieces of PCB material and build the detector 'ugly' style on the earth plate. The unit can be built into a metal box so as to withstand any heat produced, but still leave plenty of ventilation to help dissipate the heat.



Setting up is done using a calibrated power meter. You probably don't have one but no doubt there are amateurs within your

local club that can help. The low power range is great for checking handheld portables on the two metre or seventy centimetre VHF bands. The high power range is suitable for HF transceivers up to about 100W - VHF rigs of this power are not too common!

Check the output power of your transmitter on the calibrated power meter first. Then switch off the rig and transfer the output lead to the dummy load. With the low power selected, adjust R1 until the reading on the meter M1 is the same as the calibrated meter. Then repeat the procedure for the high power range, but this time adjust R2 until the reading is the same as on the calibrated meter. Do not re-adjust R1 on high power.

READY TO GO

NOW YOUR dummy load is ready for use, and you'll probably wonder how you ever managed without it!

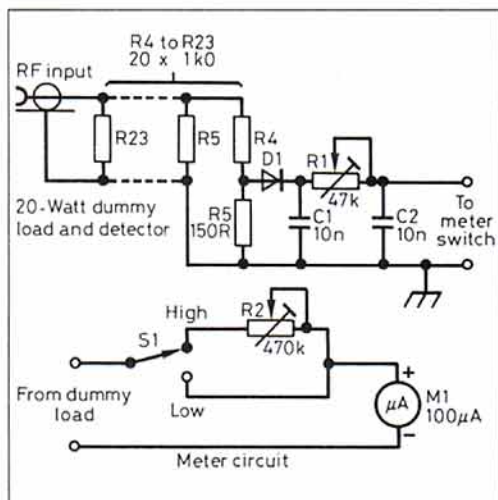


Fig 2: R4 to R22 are wired in parallel as shown above.

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KENWOOD

100W HF MOSFET Amplifier

Concluding a two part article by David Bowman, G0MRF

AS THE AMPLIFIER is broadband, testing is fairly simple. Firstly, the amplifier should either be fitted with the recommended 22MHz filter, or, if this is not required, by taking the RF directly from the output of T3. A 48-50 Volt power supply capable of 5 Amps peak is required, with a regulated 12V 500mA supply for bias and Tx/Rx switching. Also, a 50Ω load, SWR/power meter and a multimeter. Connect the amplifier to the 50Ω load via the power meter, and to the two power supplies. The 48V supply should have a 2A quick blow fuse and the multimeter in series to measure drain current.

Turn RV1 and RV2 fully anticlockwise (zero bias volts) and switch on the 12V supply. Connect the Tx/Rx pin to ground - this should cause the relays to switch to the transmit position. If successful select the 1Amp range on the multimeter and switch on the 48V supply. At this stage, the ammeter should continue to read zero drain current. The only adjustment is to set the quiescent drain current to 125mA per device. Slowly adjust RV1 until the multimeter indicates 125mA, then adjust RV2 until the total drain current increases to 250mA.

The amplifier can now be tested by applying approx 1 watt of input power. On lower HF bands, this should indicate 20-30W output on the SWR/power meter. Any fault at this stage will probably be due to soldered joints or transformer winding. If all is well, change the fuse to 5A, adjust the ammeter range and test at full output. Run the amplifier at 100W for a few minutes, then disconnect the drive. Qui-



escent drain current will probably have increased to 300mA. This is perfectly normal; it should, however, return to its previous value as the heatsink temperature drops.

Finally, check the input VSWR, which should be below 2:1 on all bands and usually much less. However, it can be optimised by making slight changes to the value of C1. Although this completes the testing of the amplifier, for good linearity it is important that the unit is not overdriven. The available gain at 18 and 21MHz is less than at LF. On 18MHz, 80W output can be achieved, but on 21MHz gain is reduced to 6-7dB. This represents an increase of over one S-point, and it

may be possible to increase the drive power to compensate for lack of gain.

POWER SUPPLY

THE POWER SUPPLY IS shown in Fig 4 and is simply smoothed, but unregulated. RL1 and R1 give protection from current surges at switch on. With the PSU off, relay contacts are open. When 240V is applied to the input, current flow is limited by R1, and the charge rate on electrolytic C1 is controlled. As the voltage on C1 approaches 40V the relay is energised and the resistor bypassed.

The high value electrolytic capacitor reduces the 100Hz ripple to a low level. Linearity tests with the supply shown produced a gain compression of 0.5dB at a power output of 112W. Testing with a spectrum analyser confirmed this PSU design to be more than adequate for amateur use, and Fig 5 uses a 7812 IC to provide a 12V 1A regulated supply.

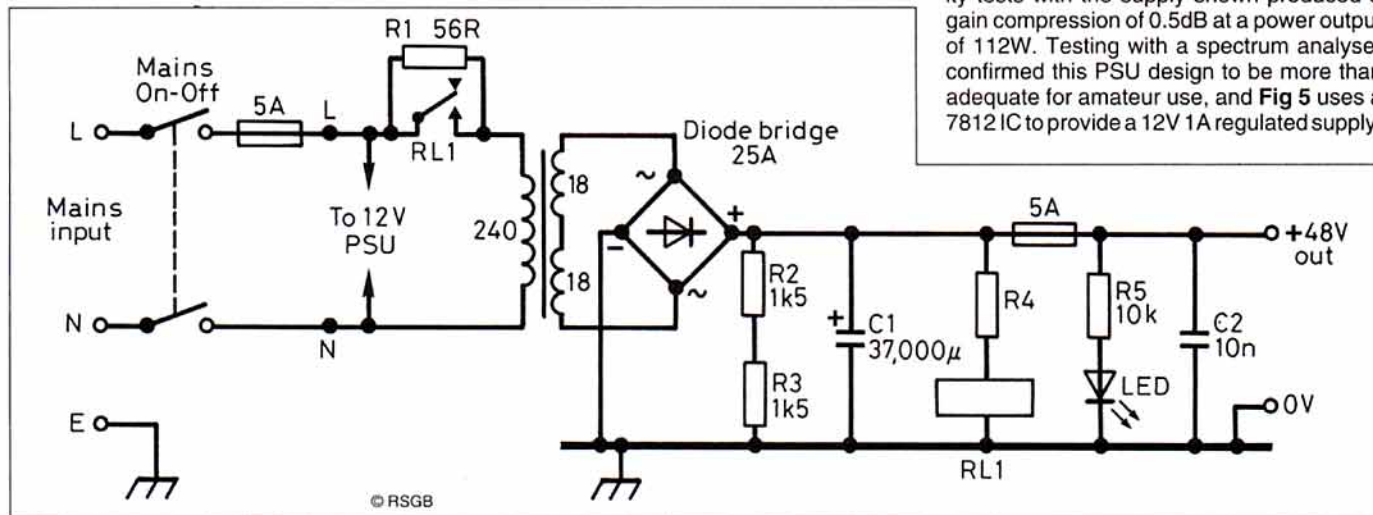


Fig 4: The resistor R1 reduces current surges in the main power supply on power-up.

COMPONENTS LIST

Semiconductors

TR1,TR2	2SK413	TR4	BFY50
TR3	BC109	D1	1N4001

Inductors (see text for construction details)

T1 Primary: 12 turns 0.56mm enamelled copper wire
 Secondary: 6 turns 0.8mm enamelled copper centre tapped
 Core: Fair-Rite 59-61000401 toroid
 22mm diam. Permeability 125

T2 Balanced drain feed RF Choke:
 11 turns 0.8mm enamelled copper, bifilar wound
 3 Twists per inch. Core as T1

T3 Primary: 2 turns comprising 5.50mm brass tube and PTFE
 high temperature wire, centre tapped.
 Secondary: 3 turns 19/0.15mm PTFE wire
 Core: 2 x Fair-Rite 26-43540001 ferrite
 sleeves (28 x 14mm, Permeability 850)

L1, L2 5.6µH Toko type FL4 axial inductor
 L3, L4 8 turns 12mm ID 1mm enamelled copper wire close wound

Resistors (All 0.25W carbon unless otherwise stated)

R1,R2,R3	50Ω input attenuator	R14	680R
R4,R9	1R0 1W metal film	R15	47k
R5,R10	1k0	R16	68k
R6,R11	10R 0.5W	R17	3k3
R7,R12	470R 0.5W	RV1,RV2	1k0 min. preset
R8,R13	220R 2.0W		

Capacitors (All ceramic unless stated)

C1,C24	270pF S.Mica	C15	1nF 1kV
C2	270pF	C16	10uF 63V*
C3,C4,C7,C9	47nF	C17	10nF 100V
C8,C10,C13,C14	47nF	C18	100uF 63V*
C5,C11	22nF	C19,C20	10nF 1kV
C26,C27,C28	22nF	C21,C22	0.01µF 1kV
C6,C12,C29	10µF 25V*	C23,C25	150pF S.Mic

* Electrolytic

Miscellaneous

RL1,RL2 12V single pole change over relay (RS 344-467)
 8 off 1mm PCB pins
 150mm miniature 50Ω coax (RG174 etc)
 Printed circuit board
 2 off PCB end caps for T3

The case illustrated is obtainable from HJ Morgan Smith Ltd, Unit 3, Vernon Building, Westbourne St., High Wycombe, Bucks HP11 2PX Tel 0494 532421. Price is £27.50 incl.VAT Carriage extra by arrangement. Inductors and ferrite components are stocked by Cirkit (Tel 0992 444111).

Kits of all components (excluding case) are available from the author at: Airwave Systems, 31 Benson Close, Hounslow, Middlesex TW3 3QX. Tel: 081 472-8615.

Price for a full kit (excluding case and PSU) is £42.00. A partial kit is also available consisting of PCB, ferrites, PTFE wire, and brass tube. Price: £17.50. Note that all prices include VAT and p&p.

AMPLIFIER O/P HARMONIC CONTENT (dB)

Freq (MHz)	2nd	3rd	4th	5th
1.8	-38	-26	-56	-42
3.5	-32	-27	-47	-48
7	-36	-23	-60	*
10.1	-32	*	*	*
14	-48	-56	*	*
18	-54	-60	*	*
21	*	*	*	*

* = Level more than 65dB below peak output.

Measurements made on a Marconi TF2370 spectrum analyzer.

Table 2.

FILTERS AND OPTIONS

HARMONIC OUTPUT LEVELS of the amplifier and filter are given in Table 2. Results compare favourably with bipolar designs and show the balancing action of the drain circuit as the second harmonic is at a significantly lower level than the third. For amateur use, all harmonics should be as low as is reasonably practicable. The five element Chebyshev filter shown has a cut-off at 22MHz; this provides sufficient harmonic rejection for the unit to be used directly on the higher bands.

However, below 14MHz more filtering is needed. Suitable λ/2 filters are given in [2] and [3], which reduce harmonic output to at least 60dB below peak level. For single band operation, the on-board filter can be replaced with one appropriate for the frequency. Owing to the large physical size of air wound coils at HF, it is envisaged that powdered iron toroid inductor cores will be used, and sufficient space is available on the PCB for these. I would strongly recommend that home-brew filters are checked for low insertion loss and correct cut-off frequency before fitting.

There are many ways in which this amplifier could be developed. For example, although robust, the FETs would not survive a prolonged infinite VSWR at maximum power. The addition of a protection circuit which detected reflected power and an over temperature sensor would protect the amplifier against most fault conditions [4]. [Readers may also be interested in Mike Grierson's, G3TSO, article 'A Solid State HF Linear Amp' in Jan 92 *RadCom* - Ed].

Finally, I have found during development that the 'passive gate' technique can be used with most other Power FETs. As there are now a number of devices with Pd ratings of 200W and above, it should be possible to adapt the circuit for two or four of these FETs, increasing potential power output to the UK legal limit.

I would like to thank K Renton, G6JMJ, at Imperial College, London, for his assistance with performance evaluation.

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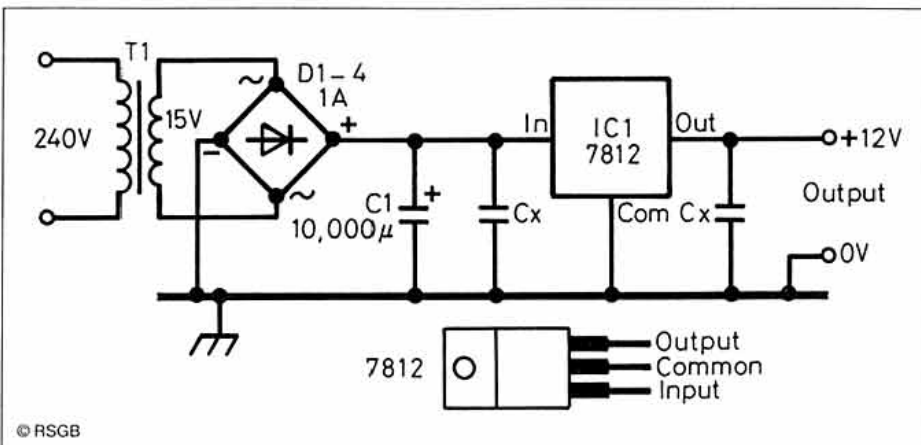


Fig 5: A simple 12V regulator supplies the bias and Tx/Rx switching.

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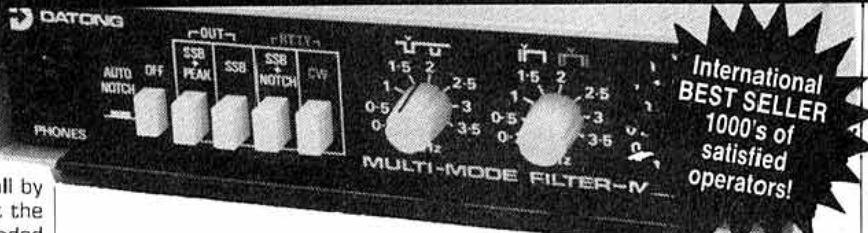
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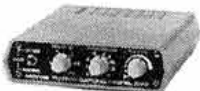


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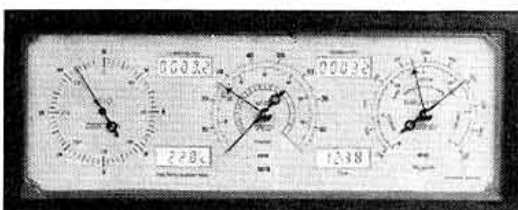
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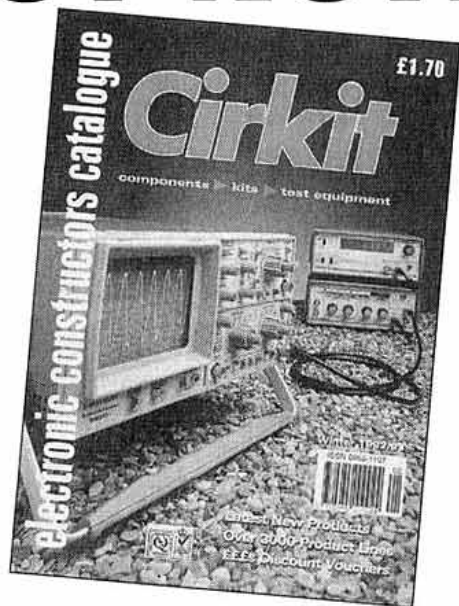
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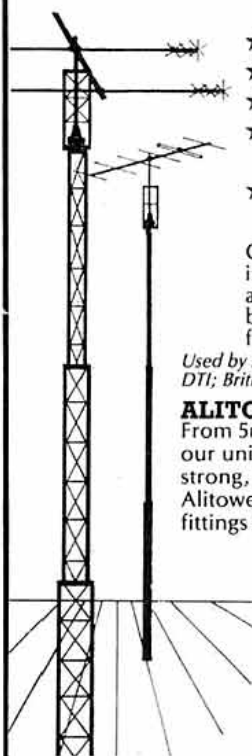
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PHASING OUT INTERFERENCE - ANOTHER LOOK

A DECADE AGO, *TT* (August 1982, pp684-5) drew attention to the renewed interest then being shown in overcoming the problem of losing wanted signals due to another, much stronger signal or nasty noise coming up on the same channel. Such interference tended to blot out the wanted signal no matter how good the selectivity characteristics of the receiver.

It was pointed out that the idea of phasing out an unwanted signal dated back many years and in the 1930s had been utilised in the so-called 'Jones noise-balancing arrangement'. This was described in early editions of *The Radio Handbook*, edited by Frank Jones, W6AJF: Fig 1. The aim was to phase out local electrical interference by means of pick-up on an auxiliary antenna used to provide a balancing (180° out-of-phase) signal to the receiver. The system required careful setting up but, it was claimed, could reduce a specific unwanted source of interference by several S-points while reducing the wanted signal by only about one S-point.

Unlike noise-blanking techniques (which are suitable only for pulse-type interference), noise-balancing/null-steering systems can be used to reduce interference from any type of interfering signal provided that it is strong enough to be picked up on the auxiliary 'noise antenna' and is of reasonably consistent strength. In the 1960s a professional MW/LW system for use by broadcasters etc was developed by Christopher Henn-Collins, GU5ZC, which could place a very deep rejection notch (over 55dB) on an unwanted signal.

The 1982 item drew attention to the work of John K Webb, W1ETC, of the American defence-communications firm, The MITRE Corporation as presented at a 1982 IEE Conference on HF communication systems and techniques (*IEE Conference Publication No 206*): Figs 2 and 3. Subsequently, W1ETC described his work on interference-cancellation in *QST*, October 1982, including constructional information on a 'null steerer' using coiled lengths of coaxial cable to provide phase-shifting. He presented a compact, relatively low-cost null steerer located alongside (or incorporated into) a receiver or transceiver which could generate deep nulls against a chosen single source of interference. The arrangement was not affected by multipath propagation over the range 2-30MHz, and manual adjustment by the operator used just two knobs. In effect, by adjusting the phase and amplitude of signals from a main and an

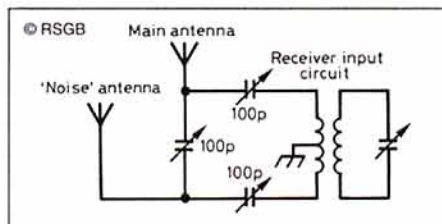


Fig 1: The original Jones noise-balancing arrangement as shown in early editions of *The Radio Handbook*. Local electrical interference could be phased out by means of pick-up on the auxiliary 'noise' antenna. Although it could be effective it required very careful setting up.

Pat Hawker's Technical Topics

auxiliary antenna element, a variety of complex directional patterns was obtained. A breadboard model was claimed to show nulls of over 50dB at 30MHz.

In the QST article he summarized the results he had obtained after many hours of null-steerer use throughout the HF spectrum as including:

- (1) The available null depth in signals propagated over short paths of up to 20 miles is large and stable, limited only by how finely the controls are adjusted.
- (2) Nulls arriving over short skywave paths of up to a few hundred miles are in the order of 30dB, provided there is a single mode of propagation and one direction of arrival. Nulls are usually stable.
- (3) Signals propagated over paths of 10 to 100 miles may arrive as a mixture of ground wave and skywave. A single null is thus ineffective.
- (4) Signals propagated by skywave over long distances frequently involve several paths each having a different number of reflections. A single null will have little effect.
- (5) Broadband radiated noise can be nulled as deeply as any radio signal. This seems to be a more effective counter to noise than any blanking or limiting technique. . . . When the desired signal is of a type that nulls poorly, then it is almost certain that only interferers will be nulled. Close, strong interferers have the deepest nulls.

He found that broadband electrical noise, such as leakage from American 60Hz power lines, could be deeply nulled. This was provided the interference was being directly radiated to the receiver antennas and not entering the receiver in a less-directional manner (for example re-radiation from mains cabling etc).

W1ETC reported that 90° phase shifts could be obtained by using a series of fixed time delay lines that on the higher frequencies could take the form of coiled lengths of coaxial cable. For example, the range 10-14.4MHz used a quarter-wave line at 12.5MHz providing a 20 nanosecond delay from 4m of cable with a velocity factor of 0.66; or for 18.0-29.7MHz, a quarter-wave frequency of 25.0MHz gave 10 nanoseconds delay from 2m of cable.

In the late-1980s an item of factory equipment called 'QRM Eliminator MkII' was marketed in the UK by SEM, reviewed in *Ham Radio Today* (June 1990), at a cost approaching £100.

The 1982 *TT* item emphasised a problem with many such nulling techniques. The problem is that they can prove difficult to adjust quickly enough to be of value to an operator when a strong interfering signal of electrical noise suddenly pops up in the middle of a contact.

Two recent articles on the use of interference null-steerers have appeared in the Australian *Amateur Radiob*y by Lloyd Butler, VK5BR (September 1992 and January 1993). The first article 'An interference cancelling system for your receiver or transceiver' presented the circuit details of a practical unit which made use of resistance-capacitance (RC) phase shift networks to adjust the relative phase of the wanted and unwanted signals over the necessary 360° of phase. In his second article: 'More on interference cancelling, and a new circuit', VK5BR makes use of the phase shift that occurs when a tuned circuit is set off resonance. His new circuit, Fig 4, despite its simplicity, can be adjusted over a full 180° of

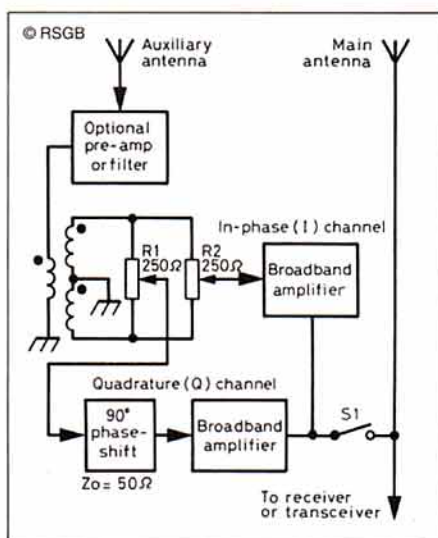


Fig 2: Functional diagram of the electronic null steering unit for use in conjunction with an HF receiver or transceiver (S1 is a relay contact to disconnect the system during transmission) as described by John K Webb, W1ETC, of the MITRE Corporation in 1982.

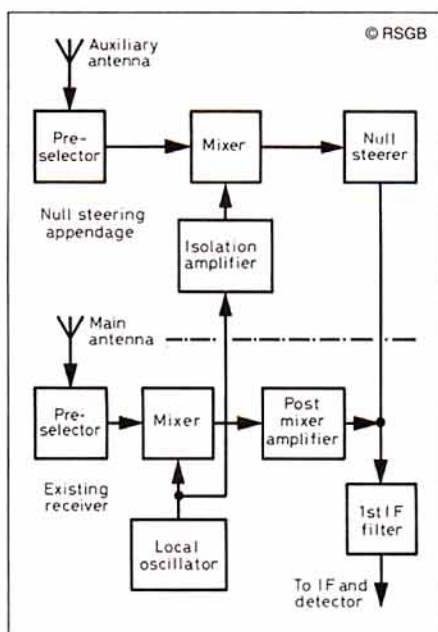


Fig 3: W1ETC's suggestion of how a null steerer might be implemented at intermediate frequency and incorporated within a receiver having dual front-end circuits.

phase with a single tuning control, with the remaining 180° accessible by operating a phase-reversing switch.

VK5BR introduces this form of interference-cancellation as follows: "The idea is to use an auxiliary antenna (almost any random length of wire) in addition to the main receiving antenna. As the two antennas are physically spaced from each other and also unlikely to have similar field patterns, the amplitude and phase of signals induced into the two antennas by an interfering signal can be expected to be different. This particularly applies to a localised interference source which is largely coupled into the antenna by induction. This induction field follows a different law of signal attenuation versus distance from that of the radiation field by which the distant desired signal is being received.

"The two antenna outputs are combined after modifying their relative signal levels and phase such that the interference signal from one antenna is equal but opposite in phase from that from the other antenna. The interference signal is cancelled but, as the two desired signals have a different amplitude and phase relationship, a resultant desired signal component is retained. Of course, for all this to work, the interference waveform must be continuous and reasonably stable in its shape and amplitude. From my own experience, the system works extremely well for power line noise and frequency dependent noise bars generated by TV line time-bases and computers".

In Fig 4, L1-C1A and L2-C1B are the two tuned circuits coupled by resistor R2. L1 and L2 are identical and C1A-B a ganged variable

pair. VK5BR states that in practice, tracking of tuning does not appear to be critical and there is no need to be too concerned about precise matching of the inductors. The circuit, as shown, runs fairly low Q and almost any identical pair of inductors can be used provided they are selected with the right inductance for the frequency coverage concerned. VK5BR uses miniature RF chokes which are convenient because they are no larger than a resistor or small capacitor, can be bought in precise values and save the effort of having to wind the coils. With 10 microhenrys and a 15-280pF the tuning range covers 3.5 and 7MHz; bandswitching can be added as shown in Fig 5. For 1.8 and 3.5MHz use 39µH; for 7 to 14MHz use 2.7µH; and for 14 to 28MHz use 0.68µH. Fig 6 shows how diode protection can be added when used in conjunction with a transceiver.

VK5BR writes: "To set for a balance, the phase and amplitude controls are adjusted for lower noise, one after the other a number of times, until an interference null is achieved. If a null is not found, or the null is not very definite, the phase is reversed with the reversing switch and the procedure repeated". In the earlier article, VK5BR notes that apart from the forms of local interference already mentioned, he found that on the MF broadcast band a distant (interstate) station was normally completely swamped by a local station. After balancing out the local station, the distant station could be received quite well with only a slight amount of sideband splatter from the local station. In effect, it is rather like obtaining the benefit from swinging the null of a good frame/ferrite-rod antenna.

ANTENNA LORE MK2

THE DECEMBER 77 ITEM on 'Persistent SWR myths' attracted several supportive comments and it does appear that the whole subject of antennas and feeders is still for many of us surrounded with an air of mystery. QST (November 1992) has recently published a five-page article by Kenneth Macleish, W7TX 'Why an antenna radiates' providing what is described as "a searching look at the mysterious process by which our antennas hurl energy from here to there". As a starter it challenges the reader to answer "true" or "false" to four statements:

- (1) In a centre-fed, half-wave dipole, electrons surge back and forth from one side of the antenna to the other.
- (2) It is possible for a perfect insulator to radiate.
- (3) Unlike ohmic resistance, 'radiation resistance' has significance only at the feed point of an antenna or antenna system.
- (4) The ground around a transmitting antenna radiates.

W7TX puts the answers in a footnote at the end of his article but, to save any embarrassment, the first and third are false; the second and fourth are true. I won't ask how many you got right! Fortunately, it is not necessary to know exactly how an antenna works to make or use one, but it helps when it doesn't seem to work in the expected manner!

In the 'Lab Notes' column of the December, 1992 QST, Zack Lau, KH6CPI/1 of ARRL technical staff, provides in question and answer form some practical, two-page guidance on 'limited space antennas', including the use of indoor antennas on HF. He notes for example that antennas squeezed into small apartments may have relatively low losses in wood-frame buildings, very high in concrete and steel structures, with stucco and wire mesh frames also bad. The practical way to determine such losses is by trial and error since there are usually too many factors involved to evaluate indoor antennas with theoretical models. He advises against running high power to an indoor antenna on the grounds that "while studies have not conclusively linked low-level RF exposure to health problems, it is prudent to limit such exposure".

If a resonant dipole attic or indoor antenna which has been carefully cut to textbook length shows an SWR in the region of, say, 4:1 it is probably being detuned by nearby objects. The length could be adjusted by the use of a GDO or noise bridge, or alternatively one could use a flexible ATU. KH6CPI also comes up with a number of other suggestions but it seems worth opening the discussion to HF antennas generally, by selecting some items from a list drawn up 14 years ago by ZL2AKLW and reproduced in the March 1979 77:

- (1) A dipole cut for the centre of the 3.5MHz band and fed with 50 or 75ohm coax via an ATU will be just as good at the band edges as it is at the resonant frequency of the dipole element.
- (2) The same dipole, fed with 300ohm ribbon or open line, again via an ATU, will work on any band from 1.8MHz to 29.7MHz.

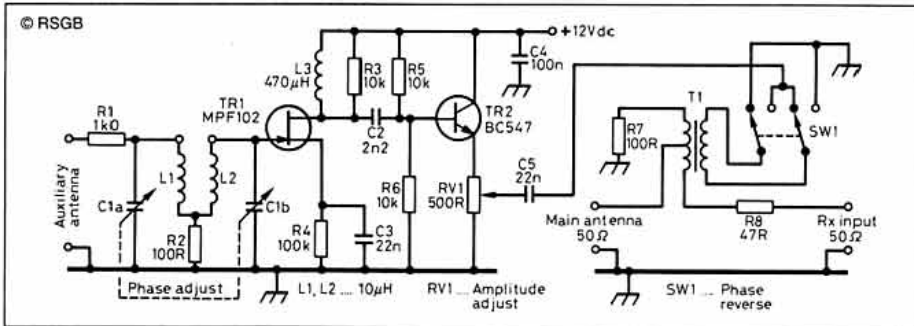


Fig 4: VK5BR's Mk 2 interference cancelling circuit as described in the January 1993 issue of *Amateur Radio*. As shown this covers roughly 3.5 to 7MHz. C1-2 ganged 15-250pF variable capacitor or similar. L1, L2 miniature 10µH RF chokes. T1 11 turns quadfililar wound on Amidon FT50-75m toroidal core.

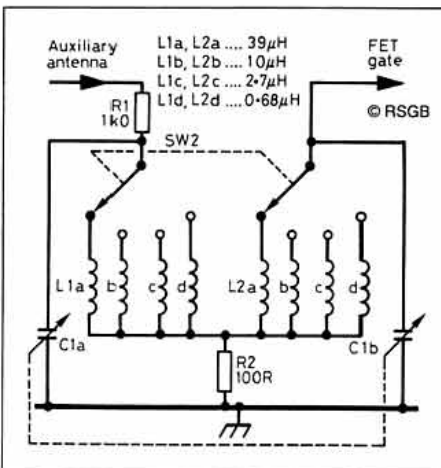


Fig 5: Bandswitching modification to provide 1.8 to 30MHz in four ranges.

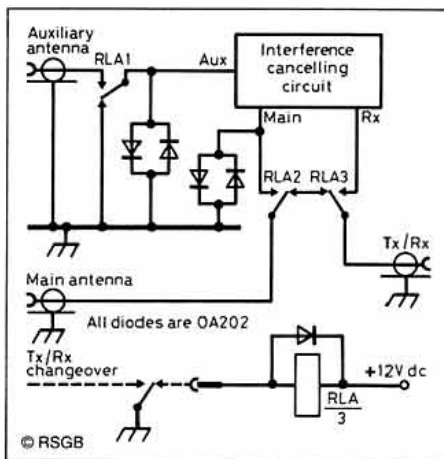


Fig 6: Transmit-receive switching with protection diodes for use of the VK5BR interference cancelling circuit with a transceiver.

- (3) Unless higher than 150ft, it hardly matters on 3.5MHz in which direction a horizontal dipole points: more significant will be obstructions, trees etc which absorb some of the power.
- (4) A long antenna provides more receiver microvolts than a short one (ie less than a half-wavelength long) but a transmitting antenna radiates all the power that can be fed to it (except IR losses).
- (5) Antennas, and the equipment connected to them, can confidently be expected to provide better and better results on HF as a sunspot cycle goes up and up.
- (6) The result of doubling your RF output power will be virtually unnoticeable, but halving your input power may well be noticeable since output efficiency may be affected.
- (7) A loosely-loaded transmitter sounds awful when overdriven.
- (8) A tightly-loaded transmitter, when overdriven, sags at the knees and output may even be reduced.
- (9) A properly tuned system is when the antenna correctly loads the transmitter.
- (10) A poor antenna is always a poor antenna; but when conditions are good it will work.
- (11) There are no magic formulas or magic boxes able to improve the performance of poor antennas, but it is easy to reduce dramatically the efficiency of a good antenna.
- (12) A bought antenna is not a better antenna but merely a more expensive antenna; a better investment is a good book on antennas.
- (13) Is your best friend afraid to tell you?

THE FIRST BEACONS

THOSE OF US WHO listened on the amateur bands during the 1939-45 war, either for personal interest or as Voluntary (or SCU3) Interceptors, soon became aware that, after an initial close-down, a number of pre-war German amateurs with D3 and D4 callsigns were permitted to resume CW operation on the HF bands. From 1942 these included a number of beacon transmissions (D4WYF2 3600kHz; D4WYF3 7000kHz; D4WYF4 14,130kHz; and D4WYF5 28,000kHz). A note on these transmissions was even published in the *RSGB Bulletin*, October 1944, p55, stemming from Frank Watts, G5BM, in connection with a report on propagation conditions on 28MHz. He noted that "These stations send V's followed by their calls continually throughout the 24 hours. They are very useful for checking frequency meters, besides providing an indication of the skip length on the various bands."

Now 50 years later, the story of why and by whom these first beacons were built has been told by Waldemar F Kehler, DL1IX, (pre-war D3FBA) in 'The Origin of Amateur Radio Beacons' (*CQ*, November 1942, pp17-18). To quote briefly from this interesting account: "In 1942 the German Wehrmacht was spread over most of the continent of Europe. This situation often resulted in difficult if not impossible communications links between front-line units and German headquarters. Faced

VERSATILE CRYSTAL TESTER

MANY YEARS AGO I included in *TT* and subsequently *ART*, circuit details of a simple bipolar transistor crystal oscillator that could be used as a simple means of testing the activity of assorted crystals. A rather more sophisticated unit capable of checking the activity of crystal and ceramic resonators over the range of about 40kHz to 20MHz has been described recently by M J Salvati of Flushing Communications in the 'Ideas for Design' feature of *Electronic Design* (July 9, 1992); **Fig 7.**

He points out that there are several reasons why crystal oscillators may fail to work. It may be due to faulty or low-activity crystals, or poor design. It is thus a good idea to check the crystal before starting to trouble shoot on the equipment (similarly it may be wise to check ex-equipment or even new crystals at the time of purchase). The arrangement shown can work with a wide variety of crystals and ceramic resonators; if used with a frequency counter it provides a check on the parallel-resonant oscillation frequency.

M J Salvati writes: "The crystal 'sees' approximately 30pF of circuit capacitance. The basic oscillator is a Pierce type that

uses the first pair of MOSFETs in the CA4007A dual complimentary pair plus inverter, CMOS IC. The remaining MOSFET pairs form a meter driver and a low-impedance output driver. The meter is the primary indicator of the crystal performance. Any low-cost microammeter with about 200-500uA FSD will do (this is the ideal application for that 'tuning' meter from a discarded stereo etc).

"The resistor (R) in series with the meter is selected to produce about 90% FSD with an active crystal. Low-activity crystals of any frequency will generate less meter deflection, as will the good crystals at the upper frequency limit of this device. The low-impedance output can drive a frequency counter or oscilloscope through a terminated cable. Aside from their forming part of the Pierce oscillator, the network of resistors around the first MOSFET pair protects the MOSFET gates from electrostatic and leakage damage. To illustrate its ruggedness, this circuit has not experienced a failure after several years of use, even though the input leads are extensively handled in connecting the crystals or ceramic resonators that do not fit the holder."

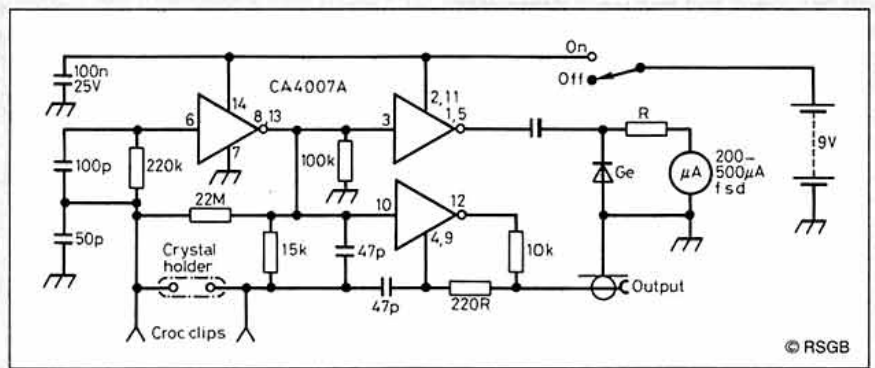


Fig 7: Versatile crystal/ceramic-resonator tester (M J Salvati, *Electronic Design*).

with the problems of selecting reliable shortwave communications frequencies, the idea arose to build and operate continuously a transmitter (called a Richtsender) near Berlin The basic design was the responsibility of Herbert Salzbrunn, D4WYF who was employed by the German High Command (OKW). He designed two-stage and three-stage transmitters using tubes types RL12P10, RL12P35 and a P50 (input power 50 watts).

"The transmitter was built by a technician in a workshop at Ludwigsfede, a village south of Berlin (site of a monitoring station for foreign broadcasts) from where they were operated except for a short break when the station was bombed during the night of January 1, 1944 tests were made with a portable 20-watt transmitter in the German Embassy in Madrid the first two beacons were D4WYF2 on 3.5MHz and D4WYF5 on 28MHz. Later we added two additional beacons, in the 40m and 20m bands. These two were installed in the former office building of a German insurance company (Allianz-Versicherung) at

Fehrbelliner Square in Berlin-Wilmersdorf, a building that became well-known in connection with the attempt on Hitler's life on July 20, 1944 after which General Thiels, head of German Signals Intelligence was executed in 1944. [Presumably this is a misprint for General Fritz Thiele who together with General Erich Fellgiebel, the Signalmaster of OKW, was executed in 1944 for their participation in the assassination plan - G3VA].

"A plan to open a beacon, D3FBA2, in East Prussia was abandoned. The Berlin beacons finally closed down in February 1945 when the Russian Army closed the ring around Berlin During the 1970s, amateurs rediscovered the idea of beacons, thereby proving the old adage that there is nothing new under the sun".

LOW-COST CHOKE 1:1 BALUN

TT, SEPTEMBER 1992 and January 1993, has provided information on two ways in which the increasingly popular ferrite-loaded sleeve baluns can be implemented and used to minimise RF current flowing along the

outer surface of the braid of coaxial-cable feeders connected to the balanced feed-point of resonant dipole-type antenna elements.

An alternative technique which does not depend on the use of ferrite beads and a length of small diameter cable or sleeves fitting over conventional cable is described by Curt Wilson, W0KKQ, in *QST*, November 1992. This depends on the use of fine steel wool to attenuate any RF on the outer braid.

He writes: "For many years, I've used choke baluns made of cardboard (and more recently, PVC) tube stuffed with steel wool . . . and placed them along the coax feed line to attenuate RF energy outside the coaxial shield. Wanting to approximate the performance of the W2DU-type ferrite choke balun on a budget, I began a search for a cheaper material that could do the job of Type 43 ferrite. I tried numerous materials before returning to fine steel wool (US grade 000 or the finer 0000)!"

This material proved to be ideal in three important categories. First, its RF attenuation properties are excellent. Second, steel wool is mechanically pliable and a distinct pleasure to use. Thirdly, these fine steel wool pads may be purchased at very reasonable prices from almost any hardware store." Fig 8 shows the balun design.

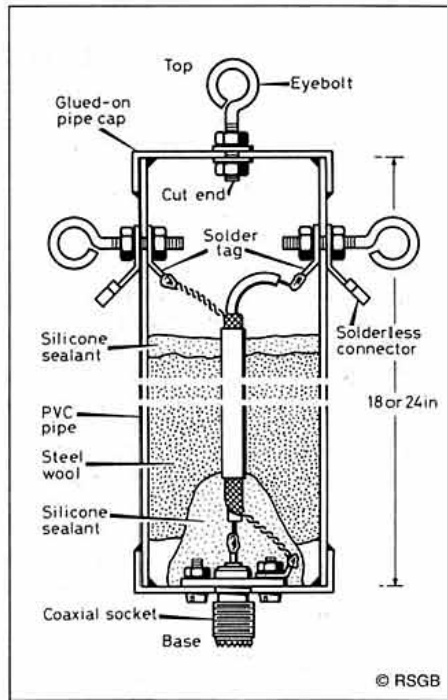


Fig 8: The low-cost 1:1 choke balun as implemented for outdoor use by W0KKQ using fine steel wool as an RF attenuator in place of ferrite rings.

W0KKQ uses an 18in length of white (US Schedule 40) plastic tubing with an inside diameter of approximately 1.5 inches with two PVC caps to fit the ends of the tube. He provides very detailed constructional details but the basic arrangement should be clear from the diagram. 'Hints & Kinks' editor, David Newkirk, WJ1Z, adds two pertinent comments: (1) Since UHF series coaxial connectors are not designed to be weatherproof you can avoid having to seal your balun's jack and cable plug against the elements by using N connectors instead of SO-239s and PL-259s; and (2) especially in closed compartments, caulking compounds that liberate acetic acid vapour as they cure can severely corrode susceptible metals (such as steel wool) so avoid using such products when you build your balun".

One effective means of presenting outer-braid RF from feeding back into the shack and at the same time minimising EMC problems and the pick-up of local electrical interference is to bring the feeder cable vertically downwards from the antenna element and then to bury the remainder of the feeder before it reaches the house or outside shack. Unfortunately, as some have found, conventional coaxial cable, even if has a noncontaminating jacket, deteriorates rapidly when buried un-

THOSE COAXIAL CABLE SCRAPS

IN THE *TT* ITEM 'Using scraps of coaxial cable' (December, 1992, pp29-30) I noted that the information came to my notice from the *Mid-Sussex Newsletter* where it had been reprinted from *Airtime*, but with the original author not credited. A letter from Brian Kendall, G3GDU, provides the answer: the material was extracted from an article 'More uses for old coaxial cable' which he wrote (under the pen name 'Ken Williams') for the late-lamented British publication *Amateur Radio* (September 1990).

The original article included additional information, including advice on the not-so-easy-as-it-looks task of stripping the cable: "The first task is to strip the coaxial cable into its component parts. It might be thought that the simplest technique would be to run a sharp blade along the outer insulation to open up the cable, but this would destroy a useful component.

"The preferred method (Fig 9) is to cut 12-18in lengths of cable. About 1in of the outer covering is then removed with a knife and the braiding pushed back. The polythene inner insulation is then firmly gripped in a vice and with a cloth to protect the hand, a firm grip is taken of the outer covering and, relaxing the grip to allow the hand to slip, an attempt is made to pull off the outer cover.

"On the first attempt hardly any movement will be noticeable, but after the second or third attempt the braid and outer cover will have moved an inch or so. Two or three more pulls and the cover and outer braid will be free. A gentle pull should now be sufficient to remove the braid from inside the outer cover.

"Removing the inner conductor follows a similar pattern, but this is more firmly attached than the outer layers. Therefore, it is

advisable to remove only 6-9in at a time. This process can often be assisted by applying a hot soldering iron to the inner conductor for a minute or so before clamping it in the vice".

The resulting sections of outer braid provide useful high-current, low-resistance conductors, while the inner pieces represent excellent insulators usable up to at least 100MHz for applications such as those described in the December *TT*. An application for the outer braid suggested in the *Amateur Radio* article is to form a common earthing

bus: "One aspect which is often suggested by equipment manufacturers but rarely implemented by radio amateurs, is to attach a common earthing bus to all equipment. For this purpose the outer braiding is ideal.

"Take three or four equal lengths of braiding and lay them on the bench. Make sure that they are not stretched and flatten them so that each one forms a flexible strip about 0.5in wide. Heavily tin about 1in at the end. Take a similar length of flexible wire, strip 1in of insulation from each end and lay parallel with the braids.

"Now lay the braids on top of each other with the flexible wire between, and apply heat with a large (at least 60W) soldering iron at one end so that the braids and wire solder firmly together. Repeat this process at the other end. Drill a 0.25in hole through each end and apply a file to 'tidy up' the end.

"Tie a strong cord through one of the holes, pass it through a length of coaxial outer insulation which is 2in shorter than the braids and 'pull through' the braids so that only the tinned sections show.

"Such braids are capable of carrying extremely high currents and, if several are used to link equipment together and to the station earth, will fully answer all common earthing bus requirements. They can also be used to form low-resistance power feeds to high-power amplifiers, etc. 'Ken Williams' concludes this section as follows:

"With the very high current capacity of the braids, you may wonder why the flexible wire is included? The reason is that this maintains the braid at a constant length. Without it the braids will stretch beyond the length of the outer covering and cause insulation problems if used as a low-voltage power lead."

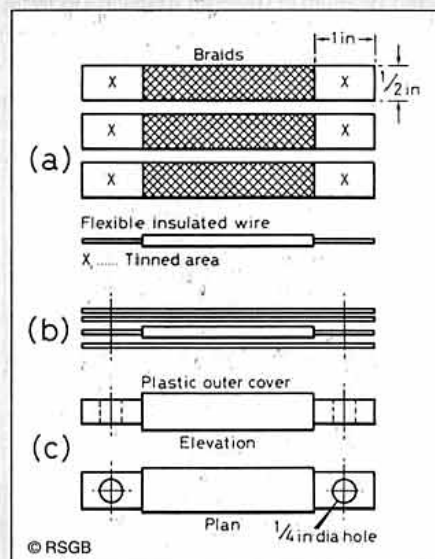


Fig 9: Construction of earthing braids or high current power cables from short lengths of coaxial cable. (a) Braids removed from cable and flattened, laid on bench and ends tinned. (b) Braids and flexible wire placed together, soldered and 0.25in holes drilled. (c) Outer cover pulled over braids.

less further protection is devised. A note in the 'New Products' section of *QST*, December 1992, p28 draws attention to a RG8-type cable designed for direct burial in the earth:

"A common misconception regarding coaxial cable is that a non-contaminating jacket means a cable is designed for direct burial. The non-contaminating jacket compound is distinctly better than regular Class 1 PVC, and under similar conditions will last twice as long, making it worth the small increase in cost. This however doesn't provide the additional protection necessary for direct burial. . . A truly 'buriable' RG8-type cable for amateur and professional applications is Flexi 4XL BURY-8.

"The size (0.405in) of familiar RG8 coax, the new cable has a thick, tough, moisture-impenetrable polythene jacket over a 'flooding' compound that self-seals small penetrations and discourages more, such as rodents, soil and gravel abrasion, freeze-thaw cycling and so forth. The two shields are tinned copper braid (95%) and aluminium-mylar foil (100%). The dielectric is sealed microcell polyethylene foam and the centre conductor is 9.5AWG 19-strand copper. Loss rating 2dB per 100ft at 150MHz, velocity factor 84%, capacitance 24pF/ft. The US retail price is given as \$0.82/ft for 100ft lengths (The Wireman Inc, 261 Pittman Road, Landrum, SC29356, USA which also has a useful catalogue of products priced \$1)."

UK cable makers and distributors have cables intended for wired-TV systems that are suitable for direct burial but I suspect these are even more costly than the above. Anyway, the main purpose of this note is to draw attention to the susceptibility of conventional cables, rather than necessarily to encourage budget-conscious readers to buy buriable cables.

RADIO - AN AGEING TECHNOLOGY

AS WE APPROACH the centenary of the start of Marconi's experiments in radio-teleggraphy (usually ascribed to 1894), it is not surprising that more and more amateurs are tending to look back on the technology of the past rather than the future, though clearly there are dangers inherent in such nostalgia. But it is necessary to remind ourselves - and the young entrants to the hobby - that many of the ideas, if not the actual components, that we use today were originally conceived, many of them by professionals who had started as amateurs, many years ago. Just how long ago, often comes as a surprise.

A ONE VALVE TRANSCEIVER OF THE 1920S

I THESE DAYS OF 'black box' stations, it is worth remembering that many of the famous names in radio engineering started off and became interested in radio as young amateur experimenters: Marconi ("You know I have always considered myself an amateur" - 1936); Howard Armstrong; Art Collins; George Brown and many, many more, particularly in the USA.

From an account in Proc IEEE (August 1992) of the lifetime achievements of 90 year old Harold Arden Wheeler, including his development in 1925 of "automatic volume control" (ie AGC), one learns that he obtained the amateur callsign 3QK in April 1920. Similarly, Charles W Harrison, long prominent in antenna engineering, recalls his early interest in radio as a teenager - later holding the call W3CGB in the 1930s - in *IEEE Antennas & Propagation Magazine* (August 1992). His first 'transmitter' based on a Ford spark coil proved capable of wrecking all AM reception in his home town, and was discarded in favour of a one-valve 'transceiver' providing 'phone in the medium-wave band: Fig 10. This "worked well, permitting communication around town. Many radio stations then signed off at 10pm, so one tuned in the station while it was on the air.

After 10pm, conversations began!" Clearly 'transceivers' are not as recent a development as many of us imagine. At the age of 16 years, he submitted a paper to the professional IRE that gave a mathematical proof of the existence of sidebands (then still in dispute) but was told by the Editor that it should have been sent to *QST*!

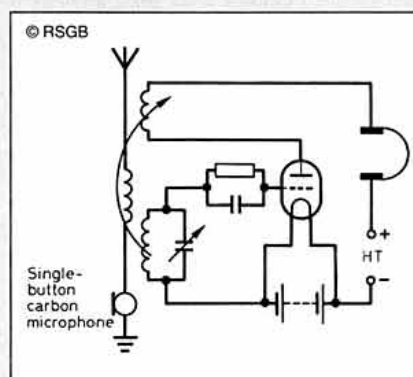


Fig 10: American schoolboys discovered how a simple one-valve regenerative receiver could be used as a low-power transmitter to talk around town in the 1920s by letting the valve oscillate and connecting a carbon microphone in the earth lead! As recalled by an eminent American antenna engineer Charles W Harrison Jr.

An example arising from recent items in *TT* will illustrate this. In the October 1992 issue I included a KISS form of Morse code practice oscillator used by ZS5L based on the howl-round between a carbon microphone and a loudspeaker or earpiece. This stirred Gerry Openshaw, G2BTO, to recall that he had published such an arrangement in the *RSGB Bulletin* as long ago as April 1947. But this has now been upstaged by a reminder from Don Graham, VK6HK, that the UK Patent 290 issued to his great-grandfather's brother - Alfred Graham of Graham Amplion Ltd fame - covered precisely this form of acoustically coupled oscillator. The abridged specifica-

tion notes that "The apparatus consists in a telephonic receiver A and transmitter C arranged in a simple circuit with a battery B and key E. When the circuit is closed at E the two instruments react on each other, producing a continuous sound . . ." Oh yes, and what was the date of the patent? Just over 99 years on January 5th, 1894!

It was Alfred Graham's son Edward who established a name for 'Amplion' loudspeakers and others in the 1920s although his father had demonstrated the first practical loudspeaker in 1887 and began to market them as Graham Loudspeakers in 1893. It was in 1920 that the 'Amplion' trade mark and was registered and the firm began producing speakers intended for 'wireless': Fig 11.

The premature death of Edward in 1926 led to the firm Graham Amplion being sold off. VK6HK sent along copies of a few pages from 1926 and 1927 issues of the 'Amplion Radio Magazine' ("published monthly in the interests of better radio reproduction") possibly the first Hi-Fi magazine! An editorial 'The Experimenter' warned against assembling a mere "agglomeration of components without a definite guiding principle going through it from start to finish . . . One of the reasons why the home building of wireless sets has steadily declined is not because it involves any serious amount of labour, but because experience has shown that in taking a selection of a vast variety of components, and combining them into one complete set, the odds are almost infinite against really good results being obtained . . . Faithful reproduction is the most difficult of all things to obtain in radio".

VK6HK wonders where there are any *TT* readers who had a close connection with Amplion in those distant days? **G3VA**

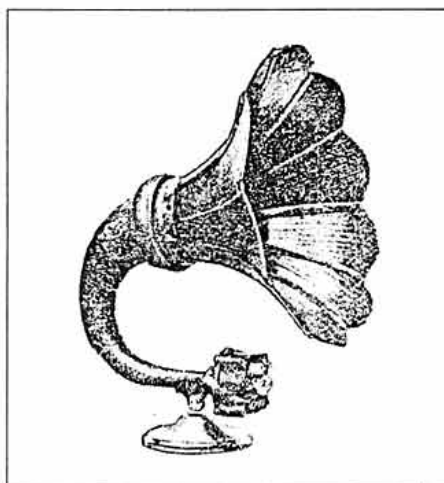


Fig 11: The 1920s was the era of the 'horn' loudspeaker in which the sound from a large headphone-type transducer was acoustically amplified by a massive horn. This is a drawing of the Standard Dragon type AR19 manufactured by Amplion, as illustrated in *The Amplion Magazine* of December 1926.

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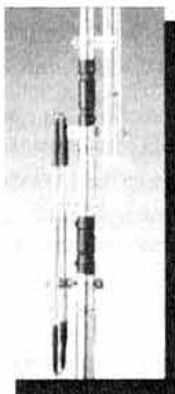
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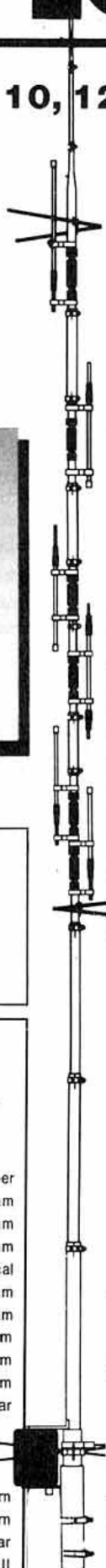
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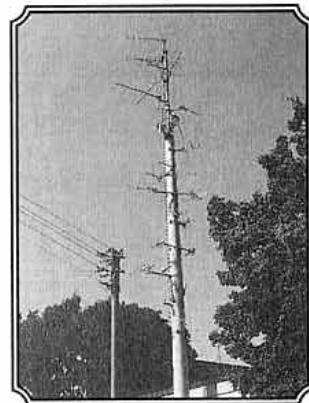
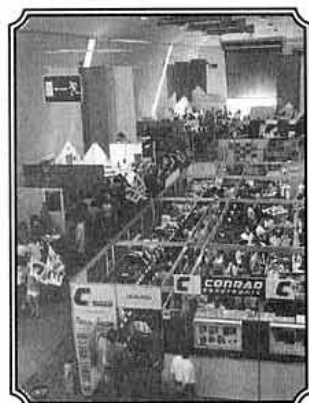
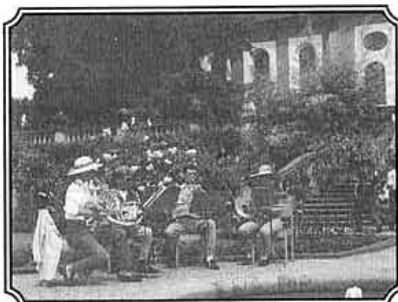
Visit Europe's biggest radio show for just £249.75

Our first coach trip to Friedrichshafen last year was so successful that we are repeating it again this year. Now you can take part and enjoy four nights at the best hotel in Friedrichshafen, a 3 day ticket to the show and free excursions to the Black Forest.

Every year Friedrichshafen hosts Europe's largest amateur radio show and our reasonably priced trip will let you to travel there in comfort on a luxury coach (equipped with toilet, coffee machine and video), stay in a quality hotel and visit the Black Forest. We'll pick up passengers from Victoria Coach Station early in the morning on Thursday the 24th of June and then drive to Dover and catch one of the first ferries across. We'll arrive in Friedrichshafen late that evening (no overnight travel!) and then spend 4 nights at the Buchorner hof Hotel. *It is worth mentioning that the rooms in this hotel are doubles, that is really doubles not twins - they have double beds.* This means that ours trip is more suitable for couples, so to encourage wives and/or girlfriends to come along there are a couple of day excursions on the Friday and Saturday.

The complete trip - coach travel, ferries, all tolls, 4 nights accommodation (with breakfast and evening meal) and excursions - costs £249.75 (based on two people sharing) and there will be a few single rooms available for a supplement.

It will help me with booking rooms if you can let me know as soon as possible if you are seriously interested in going as so few places are available and last year we had a waiting list. If you want to know more you can usually contact Roger Hall G4TNT on 071 731 6222 during office hours or by writing to me at P.O. Box 948 London SW6 2DS.



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RSGB Annual Meeting

5 December 1992

ROYAL SOCIETY OF CHEMISTRY LONDON W1

THE MEETING WAS in two parts: the Annual General Meeting as required by the Companies Act, the minutes of which are shown below, and an Open Meeting comprising the President's speech, presentation of awards and a question and answer session.



Heading the AGM on the top table (l) J T R Antieul, Auditor; P D Tucker, GU4DWZ; J T Barnes, GI3USS; P E Chadwick, G3RZP; J C Hall, G3KVA; P A Kirby, General Manager.

MINUTES OF THE 66TH ANNUAL GENERAL MEETING OF THE RADIO SOCIETY OF GREAT BRITAIN

THE PRESIDENT J T Barnes, GI3USS, introduced the platform party as J C Hall, G3KVA, Company Secretary; P E Chadwick, G3RZP, Executive Vice President; P D Tucker, GU4DWZ, Honorary Treasurer; P A Kirby, General Manager; R Antieul the Society's Auditor.

Council Members present were E J Case, GW4HWR, Immediate Past President; C N Trotman, GW4YKL; G L Benbow, G3HB; J Bazley, G3HCT; I D Stuart, GM4AUP; J Allen, G3DOT; J D Forward, G3HTA; H Clayton-Smith, G4JKS; P Sheppard, G4EJP; N Roberts, G4IJF; I J Kyle, GI8AYZ; N Lasher, G6HIU; T I Lundegard, G3GJW; E J Allaway, G3FKM.

Apologies were recorded from:

Council Member Vice President G R Jessop, G6JP, and the following members: G3ZNU, G3OUF, G6YIQ, G2AHU, GI3KYP, G6JNS, G3AAJ, G4BUO, G4HES, G4LWA, G8GG and G8XYN.

The President announced that more than 50 members were present (the total attendance recorded was 100).

The Company Secretary then read the notice convening the meeting which had previously been circulated to members with the November 1992 edition of *RadCom*.

MINUTES

THE PRESIDENT drew members' attention to the first item on the agenda which was to receive and, if approved, confirm the minutes of the 65th Annual General Meeting circulated with the March 1992 issue of *RadCom*. He also pointed out that it was not a requirement of the Companies Act that the minutes should be presented at an Annual General Meeting or that details of discussions on them should be formally recorded, but it was felt that members should have the opportunity to comment on them.

There were no comments or questions and the minutes were confirmed as published.

The President then moved to Item 2 on the agenda to receive and consider the accounts for the year ending 30 June 1992 and reports to Council and auditors thereon. The auditor read the report which stated "we have audited the accounts set out on pages 40 to 43 in accordance with auditing standards. In our opinion the accounts, which have been prepared under the historical cost convention, give

a true and fair view of the state of affairs of the Society at 30 June 1992 and of the surplus of income and its source and application of funds for the year ended that date and has been properly prepared in accordance with the Companies Act 1985".

The President called on the Honorary Treasurer to present the accounts for the 1991/1992 financial year.

The Honorary Treasurer reported that the Society had made a surplus on its ordinary activities for the first time in many years and, including the Value Added Tax refund, it amounted to £94,746. He complimented Volunteers and Staff on the effort they had put into seeing that the year had been so successful in financial terms. He reported a downward book valuation of Lambda House to reflect current property values and said that the prospects for the coming year were fair although it was too early to make accurate predictions. The half year accounts would be circulated with March 1993 *RadCom* and the Society was budgeting to break even in the current financial year. He also reported that Council had decided not to increase the subscription rate during the current financial year although there were two slight adjustments necessary to take account of payments by direct debit and payments by instalment. The current subscription had been in force since 1990.

He then offered to take questions on the accounts. W J Kennedy, G3MCX, said he would like to congratulate Council and the Treasurer on the excellent turn-round in the Society's finances. D J S Newton, G3JJZ, asked about the amount of money received by the Society from the affinity card. The Honorary Treasurer said that an amount of £5251 had been received in the current financial year. He explained to the meeting how that commission was made up. H L W Bellfield, G3SBV, asked why video recordings were not allowed at the meeting and the Company Secretary explained that they were intrusive. Mr Bellfield then asked for an explanation behind the notice in September 1992's *RadCom* referring to Radio Shopper and the Society.

The Company Secretary gave a detailed explanation of the situation and informed members that the only dispute the Society had had with the company was the anticipated style and content of proposed advertising in *RadCom*. The matter had been resolved by consultation and negotiation with the company which had been undertaken by the Company Secretary and General Manager. A number of companies which had expressed some concern about the acceptance of advertising from Radio Shopper were also seen by the General Manager, Company Secretary and the Chairman of Finance & Staff Committee when the position was explored fully by both parties. The Company Secretary said the matter had now been concluded and the Society had not suffered financially from the dispute. The Company Secretary indicated that lessons had been learnt from the whole affair and some things could have been dealt with more satisfactorily. Nevertheless the Society had felt it necessary to take a stand and, despite being subjected to gratuitous and uninformed advice on the packet network, had acted throughout the matter with the benefit of legal support from the Society's solicitors.

A E Betts, G0HIQ, said he felt it was appropriate for the meeting to show its appreciation of the way in which the Society had handled the whole matter - which it did.



RSGB ANNUAL MEETING

1993 COUNCIL

THE PRESIDENT then moved on to Item 3: to announce the names of those members to serve on Council for the year 1993 and to call for volunteer scrutineers for the 1993 Council Elections.

The President then announced the results as follows:

G R Morris	GW1ATZ	695 votes
T I Lundegard	G3GJW	1352 votes
J Bazley	G3HCT	1355 votes
J Greenwell	G3AEZ	1322 votes
F S G Rose	G3DRT (deceased)	734 votes

T I Lundegard, J Bazley and J Greenwell were declared elected Ordinary Members

In Zone D the result was:

P W Mayer	G0KKL	66 votes
J N Gannaway	G3YGF	215 votes

J N Gannaway was declared elected

In Zone C N Lasher, G6HIU, was elected unopposed

In Zone G I D Suart, GM4AUP, was elected unopposed

There were 193 votes disallowed comprised of:

Received late	22
Spoilt	4
Invalid	167

No action was taken to confirm the election of any member of the age of 70 years.

(Company Secretary's note: Legal advice given to the Society indicates that this requirement was abolished some 13 years ago and should not appear on the AGM Agenda in future years)

ORDINARY MEMBERS

THE 1993 COUNCIL would be as follows:

P E Chadwick	G3RZP	President
E J Allaway	G3FKM	
J T Barnes	G13USS	Immediate Past President
J Bazley	G3HCT	
G L Benbow	G3HB	
M H Clayton-Smith	G4JKS	
J D Forward	G3HTA	
J E Greenwell	G3AEZ	
T I Lundegard	G3GJW	
N Roberts	G4IJF	
P D Tucker	GU4DWZ	Hon Treasurer

Zonal Members

Zone A	P R Sheppard	G4EJP
Zone B	J Allen	G3DOT
Zone C	N Lasher	G6HIU
Zone D	J N Gannaway	G3YGF
Zone E	C N Trotman	GW4YKL
Zone F	I J Kyle	G18AYZ
Zone G	I D Suart	GM4AUP



The HQ team comprised of Derek Lund, (L); Lynnette Crawshaw; Brett Rider, G4FLQ; Fiorina Sinapi; Mike Dennison, G3XDV; Sylvia Manco; Justine Hodges; Peter Kirby, General Manager; and Janet Cragg.

The scrutineers were thanked for their work. They were: W N Craig, G6JJ; A H B Bower, G3COJ; A C Butcher, G3FSN; W M Dunnell, G3BYW; A E N Gard, G4LWA; E H Major, G3BYC; P A D Manning, G1LKJ; E Winchcombe, G6ZH; I R Brothwell, G4EAN; R Ray, G3NCL; G P Stancey, G3MCK; J Crabbe, G3WFM. Special thanks were accorded to W N Craig for acting as chief scrutineer.

The following member put himself forward as a scrutineer: H L W Bellfield, G3SBV.

The President said he wished to place on record the condolences of Council to the family of F S G Rose, G2DRT, who sadly died during the course of the election procedure.

AUDITORS

THE LAST ITEM on the agenda was to reappoint the Auditors, Peter Goddard & Co, for the financial year 1993/1994 and to authorise Council to fix their remuneration. This was proposed by N Bedford, G4NJP, and seconded by P D Dombrowski, GW1NYO, and carried unanimously on a show of hands.

The President then closed the Annual General Meeting.



Pat Hawker, G3VA, receives a Certificate of Merit.



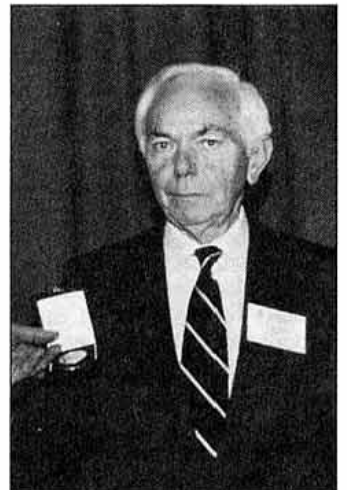
Derek Lund and Lynnette Crawshaw looked after the bookstand.



Gerald Stancey, G3MCK, receives the Norman Keith Adams Prize on behalf of Geoffrey Billington, G3AEA.



Well-known author Les Moxon, G6XN, receives the Courtney Price Trophy for his article on 'All Band Beam Antennas' which was published in the August 1991 edition of *RadCom*.



Tim Hughes, G3GVV, presented the LABRE (Brazil) Prize to RSGB for the *Radio Communication* magazine.

Amateur Radio Band Plans

On all bands there are recommended sections set aside for use by each mode. In some parts of the world (eg the USA) observance of these band sub-divisions is mandatory. The IARU Region 1 HF band plan is set out below and should be observed at all times even though its recommendations are only advisory as far as UK amateurs are concerned.

1.8MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
1.810					
CW only		Available on the basis of non-interference to other services (inside or outside the United Kingdom)	(Not allocated)	15dBW (1.830-1.850 only: 26dBW)	Morse Telephony RTTY Data Facsimile SSTV
1.840	1.840 ±2kHz RTTY				
CW and phone					
2.000					

3.5MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
3.500					
CW only	3.500 – 3.510 reserved for intercontinental working 3.500 – 3.560 contest preferred segment 3.590 – 3.600 used by packet radio shared with CW/RTTY	Primary. Shared with other services	(Not allocated)	26dBW	Morse Telephony RTTY Data Facsimile
3.600	3.600 ±20kHz RTTY shared with CW/phone				
CW and phone	3.600 – 3.650 contest preferred segment 3.635 – 3.650 used by former USSR stations for intercontinental working 3.700 – 3.800 contest preferred segment 3.735 ±5kHz SSTV/fax recommended 3.775 – 3.800 reserved for intercontinental working				
3.800					

IARU – International Co-ordination

As the RSGB represents the interests of radio amateurs within the UK, so the International Amateur Radio Union (IARU) represents amateur radio on an international scale. Its membership is made up of national societies rather than individuals and it has around 125 member societies. The RSGB is the UK's IARU member society.

The IARU was founded in 1925 and has its headquarters in the USA. It is split into three sections as is the International Telecommunications Union (ITU). Region 1 comprises the UK, Europe, Africa and the former USSR.

The aim of the IARU is to promote worldwide growth in amateur radio and where necessary represent the movement's interests at the ITU. It also regulates and co-ordinates band plans, and makes recommendations for the operation of specialised activities such as meteor scatter.

Another service provided is the Monitoring Service (IARUMS) which monitors unauthorised transmissions by other services within the amateur bands. Reports from the IARUMS are sent to both the ITU and national telecommunication administrations.

BANDPLANS

7MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
7.000					
CW		Primary	Primary	26dBW	Morse Telephony RTTY Data Facsimile SSTV
7.040	7.040 ±5kHz <i>RTTY/SSTV/fax shared with CW/phone</i>				
CW and phone					
7.100					

10MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
10.100					
CW		Secondary	(Not allocated)	26dBW	Telephony RTTY Data Facsimile SSTV
10.140					
RTTY (shared with CW)					
10.150					

Notes: No contests should be organised on the 10MHz band. Credit for awards or diplomas should be accepted for contacts made on the 10MHz band. SSB may be used on the 10MHz band during emergencies involving the immediate safety of life and property, and only by stations actually involved in the handling of emergency traffic.

14MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
14.000					
CW	14.000 – 14.060 <i>contest preferred segment</i>	Primary	Primary	26dBW	Morse Telephony RTTY Data Facsimile SSTV
14.070					
RTTY (shared with CW)	14.089 – 14.099 <i>used by packet radio</i>				
14.099	14.099 – 14.101 <i>reserved for International Beacon Project (packet radio operators are asked to take special care to avoid causing interference in this segment)</i>				
14.101					
CW and phone	14.101 – 14.112 <i>packet radio</i> 14.125 – 14.300 <i>contest preferred segment</i>				
14.250					
CW and phone	14.230 ±5kHz <i>recommended for SSTV/fax</i>		(Not allocated)		
14.350					

18MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
18.068		Primary	Primary	26dBW	Morse Telephony RTTY Data Facsimile SSTV
CW					
18.100					
CW and RTTY					
18.110					
CW and phone					
18.168					
21MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
21.000		Primary	Primary	26dBW	Morse Telephony RTTY Data Facsimile SSTV
CW	21.100 ±20kHz <i>RTTY shared with CW</i> 21.100 – 21.120 <i>packet</i>				
21.149	<i>reserved for International Beacon Project</i>				
21.151					
CW and phone	21.340 ±5kHz <i>recommended for SSTV/fax</i>				
21.450					
24MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
24.890		Primary	Primary	26dBW	Morse Telephony RTTY Data Facsimile SSTV
CW					
24.920					
CW and RTTY					
24.930					
CW and phone					
24.990					
28MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
28.000		Primary	Primary	26dBW	Morse Telephony RTTY Data Facsimile SSTV
CW	28.120 – 28.150 <i>packet radio</i> 28.190 – 28.300 <i>reserved for International Beacon Project</i> 28.190 – 28.225 <i>reserved for beacons</i>				
28.200	28.100 ±50kHz <i>RTTY shared with CW</i>				
CW and phone	28.680 ±5kHz <i>recommended for SSTV/fax</i> 29.250 ±50kHz <i>packet radio NBFM</i> 29.300 – 29.550 <i>reserved for Satellite Service downlink</i>				
29.700					

BANDPLANS

50MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission	
		Amateur Service	Amateur Satellite Service	PEP		
50.000	50.020 – 50.080 <i>beacons</i> 50.090 <i>CW calling</i>	Primary. Available on the basis of non-interference to other services outside the United Kingdom. Antennas limited to 20 metres above ground level. No Maritime Mobile operation		20dBW ERP	Morse Telephony RTTY Data Facsimile SSTV	
CW only						
50.100	50.100 – 130 <i>DX window Note 1</i> 50.110 <i>intercontinental calling Note 2</i> 50.185 <i>cross-band activity centre</i> 50.200 <i>SSB calling</i> 50.300 <i>CW MS calling</i> 50.350 <i>SSB MS calling</i>					
All narrow band modes						
50.500	50.510 <i>SSTV – note 7</i> 50.550 <i>fax – note 8</i> 50.600 <i>RTTY (AFSK)</i> 50.630 – 50.750 <i>packet radio Note 3</i>					
All modes						
51.000	51.110 <i>VK / ZL calling</i>					(Not allocated)
SSB and CW only						
51.125	51.210 <i>Note 5</i>					Secondary. Available on the basis of non-interference to other services outside the United Kingdom. Antennas limited to 20 metres above ground level. No Maritime Mobile operation
All modes						
51.250	51.300 <i>calling (not FM)</i>					
All modes except FM						
51.410	51.410 – 51.590 <i>FM telephony</i> 51.510 <i>FM calling</i> 51.530 <i>Note 6</i>					
FM simplex channels Note 4						
51.830	51.940 – 52.000 <i>Note 5</i>					
52.000						

- 1: Only to be used for QSOs between stations in different continents.
- 2: No QSOs on this frequency. Always QSY when working intercontinental DX.
- 3: 20kHz channel spacing. Channels start at 50.630MHz.
- 4: 20kHz channel spacing. Channels start at 51.410MHz.
- 5: Emergency communications priority. Do not use without first liaising with local groups.
- 6: Used by *GB2RS* news and for slow morse transmissions.
- 7: IARU Region 1 working recommendation.
- 8: Interim recommended working practice.

70MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
70.000	70.030 <i>personal beacons</i>	Secondary. Available on the basis of non-interference to other services outside the United Kingdom	(Not allocated)	22dBW	Morse Telephony RTTY Data Facsimile SSTV
Beacons					
70.030	70.150 <i>meteor scatter calling</i> 70.185 <i>cross-band activity centre</i> 70.200 <i>SSB / CW calling</i>				
SSB and CW only					
70.250	70.260 <i>AM / FM calling</i>				
All modes					
70.300	70.3000 <i>RTTY/ fax</i> 70.3125 <i>packet radio</i> 70.3250 <i>packet radio</i> 70.3375 70.3500 <i>Note 1</i> 70.3625 70.3750 <i>Note 1</i> 70.3875 70.4000 <i>Note 1</i> 70.4125 70.4250 70.4375 70.4500 <i>FM calling</i> 70.4625 70.4750 70.4875 <i>packet radio</i>				
Channelised operation using 12.5 kHz channels					
70.500					

- 1: Emergency communications priority: Do not use without first liaising with local groups.

144MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
144.000					
CW only	144.000 – 144.025 <i>moonbounce</i> 144.050 <i>CW calling frequency</i> 144.100 <i>MS CW ref. frequency</i> 144.140 – 144.150 <i>FAI working – note 6</i>				
144.150					
SSB and CW only	144.150 – 144.160 <i>FAI working – note 6</i> 144.250 <i>Notes 1 and 2</i> 144.260 <i>Note 3</i> 144.300 <i>SSB calling frequency</i> 144.400 <i>MS SSB ref. frequency</i>				
144.500					
All modes non-channelised	144.500 <i>SSTV calling frequency</i> 144.600 <i>RTTY calling frequency</i> 144.600± <i>RTTY working (FSK)</i> 144.625 <i>packet radio TCP/IP</i> 144.650 <i>mailboxes</i> 144.675 <i>packet radio</i> 144.700 <i>fax calling frequency</i> 144.750 <i>FSTV calling and talkback</i> 144.775 – 144.825 <i>Note 3</i>				
144.845					
Beacons	144.850 <i>Note 4 (not telephony)</i>				
144.990					
FM repeater inputs	145.000 R0 145.025 R1 145.050 R2 145.075 R3 145.100 R4 145.125 R5 145.150 R6 145.175 R7	Primary	Primary	26dBW	Morse Telephony RTTY Data Facsimile SSTV
145.200					
FM Simplex channels	145.200 S8 <i>Note 3</i> 145.225 S9 <i>Note 3</i> 145.250 S10 <i>Note 2</i> 145.275 S11 145.300 S12 <i>RTTY AFSK</i> 145.325 S13 145.350 S14 145.375 S15 145.400 S16 145.425 S17 145.450 S18 145.475 S19 145.500 S20 <i>FM calling channel</i> 145.525 S21 <i>Note 1</i> 145.550 S22 <i>Note 5</i> 145.575 S23				
145.600					
FM repeater outputs	145.600 R0 145.625 R1 145.650 R2 145.675 R3 145.700 R4 145.725 R5 145.750 R6 145.775 R7				
145.800					
Satellite service					
146.000					

1: Used by GB2RS.

2: Used for slow Morse transmissions.

3: Emergency communications priority. Do not use without first liaising with local groups.

4: Used by Emergency communications subject to 14dBW ERP limitation. This note will eventually be deleted from the band plans.

5: Recommend frequency for rally and exhibition talk-in.

6: The use of 144.14 - 144.16 MHz for moonbounce is an IARU Region 1 Interim recommendation practice for stations suffering from computer hash in the frequency range 144.0 00- 14.025 MHz.

Notes on UK 50MHz, 70MHz, 144MHz and 430MHz Band Plans

MS operation can take place up to 26kHz higher than the reference frequency (see RSGB *Amateur Radio Operating Manual* p80).

The beacon and satellite service must be kept free of normal communication transmissions to prevent interference with these services.

The use of the FM mode within the SSB/CW section and CW and SSB in the FM-only sector is not recommended.

Repeater stations are primarily intended as an aid for mobile working and they are not intended to be used for DX communication. FM stations wishing to work DX should use the all-modes section, taking care to avoid frequencies allocated for specific purposes.

BANDPLANS

430 – 440MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
430.000					
All modes Note 1	430.4 – 430.800 <i>Note 8</i>	Secondary. Not available for use within the area bounded by: 53°N 02°E, 55°N 02°E, 53°N 03°W and 55°N 03°W		16dBW ERP	
431.000					
All modes Note 1		Secondary. Not available for use: a) within the area bounded by: 53°N 02°E, 55°N 02°E, 53°N 03°W and 53°N 03°W; b) within a 100km radius of Charing Cross, London (51°30'30"N, 00°07'24"W)			
432.000					
CW only	432.000 – 432.025 <i>moonbounce</i> 432.050 <i>CW centre of activity</i>				
432.150					
SSB and CW only	432.200 <i>SSB centre of activity</i> 432.350 <i>microwave talk-back</i>				
432.500					
All modes non-channelised	432.500 – 432.600 <i>Note 2</i> 432.600 – 432.800 <i>Note 3</i> 432.500 <i>SSTV activity centre</i> 432.600 <i>RTTY (FSK) activity centre</i> 432.625 <i>packet radio</i> 432.650 <i>packet radio</i> 432.675 <i>packet radio</i> 432.700 <i>fax activity centre</i>				
432.800					
Beacons		Secondary	(Not allocated)	26dBW	Morse Telephony RTTY Data Facsimile SSTV FSTV
432.990					
433.000					
FM repeater outputs in UK only	433.000 RB0 433.025 RB1 433.050 RB2 433.075 RB3 433.100 RB4 433.125 RB5 433.150 RB6 433.175 RB7 433.200 RB8 433.225 RB9 433.250 RB10 433.275 RB11 433.300 RB12 433.325 RB13 433.350 RB14 433.375 RB15				
433.400					
FM simplex channels	433.400 SU16 433.425 SU17 433.450 SU18 433.475 SU19 433.500 SU20 <i>FM calling channel</i> 433.525 SU21 433.550 SU22 433.600 SU24 433.625 433.650 433.675 433.700 433.725 433.750 433.775 <i>Note 4</i> <i>RTTY AFSK</i> <i>packet radio</i> <i>packet radio</i> <i>packet radio</i> <i>Notes 5, 6 and 8</i> <i>Note 5 and 8</i> <i>Note 5 and 8</i> <i>Note 5 and 8</i>				
434.600					

continued on next page

430 – 440MHz

continued from page 50

430 – 440MHz <i>continued from page 50</i>	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission					
		Amateur Service	Amateur Satellite Service	PEP						
434.600	434.600 RB0 434.625 RB1 434.650 RB2 434.675 RB3 434.700 RB4 434.725 RB5 434.750 RB6 434.775 RB7 434.800 RB8 434.825 RB9 434.850 RB10 434.875 RB11 434.900 RB12 434.925 RB13 434.950 RB14 434.975 RB15	Secondary	(Not allocated)	26dBW	Morse Telephony RTTY Data Facsimile SSTV					
435.000						Satellite Service and fast scan television	Secondary			
438.000							Fast scan television	(Not allocated)		
439.800									Packet radio	
440.000										

* See page 56 for notes to the 430-440MHz band plans.

1,240 – 1,300MHz

1,240 – 1,300MHz	UK Band Plan Amateur Service	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission			
		Satellite	Amateur PEP Service					
1,240.000	1,240.150 <i>packet radio (150kHz b/w)</i> 1,240.300 <i>packet radio (150kHz b/w)</i> 1,240.450 <i>packet radio (150kHz b/w)</i> 1,240.600 <i>packet radio (150kHz b/w)</i> 1,240.750 <i>packet radio (150kHz b/w)</i>	Secondary	(Not allocated)	26dBW	Morse Telephony RTTY Data Facsimile SSTV FSTV			
1,241.100						ATV		
1,251.500						All modes		
1,260.000						Satellite service		
1,270.000						ATV		
1,286.000						All modes c)		
1,291.000						RM0 RM19 <i>(UK) 25kHz spacing</i>	(Not allocated)	
1,291.475								
1,291.500								

continued on next page

1,240 – 1,300MHz <i>continued from prev. page</i>	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
1,291.500					
All modes					
1,296.000					
CW	1,296.000 1,296.025 <i>moonbounce</i>				
1,296.150					
SSB | Narrow band DX segment | a)	1,296.200 <i>narrow-band centre of activity</i> 1,296.500 <i>linear transponder input</i> 1,296.600 1,296.600 <i>linear transponder output</i> 1,296.700				
1,296.800					
Beacons exclusive | b)	1,296.500 <i>SSTV</i> 1,296.600 <i>RTTY</i> 1,296.700 <i>fax</i>				
1,296.990					
1,297.000					
Repeater output	RM0 RM19 <i>(UK) 25kHz spacing</i>	Secondary	(Not allocated)	26dBW	Morse Telephony RTTY Data Facsimile SSTV FSTV
1,297.475					
1,297.500					
FM simplex | d)	SM20 SM30				
1,298.000					
All modes	<i>digital communications</i>				
1,298.500					
	1,299.000 <i>remote control</i> 1,299.000 <i>packet radio (25kHz b/w)</i> 1,299.425 <i>packet radio (150kHz b/w)</i> 1,299.575 <i>packet radio (150kHz b/w)</i> 1,299.725 <i>packet radio (150kHz b/w)</i>				
1,300.000					

UK allocation extends to 1,325MHz.

Notes on the 1,240 – 1,300MHz Band Plan

1. IARU Region 1 Band Plan
the following notes are part of the provisional IARU Region 1 band plan, adopted at the IARU Region 1 conference in Cefalu (1984), and all member societies should strongly promote adherence to the recommendations made in these notes.
 - 1.1 Footnotes
 - a. CW is permitted over the whole narrow-band DX part of the band; CW exclusive between 1,296.000 – 1,296.150MHz.
 - b. Regional planning by the Beacon Co-ordinator only for beacons with more than 50 Watts ERP.
 - c. DARC draws attention to the fact that in order to avoid interference to/from primary users the use of 1,286 – 1,291MHz for ATV will be continued in Germany.
 - d. In countries which do not have access to 1,298 – 1,300MHz (eg Italy) the FM simplex segment may also be used for digital communications, if necessary.
 - 1.2. Miscellaneous agreements
At the IARU Region 1 conference in Warsaw (1975) it was recommended that France, after their loss of the upper part of the band to other services, adopt the portion 1,238 – 1,240MHz for narrow-band operations in the same way as the rest of Region 1 uses in 1,296 – 1,298MHz segment of the band.
2. Usage
The following notes refer to the usage column in the band plan. In the right amateur spirit operators should take notice of these agreements which are made for operating convenience, but no right to reserved frequencies can be derived from a mention in the usage column or from the following notes.
 - 2.1 During contests and band openings local traffic using narrow-band modes should operate between 1,297 – 1,298MHz.

2,320 – 2,450MHz

	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
2,300.000					
Sub-regional (National band plans)	2,310.0 – 2,310.5 <i>repeater links</i> 2,310.100 <i>packet radio (200kHz b/w)</i> 2,310.300 <i>packet radio (200kHz b/w)</i> 2,310.0 – 2,310.5 <i>remote control</i>				
2,320.100					
CW exclusive	2,320.000 <i>EME</i> 2,320.025 <i>(moonbounce)</i>				
2,320.150					
CW & SSB	2,320.200 <i>SSB centre of activity</i>				
2,320.800					
Beacons exclusive					
2,320.990					
2,321.000					
Simplex & repeaters (FM)		Secondary	(Not allocated)	26dBW	Morse Telephony RTTY Data Facsimile SSTV FSTV
2,322.000					
All modes	2,322 – 2,355 <i>ATV</i> 2,355.1 – 2,364.0 <i>repeater links</i> 2,355.100 <i>packet radio (200kHz b/w)</i> 2,355.300 <i>packet radio (200kHz b/w)</i> 2,364.000 <i>packet radio (1MHz b/w)</i> 2,365 – 2,370 <i>repeaters</i> 2,370 – 2,390 <i>ATV</i>				
2,390.000					
	<i>EME (moonbounce)</i>				
2,392.000					
All modes					
2,400.000					
Amateur satellite service		Secondary. Users must accept interference from ISM users	Secondary. users must accept interference from ISM users		
2,450.000					

Notes on the 2,300 – 2,450MHz Band Plan

- a) In countries which do not have access to the ALL MODES section 2,322 – 2,390MHz, the SIMPLEX & REPEATERS segment 2,321 to 2,322MHz may be used for digital data transmissions.
 - b) In countries where the narrow-band segment 2,320 – 2,322MHz is not available, the following alternative narrow-band segments can be used:
2,304 – 2,306MHz and 2,308 – 2,310MHz.
- ISM (Industrial, Scientific and Medical).

3,400 – 3,475MHz

	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
3,400.000					
All modes					
3,456.000					
Narrow band CW/EME/SSB	3,456.200 <i>centre of activity</i> 3,456.800 – 3,457.000 <i>beacons</i> 3,457.000 – 3,458.000 <i>remote control</i>	Secondary	(Not allocated)	26dBW	Morse Telephony RTTY Data Facsimile SSTV FSTV
3,458.000					
All modes					
3,475.800					

BANDPLANS

5,650 – 5,850MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
5,650.000					
Amateur satellite service (up-link)	5,668 – 5,670 5,668.2 5,668.8 – 5,669.0 <i>narrow band* centre of activity* beacons*</i>	Secondary			
5,670.000					
All modes			Secondary. Earth to Space only		
5,680.000					
All modes		Secondary. Users must accept interference from ISM users		26dBW	Morse Telephony RTTY Data Facsimile SSTV FSTV
5,760.000					
Narrow-band CW/EME/SSB	5,760.200 5,760.800 – 5,761.000 <i>centre of activity beacons</i>				
5,762.000					
All modes					
5,830.000					
Amateur satellite service (down-link)			Secondary. Users must accept interference from ISM users. Space to Earth only		
5,850.000					

* Proposed change.

10,000–10,500MHz	UK Band Plan	Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
		Amateur Service	Amateur Satellite Service	PEP	
10,000.000					
All modes (ATV, data transmission, FM simplex, duplex and repeaters)	10,006 – 10,026 10,006 – 10,026 10,100 10,150 – 10,170 10,150 – 10,170 <i>packet radio repeater links / control wide band beacons packet radio repeater links / control</i>	Secondary		26dBW	Morse Telephony RTTY Data Facsimile SSTV FSTV
10,368.000					
Narrow-band CW/EME/SSB/ Beacons	10,368.200 10,368.800 – 10,369.000 <i>SSB centre of activity narrow band beacons</i>				
10,370.000					
All modes	10,400 <i>wide band beacons</i>				
10,450.000					
Amateur and amateur satellite service (all modes)			Secondary		
10,500.00					

Notes on the 10,000 – 10,500MHz Band Plan

In those countries where the narrow-band segment 10,368 – 10,370MHz is not available, the segment 10,450 – 10,452MHz is suggested as an alternative narrow-band segment.

24.0 – 24.25GHz	UK Band Plan		Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
			Amateur Service	Amateur Satellite Service	PEP	
24,000.000						
Amateur satellite service	24,025.000	<i>preferred operating frequency wide-band equipment</i>	Primary. Users must accept interference from ISM users	Primary. Users must accept interference from ISM users	26dBW	Morse Telephony RTTY Data Facsimile SSTV FSTV
	24,048 – 24,050	<i>preferred narrow band operating</i>				
24,050.000						
All modes			Secondary. May only be used with the written consent of the Secretary of State. Users must accept interference from ISM users	(Not allocated)		
24,150.000						
All modes			Secondary. Users must accept interference from ISM users			
24,250.000						

47.0 – 47.2GHz	UK Band Plan		Status of allocations in UK to:		Maximum Power:	Permitted Types of Transmission
			Amateur Service	Amateur Satellite Service	PEP	
47,000.000						
	47,088.000	<i>centre of narrow-band activity</i>	Primary	Primary	26dBW	Morse Telephony RTTY Data Facsimile SSTV FSTV
47,200.000						

Notes to the Schedule

(a) Maximum Power refers to the RF power supplied to the antenna. Maximum power levels will be specified by the peak envelope power (PEP).

(b) In the case of frequency bands above 1000 MHz, since high intensities of RF radiation may be harmful, the following safety precaution must be taken. In locations to which people have access, the power flux density on transmit must not exceed the limits recommended by the competent authorities (currently, this limit is 10mW per square centimetre).

(c) **Primary, permitted and secondary services**

For the purpose of this Licence, frequency bands allocated to the Amateur Service and the Amateur Satellite Service on a primary basis cannot claim protection from Harmful Interference or Undue Interference from any other authorised services, such protection being afforded only to users whose frequencies have been registered nationally or internationally. In the United Kingdom, individual frequency assignments are not registered in the Amateur Service, except for beacons and repeaters. This applies equally to bands allocated on a secondary basis where stations of the Amateur Service and the Amateur Satellite Service are also required not to cause Harmful Interference or Undue Interference to stations of a primary or permitted service to which frequencies are already assigned or to which frequencies may be assigned at a later date.

(d) Any modulation technique (except for pulse emissions below 1000 MHz) may be used for the types of transmission specified in the sixth column of the Schedule which are defined as follows:

- Morse: hand or automatically-sent international morse code
- Telephony: speech, including selective calling signals

RTTY: radio teletype and AMTOR

Data: digital codes representing numbers, text, speech, images, measurements, computer programmes or other information authorised by the Licence

Facsimile: transmission of fixed or graphic images

SSTV: slow scan (ie, reduced bandwidth) television

FSTV: fast scan television

(e) **Interpretation**

(i) Effective Radiated Power (ERP): The product of the power supplied to the antenna and its gain in the direction of maximum radiation.

(ii) Gain of an Antenna: The ratio, usually expressed in decibels, of the power required at the input of a loss free reference antenna to the power supplied to the input of the antenna to produce, in a given direction, the same field strength or the same power flux-density at the same distance. When not otherwise specified, the gain refers to the direction of maximum radiation. The gain may be considered for a specified polarisation. The reference antenna is usually a half-wave dipole. The gain may be referred to as decibels relative to a half-way dipole (dBd).

(iii) Peak Envelope Power (PEP): The average power supplied to the antenna by a transmitter during one radio frequency cycle at the crest of the modulation envelope taken under normal operating conditions.

Amateur Radio (Novice) Licence (A) and (B) Schedule

Those licensed under an Amateur Radio (Novice) Licence (B) may not transmit on those bands between 1.950 and 28.500MHz.

1	2	3	4	5
Frequency Bands in MHz	Status of Allocations in the United Kingdom to the Amateur Service	Maximum Power DC Input | RF Output (Watts)		Permitted Types of Transmission
1.950 - 2.00	Available on the basis of non-interference to other services (inside or outside the United Kingdom).			Morse Telephony RTTY Data
3.560 - 3.585	Primary. Shared with other services.			Morse
10.13 - 10.14	Secondary.			Morse
21.100 - 21.149	Primary.			Morse
28.060 - 28.190				Morse RTTY Data
28.225 - 28.300				Morse RTTY Data
28.300 - 28.500				Morse Telephony
50.0 - 51.0				Primary. Available on the basis of non-interference to other services outside the United Kingdom. Antennas limited to 20 metres above ground level.	Morse Telephony Data
51.0 - 52.0	Secondary. Available on the basis of non-interference to other services outside the United Kingdom. Antennas limited to 20 metres above ground level.			Morse Telephony Data
432.00 - 435.00	Secondary.			Morse Telephony Data
435.0 - 440.0		Morse Telephony Data SSTV FSTV		
1240 - 1325		Morse Telephony RTTY Data Facsimile SSTV FSTV		
10000 - 10500		Morse Telephony RTTY Data Facsimile SSTV FSTV		

Notes to the Schedule (Extract)

- (a) The maximum power specified in the third column of the Schedule refers to the peak input power (PIP) and the maximum power specified in the fourth column of the Schedule refers to the peak envelope power (PEP). The Licensee may use either measurement method, provided that the maximum power specified in the fourth column of the Schedule is not exceeded.
- (b) In the case of frequency bands above 1000MHz, since high intensities of rf radiation may be harmful, the following safety precaution must be taken. In locations to which people have access, the power flux density on transmit must not exceed the limits recommended by the competent authorities (currently, this limit is 10mW per square centimetre).
- (c) **Primary, permitted and secondary services**
For the purpose of this Licence, frequency bands allocated to the Amateur Service on a primary basis cannot claim protection from undue interference from any other authorised services, such protection being afforded only to users whose frequencies have been registered nationally or internationally. In the United Kingdom, individual frequency assignments are not registered in the Amateur Service, except for beacons and repeaters. This applies equally to all bands allocated on a secondary basis where stations of the Amateur Service are also required not to cause undue interference to stations of a primary or permitted service to which frequencies are already assigned or to which frequencies may be assigned at a later date.
- (d) Any modulation technique (except for pulse emissions below 1000 MHz) may be used for the types of transmission specified in the fifth column of the Schedule which are defined as follows:
 Morse: hand or automatically-sent international morse code
 Telephony: speech, including selective calling signals
 RTTY: radio teletype and AMTOR
 Data: digital codes representing numbers, text, speech, images, measurements, computer programs or other information authorised by the Licence
 Facsimile: transmission of fixed or graphic images
 SSTV: slow scan (ie reduced bandwidth) television
 FSTV: fast scan television

Notes to the 430 – 440MHz Bandplan

- 1: In Switzerland, Germany and Austria, repeater inputs are 430.6 – 431.825MHz with 25kHz spacing, and outputs are 438.200 – 439.425MHz. In France and the Netherlands repeater inputs are 430.025 – 430.375MHz with 25kHz spacing and outputs at 431.625 – 431.975MHz. In other European countries repeater inputs are 433.000 – 433.375MHz with 25kHz spacing and outputs at 434.600 – 434.975MHz, ie the reverse of the UK allocation.
- 2: IARU Region 1 Linear Transponder outputs.
- 3: IARU Region 1 Linear Transponder inputs.
- 4: Recommend frequency for rally and exhibition talk-in.
- 5: Emergency communications priority. Do not use without consulting local groups.
- 6: IARU Region 1 Fax/AFSK.
- 7: Fast Scan Television carrier frequencies shall be chosen so as to avoid interference to other users, in particular the satellite service and repeater inputs. IARU Region 1 recommends that video carriers should be in the range 434.000 – 434.500MHz or 438.500 – 440.000MHz.
- 8: IARU Region 1 Packet Radio.

Planning Permission

Got an Aerial?

**No Planning
Permission For It?**

**Are you an RSGB
Member?**

IF YOU ANSWERED YES TO ALL THREE QUESTIONS, why not contact RSGB HQ. They have available just for RSGB members a free advice booklet on planning permission.

This booklet will help you decide whether or not you need permission, and if you do, how best to go about it. It is regularly revised consequent upon changes in the law and practise. Insert slips being used where necessary on an interim basis.

Furthermore, through RSGB HQ, you can call upon the advice of the Planning Advisory Committee, assuming of course that you are an RSGB member! They can assist you in the event of you having to appeal to the Department of the Environment for permission.

RADIO SOCIETY OF GREAT BRITAIN

Unaudited Income and Expenditure Account For the 6 months ended 31 December 1992

	Notes	6 Months Ended 31/12/92 £	6 Months Ended 31/12/91 £
INCOME			
Subscriptions	1	420,000	402,000
Newsletters .....	.....	14,749	10,487
Advertising .....	.....	117,144	123,289
Book Sales	2	185,669	191,939
Other Income	3	38,249	39,835
Total Income	4	£ 775,811	£ 767,550
EXPENDITURE			
Cost of sales			
Cost of printing & distrib (books) .....	.....	73,851	72,268
Cost of publishing & despatch staff .....	.....	36,943	25,802
Cost of printing & distrib (newsletters) .....	.....	20,260	20,711
Sundry .....	.....	18,161	7,192
		149,215	125,973
Headquarters			
Rates, lighting, heating & cleaning .....	.....	23,238	23,139
Repairs and maintenance	5	7,822	35,380
		31,060	58,519
Administration Costs .....	.....	240,145	247,982
Finance	6	16,765	39,548
Membership Services			
Radio Communication	7	223,644	228,003
QSL Bureau .....	.....	11,522	13,320
Beacons, repeaters, satellites & Int Watch .....	.....	13,833	12,923
Cost of committees, regnl & Ccl mtgs .....	.....	24,754	22,633
Novice Licence .....	.....	5,424	15,474
Other services .....	.....	30,052	29,411
		309,229	321,764
TOTAL EXPENDITURE .....	.....	£ 746,414	£ 793,786
PROFIT/(DEFICIT) FOR HALF YEAR .....	.....	£ 29,397	£ (26,236)

NOTES

- Subscription income is brought in rateably during the year with any excess or shortfall being taken at the year end.
- Book sales have fallen slightly over the same period last year.
- All other income figures have been aggregated.
- Total income is £8,261 ahead of the same period last year.
- The repair and maintenance figure for 1991 included the cost of re-wiring Lambda House.
- Finance costs include provisions for bad debts of £4,314. (1992 - £23,712).
- Radio Communication costs are below budget for the period.

RADIO SOCIETY OF GREAT BRITAIN

BALANCE SHEET AS AT 31 DECEMBER 1992

	At 31 December 1992 £	At 31 December 1991 £
FIXED ASSETS		
Tangible assets	688,845	804,665
CURRENT ASSETS		
Stocks, at lower of cost and net realisable value	122,237	142,132
Trade and other debtors	124,479	110,995
Prepayments and accrued income	8,118	23,088
Cash at bank and in hand	336,852	236,288
	<u>591,686</u>	<u>512,503</u>
CREDITORS: AMOUNTS FALLING DUE WITHIN ONE YEAR		
Obligations under finance leases	19,874	19,874
Trade creditors	17,008	34,064
Corporation tax	17,500	1,000
Other taxation and social security	9,357	7,464
Other creditors	3,419	21,957
Accruals and deferred income	67,701	20,764
Current subscriptions reserve	235,004	289,172
	<u>369,863</u>	<u>394,295</u>
NET CURRENT ASSETS	<u>221,823</u>	<u>118,208</u>
	<u>910,668</u>	<u>922,873</u>
CREDITORS: AMOUNTS FALLING DUE AFTER MORE THAN ONE YEAR		
Obligations under finance leases 2-5 years	(17,734)	(37,607)
	<u>£ 892,934</u>	<u>£ 885,266</u>
ACCUMULATED FUNDS		
Income and expenditure account		
Balance at 31 December	(20)	(142,157)
Result for period ended 30 June, 1992	120,983	168,373
Result for period ended 31 December, 1992	29,397	(26,236)
	<u>150,360</u>	<u>(20)</u>
Revaluation reserve	207,288	350,000
Special reserve	317,946	317,946
General reserve	217,340	217,340
	<u>742,574</u>	<u>885,286</u>
	<u>£ 892,934</u>	<u>£ 885,266</u>

Half-Year Accounts

THE UNAUDITED Income & Expenditure account for the half-year to 31 December 1992, set out on page 57, shows that the Society has produced a surplus of £29,397 (1991 - Deficit £26,236). This figure is well ahead of our budget for the half-year although total income has only just hit target. Expenditure has been kept under tight control.

Recessionary pressures are still affecting the Society. Membership numbers have continued to slide although at a slower rate. It is hoped

that the recent introduction of a quarterly direct debit facility for payment of subscriptions will assist members.

Current projections are for the Society to break even in the year to 30 June 1993. This will be a good result as subscription levels have been held at current levels since November 1990.

Peter Tucker, GU4DWZ
Honorary Treasurer



SOUTH WALES LEADING AMATEUR RADIO SHOP

EVERYTHING FOR THE ENTHUSIAST

DEALERS FOR:
KENWOOD
YAESU
ICOM
A.O.R.
YUP ITERU

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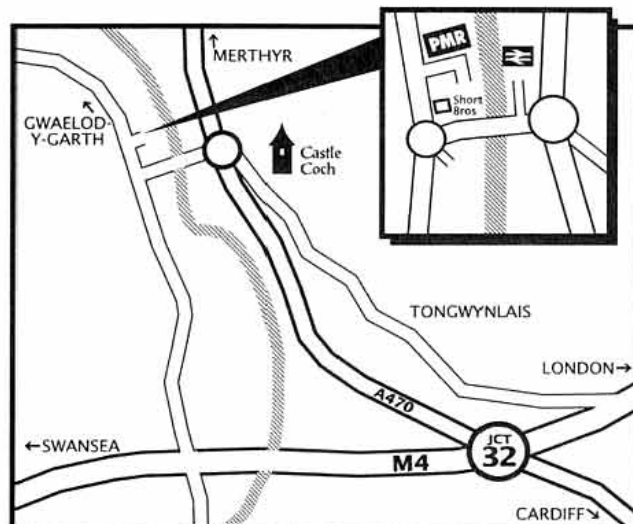
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Power Splitter For 70cms

by Peter H Saul, G8EUX.

THIS NOTE DESCRIBES a simple, accurate power splitter for the 70cm uplink to Oscar 13. The invention was to derive a design which could be made in an afternoon, with hand tools and no specialist equipment. The prototype was built in exactly this way, using scrap copper water pipe, at a total cost of one pound from the local tip. Other components needed are connectors and some solder.

The conventional power splitter shown in the *RSGB VHF/UHF Manual* uses two quarter wave sections, each of 72Ω , to achieve a match of the 50Ω source to the two 50Ω antennas. This is a simple design, but results in a fairly large assembly. The dimensions do not suit standard sizes of copper, and would need to be cut to dimension fairly accurately.

Looking at the dimensions of standard copper water pipes as potential coaxial structures, there are several useful combinations. The dimensions of the pipes are shown diagrammatically in Fig 1. From the standard texts:

Coaxial Line impedance (circular conductors) = $138 \times \log D/d$

Where D and d are the outer inside diameter (I/D) and inner outside diameter (O/D) respectively. The available impedances are therefore 33.0Ω , 17.2Ω and 10.0Ω . More could be achieved with combinations including microbore tape.

The match from 50Ω to 25Ω , ie two 50Ω antennas in parallel, requires a single quarter wave section of 35.3Ω . This can be fairly accurately approximated by a 15mm outside

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diameter (O/D) conductor in a 26mm inside diameter (I/D) outer, ie a 15mm pipe inside a 28mm (O/D) pipe.

The actual impedance is 33.0Ω , so the output impedance is theoretically:-

$$(33 \times 33)/50 = 21.8$$

ie Close to the target of 25Ω .

Since the pipes were surplus in origin, they were first thoroughly cleaned using steel wool. In particular, the inside of the 28mm pipe was cleaned by many passes through with the steel wool; even new pipe should be cleaned and deburred.

Pipe cutting was by hacksaw, with filing to final size and squareness, although a pipecutter would have given a better finish. The only critical dimension is the inner conductor length, at 172.2mm nominal. It is possible to get this within 0.5mm with care. The outer was cut about 15mm longer.

Scrap copper pipe was opened up and flattened to make an end cap and a connecting fillet from the input connector to the coaxial line. A large pair of tinsnips were used for this cutting out, since they do a neat job much faster than the saw.

The connecting fillet was soldered in place in the inner pipe first. As a compromise, soft (ordinary cored electrical) solder was used. A lot of heat was required. It was found that the hot air gun (Black and Decker 1600 watt) which was used for pre-heating was capable of reaching soldering temperatures, so this was the technique used. The metal was heated for a minute or so, then the solder was flowed on. Plumbers solder might have been even better, but would needed flux; this has not been tried.

The connector was mounted through an appropriate hole in the bottom plate. Screw mounting BNC connectors were used for convenience of assembly, especially in the dual ported end of the assembly. Fig 2 shows the arrangement. The connector was soldered to the fillet. The outer pipe was prepared by attaching the two output connectors. The bottom plate was then soldered to the outer pipe. Since this involved much heat, it would have been better to silver solder the inner connections, but this was not available. Instead, the joints were inspected visually and with an ohmmeter to check for continuity.

Finally, the inner was soldered to the output connectors in the end of the outer pipe. This required some squeezing of the inner pipe to make a good mechanical fit. The connectors centre pins were fitted into triangular grooves in the end of the inner pipe to ensure that it was not increased in length. The

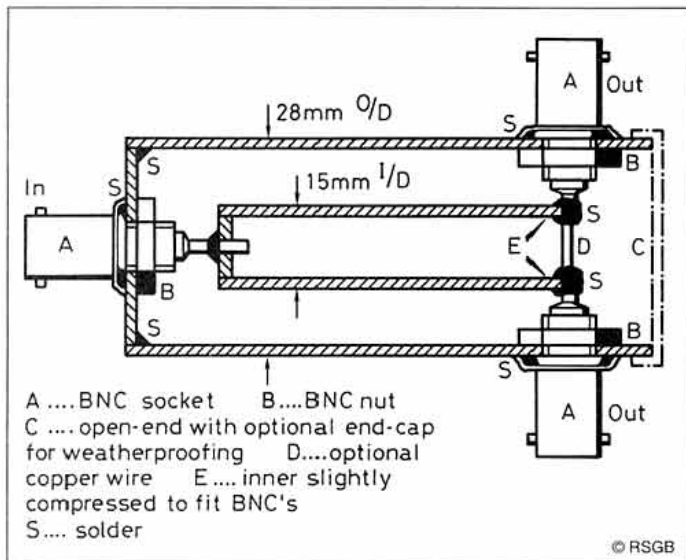


Fig 1: The power splitter is constructed from standard sizes of copper pipe.

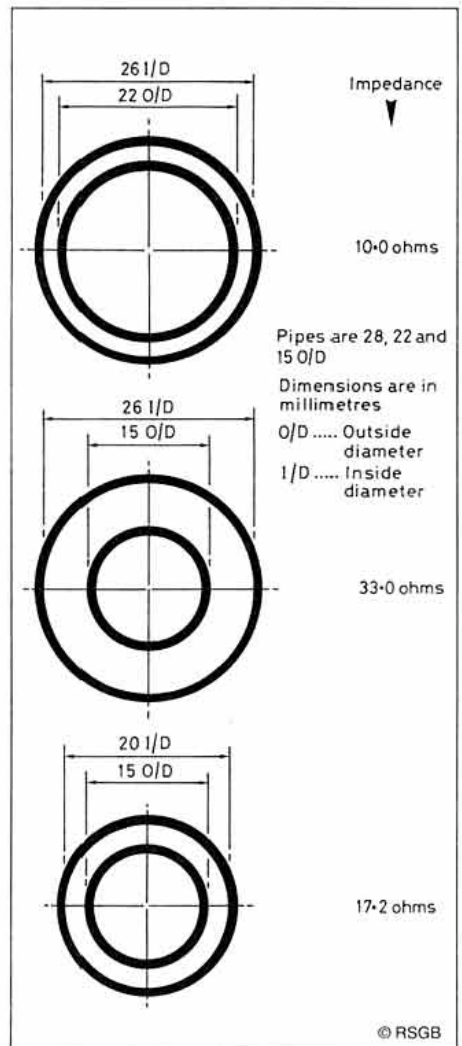


Fig 2: Variations of matching impedance.

really critical dimension was the length of the pipe at the 33Ω impedance, so the small fillet length, which was approximately 50Ω anyway, was ignored. No end cap was used on the prototype, but this could be easily provided if desired.

Finally, the assembly was cleaned again, and surplus solder filed off.

An on-air test was carried out as soon as the assembly was sufficiently cool! VSWR minimum was at 435.0MHz, suggesting a small lengthening of the line, but very close to theory. The power returned by the whole assembly, including antennas, was less than 0.5W for 10W forward, over the central part of the band from 432MHz to 438MHz. When two 50Ω loads were fitted, reflected power remained constant at 0.4W over the whole band.

SATELLITE CONNECTIONS

Satellites normally operate with circular polarisation, ie a mix of horizontal and vertical, with appropriate phasing. Although it is perfectly possible to operate through satellites with only horizontally (or only vertically) polarised signals, better results are usually obtained using circular polarisation. This is achieved by using two ('crossed') antennas, with an equal power split between them, and a 90° phase shift in one feed.

My feature 'Antenna Feeder Cable Measurements', *Oscar News* Issue 92, Dec 1991, pp 12,13, indicated how antenna feeder cables can be matched and fed appropriately. Most satellites also spin about their axis at a rate of a few Hz. This imposes an apparent amplitude modulation on the signal known as 'spin modulation'; it can make the signals very difficult to read at times. Although not a com-

plete cure, the use of circular polarisation on transmit and receive does go some way to reducing this effect by removing the gain variation due to antenna orientation.

Operationally, the improvement of the circular polarisation over horizontal or vertical was noticeable, both in reduction of spin modulation on the return signal from the satellite, and in apparent signal strength.

In terrestrial contacts, simple equal cable length phasing of antennas would be adequate in most cases; the power splitter enables two antennas to be connected very simply into the transceiver. A useful alternative for those who want to mix terrestrial and satellite contacts is to leave the satellite connections in place. On UHF, over long paths especially, some polarisation twist is almost inevitable, so the apparent loss of 3dB in feeding the additional antenna of the unused polarisation is less of a disadvantage than simple theory indicates.

Bench measurement showed that the insertion loss, to each output port, with both ports terminated correctly, was 3.35dB at the band centre, against a theoretical zero loss of 3.01dB. The excess loss of only 0.34dB was considered to be very satisfactory, especially as it includes connector losses. There was only a very small increase at the band edges.

After completing and using the unit for some weeks, the possibility of computer modelling came to mind. The author has a demonstration version of the CAD program SPICE on the shack computer. This can model lossless transmission lines, in addition to many other facilities. The result of a simple insertion loss calculation is shown in Fig 3. This indicates a minimum insertion loss to either output port of 3.01dB. The figure measured, 3.34dB includes connector losses and

copper losses. More interesting is the apparent bandwidth. VSWR cannot be easily predicted, but the diagram indicates that acceptable performance is available from 420MHz to 450MHz, with only slight degradation outside this range. This agrees with the measurements over the actual band, which showed very little variation between the band edges. For reference, the conventional $2 \times 72\Omega$ splitter was also modelled (Fig 4). This showed a similar in-band loss, the theoretical 3.01dB, but sharper band edges, ie the design is more critical. Intuitively, this is correct, since two tuned circuits are involved instead of just one.

CONCLUSIONS

This article has described a prototype assembly, which is now in constant use. The only improvement required was the soldering of the BNC connectors to the outer tube, to avoid twisting the centre conductor when removing the unit. N-type connectors were considered, but the BNCs work well at this frequency and are very convenient in the assembly. Most cables for this frequency are better suited to N types, so adaptors are used at the outputs. The input has a short length of RG58 from the linear.

The antennas are separately fed, so that all polarisations are available by arrangement of connections. A switch would increase losses. Of course, a simpler arrangement would be to use a single feed, with the power splitter at the mast-head; it is amply rugged enough for outside use, and with an end cap could be made watertight.

The dimensions of the pipes are such that no narrow gaps are involved, so no arcing should be expected. Operation at close to 100W input has been proved, and no problems are expected at full legal power.

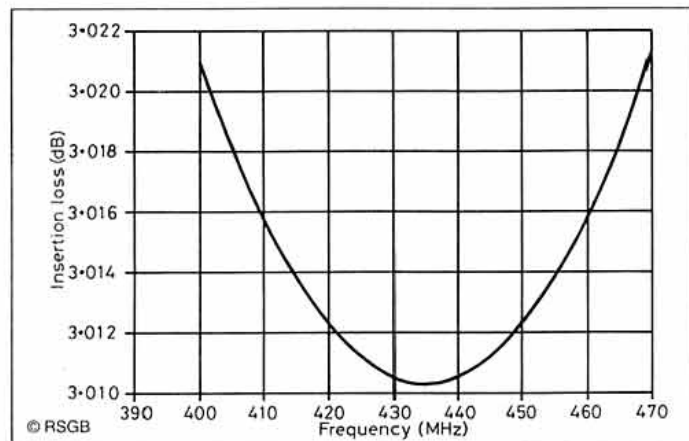


Fig 3: Results of a computer model using the SPICE program (2 x 50 Ohm version).

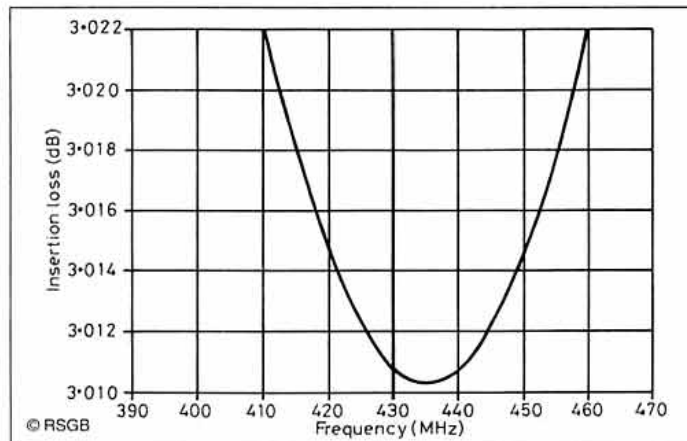


Fig 4: The conventional version (2 x 72 Ohm) shows similar bandwidth.

A PROPOSED CODE OF PRACTICE FOR AMATEUR OPTICAL COMMUNICATIONS

AN UPDATED VERSION (v2.1) of the BASIC computer program published in the January 1993 issue of *RadCom* has been supplied by the author, B.Chambers, GBAGN. This includes suggestions from G4XVJ and others, who have shown interest in this fascinating mode of communications. The following lines should be amended or, if they do not already exist, inserted into the program:

TECHNICAL UPDATE

```

240 CLS: INPUT 'Enter laser output power in mW ';
    Po
285 IF yn$ <> 'Y' AND yn$ <> 'y' THEN GOTO 340
290 INPUT 'Enter expander magnification factor
    (>1) ';emf
365 IF yn$ <> 'Y' AND yn$ <> 'y' GOTO 450
370 INPUT 'Enter collecting lens diam in mm ';od
460 IF yn$ <> 'Y' AND yn$ <> 'y' THEN
    r = (SQR(4 * Po / (PI * 18 * 10-25))) - a) / phi
    ELSE r = (SQR(4 * Po * k / (PI * 18 * 10-25))) -
    a) / phi
465 END IF
470 ir = INT(r + .5)

```

All other lines in the program remain unchanged. Note that many forms of BASIC use double quotes rather than the single ones shown in the original listing and amendments.

SIMPLE 160M PHONE TRANSCEIVER

COMPONENT LAYOUT DIAGRAMS for this project (Jan & Feb 1993 *RadCom*) are being supplied with the pair of PCB's. In addition the component overlay is marked on the board to simplify construction. Available from Badger Boards (Tel 021 353-9326).



Translated and Edited by Erwin David, G4LQI

continued from page 41

ies of hand-held radios somewhere in-between - G4LQI].

Programming the *Supply 2000* as a constant current source only requires C1, C2 and R8, the latter being calculated as for current limiting above. R2 and R7 must be shorted or replaced by wire jumpers. The battery minus

is connected to $-V_{OUT}$; the battery plus to $+V_{OUT}$ through a 1N4001 diode (cathode, ie banded end, to the battery). This diode prevents discharge of the battery into the L200 if the input power to the PCB fails. If not already contained in the battery pack, as it is in many hand-held radios, this diode can best be installed at the battery-end of the charging cable.

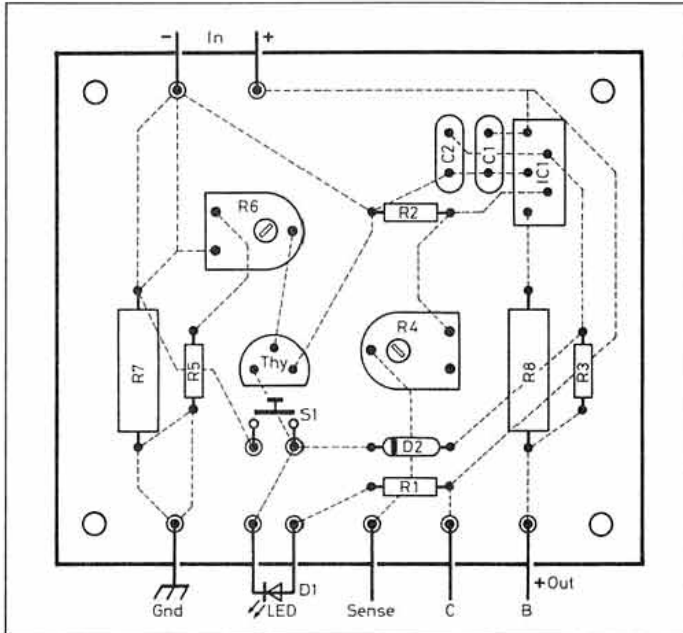


Fig 2: Component location on the PCB.

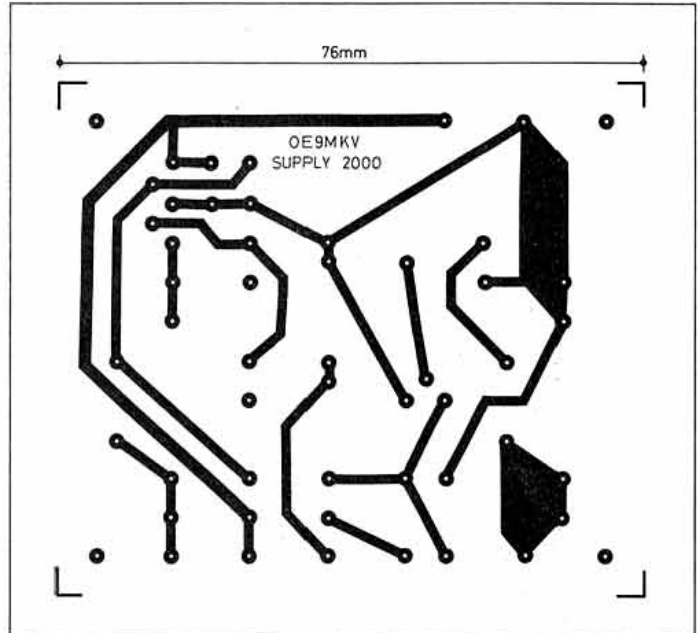


Fig 3: Etching pattern for the PCB.

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How Big is a Bad SWR...

and how does it affect your transmitter?

by Bob Pearson, G4FHU

ONE OF THE MANY preoccupations of a radio amateur is the need to check the Standing Wave Ratio (SWR) of an antenna system connected to a transceiver. Much has been written about the consequences of getting it wrong, but mostly from the point of view of squeezing the last possible drop of power out to the antenna. Of considerably more importance is the need to avoid wrecking the transmitter output device(s) and with rapidly increasing costs of replacement transistors and tubes, consequent wallet failure!

This article will concentrate almost entirely upon the latter aspect of SWR. In fact, the reader may prefer to wait for the final conclusions next month before going on to the detailed reasons for them. It is not at all necessary to understand anything about SWR or antenna systems to grasp what is happening at the transmitter. Translations from measurement and description, into ordinary AC circuit quantities (resistance, reactance, impedance and phase angle) are shown by the graphs and as formulae in the Appendix, next month.

The common type of SWR meter, which is really a kind of reflectometer, is a splendid example of instrumentation with a high ratio of performance to cost. It is often quite unjustly maligned because it is not the answer to every requirement. However, it offers a very cheap and convenient way of making an important check and can be left in circuit as a continuous monitor. It does have limitations, some of which will be mentioned later.

A transmitter works most effectively and safely when driving the purely resistive load for which its output power amplifier was designed. It is a pity that this is often carelessly termed the output impedance, which is something quite different. Since this design value of load resistance also determines the characteristic impedance (R_0 or Z_0) of the most suitable connecting cable, the figure is likely to be near 50 or 75Ω, the common figures for coaxial cable. If the SWR meter is set up so that it shows the smallest possible SWR, (ie zero reflection coefficient or SWR=1.0), when connected to that particular resistance, R_0 , then it can be used to check both the antenna system and the loading of the transmitter at the same time.

If the SWR is higher than a perfect 1.0 it may be because the load resistance is too high or too low, or because the load phase angle is not zero, or a combination of these. If the phase angle is not zero, it means that the load contains reactance (capacitive or inductive) as well as resistance. Any of these

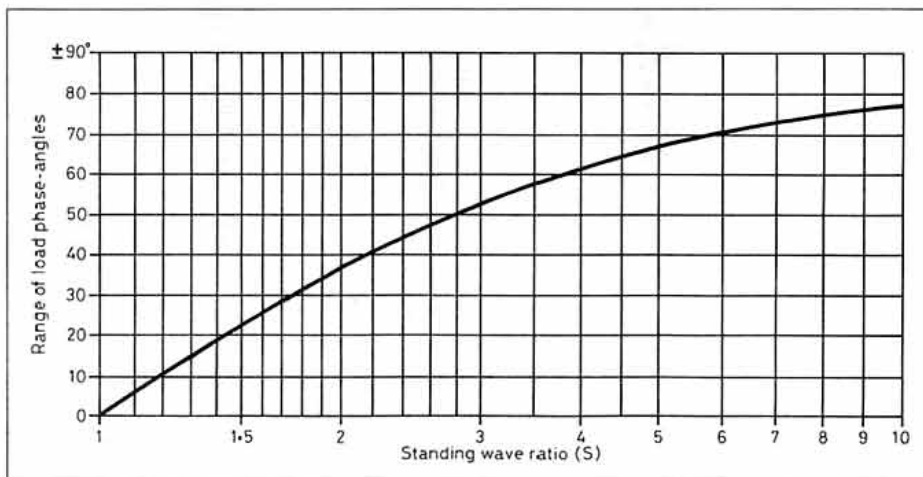


Fig 1: Range of possible load phase angles for a given SWR.

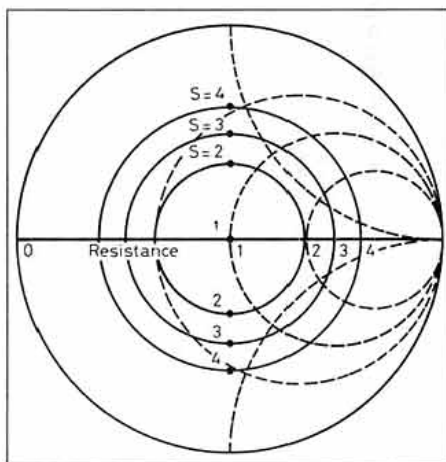


Fig 2: Smith Chart shows the variation of SWR with load impedance.

can lead to an SWR above unity and the standard design of reflectometer will register that fact but not reveal the cause.

It is of course possible to find out more by using RF impedance measuring equipment but that is usually very expensive except for the humble noise bridge which can be built at home very cheaply and easily. This is fine for occasional checks on a broadband antenna system that does not require frequent re-tuning, but is not so convenient when using a matching unit (ATU or ASTU) to remedy big changes in impedance at every change of frequency.

It is also possible to modify the design of the reflectometer which could well be the subject of another complete article. However this is not necessary for most ordinary operation.

HOW DOES SWR DEPEND UPON LOAD RESISTANCE?

IN THE RATHER SPECIAL case where the impedance is purely resistive but not necessarily the desired resistance value (ie the whole antenna system is perfectly at resonance or has been made to appear so by an antenna tuning unit) then the SWR is simply the ratio of two resistances:

$$SWR = R_L/R_0 \text{ or } R_0/R_L$$

(whichever is the larger)

where:

R_L is the 'Load' resistance actually presented to the transmitter and R_0 is the correct load resistance for which it was designed.

Note especially that *two* different resistances can give the same value of SWR, ie $R_0 \times SWR$ and R_0 / SWR .

Also, the abbreviation S is often used for SWR as in the diagrams, and Appendix (next month).

HOW DOES LOAD REACTANCE AFFECT SWR?

EVEN WHEN THE LOAD impedance has the correct magnitude, SWR can still be larger than unity owing to a non-zero phase angle. For each value of SWR there is a range of possible phase angles from zero to a maximum and the reactance can be of either type, inductive or capacitive. The range is shown in Fig 1. It can be calculated as shown next month or found from a Smith Chart such as the one shown in Fig 2. It can be seen that for any given SWR, many combinations of resistance and reactance are possible.

WHAT ARE THE LIMITATIONS OF THE AMPLIFIER DEVICES?

IN SMALL-SIGNAL DESIGN work we use only a portion of the available device characteristics as for example in Fig 3. Small-signal operation would normally be restricted to Region 'A', in which the characteristics are uniform and predictable in shape. The operating point is well to the left of the $P_{c,max}$ curve which shows the maximum steady power that can be dissipated with a given heat sink and ambient temperature.

There are several limitations to safe operation with large signals (apart from problems of harmonic generation), which are shown in Fig 4. Region B, although beyond the safe static power dissipation limit, can safely be entered as long as two conditions are observed.

Firstly, operation must not remain in region B long enough to allow the temperature inside the device to rise too far. This might be many seconds for a thermionic tube but as little as milliseconds for a semiconductor device.

Secondly there must follow immediately a sufficient cooling period during which operation is well inside Region A. These conditions

are easily met in RF power amplifiers (and in AF ones except at very low audio frequencies), and assume operation into a resistive load.

The forbidden Region D is one of excessive current where internal connections may fail or a cathode may be stripped. Region E is especially deadly for transistors, where the collector-emitter breakdown voltage V_{BR} is reached. The conditions are such that current and voltage are simultaneously high. The collector power dissipation is of course the product of current and voltage

$$P_c = I_c \times V_{ce}$$

Thermionic vacuum tubes are much more tolerant of excess voltage and often survive a brief 'flashover', though with a good big PA tube costing well over £100 these days, it is something to be avoided.

In Region C, which is of special concern for transistor operation, local heating can be so rapid and intense that the transistor characteristics alter during the cycle, leading to what is often termed 'secondary breakdown'.

HOW DOES LOAD RESISTANCE AFFECT THE AMPLIFIER?

IN A SINGLE-ENDED amplifier, ie using only a single device or several in parallel, as is common for vacuum tube PA stages, there is a serious risk of generating excessive voltages if the load resistance is too high. The

most likely and the most risky cause is of course forgetting to connect anything to the transmitter output! When using semiconductors there is much to be gained by using a Push-Pull, Class-B circuit such as that of Fig 5, not least because the transistor which is conducting, controls the maximum voltage applied to the one that is not. At least this is the condition if the transformer is well made. With a perfectly resistive load, operation is confined to the diagonal load line R_L as shown in Fig 6. Problems can arise if the load resistance is too low or too high.

Most dangerous for a push-pull pair of transistors is the 'load resistance too low' condition, because Regions B,C and D (Fig 4) are all likely to be entered via a load line that is too steep. If the load resistance is too high, the load line will be near to the horizontal and Region E is likely to be entered, especially in single ended circuits.

In both cases power output and efficiency will be reduced and it is likely to be necessary to reduce the drive level to avoid peak clipping (with consequent distortion and harmonic generation) even before damage occurs.

HOW DOES THE WRONG LOAD RESISTANCE AFFECT PERFORMANCE?

LET US LOOK AT SOME practical figures, relating to the circuit of Fig 5. Assume that the transformer reduces the designed load resistance to a round figure of just 1ohm at the collector of the conducting transistor, that the supply voltage is 12V and that the peak collector current is 12A (reduced just enough to prevent peak clipping when the load resistance is too high). We can now assume sinusoidal waveforms in our calculations.

Fig 7 shows what happens as a purely resistive load is varied over an SWR range of 1 to 4. The power calculation relates to only one of the two transistors.

Note that there are two curves for the transistor internal power dissipation P_c . The higher curve is for load resistances less than normal and the lower curve is for load resistances larger than normal and with drive reduced to prevent peak clipping of the collector waveform. With the best condition, SWR=1, the output power per transistor (P_o) is 36W and the dissipation inside the transistor P_c is 9.84W

But with SWR=1.5, a very modest value, the transistor dissipation more than doubles if the load resistance is below normal. Even at an SWR of 1.1 the dissipation is increased by over 30 percent.

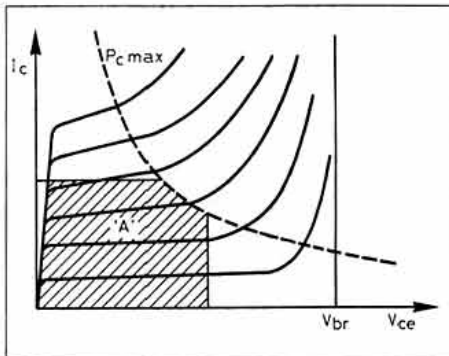


Fig 3: Typical collector characteristics for a bipolar transistor.

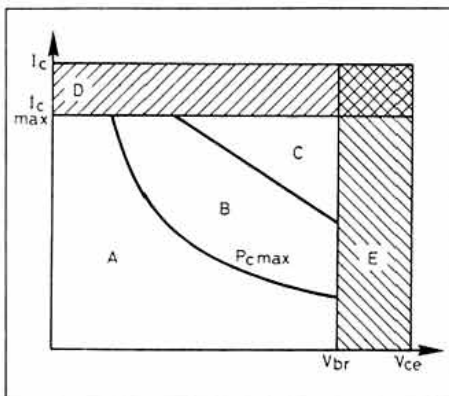


Fig 4: Operating regions for semiconductor and vacuum tube amplifier devices.

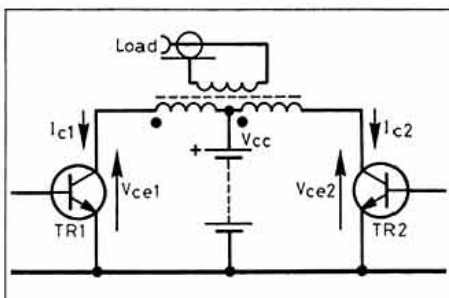


Fig 5: Class-B push-pull amplifier circuit.

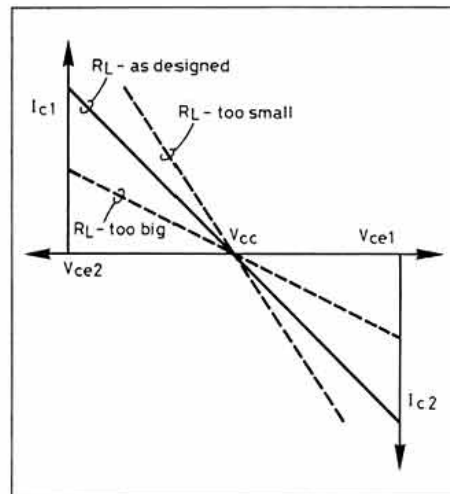


Fig 6: Pure resistance load lines for a Class-B push-pull pair of devices.

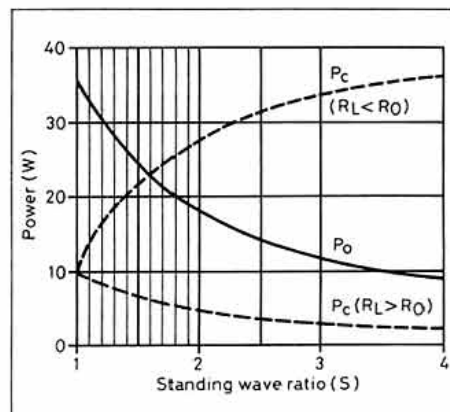


Fig 7: Output & device power versus SWR using a purely resistive load.

... to be continued

NEXT MONTH

IN THE SECOND PART of this feature, next month, I will discuss the effect of load reactance on the PA stage of a transmitter, and show how the various parameters may be calculated for a practical situation.

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MFJ-9020

20 Metre CW Transceiver

by Rev. George Dobbs, G3RJV

WHEN I FIRST LOOKED at the circuit of the MFJ-9020 Transceiver, my initial thoughts were . . . "Good circuits never die, they just re-appear with other components wrapped around them."

THE NE602 MARCHES ON

MANY AMATEUR RADIO applications have been applied to the Philips/Signetics NE602 integrated circuit. It is a low power HF/VHF double balanced mixer, with an onboard bipolar local oscillator and voltage regulator. Designed for Cellular Radio applications, it also happens to contain three useful amateur radio circuit building blocks in one small 8-pin DIL device.

The mixer may not have the best specifications amongst its peers but it has good conversion gain and an adequate performance on the HF bands. It soon emerged that the NE602 could form the basis of an inexpensive, low component count superhet transceiver.

The MFJ-2020 was designed by Rick Littlefield, K1BQT, and his article 'An NE602 QRP Transceiver for 20 Meter CW' in *Ham Radio*, Jan 1989, was one of the first of several complete rigs based upon the NE602.



MFJ Enterprises Inc. of Mississippi are usually thought of as the manufacturers of Antenna Tuners, Keyers and an interesting range of amateur radio accessories. I do recall an early simple QRP transmitter produced by MFJ, so I suspect that this is their first attempt at producing a transceiver.

CIRCUIT DESIGN

THE MFJ-9020 IS A CW only, single conversion, superhet transceiver covering the frequency range 14.00 to 14.075MHz. The claimed transmit output power is 4 watts, or better, using a 13.8 volt power source. The

circuit has a 10MHz IF, based upon an 8-pole ladder filter, and a 4MHz variable frequency oscillator (see Fig 1). MFJ also offer optional Audio Filter and Keyer Boards to fit inside the case.

A four pole bandpass filter feeds the NE602 input mixer, together with the 4MHz internal VFO. A varactor RIT circuit is switched by Q2 to provide VFO shift on receive only. The balanced output is inductively coupled to the 10MHz Ladder Filter. MFJ call it an 8 pole filter, in fact it contains only four crystals.

The IF Amplifier is an MC1350, with the gain control pin used as part of an audio derived AGC system. On transmit, the gain of the MC1350 is clamped low and the receiver remains on to generate a genuine sidetone from the transmit signal. Another NE602 serves as the product detector and beat frequency oscillator.

Audio amplification is provided by an LM386 run at full gain with a simple volume control at the output. This method gives enough audio voltage for the two stage AGC amplifier mentioned earlier. On transmit, the AGC line is clamped to mute the IF stage and allow sidetone monitoring. This is ingenuity and compromise at its best but compromise it is. The AGC is very useful but I rate it more as an 'ear saver' than a true AGC action. I am not quite sure why they claim the 'trade mark' for the transmit muting circuit, as it appears to be a well tried design. Having said that, both circuits work and serve their purpose. Obtaining the CW tone from the actual signal enables true netting to other stations.

On transmit a bipolar DC switch (Q5) keys the transmit mixer, and drives the transmit/receive relay through a driver transistor. This has an RC circuit to set the QSK hold time and prevent relay chatter during keying. The VFO signal from the input mixer has a single FET buffer stage to drive the transmit mixer, with its internal oscillator used in a 10MHz VXO

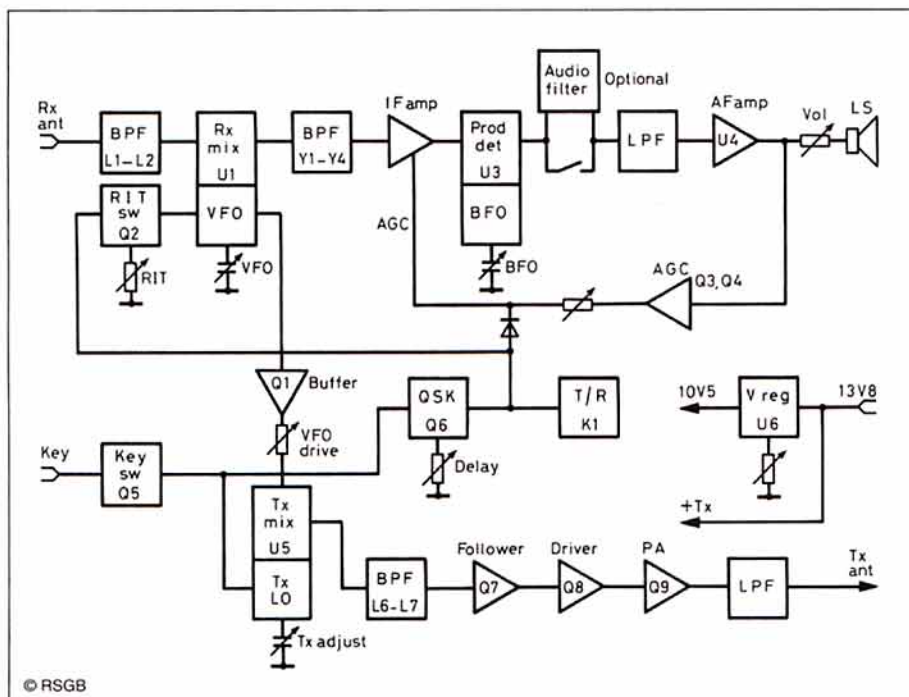


Fig 1: The manual contains a full circuit diagram plus component locations and field alignment procedure.

circuit to give transmit frequency offset. The signal then passes through a low pass filter to be matched via an FET follower to the transmit driver stage. The power amplifier is a single MRF476, with a half wave filter on the output. The overall result is a simple, but surprisingly effective, amateur radio station for 20 metres.

STURDY CONSTRUCTION

FULL MARKS TO MFJ for translating the circuit into a transceiver unit. The whole unit is built on a 1/16" aluminium chassis with wrap-around lid and brushed aluminium front panel. For portable operation it is compact and very sturdy. All the electronics including the controls are mounted on one printed circuit board. The only wires are those to the internal lid speaker and the antenna.

The manual contains the full circuit diagram plus an adequate description of the circuit functions. Location diagrams for all the components and a layout drawing for all adjustable parts are also provided. A 'field alignment' procedure, DC voltage chart and fault check list for trouble shooting are included in the manual. Its unusual, these days, to find a manufacturer who gives user service information.

SIMPLE CONTROLS

CONTROLS ARE VERY SIMPLE: just three knobs and a switch. The tuning control is the classic large knob driving an epicyclic reduction drive with a pointer indicating frequency on the front panel. No digital readout here and calibration is rather rudimentary. The other controls are volume and RIT. Perhaps one small drawback is that the RIT is always switched into circuit on 'receive' so the user must remember to return it to the centre after use.

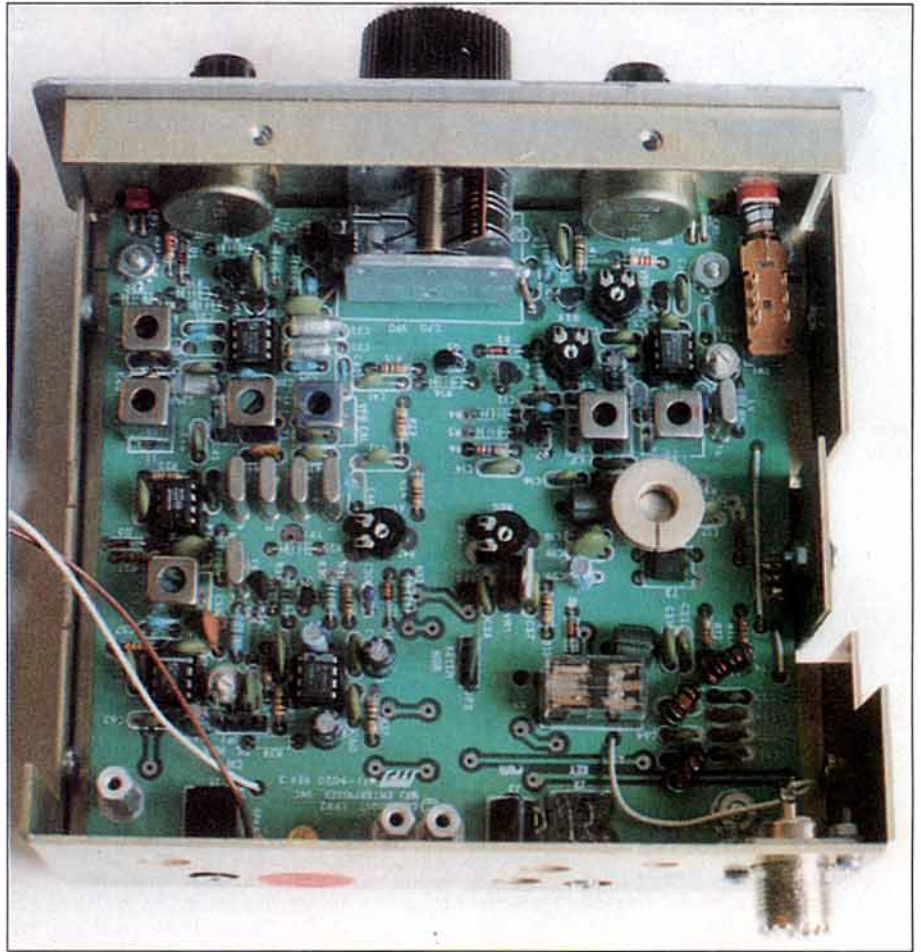
The antenna, power, phone and key sockets are on the back panel, which also contains spare holes for mounting the optional audio filter and keyer controls.

ON THE AIR

I USED THE TRANSCEIVER with a regulated 13.8V supply and fed it into my Cushcraft R5 half wave vertical antenna mounted on the roof. In the first hour, with mediocre band conditions I had worked five stations including three European countries and W3ARK. In later tests over several weeks I decided to try the transceiver under simple portable conditions, and used a half wave dipole at about 30ft. In casual operating sessions the transceiver did all that can be expected of a QRP rig. I worked most of Europe as far as UA9 and three USA call areas. A more dedicated operator would have done better.

The MFJ-9020 is certainly sensitive enough to match its transmit power. It easily detected a 1µV signal, the smallest my amateur test bench can offer. In several simple tests against my frequency counter, the worst drift I encountered was 400Hz in an hour from switch on. The transmitter output on my model did not quite live up to the MFJ claim of at least 4 watts, giving 3.9W from a 13.8 volt supply. On a 12V battery, power dropped to under 3 watts. Still a viable QRP power level however.

The loudspeaker in the lid is, perhaps, an optimistic addition but probably fine for quiet



locations. A pair of cheap Walkman type phones with a mono 3.5mm jack worked well, although I found the background audio noise a little high on headphone operation. This was greatly improved by adding an audio filter. I did not have the MFJ optional filter but added another simple two pole home-built active filter. This really enhanced the receiver performance and was very worthwhile.

WHAT DO I THINK?

DURING THE TWO MONTHS OF USE I really enjoyed using the MFJ-9020. It is a 'real' radio: easy to drive, the long term frequency drift was minimal, it heard more stations than I could work, the QSK (break-in) is adequate and the RIT useful. Also, I can find out what goes on inside the box and so stand a good chance of fixing a fault.

The MFJ-9020 could become a classic with QRP operators. It is rugged, uses standard parts and is readily serviceable. The case, although compact, does contain plenty of extra headroom. Those rigs which have stood the test of time in QRP circles are the ones which can be modified to suit the user. It is difficult to find an unmodified Heath HW8 and practically impossible to find an unmodified HW7. It will not be long before modifications for this transceiver begin to appear for such is the nature of this branch of the hobby.

It also fills a gap in two sectors of the amateur radio market as a basic no frills station or a useful portable rig. I can well imagine the MFJ-9020 in the role of a minimal but worthwhile amateur radio station. Even in the most difficult and cramped conditions, it

would be possible to use the transceiver with a simple half wave dipole or 'invisible' wire antenna. It could be a 'station in a box' or in a small drawer. Its physical size, and a power output unlikely to cause interference to other types of consumer electronics, might provide a station with a high level of social and domestic acceptance.

It is an ideal 'take-away' transceiver - 20 metres is usually a good compromise for single band portable operation. There are stations to work most of the time, and a useful antenna need not occupy a large space. Also, low power operation can produce satisfying results, and QRP operators have attempted DXCC with even simpler set-ups.

With these points in mind, MFJ have also provided two extra modules to make up a complete compact station: the 4114 supply/charger unit and the 971 Antenna Tuner. These are in cases of matching size and style which stack together to provide the complete station. They even supply a 20 metre folded dipole for portable use. Well done MFJ . . . You have taken a typical QRP circuit and made a good job of turning it into a working unit. The price of just under £200 reflects the problems of imported equipment from the United States. I think it is somewhat expensive but then I consider all amateur radio equipment to be expensive! At a time when it is almost impossible to buy a basic, no frills, transceiver which will do the required job and no more, this is one of the very few choices.

The MFJ-9020 is available from Waters and Stanton, 22 Main Road, Hockley, Essex, SS5 4QS. (Tel: 0708-444765) price £199.95 inc VAT, plus £5 p&p.

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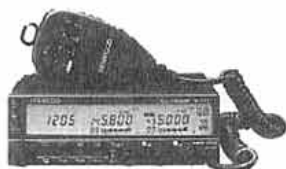
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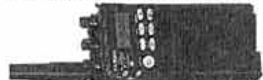


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Microwaves

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THIS MONTH THERE IS much important operating news, almost to the exclusion of technical matters. Who says that winter microwave operating isn't successful or that changes are not in the air? Read on!

47GHZ WORLD RECORD COMES BACK TO EUROPE

IN 1984, HB9MIN/P and HB9AGE/P established a 47GHz world record of a little over 56km, using entirely home designed and constructed WBFM equipment with an output of about 200µW. This equipment was outlined by HB9MIN in Volume 3 of the RSGB *Microwave Handbook*. In 1988, WA3RMX and K7AUO, in the USA, increased this distance to a little over 105km, using home-designed and constructed linear transverters with an output of some 4.5mW. That record stood until recently.

A letter from HB9MIN said that this record "triggered the will to develop a completely new concept for a 47GHz portable station." Development of a new modulation technique, described by HB9MIN as CASM (Constant Amplitude Sideband Modulation), took some four years and many problems had to be overcome during development: ie, the linear mixers needed some 7mW of local oscillator power at about 46GHz, derived from an ovened crystal oscillator (OCXO) at 199.25MHz. The modulation method finally evolved has a number of important advantages over conventional SSB, namely, the signal can be divided, multiplied and amplified with low distortion using class-C amplifiers.

After 'much research into propagation characteristics' (mainly the effects of water and water vapour - see Chapter 20, *RSGB Microwave Handbook*, Volume 3), 'several possible paths between 80 and 200km were identified'. The main pre-requisites for success are no hydrometeors (water droplets - rain or wet cloud/fog. Even ice particles - snow, freezing fog or hail can cause attenuation) and low water vapour concentration (low relative humidity): the answer, in 'temperate zones' such as Europe, is *Altitude*. Low humidity (and slightly reduced oxygen tension) can be found high in the Alps in fair weather! Under normal conditions, water vapour attenuation is about 0.4dB/km at 20°C (0.2dB/km at 0°C) and losses due to rain can vary from about 0.5dB/km (light rain) to 10dB/km (cloudburst). Oxygen attenuation is of the order of 0.15dB/km. Don't forget that these losses must be added to the free-space loss (already of the order of 160dB over a 100km path)!

Initial trials, using CASM (3.5kHz B/W) on 47GHz after dish alignment using 24GHz, led HB9MIN/P and HB9AMH/P to work a 114km path from Albishorn (900m ASL, JN47GF) to

Chasseral (1600m ASL, JN37MD) on 2 September, 1992. Signal reports both ways were between +20 and +25dBn. Thirteen days later (lucky for some?), on 15 September, 1992, the new record was stretched to 166km, when two operators, HB9MIN/P and HB9MIO/P (with HB9AMH and HB9TBT present), worked a path from Hochalp (1550m ASL, JN47PF) to Chasseral (1600m ASL, JN37MD). HB9MIO/P's CASM signals were reported as +15dBn over the path which was estimated as having a loss of 200dB. At HB9MIO/P, HB9MIN/P's signals were reported as '53'.

Prior to the 166km contact, 24GHz was again used for dish alignment and the 0.8mW, 24GHz marker signal was some +12dBn over the path! Initially some 10dB QSB was noted at 47GHz due, it was observed, 'to passing clouds' - when the cloud cleared the path 'was stable over a very long period'. For the record similar, but not identical, equipment was used at both ends of this contact and was as follows:

HB9MIN/P: OXCO, multipliers to 23GHz, 100mW GaAs FET amplifier at 23GHz to a doubler and rat-race mixer using HP HSCH9101 Schottky diodes. TX, injection locked to OXCO, amplifier to 8mW. Antenna, 60cm dish, gain 45dB.

HB9MIO/P: similar receiver. TX: multipliers to 23GHz from OXCO, GaAs FET doubler

to 47GHz, output 8mW. Antenna, 60cm dish, gain 44dB.

Congratulations to all stations involved.

24GHZ - NEW UK RECORD

STARTING IN EARLY DECEMBER, Steve, G4KNZ, used about 1mW of 24.048GHz CW/NBFM by multiplying from 1145MHz and used a G3JVL-type waveguide receiver to work Les, G3BNL/P, over a path of 19km and Roy, G3FYX (fixed) over a 10km path. Later, his Gunn wideband gear was used to good effect in the frosty (low humidity) weather experienced in many part of the country for most of December and the first week of January.

On 28 December, Steve climbed Fairsnape Fell (Lancashire), with Ray, G3NKL. Using simple Gunn wideband equipment, both failed to work Roy, G3FYX/P and Phil, G3PPF/P on Long Mountain (near Welshpool, but just in England, non-line-of-sight) at a distance of 142km, or G8HMV/P (Brown Clee, line of sight) at 156km. Later both of them worked GW3FYX/P and GW3PPF/P on Esclusham Mountain (near Wrexham) at 102km. G4KNZ also worked Paul, G8AYY/P, at Sutton Common (East Cheshire) at 86km.

Two days later, Steve went to the North York Moors and worked Peter, G3PHO/P, over four different paths, successively at 92, 113, 124 and finally 136km. His total 'score' for 1992 was 42 QSO's, 22 different callsigns,

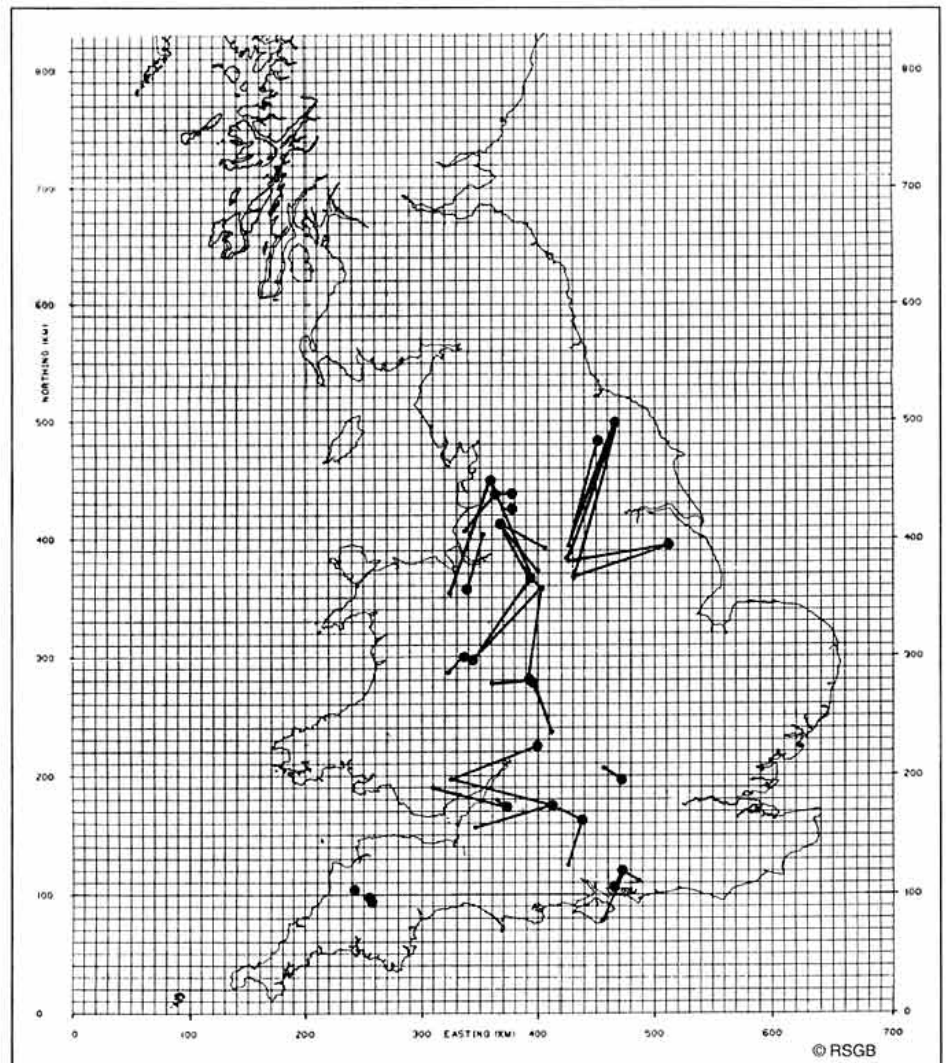


Fig 1: Map showing some of the paths worked during 1992 by G4KNZ on the 24GHz band. Heavy dots are G4KNZ's end of the paths.

operated from 24 different portable sites, best dx 136km, ladder score 2292 points. However, it didn't end there! On 3 January 1993, Steve worked Phil, GW3PPF/P at Mynydd Maen (South Wales) first from Stokenchurch (146km) and then from Loosely Row (nr Princes Risborough) at 156km.

This contact set two new UK records: the first wideband contact beyond 150km and the UK distance record, any mode. The earlier record, 150km, was held by Les, G3BNL/P and Alan, G(W)3EEZ/P, for a narrowband contact over the well-known Dartmoor to Prescelly path, in 1975! The new path is obstructed by the Cotswold ridge and interestingly the contact was made early in the morning, starting at 0800z, with heavy frost. By 1100z signals were beginning to fade out as humidity increased. Steve's 50mW signals were reported as peaking 5:7, so there is potential to extend the path a little further when conditions are right. It is also of interest that signals on 10GHz were so strong that Steve was able to use 0.5mW NBFM (yes, 500 microWatts!) to a 20dBi horn as talkback!

Perhaps this activity might just re-awaken G3BNL's 24GHz PLL narrowband activities - see the description in Chap 19, Vol 3 of the *Microwave Handbook*. I still have some high quality PCBs available for that design if those interested in having a go at converting their Gunn wideband gear into a PLL narrowband system. Fig 1 shows some of the 24GHz paths Steve worked during 1992.

CUMULATIVE CONTESTS AND ACTIVITY DATES FOR YOUR DIARY

THE SUMMER 10GHz CUMULATIVE CONTEST, Microwave Cumulatives dates for 1993 and Winter Cumulative dates for 1993/94 were agreed at the December Microwave Committee meeting and are shown below. Our apologies if any of the dates coincide with your favourite rally dates - it is proving almost impossible to avoid some sort of clash as there are now so many amateur radio events in the UK calendar, to say nothing of IARU Region 1 contests!

These are cumulative activity periods, on any band 2.3GHz up, intended to increase (particularly portable) activity throughout the winter. They are not contests and there will be no awards for them: however, log entries will

SUMMER CUMULATIVE CONTESTS 1993

10GHz	24GHz	5.7GHz
25 April	11 July	11 April
30 May	15 August	9 May
27 June	19 September	13 June
25 July	17 October	
29 August		
26 September		
31 October		
Best 4 count	Best 2 count	Best 2 count

Rules: No restriction on the number of sites used during each day. If a station is worked more than once during a single contest event from different sites, only the longest contact will count. Remaining rules as for 1992. Contacts count for tables.

WINTER CUMULATIVES 1993/94

- 28 November 1993
- 26 December 1993
- 30 January 1994
- 27 February 1994
- 27 March 1994.

be analysed and the results published in the Microwave Newsletter. Contacts count for tables. Rules: none, but see 'Microwaves' Jan 1993 for valid table entries.

MANUAL LADDER AND 10GHZ ALL-TIME SQUARES TABLE

NO ANNUAL LADDER UPDATE this month: the next one should be the last one for 1992, before the 1993 Ladder starts. Another opening in the dying days of 1992 and the early days of 1993 have enabled G3WDG to increase his 10GHz squares worked by three and move well ahead at the top of the table. By working ON5UI, G3GNR and F6DKW in new squares, his total becomes 24, with a grand total of 63 different stations worked: remember, this is all from a fixed station location! (See table 1).

10GHZ ALL-TIME SQUARES TABLE				
Posn	Call	Locator	Squares	DX(km)
1	G3WDG	IO92RG	24	1,008
2 =	G3BNL	IO92KA	15	1,027
2 =	G4DDK	JO02PA	15	624
2 =	G8KQW/P	IO91GI	15	300
5 =	G8AGN/P	IO93EH	12	338
5 =	G3PHO/P	IO93EH	12	338
7 =	G4FCD	IO91JV	11	1,039
7 =	G3JMB/P	IO90TV	11	245
7 =	G8LSD/P	IO90TV	11	245
10	G8BRK/P	IO91FW	9	228
11	GOAPI/P	IO90UU	8	277
12	GOAPI	IO80XS	5	184
13	G3NWU/P	IO94MJ	4	290
14	G3JMB	IO91WA	4	48

Table 1

MICROWAVE BAND-PLANNING UPDATE

THE 2.3GHZ (13CM) BAND:

In the longer term, following WARC '92, it now seems certain that the situation will be as follows, at least in IARU Region 1:

Domestic (digital sound) broadcasting from satellite will occupy up to 2350MHz (Primary). Low power spread-spectrum LANs will occupy 2400 to 2500MHz ISM, eg Microwave Ovens, will centre around 2450MHz

All these services will, ultimately, become commonplace in domestic and office premises which means that amateur operation in urban areas may become well-nigh impossible. The first two services could be seriously disrupted by amateur transmissions - and vice-versa! The solution might be that suggested in the last column, whilst maintaining as wide a Secondary allocation as possible. This is, at the moment, speculative, but will be on the agenda for the September 1993 IARU Region 1 Conference in Belgium.

THE 3.4GHZ (9CM) BAND

Most of the nearer European 3.4GHz operators (in PA and DL) have now moved frequency from 3456MHz to 3400MHz, following restriction of the band in the Netherlands to between 3400.000MHz and 3400.200MHz. John, G4BYV, in East Anglia, sent information that at least four European beacons have moved from their old frequencies into the new sub-band, as follows: PI7SHF (JO22) 3400.020MHz; DB0KI (JO50) 3400.040MHz; DF6VB (JO31) 3400.170MHz; DB0EZ (JO31) 3400.050MHz.

If you want to work into Europe on 3.4GHz,

then you'll have to have facilities for 3400 - 3402MHz. I understand that many UK operators have already moved. There are no UK restrictions in the use of such things as *unattended* personal beacons anywhere in the band, so that this move is not as restrictive as the much-debated 24GHz move for narrowband operation in the '12mm' band (see below and the January 1993 column).

However, the position vis-a-vis Amateur (Secondary) and 'IONICA' (telephone link, also Secondary) frequencies in the UK has not yet been resolved and, as already pointed out, until it is resolved, operators are advised, interim, to retain 3456MHz facilities - or, better still, be able and prepared to work both frequencies. Now there's a challenge!

THE 24GHZ BAND

Since the last column, a check of licensing conditions has been made and it has revealed that the statement (in the *RSGB Callbook*) that 24150 to 24250MHz is Amateur Primary is a serious error. The Schedule, issued with your licence, states that part of the band to be Amateur Secondary and that unattended operation is allowed *only* in the Amateur Primary segment, 24000 to 24050MHz [Note that this has been corrected on the Band Plan in this issue - *Ed*]. It must, therefore, remain policy to recommend the Primary band segment as 'preferred', with the Secondary segment 'alternative'. Satellite operators have no choice - their only allocation is in the Primary segment!

BEGINNER'S CORNER

IN THE JANUARY *RadCom* 'Eurotek', Erwin David, G4LQI, outlined an amateur 10GHz ATV system based on two modules: a modified satellite TV LNB (SATTV Low Noise Block Converter) into a good, sensitive, multi-mode scanner tuning 300 to 500MHz (AOR 3000), as the receiver. A home-built Gunn oscillator/modulator TX, running a few mW output was used as the transmitter. The article was based on the experiences of Michel Vonlanthen, HB9AFO, operating 10GHz amateur TV (ATV) as F/HB9AFO/P from Puy-de-Dome (Central France, at 1465m or 4761ft) to FC1JSR/P, who was running no less than 20W from a TWTA on Mont Blanc (at 3842m - 11316ft!)

Although the path length was 303km, almost double the present path-length of the best UK ATV contact, this was not the most remarkable aspect as it was almost certainly a 'line-of-sight' path. What does make it remarkable, though, is the simplicity of the equipment used by F/HB9AFO/P. The Gunn oscillator transmitter was a simple open waveguide design, the modulator consisted of a variable-voltage LM309K integrated circuit and the antenna a small, 15dB gain, pyramidal horn.

If you are interested in using such simple equipment for 10GHz TV, there are designs and information available in either the British Amateur Television Club (BATC) journal *CQTV*, *ATV Compendium* or in Vol 3 of the *RSGB Microwave Handbook*. It should not be necessary to revive the simple, wideband techniques of 'yesteryear' here since these techniques are amply covered in Chapter 18, Vol 3, of the *RSGB Microwave Handbook*.

PACKET/DIGITAL RADIO

Thinking about Packet Radio? read on...

Tiny 2, MKII (Le Euro-Tiny??)

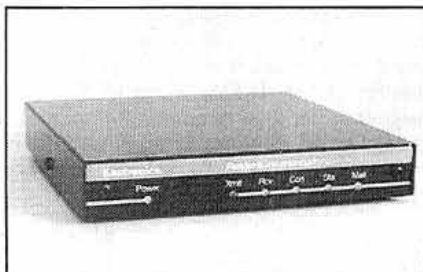
The Tiny 2 MK II is available NOW! The UK's *best selling* dedicated packet TNC now sports exciting new extras including: 64K eeprom (including the famous PacCom PMS) plus an additional rom such as DED Host mode, TheNet/NetRom or we'll even give you a second language such as French, German or Spanish etc); Current firmware now implements TAPR 1.1.8 features; 6MHz CMOS CPU with 10MHz option; low power consumption for portable operation (<40 mA); 300 to 38,400 computer baud rate, optional 9600 add-on modem. What's more we'll supply the Tiny-2 MKII complete with *free software, ready made radio cables and computer leads for YOUR setup.*

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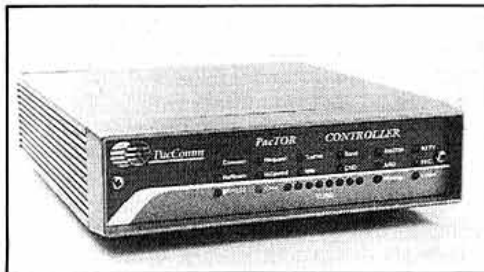
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DataComms

RICK STERRY G4BLT
1 Wavell Garth, Sandal Magna, Wakefield,
West Yorkshire WF2 6JP

IT SEEMS I WAS WRONG in January, when I expressed some doubts about the arrival of Clover-2 controllers on the market. The PCI-4000 Clover system is now available for \$995 off-the-shelf in the USA, as a PC expansion card. It is marketed by HAL Communications Corp., and requires a 286 (or above) machine. I have yet to see any user reports, so if you are running Clover please write to me or contact me on packet, (G4BLT @ GB7WRG.#19.GBR.EU).

The US price could well translate into about £900 in the UK, which is rather expensive for a one-mode controller. Also, I gather, no mention of transceiver requirements was made in the US advertisements, which seems odd. I hope to bring you more comprehensive information in the next *DataComms* column.

PACTOR HERE I COME!

I FINALLY CAME TO A decision and ordered a PacComm PACTOR/AMTOR/RTTY controller unit. The BMK-MULTY software was very tempting, but it would have meant buying a PC specially, and my shack is shambolic enough without cramming even more into it.

I've only had the unit for one day, so it's too soon to give an opinion on PACTOR itself. However, my first impression of the controller firmware is that it is rather eccentric, and the less said about the manual the better!



PACTOR ON THE AEA PK232

ALTHOUGH PACTOR IS now available as an upgrade to the Kantronics KAM multimode controller, it is not yet available for the PK232. I do not know when, or even if, AEA will release an upgrade, but there is hope in another direction.

Mike Kerry, G4BMK, is adapting and interfacing the BMK-MULTY software so that it can drive the PK232 via the external modem socket, and hence operate in PACTOR mode. This involves no soldering etc. inside the PK232, so would not void the warranty. Please direct any enquiries to Grosvenor Software.

AMTOR ON THE BBC MICRO

THE EXCELLENT RTTY and RTTY/AMTOR ROMs by Peter Harris, G3WHO, for the old Acorn BBC Micro, (known affectionately as the 'Beeb'), were very popular at one time, though I gather that the latter wasn't entirely suitable for the later Master 128. An improved Mk2 version is available for both the BBC and the Master, handling RTTY, AMTOR and CW transceive. The hardware requirements are

the same as the original ROM, and the cost is £27 for the ROM, less £10 discount if you already have the G3WHO RTTY/AMTOR ROM.

The ROMs are available from Peter Adams, G6LZB, 464 Whippendell Road, Watford, Herts WD1 7PT. Incidentally, Peter is also BARTG's membership secretary.

AMTOR ON THE ATARI ST/STE

THE BMK-MULTY SOFTWARE for AMTOR, RTTY and CW is also available for the Atari ST and STE machines, though alas it seems there are no plans for a PACTOR option. (See my later comments about the popularity of Atari machines.)

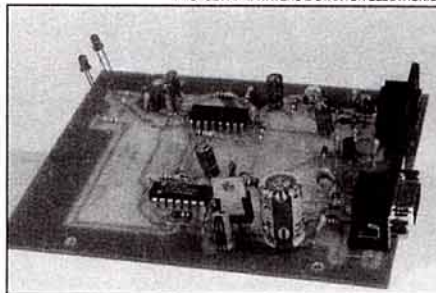
PACKET CHOICE

THERE SEEMS TO BE plenty of choice in the Packet TNC market at the moment. I reviewed the Mini-Pak TNC-less system in *RadCom* September 1992, and I notice that a similar (though physically larger) system is made by Ramsey, an American company, and is available as a kit through Waters and Stanton Electronics in Essex, and also at Maplin Electronics stores. The kit uses conventional components, (no fiddly surface-mount devices), appears to be very easy to assemble and repair, and costs around £60 including BayCom software for IBM-compatibles only.

The very popular Tiny-2 TNC now has a challenger in the form of the DRSI DPK-2, available through AMDAT in Bristol. This appears to have a virtually identical specification, but with much lower power consumption, (about 45mA at 12v), and a price of around £120. However, PacComm have just brought out the Tiny-2 Mk2 at about £140, also with low power consumption, which has the novel ability to be fitted with 2 different sets of firmware, eg 'normal' Terminal/PMS ROM plus, for example, a Hostmode or TheNet ROM.

Apart from conventional TNCs and multimode data controllers, DSP (Digital Signal Processing) units are becoming available. These use digital processing to achieve the function of the older analogue modems, but at the moment the very high prices limit them to specialist applications. (For example, the DSP-12 multimode controller, available from AMDAT, costs almost £800!) However, this will almost inevitably change in the future, so I'll be keeping an eye on them. I feel sure that we shall soon see DSP being widely used in HF receivers and transceivers.

PHOTOGRAPH: WATERS & STANTON ELECTRONICS



The Ramsey packet radio modem.

A DSP COMPUTER?

ON THE SUBJECT OF DSP, I understand that Atari have designed the Falcon 030 computer, which has a 16MHz MC68030 32-bit CPU, and incorporates the same 56001 DSP chip as the DSP-12. The machine is not readily available in the UK at the time of writing, but is apparently soon to be joined by a Falcon 040 model, with an MC68040 CPU.

Depending on how the DSP chip is interfaced to the outside world, it might open up some extremely interesting possibilities for datacomms use. Will it be possible to have a complete multimode data terminal with almost no hardware external to the computer? Atari machines have not enjoyed huge popularity in the UK until now, but perhaps the Falcon will change all that.



TPK SOFTWARE FOR FBB

IN THE NOVEMBER 1992 COLUMN, under the heading 'Making Packet Easier', I waxed lyrical about a multi-tasking application which takes all the hassle out of BBS accessing. Well, the TPK software for the PC has a similar function, as it is designed primarily to operate with a local BBS running the F6FBB software. It allows you to forward your messages to the BBS in compressed forwarding mode, improving throughput, and it has a built in text editor with auto-justify.

It compiles a list of bulletins on your local BBS, (if it runs FBB 5.14d or above), from the 'unproto' lists the BBS sends out. These beacons contain message headers which TPK uses to make a list of all the bulletins on the BBS. You do not need to log on to the BBS and type the (L)ist command any more, as TPK will have the list for you. You do not need to leave the computer on 24hrs to have an up-to-date list of bulletins, as TPK will automatically ask the BBS to list the bulletins you don't have. From this list you can select the bulletins you want, and TPK will go and fetch them from the BBS using compressed forwarding mode. It can also search for and fetch bulletins under certain specified fields, including the Sender and the Subject.

It supports a new YAPP Protocol, which allows you to download or send binary files over the air. In the event of a disconnection, transfer can restart from the point where you left off, instead of downloading the entire file from scratch. There is a Remote mode which allows other users to download files from your disc, leave a message for you, or even page you for a chat. TPK supports scripts files in its own language, allowing you to do many things. You can also program TPK so that it will execute different scripts or commands at certain times of day.

Watch out for bulletins on your local BBS for details of how to obtain this PD software. You will be amazed how relaxed and pleasant packet operation can become, once you don't have to sit in front of the screen, waiting for responses from the BBS in 'real time'. It'll work wonders for your blood pressure, and stop you grinding your teeth down to stumps!

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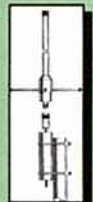
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EURISY IS THE European Association for the International Space Year, whose role is to carry out the promotion, in Europe, of activities demonstrating the importance played by space technologies in monitoring and conserving the environment, and the contribution they make to everyday life. This it does primarily by organising frequent events on these themes, many of which are concerned with educational and training aspects. Their first Forum for Europeans was held in Paris on the 4, 5 and 6 December last. It was attended by over 140 young people aged 15 to 18, from 14 countries throughout west, central and east Europe and Morocco.

A series of presentations was given by leading figures from the European Space Community, from ESA, CNES, EUMETSAT and DARA, from educational circles and specialists in remote sensing and astronomy. The Forum was sponsored by Hubert Curien, the French Minister for Research and Space and founding President of EURISY, opened by Roger Lesgards, President of the CSI, and chaired by Heinz Stoewer, Deputy Director of Space Utilization Programmes at DARA, the German Space Agency.

In parallel with the Forum, an exhibition was organised to allow the young participants to give free rein to their imagination on a selected theme: 'Earth observation by satellite for better management of our planet', and this yielded a rich crop of outstandingly interesting projects on display - some 38 in all. The usefulness of space technologies for the protection of our environment was clearly brought out by these enthusiastic young Europeans, who demonstrated their skill in deploying the powerful scientific tools that they will soon be using operationally.

Prizes were presented to the competition winners, the first going to the Piarista and Teleki Blana School of Budapest, which was a visit to the Guiana Space Centre on the occasion of an Ariane launch. It was good to see the United Kingdom was represented in the list of winners, by the Newman School in Carlisle, for their presentation on 'Remote sensing and the forestry industry in Cumbria'. Germany, Romania, Poland, France, Denmark and Norway also featured in the prize list.

RUSSIAN SPACE AGENCY AND NASA SIGN SPACE AGREEMENTS

NASA AND THE Russian Space Agency (RSA) have signed two cooperative agreements in Moscow in the areas of human space flight and Mars exploration.

NASA Administrator Daniel S Goldin said

"Signing these two agreements is the next crucial step in expanding cooperative space activities with our Russian partners. We are very anxious to begin working on these important programs".

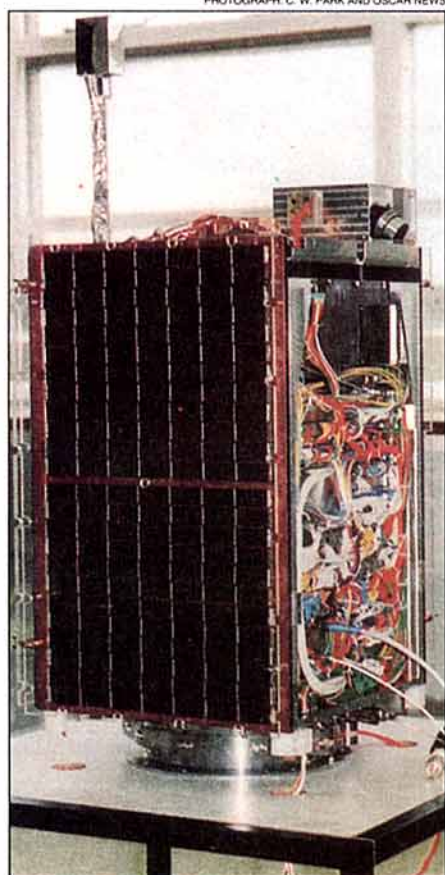
The Human Space Flight Agreement outlines the flight details of a Russian cosmonaut on the US Space Shuttle; the flight of a US astronaut on the Russian Mir Space Station and a joint mission including the rendezvous and docking of the Space Shuttle with the Mir Space Station.

These were signed by Administrator Goldin and RSA Director Yuri Koptav at the first annual US/Russian Space Policy Consultations. Ambassador Frank Wisner, Under Secretary of State, headed the US delegation and met with Ministry of Foreign Affairs officials to review the US/Russian Space relationship.

It is good to see this cooperation between NASA and RSA. The activities of RSA in the sphere of amateur radio satellites has been outstanding and the feared cancellation of such activities in the future might well have seen the end of their efforts in this direction. The importance of bringing on a well trained and space orientated supply of young entrants into space technology appears to be much appreciated by Russian education and space authorities and this recently signed cooperative agreement indicates their determination to continue this policy.

The Russian Amateur Satellites (Radio Sputniks coded 'RS') are the favourite starting point for the newcomer to amateur radio satellite communication. They have given consistently good service with strong downlink signals and have very sensitive transponders

PHOTOGRAPH: C. W. PARK AND OSCAR NEWS



KITSAT-A (OSCAR 23). Engineering model in lab at University of Surrey.

which make them easily accessible to the most modest amateur radio satellite ground stations.

The space agreements signed, include two cosmonauts to fly on the STS-60 Space Shuttle mission for launch in November next. A NASA astronaut will fly on a long-duration (more than 90 days) Mir Space Station flight, the flight's timing to coincide with a Shuttle docking flight in 1995. The astronaut will be flown on a Space Shuttle to replace the two cosmonauts on board Mir. Life science experiments involving the NASA astronaut and the two cosmonauts on board Mir will be conducted while the Shuttle and Mir are docked. The NASA astronaut and the two cosmonauts who have been on Mir will be returned in the Shuttle to the United States for continued life science experiments.

A NEW SATELLITE - RS 15

LAUNCH OF THE new satellite RS 15 is planned for early 1993 and may well be in orbit by the time you read this. Its orbit has been planned for near circular and polar with a height of 2300km, and inclination of 67 degrees. Its weight is 70Kg. It has a radio system called BRTH-11, consisting of a linear transponder and two beacons, a bulletin board with 2Mb of memory and a command/telemetry system of 64 parameters. Uplink passband is 145.857 to 145.897MHz. Downlink passband 29.357 to 29.397MHz. Beacon '1', 29.398MHz; Beacon '2' 29.398MHz. Transponder output 5 watts. Beacons between 0.4 watts and 1.2 watts. Antennas are 1/4 wave monopoles. It was built by the same team who have built the previous Russian RS satellites and is basically a clone of RS 10/11.

It is expected that its range from the UK will include North and Central America, part of South America, most of Africa, Japan and Malaysia.

'LIGHTSAT' SYSTEM 'S-80-T'

IN VIEW OF the trend in the amateur radio satellite service for smaller and consequently cheaper satellites such as the University of Surrey type and the MicroSats, it is interesting to see that this trend is being followed in the commercial field.

In the BELAMSAT's news letter No 7/92, there is a description of a small satellite design arising from a study initiated by CVES, from Aerospatiale for a 'lightsat' system called S-80-T. The system is designed to provide a low cost service for locating and communicating with mobile vehicles. The system would involve a constellation of five small satellites orbiting the Earth at an altitude of 1248km and an inclination of 57.1 degrees. Several ground stations are planned to cover the different reception areas, which will extend eventually to the entire globe.

These low cost spacecraft would be designed for a five-year lifetime, would have a launch mass of about 150kg, and would supply about 270W of electric power. They would have magnetic stabilization coupled to a momentum wheel. They would be able to spot vehicles with a precision of about 1km. The program is particularly well adapted to the growing demand for inexpensive mobile communication.

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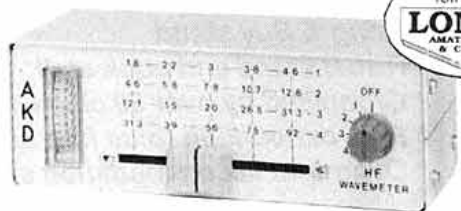
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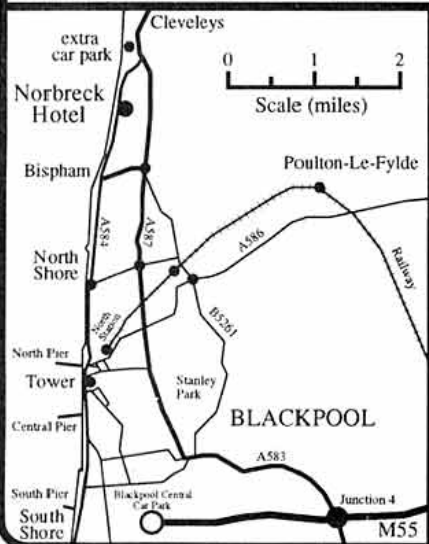
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1993		
Feb 13	London	Sandown Park, Esher, Surrey J9/10 M25
20	North West	Haydock Park Racecourse J23 M6
21	Scotland	City Hall, Candleriggs, Glasgow
27	Hemel H/stead	Dacorum Pavilion, The Marlowes
28	West	Brunel Centre, Templemeads, Bristol
March 6	Leicester	De Montfort Hall, Granville Road
7	North	Univ. Sports Centre, Calverley St., Leeds
13	North East	Seaburn Centre, Sea Road, Sunderland
20	London	Sandown Park, Esher, Surrey J9/10 M25
21	West Midlands	National Motorcycle Museum J6 M42
27	North West	Haydock Park Racecourse J23 M6
April 3	Scotland	Adam House, Chambers St., Edinburgh
4	Scotland	City Hall, Candleriggs, Glasgow
11	Brighton	Corn Exchange, Church St.
17	Nottingham	Jesse Boot Centre, University
18	West Midlands	National Motorcycle Museum J6 M42
24	London	Sandown Park, Esher, Surrey J9/10 M25
25	West	Brunel Centre, Templemeads, Bristol
May 1	North East	Northumbria Centre, Washington, Dist. 12
2	Leeds	Univ. Sports Centre, Calverley St., Leeds
8	Cardiff	Pentwyn Leisure Centre, off A48
22	London	Sandown Park, Esher, Surrey J9/10 M25
23	Hemel H/stead	Dacorum Pavilion, The Marlowes
29	Leicester	De Montfort Hall, Granville Road
30	West Midlands	National Motorcycle Museum J6 M42
June 19	London	Novotel, Hammersmith
20	West	Brunel Centre, Temple Meads, Bristol
26	North West	Haydock Park Racecourse J23 M6
27	West Midlands	National Motorcycle Museum J6 M42
July 25	West Midlands	National Motorcycle Museum J6 M42
Sept 11	West Midlands	National Motorcycle Museum J6 M42

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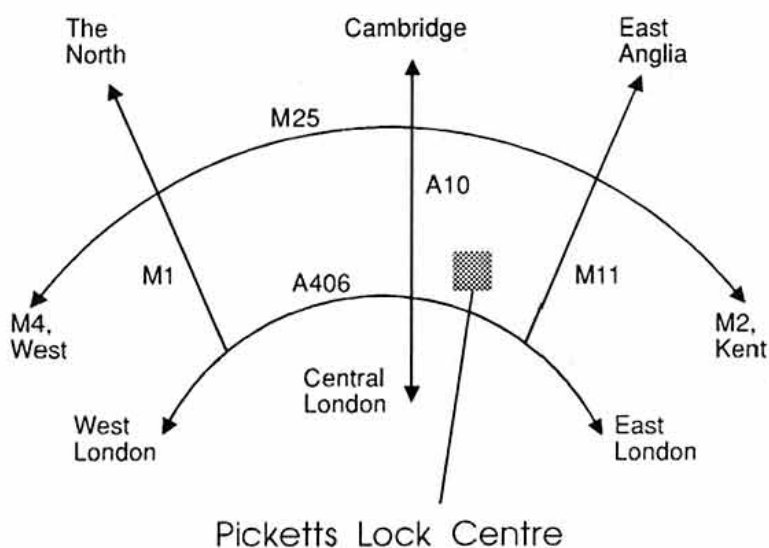
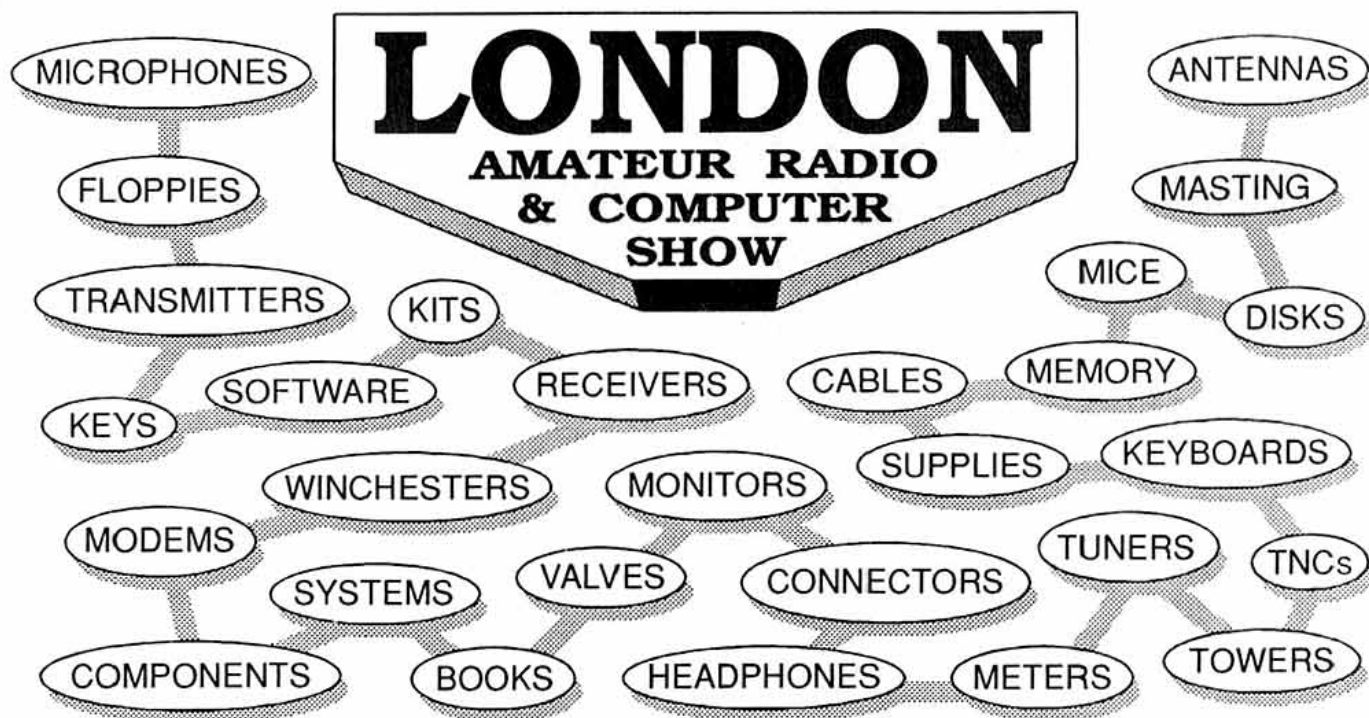
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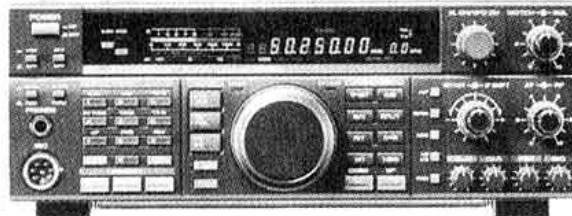


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CONTEST CLASSIFIED

All rules should be read in conjunction with the General Rules published in *Contest Classified* January 1993

HF RULES

IOTA CONTEST 1993

The Radio Society of Great Britain invites radio amateurs worldwide to participate in the first ISLANDS ON THE AIR CONTEST, July 1993.

The contest is intended to promote contacts between stations in qualifying IOTA island groups and the rest of the world, to encourage expeditions to IOTA islands, and to enhance the amateur spirit throughout the world.

1. The Term 'UK' in these rules means Mainland G, GI, GM and GW ONLY, ie IOTA reference stations EU005 and EU115.

2. When: 1200UTC Saturday 24 July to 1200UTC Sunday 25 July 1993. UK stations may only use 3.5MHz & 7MHz between 1600UTC and 0800UTC.

3. Entrants: UK entrants see General Rules, *RadCom* Jan 93

4. Bands & Mode: 3.5, 7, 14, 21 and 28MHz, EXCLUDING 3.65-3.70MHz and 14.30-14.35MHz, SSB only.

5. Sections:
(a) **UK Multiband** - UK stations only, single- or multi-operator.
(b) **UK LF** - UK stations, Single-operator, 3.5 & 7MHz only. A maximum of 8 hr operation in no more than 3 sessions. Off periods must be marked in the log.

(c) **UK HF** - UK stations, Single-operator, 14, 21 & 28MHz only. A maximum of 8 hr operation in no more than 3 sessions. Off periods must be marked in the log.

(d) **IOTA ISLANDS** Stations on an island with an IOTA reference (eg AS234). This includes GD, GJ and GU. Entrants are advised to confirm validity by reference to the IOTA directory (available from RSGB IOTA Committee).

(e) **World** (Listed by continent): Any station not in sections (a) to (d) above.

(f) **Short Wave Listener** (Listed by Continent). See Rule 10. Listings will be according to the number of entries.

6. Exchange: RS and Serial Number starting from 001, plus IOTA Island reference number if applicable.

7. Scoring: Scoring contacts are between stations in different DXCC Countries. Further, UK stations may not work each other for points. Stations in the same country (and within UK) may work each other for a new multiplier, but with QSO points of zero.

(a) **QSO POINTS:** Each contact with an IOTA Island (including UK): 15 points. Other contacts: 5 points.

(b) **MULTIPLIER:** The total number of different IOTA references contacted on each band, added together.

(c) **TOTAL SCORE:** The total of QSO points on all bands added together, multiplied by the total of multipliers on all bands added together.

8. Logs: Separate logs for each band. UK stations see General Rules re requirements; Overseas use local format. Logs must show IOTA reference sent and received, if applicable. Include list of Multipliers and alphabetical list of stations worked for each band. Entrants in UK-LF and UK-HF Sections must include a checklog of any contest QSOs made on ineligible bands. Entries to: **RSGB IOTA Contest c/o G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey, CR7 7AF, ENGLAND**, to arrive before 31.08.93. Overseas entrants should use Air Mail.

9. Penalties: Points may be deducted or entrants disqualified for violation of the rules or spirit of the Contest. This includes IOTA ISLAND stations refusing contacts with their own country. Duplicate QSOs must be clearly marked, with zero points claimed. Duplicates for which points are claimed will be penalized at ten times the claimed points. Excessive duplicates may result in disqualification.

10. SWL Contest: SWLs must log sta-

tions outside their own country (outside the UK for UK stations) except for new multipliers. Logs must show Time, Callsign of Station Heard, RS/Number/IOTA reference Sent, Callsign of Station being Worked, New Multiplier and QSO Points. Under "Callsign of Station being Worked" there must be at least TWO other QSOs before a Callsign is repeated, or ten minutes must have elapsed. If both sides of a QSO can be heard, both may be logged for points in appropriate.

11. Awards will be made, at the discretion of HFCC, to the leading stations in each section and in each continent, according to the number of entrants.

1ST SLOW CW CUMULATIVE CONTEST 1993

1. General: So many people wrote in after the last QRS CW Contest requesting more of the same that it has been decided to try an additional one in the spring. These events are intended primarily for Novices and those newly licensed or just getting their feet wet in the world of CW contesting. Experienced contesters are welcome, of course, but please remember the speed limit of 12WPM. **Slow down to the speed of the other station**, even if you recognise the callsign and know that he can copy fast CW - he may be training someone else! And please don't just sit and call CQ - go out and look for the weak ones! The band segment allocated has been widened and the length of session increased to 90 minutes, to help with easing the pressure.

2. The HF General Rules (January 1993 *RadCom*) apply unless stated below. Please read them carefully!

3. Sections:

(a) Transmitting

(b) Receiving

4. Eligible Entrants:

Section (a) Individual RSGB Members, or a team of two RSGB Members (ie one callsign is to be used, but there may be two operators if desired). Where there is a team entry, the operators must be the same for all sessions.

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 1830 to 2000GMT on:

Mon 5 April 1993

Tue 13 April 1993

Wed 21 April 1993

Thu 29 April 1993

Fri 7 May 1993

6. Frequency/Mode: CW only between 3.530MHz and 3.580MHz

7. Exchange: RST and First Name. Teams must send only one name during any particular session although different names may be used in different sessions.

8. Maximum RF Output Power: Novices: 3 Watts; Others: 10 Watts.

9. Speed Limit: 12WPM MAXIMUM, 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. All others 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: Use RSGB Log forms, or see General Rules for format. The name of the operator worked/heard should be recorded in column 5. Logs must be

postmarked no later than 24 May 1993 and sent to: **S Knowles, G3UFY, 77 Bensham Manor Road, Thornton Heath, Surrey CR7 7AF.**

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 state on your Cover Sheet whether you wish to be considered 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.

COUNTY ROUNDUP CONTEST 1993

The General Rules for RSGB HF Contests (*RadCom* Jan 93) apply.

1. When:

Section A: 0800 - 1100GMT, 15 May 1993

Section B: 0800 - 1100GMT, 16 May 1993

2. Sections: A - SSB, B - CW, single-operator only. Entrants may submit logs for either or both sections.

3. Frequencies: 3.5 and 7MHz bands only.

Section A: 3.600 - 3.775MHz and 7.050 - 7.100MHz

Section B: 3.520 - 3.560MHz and 7.010 - 7.040MHz

4. Exchange: RS(T) plus serial number commencing with 001 in each section, plus county code (see *RadCom* Jan 93).

5. Scoring:

(1) **Points:** Work anyone for 3 points per QSO. Stations may be contacted once on each band in each section (possible 4 QSOs).

(2) **Multiplier:** One for each UK COUNTY worked on each band. NB - There is no multiplier for overseas COUNTRIES.

Each section is to be scored as a separate contest.

6. Logs: Form of logs and address for entries as in General Rules.

7. Awards: Certificates to the leading three stations in each section.

HF RESULTS

21/28MHZ SSB CONTEST 1992

In contrast to 1991, conditions were below par on both bands resulting in a substantially reduced score for the leading stations. The top spot was taken by G3NLY, who won the Whitworth Trophy for the best overall score and the third place certificate for 28MHz. His two band total of 392041 compared with 615600 achieved last year. Another two regular top scorers in this event, G3NAS and G4BWP, were in second and third places, again with reduced totals. The Powditch Transmitting Trophy for the highest 28MHz score, was won by GW0ARK, who concentrated his efforts on a single-band entry, as did several other entrants, but here again his total of 95637 was well below the 385632 made by G4BWP in the 1991 contest.

Possibly due to the conditions, there were 12 fewer entries in the UK Single-operator section. However there was a small increase in the number of UK Multi Operator entries and of these Lichfield, G3WAS, was the clear leader, with GD3CSA/P (South Wirral) second and GW4CC (Swansea ARS) in third place.

In spite of comments from the Committee in the 1991 report, the UK SWL entry was again limited to the same three entrants as last year. While not wishing to lessen RS32525 (Bob's) efforts in winning the Metcalf and Powditch Receiving trophies, there seems to be no real competition for these two SWL awards and the committee will almost

certainly be making changes to the rules for the SWL section in next year's contest.

In the Overseas sections, the entry was also reduced and this was particularly noticeable in the much lower number of logs received from Japan and from the countries that originally made up the USSR. Checking, this year, was made easier as most overseas societies and contest magazines published the correct rules, so very few logs had to be rescored.

Checklogs are gratefully acknowledged from GB1OTA, G0AEV, G3WRR, GW4BLE, AM5FXS, E15DI, LZ3FN, SM4BTF, SP9RVD, UA9CQS, WA9LZK, W0IC and Y23FG.

The Committee congratulate all the award winners. G6LX

UK SINGLE-OPERATOR SECTION

Overall Pos	Call	Points	28MHz Pos	Points
1	G3NLY*	392041	3	72822
2	G3NAS*	394150	6	34443
3	G4BWP*	364150	4	62587
4	G3TBK	227124	10	11136
5	G0BIR	187872	5	38400
6	G0IVZ	162225	11	8100
7	G3FFF	135915	9	13350
8	GW0ARK*	95637	1	95637
9	G6LX*	90228	2	90228
10	G4DFR	82431	8	18147
11	G3PJT	74682	7	24633
12	G41QM	61983	13	5481
13	G5LP	54900	14	3717
14	G2QT	28779	12	6042
15	G4BUJ	27805	15	2916
16	GW4HBK	25575	20	848
17	GW4QXB	24360	16	2160
18	GM4HOF	13110	23	3
19	G3IAR	9990	19	900
20	G2BLA	8316	17	1800
21	G4FVK	4680	21	240
22	G3XNS	1710	18	1710
23	G3QF	1428	22	3
	GM3BCL*	11088	-	-

UK MULTI-OPERATOR SECTION

Pos	Club	Call	Score
1	Lichfield ARS	G3WAS	376614
2	S Wirral CG	GD3CSA/P	233160
3	Swansea ARS	GW4CC	198120
4	North West ARCC	G3PWW	183600
5	G3CAR	G3SSD	158995
6	Flight Refueler's ARS	G4FRF	149055
7	Ipswich Radio Club	G4IRC/P	149049
8	Central Lancs ARC	G0FDX	123444
9	Chipp'n'h'm & DARCG3VRE	98154	
10	North Wakefield RC	G4NOK	93600
11	Newport ARS	GW4EZW	56160
12	Submarine RC	G0NKL	35685
13	Axe Vale ARC	G8CA	30450
14	Lowestoft RC	G3JRM	27189

UK SWL SECTION

Pos	RS No	Total Score	28MHz Score
1+	32525	45360	13320
2	28198	19890	7140
3	20249	8325	456

OVERSEAS SINGLE OPERATOR SECTION

EUROPE

Pos	Call	Score
1	UT5JBZ*	41400
2	RA6YY	36240
3	LZ2HM	36199
4	9H1DE	23622
5	AM7BA	18525
6	RA3RFH	10701
7	UA3DPX	7182
8	LZ1ZX	4641
9	IK1PBR	3996
10	UV3DRH	3824
11	EA4BDS	3810
12	US1J	3627
13	IK8LFS	3570
14	RB5QRW	3480
15	RA3LDV	3157
16	SP8OON	3120
17	3A2FL	3111
18	HABEK	2800
19	OK3CRH	2232
20	SP9KEA	2208
21 =	SP5YQ	2160
	OK3YK	2160
23	OK9MA	2144
24	RB5QJ	1980
25	EA6HU	1977
26	PA0MIR	1440
27	Y55TJ	1260
28	LY2BLA	750
29	ES1DX	727
30	OK2MMR	672
31	YU7KM	600
32	SP7FQI	540
33	YU7SF	408
34	SM0DZH	396

35	UA3TAM	320
36	SP4AVG	270
37	SP8LZC	168
38	UA6GFH	163
39	UF6HG	120
40	LA3V	113
41	OG7NW	3

AFRICA

1	ZD8LI*	57018
2	ZS6KU	2301

N. AMERICA

1	N4UH*	91800
2	K2SX/1	17100
3	N9KAU	16335
4	K2FE	10437
5	W4YDD	5250
6	KNOC	4860
7	N8FU	3165
8	W2OAE	2511
9	KD4FUE	2050
10	N1BV	1320
11	KA2VAE	1242
12	N2KYP	107
13	VE7CCN	77

S. AMERICA

1	PT1Z*	29592
2	LU3OZZ	1412
3	OA4ANR	837
4	PY2DBU	270

OCEANIA

1	ZL1AAS*	2754
2	VK9CC	174

ASIA

1	4X4VF*	9360
2	JF7DZA	7068
3	JA7BEW	3999
4	ZC4IW	3150
5	JL1MWI	2800
6	JA1UWD	1782
7	JO1XOD	1380
8	JL1DRK	1311
9	JA3UBW	1254
10	JRN1VB	960
11	JA1PUK	840
12	JL1TVK	528
13	JK2VOC	480
14	JR1TLA	324
15	JH2WHS	270
16	JA1JLP	243
17	JF2WXS	81
18	DU7/JA1QSA	27

OVERSEAS MULTI-OPERATOR

Pos	Club	Call	Score
1	Ukrainian CC	RY0Q*	46431
2	RB4NYU Club	RB4VLU	12288
3	RNARI	L20AF	11110

OVERSEAS SWL SECTION

Pos	Call	Score
1	UB5-073-1610*	17010
2	Ian Peter Jordan (VE2)	13272
3	UA6-150-1367	11550
4	UB5-060-2903	3726
5	Alan Winter (VK6)	2633
6	Hans Bector (VP2)	2223
7	UA0-098-134	945
8	SP-0189-60	114
8	SP-0142-JG	48

* Trophy Winner

† Certificate Winner

* No Declaration or Summary Sheet (Claimed Score)

HF CONTESTS CALENDAR - 1992/3.

6/7 Mar	ARRL SSB (Feb 93, p15)
13/14 Mar	Commonwealth (Oct 92)
20/21 Mar	Bermuda (Mar 93, p15)
20/22 Mar	BARTG Spring RTTY (rules de G3UFY/G4SKA)
27/28 Mar	WPX SSB (Mar 93, p15)
3/4 Apr	SP-0X SSB
4 Apr	ROPOCCO-1 (Feb 93)
5 Apr	Slow CW Cumulative
13 Apr	Slow CW Cumulative
18 Apr	Low Power
21 Apr	Slow CW Cumulative
24/25 Apr	Helvetia (Mixed Mode)
29 Apr	Slow CW Cumulative
7 May	Slow CW Cumulative
15 May	County Roundup (SSB) (Feb 93)
16 May	County Roundup (CW) (Feb 93)

VHF RESULTS

VHF FIELD DAY NEWS

PLEASE NOTE THERE ARE CHANGES TO VHF FIELD DAY RULES

There are various changes to the rules this year, some of them in response to a survey sent out to all last year's entrants. Some changes have been made in the light of experience, there are also a few changes which might encourage more people to go out and enjoy themselves (who am I kidding).

1. 2.3GHz has been removed from VHF Field Day. Only 1.8% of entrants wanted it in. However 2.3GHz has been included in the fixed 1.3GHz contests as a contest in its own right.
2. Remember to submit 2 cover sheets on 70MHz, you will lose points if you don't!
3. There is a new section for low power unrestricted antennas, for those of you who enjoy structural engineering.
4. There is no shut down on 23cm, for those of you who don't need sleep! Shut down remains on 70MHz for those of more delicate disposition and age!
5. Single band entries are now allowed, to encourage those of you who cannot manage to put up multiple masts and set up multiple stations. I realise that manpower is a problem, and that not everybody has unlimited funds for contests. It is hoped that this will encourage more entries to Field Day, not less.

Things that were thought of but cast aside this time were:
6 Metre band,
Any four bands from six, this could have made a very lopsided event.
25W maximum limit on all. That would sort out the operators from the rest!
Overnight shutdown, some groups do this anyway from what I have seen!

By the way don't forget your Novice Licence holders, I reckon some of them could show you a thing or two!
No doubt my post lady will complain at the letters she has to deliver after this news item, but if you do have comments please let me or VHFCC member know. Enjoy yourselves this year, hope the weather improves over 1992, 91, etc.

Bryn Llewellyn, G4DEZ

VHF NATIONAL FIELD DAY 1993

1. Duration: 1400GMT Sat 3 July to 1400GMT Sun 4 July 1993.

2. Site Notification: Each Group intending to compete must send details of the site to be used to: VHF Contests Committee, c/o B Llewellyn, G4DEZ, 110 South Avenue, Southend-on-Sea, Essex SS2 4HU, to arrive no later than 10 June 1993. The appropriate site registration form can be obtained from G4DEZ or photocopied from the Call Book, and should contain the following information. The name and address of the person responsible for the entry, a contact telephone number, the name of the group, the callsigns to be used on each band, the section (Open, Restricted or Low power or Low power unrestricted antenna), the locator and national grid reference of the site, and sufficient access information for an inspector to locate the site (preferably a sketch map). Each group may only register one site. TWO copies of registration forms and maps/directions MUST be included in your registration.

3. Bands: Up to four separate stations may operate simultaneously on the 70, 144, 432, and 1296MHz bands. Single band entries will be accepted. The 70MHz CW section will take place in the period 1400-2200GMT, and the 70MHz SSB section will take place in the period 0600-1400GMT, with close down between 2200GMT and 0600GMT.

4. Operators: Any RSGB member or group of members operating from the British Isles (excluding Eire) may enter. Visiting foreign amateurs may also operate field day stations as long as they are members of IARU member Societies. Groups operating from the same

site may combine their scores subject to rules 3 and 5.

Affiliated RSGB societies may enter (operators MUST be members of the Affiliated Society, but not necessarily members of RSGB themselves). A signed declaration (as required in other AFS contests) that the operators are members of the affiliated society is required with the entry (not at registration). This must be signed by the club secretary or chairman if entering as an AFS society. This rule has been amended to help clubs over possible manpower problems.

RSGB members are allowed to operate in AFS groups whether or not they are actually members of that AFS group.

5. Stations: All the stations forming one entry must operate from within a circle of 1km radius centred on the operating position of any of the stations. All equipment including antennas, must be installed on site not more than 24hrs before the contest, and the site must not be used by the entrant for transmitting activities during the five days prior to the contest. Only portable accommodation can be used to house the stations. Power for all equipment must be derived from an on site generator or battery. The public mains supply must not be used.
6. Scoring: Contacts will be scored by the radial ring system. The overall score

will be determined as per general rule 10 using the final 70MHz, 144MHz, 432MHz and 1296 MHz scores.

7. Contest exchanges:

- (a) On 70MHz QTH information must be exchanged. It must be given in a different form on each mode.
- (b) On 144, 432, and 1296MHz QTH information need not be exchanged.
- (c) Contacts with stations whose callsigns appear on any of the group's cover sheets will not count for points.

8. Sections: There will be five sections: Restricted section (R):

- (i) The height of any antenna must not exceed 10 metres above ground level.
- (ii) Only one antenna per band may be used (eg. no stacked, bayed or colinear arrays or switching between two or more antennas). A slot fed Yagi or Quad antenna is permitted. Dish or Backfire antennas must not exceed 2m diameter.

Low Power Single Antenna section (LS):

- (i) The power output of any band must not exceed 25W PEP at the transmitter.
- (ii) The height of any antenna must not exceed 10 metres above ground level.
- (iii) Only one antenna per band may be used (eg no stacked, bayed or

colinear arrays or switching between two or more antennas). A slot fed Yagi or Quad antenna is permitted. Dish or Backfire antennas must not exceed 2m diameter.

Low Power Unrestricted Antenna Section (LU):

- (i) The power output of any band must not exceed 25W PEP at the transmitter.

Open section (O): as per general rules. SWL section (S): as per general rules.

9. Inspections. All stations are subject to inspection by members of the VHF Contests Committee or nominated representatives. Should the inspector be unable to locate the site due to inadequate or incorrect information, the entry will be disallowed. In the event of a last minute change it is the responsibility of the group to make suitable arrangements for the inspector to find the site. The inspector must be given immediate access to all parts of the site with the right to stay as long as desired, and the ability to return at any time during the contest.

10. Entries:

- (a) All entries must be postmarked no later than 31 July 1993.
- (b) Entries must be addressed to: VHF Contests Committee, c/o B Llewellyn, G4DEZ, 110 South Avenue, Southend-

on-Sea, Essex SS2 4HU. NO RECORDED DELIVERY or REGISTERED POST, any such entry will be disallowed. Separate cover sheet for each band, one cover sheet for 70MHz CW and one cover sheet for 70MHz SSB.

11. Awards: The Surrey Trophy will be awarded to the overall winner of the Open section, the Arthur Watts Trophy to the overall winner of the Low power section, the Tartan Trophy to the leading resident Scottish entry in the Open section, the Scottish Trophy to the leading Scottish entry in the Low power section, and certificates will be awarded to the winners and runners-up on all bands in each section, and to the leading stations in each county. The Martlesham Trophy will be presented to the winners of the Restricted Section.

12. REQUIRED DOCUMENTATION:

1. TWO (2) copies of Registration Form (REG 1 as in 1993 RSGB Call Book, or REG 2 VHFCC), completed in FULL, please quote contact telephone number.
2. Separate Cover Sheet for each band (427-86 or later). Note: 70MHz SSB and CW sections require cover sheet for each session.
3. Summary Sheet (4422). Separate entry line for each band, separate entry line for 70MHz CW & SSB sessions.
4. And of course the log sheets!

VHF RESULTS

50MHZ CW CONTEST 1992

Entries for this contest were very disappointing in spite of good Sporadic-E propagation throughout the event. The clash of dates with HF CW NFD was unintentional, and the committee did attempt to change the date earlier in the year. However the same date as HF NFD was that which was published in *RoadCom*, so we reluctantly felt we had to stay with it. Contestants felt that good conditions actually discouraged the UK stations from calling them, and also found it difficult to persuade the DX stations onto CW. Some entrants felt that they could not have valid QSOs with the DX stations who were only sending the first 4 characters of their locators, and no serial numbers. However this is not the case - the general rules state that no points will be lost if a non-competing station is unable to supply an IARU locator, or serial number, but the receiving operator must obtain enough information to calculate the claimed distance score - in this case almost certainly 25 points. Congratulations and certificates go to Darrell Moody, G0HVQ; Roger Dixon, GW4BVY/P, and the Sutton and Cheam RS, G2XP/P as winners and runners-up in their respective sections. G4PIQ

SINGLE OPERATOR FIXED SECTION

Pos	Callsign	Points	QSOs	Loc	Pwr	Ant	Best DX	km
1	G0HVQ	84	7	81UT	25	3Y	OH0BFF	1651

ALL OTHERS SECTION

Pos	Callsign	Points	QSOs	Loc	Pwr	Ant	Best DX	km
1	GW4BVY/P	320	28	81NV	8	2 x 5Y	ESSMC	2015
2	G2XP/P	63	13	91VH	10	5Y	OH0BFF	1586
3	G1KEA	28	2	92CK	25	3Y	OH0BFF	1580

70MHZ CW CONTEST 1992

By 70MHz standards, this event attracted a healthy entry in spite of the unintentional clash with HF NFD. Sporadic-E raised the noise floor for some time, but also brought some good QSOs between GM and the South of the country. Logging accuracy was patchy with several stations losing a high percentage of their points, resulting in a significant shift in positions at the top of the tables, but congratulations to GSUKV, GM4AFF and G0AEV for their perfect logs. Certified congratulations go to Chris Tran, GM3WJQ; Stewart Cooper, GM4AFF; Bill Somerville-Large, EI9FK/P, and Roger Dixon, GW4BVY/P; as the winners and runners-up in their respective sections. A certificate of merit is awarded to Stephen Reed, G0AEV for the highest single operator fixed station score with 25W or less and a single antenna. G4PIQ

SINGLE FIXED OPERATOR SECTION

Pos	Callsign	Points	QSOs	Loc	Pwr	Ant	Best DX	km
1	GM3WJQ	229	12	77WS	30	5Y	GJ3YHU	959
2	GM4AFF	150	8	87VA	40	7Y	GJ3YHU	866
3	G0AEV	100	14	81WL	10	5Y	GM3WJQ	711
4	GSUKV	100	14	82RR	75	5Y	GM3WJQ	569
5	G3TCU	71	10	91QE	50	6Y	EI9FK/P	478
6	G4FOH	64	11	83QC	25	5Y	GM3WJQ	525
7	G4OUT	54	10	92AT	10	3Y	EI9FK/P	279

ALL OTHERS SECTION

Pos	Callsign	Points	QSOs	Loc	Pwr	Ant	Best DX	km
1	EI9FK/P	173	17	82WV	100	5Y	GM4AFF	609
2	GW4BVY/P	141	18	81NV	100	2 x 7Y	GM3WJQ	658
3	G2XP/P	107	14	91VH	20	5Y	GM3WJQ	761

432MHZ CUMULATIVE CONTEST (OCT-DEC 92)

Compared to last years cumulative contest the number of entries in the single operator fixed station section was up by 50% whilst the 'All Other Stations' section showed an increase of 5 times last years entry! The day before the final session had excellent propagation conditions and many entrants thought that the contest committee should be censured for "ordering good conditions" for the wrong day. There were some requests for contests to be co-ordinated with other European contests and some complaints about the dates, intervals of the contest. Many VHF/UHF contests are already co-ordinated. However, the scheduling of contests is not an easy task with factors such as similar mode contests on HF, other RSGB activities, European

contests and national holidays all being considerations. Congratulations to R Ferguson, GD4GNH, for winning the Single Operator Fixed Station section, and to the Spalding and District ARS, G4DSP, for coming first in the All Other Stations section. Certificates also go to Peter Tribe, G8FBG, and to The Federation, G4HWA, for being runners-up in their respective sections.

Will entrants for Normalised contests please remember to enclose logs for ALL their activity not just the three highest points scoring logs, as after normalisation it is possible for lower scoring sessions to be more valuable than apparently higher scoring sessions. All entrants enjoyed the contest and are looking forward to next years event. G4OUT

Footnote: In a normalised contest suppose the band leader G9XYZ on day one has 3000 points and you score 2000 points. On day two G9XYZ does not enter and the band leader G2XXX scores 200 points, you score 180 points, on day three you score 100 points, band conditions are atrocious, G9XYZ scores 80 points, but you don't know that.

This contest is the best of two from three. Which two days would you use? Day 1 and 2, a total of 2180 points, must be in with a winner here, but no. Your best days were in fact 2 and 3. Why?

Day one - G9XYZ 3000 points normalises to 1000 as band leader, you score 2000/3000*1000 = 666 points normalised.

Day two - G2XXX 200 points normalises to 1000 as band leader, you score 180 / 200*1000 = 900 points normalised.

Day three you are band leader, you score 1000 points. G9XYZ scores 80/100*1000 = 800 points.

If you had taken days 1 and two as your best efforts you would have scored 1566, if you let the adjudicator decide which days were your best efforts you would score 1700. Easy isn't it. Leave it to the adjudicator to decide which days are your best, he is the only one who knows all the answers! G4DEZ

432MHZ CUMULATIVE CONTEST (OCT-DEC 1992)

Pos	Call	Pts	Ant	dBW	Oct 14	Oct 29	Nov 13	Nov 30	Dec 15	R/DX	Km
1	GD4GNH	3000	4X21	14	166/1000	227/938	112/612	331/1000	187/1000	G10GY	437
2	G8FBG	2535	4X33	26	0/0	242/1000	0/0	184/556	183/979	G1AGZS	503
3	G1GHA	2372	21	20	32/193	66/281	183/1000	210/634	138/738	GM0DNH	447
4	G8NEY	2309	2X21	22	96/590	170/702	169/923	225/680	128/684	DK3WO	580
5	G7AZP	1700	2X18	20	112/675	121/500	86/525	39/118	0/0	G0EHV	464
6	G10GY	1683	18	20	0/0	93/384	84/459	113/341	157/840	GD4GNH	438
7	G8RRC	1515	21	20	87/524	0/0	60/328	95/287	124/663	GD4GNH	443
8	G8ZOB	1449	19	15	81/488	0/0	65/464	75/227	83/497	GD4GNH	286
9	G4LRT	1141	26	0/0	0/0	64/350	106/320	88/471	0/0	G1AYZ	406
10	G4LDR	1131	17	20	46/277	73/302	100/546	77/233	51/283	G8XVJ	262
11	G0MYE	999	24	26	0/0	78/322	74/404	48/145	43/273	GW0MGR	210
12	GBATD	863	10	10	44/265	76/314	52/284	41/124	42/225	GD4GNH	374

ALL OTHER SECTION

1	G4DSP	3000	88	24	205/1000	232/712	151/481	273/1000	205/1000	DJ9DL	530
2	G4HWA	2398	8X21	26	172/839	0/0	202/643	250/916	0/0	E1GAS	395
3	GW0MGR/P2000	21	20	0/0	326/1000	314/1000	0/0	0/0	0/0	G0JBA	324
4	G8OHM	1301	24	25	110/537	0/0	99/315	67/245	92/449	PE1MPI	431
5	G4HRV/P108821	18	59	288	105/322	99/312	0/0	93/454	61GEY	278	

RSGB 1993 VHF/UHF Contests Calendar

- 28 Feb 70MHz Cumulative (Dec 92)
- 6/7 Mar 144/432MHz (Feb 93)
- 14 Mar 70MHz Cumulative
- 28 Mar 70MHz Fixed (Feb 93)
- 11 Apr 1st1296/2320MHz Fixed (Feb 93)
- 1/2 May 432MHz-24GHz
- 2 May 432MHz Trophy
- 15/16 May 144MHz
- 13 Jun 50MHz Trophy
- 19 Jun 432MHz FM
- 20 Jun 70MHz CW
- 30 Jun VHF/NFD
- 24 Jul 144MHz Low Power
- 25 Jul 432MHz Low Power
- 22 Aug 2nd432 MHz Fixed
- 31 Aug 144MHz CW Cumulative
- 4/5 Sep 144MHz Trophy
- 15 Sep 144MHz CW Cumulative
- 19 Sep 70MHz Trophy
- 30 Sep 144MHz CW Cumulative
- 2 Oct 1296MHz Trophy
- 2 Oct 2320MHz Trophy
- 2/3 Oct 432MHz-24GHz & IARU Contest.
- 5 Oct 1.3/2.3GHz Cumulative
- 13 Oct 432MHz Cumulative
- 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 70/144/432MHz Fixed

For details of rules for European contests, contact G4PIQ, QTHR.



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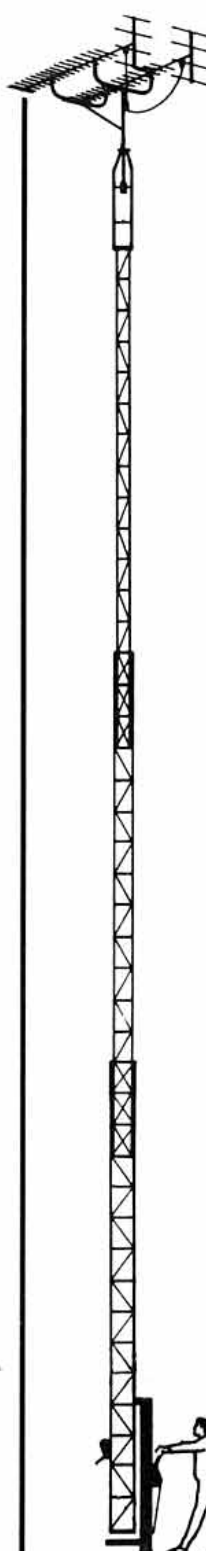
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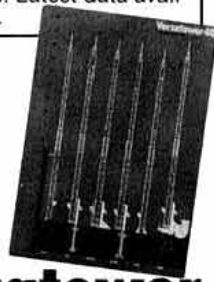
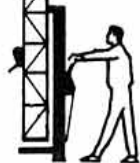
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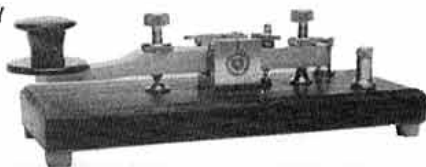
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Noise Figure	>18dB	<2dB
Image Reject.	>60dB	>70dB
Itermod. free dynamic range	>80dB	>90dB
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Noise Figure	>18dB	<1.5dB
Image Reject	>60dB	>70dB
Itermod. free dynamic range	70dB	>80dB

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AMT-2 AMTOR controller unit from ICS. Includes RTTY, ASCII and CW. Excellent condition, CW manual: £60ono. G4BLT QTHR. (Wakefield) 0924 255515.

ANALOGUE technology replay model 3, digital voice message system. Sends three separate messages up to 32 or 64 seconds 6x4x5in, cost £180, now £40. Thermo meters 0-12A, 0-350MA (2), moving coil 100-0-100UA, 0-50UA (2) 0-1MA: £20. Microwave Modules Morse keybd MM1001KB sends Morse four buffers, cost £120, now £60. 2m 4-ele beam: £20. G3JLJ QTHR. (London) 081 749 1454.

AR2002 communications receiver, 25-550 800-1300 megs, as new: £275ono. IC-4 set 20 cms hand held tcvr with two battery cases and soft case, as new, unused: £225ono. (Herne Bay) 0227 742061.

AR 3000A, latest and best scanner. Present price: £850+, as new with manual etc: £525. Reason for sale explained. G6RJQ QTHR. (Bedale) 0677 70480 20.15hrs onwards.

ATU Armcrom 9000, 3.5-30MHz, balanced, unbalanced, inputs, VGC: £60. G0LOZ QTHR. (Stourbridge) 0384 373898.

BARGAINS to clear. Original Marine Morse Key: £15. Eddystone square dial (LG300)

type: £10. Belco LCR bridge: £15. (Waterlooville) 0705 265101.

BBC Master 128, 14" monitor, disc drive: £300. G3GHS. (St Austell) 0726 843487.

CAMBRIDGE 288 with 512K RAM, 128K EPROM, PC link and extras: £150 or exchange for Butternut HF6V or CapCo Loop. (Norwich) 0603 503076.

COLLINS mechanical filter F455J08 B9A plugin type, in original packing with maker's quality control tag, offers. Belmont BC348 OK spares/restoration: £25. Eddystone EP14 panadaptor: £25. ARC44 Airborne FM tcvr, 24-51MHz: £30. ARC38 control box: £15. Will consider p/sex any/all of above for Collins R390A subchassis or defunct complete 390A for spares. Buyers collect pse. G8LIU QTHR. (Uxbridge) 0895 230006.

COMMODORE 64 computer, little used, as new: £80. BBC-C Computer, needs attention: £50. (Berwick) 0289 382464.

COMPUTER Research Machines PC2 with s/ware, Piconet serial board, parallel I/O port board, IBM emulator, mouse, mono-monitor, 1st class cond: £295ono. REVCO magnetic mount, 2m HG3F loading coil, 5/8-whip antenna, all unused: £25. Buyer collects. G3JNM QTHR. (Bolton) 0204 843999.

DIAMOND d130N super discosne antenna: £40. TET HB33 (mini beam) antenna: £50. 18" antenna with load coil on mag base: £15. Trio SMC 30 microphone: £10. Kenwood MC30S dynamic microphone: £10. Toyomuro KR-400 horizontal rotator: £75. Pama 13.8v, 3amp stabilised power supply: £15. SML SWR-25 SWR meter: £15. Pye 6 channel tcvr (inc 4 rechargeable batteries): £35. Kenwood TH-215E FM handheld tcvr (inc 2 PB-2 nicad batts and chrg): £180. Trio TS830S HF SSB tcvr: £500. (Preston) 0772 621377.

DRESSLER ARA500 active antenna, 50-550MHz complete with power supply: £25. G3HKH QTHR. (Weybridge) 0932 847112.

EDDYSTONE 990R with manual, covers 27-250MHz, good condition: £150ono. Reed teleprinter, good free to collector. Venables. (Redditch) 0527 68031.

EDDYSTONE EA12 receiver. Superb condition, to good home only! £180. No offers. (Reading) 0734 351289.

EDDYSTONE EC10, gd condx: £75. Wanted Eddystone 780, 870A. Phone Peter Lepino (Surrey) 0374 128170 anytime quoting 231292.

EDDYSTONE S640 receiver, spare valves, external S meter, handbook, circuit: £30, GWO, buyer to collect, would deliver local for OAP if required. Free Panda Cub transformers (three) and complete set of spare valves. GWOHDY. (Chepstow) 0291 629905.

FL2000B amplifier: £250. Rascal high power ATU: £110. Sharp 5600A CPM computer, 20meg h/drive. Offers! Ring G0JNZ. (Plymouth) 0752 774106.

FOR SALE: FT736R immaculate 2M 70cm 6M mic, manual, original box, little used: £1225ono. Pete G0FZE. (Coalville) 0530 839939.

FT101ZD complete with mic and manual: £350. AR88 with manual, spare valves: £70. Phone Tony evenings. (Edinburgh) 031 556 6125.

FT101ZD FM, WARC, matching SP901 speaker, manual, mint condition: £425. FT290R nicads, charger, software, manual: £225. Stuart G8OXA QTHR. (Barnsley) 0226 752632.

FT101ZD Mk3, WARC, lan, CW filter, DC converter, mic, lightly used, immac. Boxed with manual, CTS: £425ono. G4BLT QTHR. (Wakefield) 0924 255515.

FT102 tcvr with FMFC102 ATU, SP102 speaker unit, MD-1 desk mic, HI-Mound HK707 key, all in excellent condition + handbooks: £700. G0KOG QTHR. (Northampton) 0604 751928.

FT221 2M base all mode VFO: £225. TS520 80-10M tcvr: £295. TR2200 2M 6ch: £65. JR310 RX160-10: £55. AT5 160M AM TX: £20. (Ewell) 081 393 6367.

FT290 Mk 2 with mic, batts, chrg, case, strap anteauna manual: £350. 25W clip-on amplifier: £50. High gain Comet 2m/70cm mobile antenna: £20. 5-ele ZL special 2m: £10.

HB9CV 4m: £10. Lindsey G7IYH or Nick G7IYG QTHR. (Uxbridge) 0895 236397.

FT767GX, mint condition. Purchased 1992, many facilities, auto ATU, internal power supply, manuals, boxed: £1125. G3EGS. (Birmingham) 021 458 2596.

G2DAF linear bits: pair QY3-125's with bases and fls x former: £50. Alcad EP5.5 54AH plastic cased wet nicads: £15 per 5-cell tray. Motorola 80W FM base station, C64RCB in 3-foot rack: £50. Double screen, silver plated coax ?RS 388-647: 70p per metre. JJ Lloyd 12 inch chart recorder CR600: £25. Peter Mellett G3PIJ QTHR. (Nr Bath) 0225 742163.

HYGAIN vertical 12AVO S 20-15-10 metres, 13'-6": £65. MFJ antenna bridge, MFJ204B, cost £79: £35. Mizuho FX1 absorption frequency counter, cost £87: £55. Cirkil TM5375 test meter, cost £37: £20. Altai dip meter, TDM6, cost £70: £35. Mizuho FX1 absorption frequency meter: £35. Casio calculator UC365: £3.50. G3JLJ. Mr AF Sephton, 16 Bloemfontein Avenue, Shepherds Bush, London, W12 7BL. 081 749 1454.

ICOM 735 gen cov TX/RX, CW filter, VGC, remote control PC software, service manual, Kingshill 20A PSU with o/c current and o/voltage protection: £650ono. G3RFI QTHR. (Potton) 0767 260800.

ICOM 751 with frequency key pad, mint condition: £900ono. (Salisbury) 0722 780396.

ICOM AH2A, brand new HF band digitally controlled antenna tuner: £375. Diamond KB105 vertical antenna 3.5-7-14-21-28MHz. Instructions in Japanese. Endeavour translation by (up): £100ono. Only used once. G0GZS. (Mpminster) 0708 8228896.

ICOM IC245 2M multimode with MET, 6X crossed Yagi (never unwrapped) and rotator: £200. G0ICM QTHR. (Stourbridge) 0384 395462.

ICOM IC255E: £120. 10SB headset: £15. SEsmatch: £95. Wideband preamplifier: £20. 6 amp PSU: £15. Pye Westminster AM lowband: £35. (Taunton) 0823 326333.

ICOM IC725 100W tcvr, DC leads, HM12 mic, PS515 20A PSU, both boxed, mint. G3CDC QTHR. Also 3 year old detached, 3 bedroom bungalow. Details on request. (Notts) 0777 871062.

IDEAL for magnetic loop antennas, vacuum capacitors 2000pF at 3KV: £40. 1000pF: £35. 30ft three-section base mount marine whip ant: £45. QRO transfrm 2900V at 0.8A: £55. Prefer buyers collect. (Ashford, Middx) 0784 258992.

IDEAL starter rig: FT200, PSU, mic, manual, boxed, excellent, unmodified: £190. Icom AT-100 auto ATU, mint: £220. Carriage extra. (Castle Cary) 0963 24319.

KENPRO KT-44 70cm handheld with extras: £160 post paid. Diamond CP22E 5/8 stacked 2M, still bxd: £35. Buyer collects. Sandpiper 2M/70cm mobile antenna: £25 post paid. Diamond D-130 super discosne antenna: £60 post paid. TNC for Packet radio for Commodore with software: £75 post paid. (Ormskirk) 0704 892088.

KENWOOD 950SD, packing etc. As new: £1995. G3GHS QTHR. (Cornwall) 0726 843487.

KENWOOD R2000 G/C receiver, first class condition, fitted YG-455C 500Hz CW filter, manual: £365 carriage extra. Also ICS fax-1 weather map decoder, complete with all leads, manual: £250 post paid. Also advance OS12 case, going just, manual, circuit: £10. G3RDC. (NW London) 081 455 8831.

KENWOOD SM220 station monitor with panoramic adaptor: £250ono. PC computer, hard disk 640K, mono 8088 processor: £250. G3ELH QTHR. (Petersfield) 0730 264971.

KENWOOD TS1205 100W HF tcvr with CW filter: £250. VFO120 matching VFO: £40. G3ZAY QTHR. (Cambridge) 0223 424714.

KENWOOD TS430S FM board, MC60 mic, PS230 power supply and ATU230. All mint, boxed with manuals: £750. Peter 6-630pm. (Preston) 0772 38899.

KENWOOD TS790E 2M/70cm multimode: PS31 PSU, SP31 speaker, MC60A desk mic,

all VGC, boxed: £1300. G6DBX QTHR. Phone 6-9pm. (West Sussex) 0444 248767.

KENWOOD TS811E, original packing, full spec complete with manual, acc. mint condition: £725. Les G4CUT QTHR. (Chelmsford) 0245 266993.

KENWOOD: PS30, 20A, PSU: £90. DFC230 frequency counter: £45. 14AVQ 40M-10M vertical, new: £50. Wanted HF rig to renovate. (Stockport) 061 477 6702.

KW1000 HF linear, recent new valves plus two good spare valves: £420. New condition. G3FYF. (Devon) 03643 319.

KW1000 linear, good condition with manual, prefer buyer collects: £295. Call Geoff G3YLC. (Buckingham) 0280 823126.

KW2000 with PSU mic and manuals: £150. KW match SWR bridge: £15. Sony ICF2001 R x 0.15-30MHz FM/CW/SSB 88-108MHz FM bxd with manuals and optional PSU: £90. G4NMD QTHR (Herne Bay) 0227 372470.

LOWE HF225 general coverage receiver, 30kHz-30MHz with FM/AMs, excellent condition: £310. Phone Ron 6-9pm. (Kewswick) 07687 72418.

MML transverter, 2M in, 6M out, 20W output: £100. Also HF unit for FT726: £200. Both excellent condition, hardly used. (Kendal) 0539 721068.

MUSEUM/Collectors pieces. RAF AM control unit 2A, AM Tx 310 control unit, AM 120V 30MA HT mains eliminator, WAAF telephonic breast mic, CV966 osc/scope c/ray tube. Naval batt oscillator type G219. Offers. Further details G3GMM QTHR (Sandbach) 0477 37708.

NRD535 receiver, very good condition, handbook, original packing: £775. G4OTG QTHR. (Newtown Abbey) 0232 866628.

PC EPROM programming interface, card/software, ZIF sockets(6), as new: £60. Kenwood SP31 speaker (new): £45. Tokyo Hy-power HL1240U 23/24cms P.A.: £425. EME (German) SWR/PWR meter, 100MHz to 2.3GHz plus inc directional coupler etc: £200. Sony KX14CPI, Trinton 14" monitor (mint) TTL/ANAL composite: £200. Panasonic A1 video camera/PSU (mint): £90. Must clear above. Tel Paul G4XHF QTHR eves. (Crawley) 0293 515201.

RACAL RA17 MkII, new filters fitted with cabinet and handbook. The SWLs RX: £120. Buyer collects. FL3 filter: £60 plus postage. G3WYN QTHR. (Haywards Heath) 0444 412420.

RACAL RA17L 0-30MHz rcvr: £130. Spectrum +2 computer with RAMS IV ready to decode RTTY, AMTOR, SITOR, Morse up to 250wpm, SSTV: £70. B40 0-30MHz receiver AM, SSB: £50. Sideband converter for B41, B40: £30. receive converters, microwave modules 28MHz to 50MHz, 28MHz to 432MHz up to 436MHz: £25 each. (Derby) 0332 372696.

RACAL RA17L with RA98A ISB adaptor, manuals available: £180. Buyer collects. (Felixstowe) 0394 277571.

RADCOM 1977/1990 in yearly easi binders. FREE to collector. G4FLS QTHR. (Cheltenham) 0242 232574.

RETIRED RAYNET member selling off complete 5/25W base/mobile station. Dual band Kenwood TM701E, BNOS PSU, Welz S/PWR meter, duplexer, antennas: £385. Collect/carry. Ring Badge G6TPQ. (Oldham) 061 633 3895.

SANGAN gen purpose rx, 10mths old plus P/P: £70. 0no. 40MB H/D MF plus 2/360K 5.25 floppies: £60. (Bletchley) 0908 642398.

SHACK clearance of capacitors, resistance pots, vanguard control units and components. Send SAE for list. Bill G6DJE QTHR or tel. (London) 081 451 1611.

SHACK clearance rigs, antennas, bits and pieces: 50p - £75. Buyers collect. For list, SASE to G6TTL QTHR. (Herne Bay) 0227 361740.

SILENT key sale - G0BFP. TS530SP, as new: £425. ATU SPC 1KW: £50. Buyer collect. Contact G0BGG QTHR evenings. (Chippenham) 0454 218431.

SILENT key sale. Yaesu FT767GX internal PSU, AATU, 2M module, MDI desk mic, boxed and as new: £1250. G0RFE. (Heywood) 0706 621263.

SILENT KEY sale: Yaesu FT101ZD tcvr, excellent condition: £395 plus carriage. (Scotland) 0557 31557.

SOMMERKAMP FT277ZD (Yaesu FT101ZD Mk III) narrow CW filter, fan, DC/DC inverter, bxd + G5RV full size: £450. Tokyo HC-200 aerial coupler, never used: £80. Microwave modules 28-144 transverter: £80. FT290R Mk1 mutek board, soft case, helical, nicads and charger; PSU 8-ale J-beam rotator: £250. Call G1JSZ Bob. (Bath) 0225 444832.

SONY ICF200ID receiver, excellent condition, boxed: £180ono. G1BQL. (Hemel Hempstead) 0442 66878.

STRUMEC P30 telescopic tilt over mast, needs post. Rotator and bearing and DX33

antenna: £300. G4OEF. (Lincoln) 0522 544689.

TANDY PRO2021 base mobile scanner, excellent condition, 200 memories 68/512MHz with gaps but includes Airband, manual, bxd: £80. Einstein TC01 64K computer, twin drives, mono screen, 80 column card, packet RTTY CW FAX software, cables, manuals, bxd: £85. (Warrington) 0925 821414.

TEN-TEC 560 Corsair, all filters with 263VFO, immaculate, bxd, manuals: £640. Coax switch: £10. Balun: £10. R600: £190. Carriage extra. (Sheerness) 0795 873100.

TIME WASTERS not wanted. IC202E best offer above: £100. Within fortnight of advertisement appearance. Evenings only after 7.30pm. (Telford) 0952 590444.

TM411 Kenwood 70cm mobile (44front) 25W: £150; 23cm module for Kenwood TM741: £125. Data engine TNC by Kantronics, large memory: £250. G3MSW (Harpenden) 0582 715 549.

TONO 5000E sender decoder, CW/RTTY/AMTOR keyboard, terminal, built in monitor, ex cond: £300ono. G6MKCY Don. (Stranraer) 0776 853220.

TRIO R-1000 0.15-30MHz HF RX, gd condition, fitted FM board, instructions, boxed: £180. SEM QRM Eliminator, mint: £55. Howe HF active antenna, switchable gain, bxd, internal battery: £15. Maplin SSB expander unit: £10. Call G8XPZ. (Nottingham) 0602 389911.

TRIO TR9130 2M m-mode tcvr. Spectrum Comms 144 10-50W 2M pre-PWR amp. Oskerblock SWR200 SWR-PWR meter. All in excellent condition, offers? GW4RPL QTHR. (Caernarfon) 0286 675264.

TS830S, VGC: £599. G3XLL QTHR. (Diss) 0379 652043.

TS850S with ATU: £1295. SP31 speaker: £50. TCXO SO-2: £79. Amstrad PCW8512 with RS232 interface: £175. Dave G4EVS QTHR. (Guisborough) 0287 636464.

UNIDEN HR2510 28MHz rig, all mode, 25W, scanning mike: £195. 1 year RadCom (1992): £10 the lot. (Baintree) 0376 326577.

VIBROPLEX original standard bug key, bxd as new: £55. Plus carriage. G2FQG QTHR. (Maidenhead) 0628 27302.

VEGUIDE + ancillary apparatus directional couplers, circulators, variable attenuators, detectors, all in WG16 Marconi/Sperry. (Looe) 0503 72967.

WESTMINSTER W15MN Dash R1 S20 to S23, mic, spkr, toneburst: £40. Pve signal generator SG5U: £42. Westminster UHF boot RBO RB14 Tx/Rx RB2 RB4 RB11 Rx toneburst: £40. Hatfield RF bridge LC300A1 manual: £40. Einstein computer TC1: £38. G4ULR QTHR (Norwich) 0603 51656.

YAESU FRDX400 RX all filters matching, FLDX400 TX plus speaker and leads, excellent condition: £260ono. (Somerset) 0458 45179.

YAESU FRG8800 Rx plus FRT7700 ATU: £450. Hy-Gain CD45-11 Rotator with control unit: £90. Hy-Gain 10m 3-ele beam: £25. Kenwood MC55 mobile mic: £30. Antenna coax S/W: £10. SWR/PWR meter: £10. G0PJI (Plymouth) 0752 775375.

YAESU FT101ZD Mk 1 with fan and CW filter: £300. Buyer collects. GM3JQJ (Nr Falkirk) 0324 714194.

YAESU FT102, FV102DM, SP102: £570. Please telephone Reg. (Chesham) 0494 783190.

YAESU FT757GX Mk2 hand/desk mics: £625. FP757 HD PSU: £100. FC757AT: £150. FRG8800 + FRT7700 ATU: £400. Era decoder: £100. All VGC. Also AR2200 rotator: £75. SMC/KW monitorscope: £50. Pve Westminster 4M FM + PSU + beam: £50. Heathkit 052 CRO: £25. Butterut HF5B minibeam: £75. G4EHM not QTHR. (Romsey) 0794 516007.

YAESU FT77, narrow CW filter fitted, WARC bands, VGC: £375. Ray G0CGQ QTHR. (Wilmslow) 0625 529713.

WANTED

AP1086 Issue 1 (RAF Radio Stores Ref no's). Also Air Publications relating to radio, radar equipment, exc prices 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 input with output of 80/115V 1500/2000 cycles. Also R/X type R1355 10D/13032 unmodified. (London) 071 511 4786 or 071 790 2846 please phone anytime.

AUTOPLEX. All brass bug key, made by David Marshall in Glasgow. C.1932. Any condition, complete or incomplete. G3TSS QTHR. (Corbridge) 0434 633125.

AP1086 Issue 1 (RAF Stores Ref Nos), also air publications relating to radio, radar equipment, exc prices offered. Would purchase post-war to current magnetrons, klystrons, T/R cells, TWTs, photo-multipliers, microwave and special CV types. Required static or rotary inverter AC or DC input with output of 80/115V 1500/2000 cycles. Also R/X type R1355 10D/13032 unmodified. (London) 071 511 4786 or 071 790 2846.

HEATHKIT manuals for SB101 and SB610. Borrow for copying or purchase. GM0LVI QTHR. (Errol) 0821 642321.

"**RADIO** transmitters" by V.O. Stokes, published mid sixties? Good price paid for clean copy. Lee S79PDL. Box 448, Seychelles.

4 PIN 1.25" diam plug in coil formers and holders. 40mr band 10XJ crystals and holders. G3BPE. (Westbury) 0373 826939.

8C28 software for Kenwood TH77E. G0DIC Dick Fixter, 18 Linley Drive, Boston, Lincs, PE21 7EJ. All letters answered, tel: 0205 360044.

ANY HF mobile radio and aerial, prefer Icom 735 or TS450-440, FT777 707. G0JJJ. Steve. Cash Waiting. (Walsall) 0922 712708.

AR88 D or LF, working or not, Phone Nick, 24hr answerphone. (London) 081 852 4065.

AUTOMATIC Kenwood AT940 internal unit, MC60A mic, service manual TS780, or copy, 3amp 240v variac. Frank. (Dartford) 0322 663965.

AVO meter, model 8 circuit diagram and manual. GM3MAS QTHR. (Glasgow) 041 956 4897.

COLLINS 30L1, KWM380, 180U-2, mikes WHY? G4KDV QTHR. (Otley) 0943 463083.

COLLINS ATU motorised C. QRO amp bits. WHY? HF6V, good cond. Please write: Mr Bucknell, 7 Cavendish Drive, Clowne, Chesterfield, Derbys.

COLLINS KWM1 KWS1 51S1-3 30S1 312B5 DL1 4A-45A 32B-G 32RA TCS-TX 51J1-3 75A1-2 R390 310B-C 618T DX Engineering Processor Collins CW filters. Any Collins eqpt considered. Any Collins info, ie handbooks mans adv lit technical articles history Shure 444 G3ZIG QTHR (Dereham) 0362 88430.

DETAILS of Plessey SL917 and SL91B and circuit changes necessary to substitute latter for former (TV colour decoders). G3JKY QTHR (Lewisham) 081 318 6691.

DRAKE MN2700 in full working order. G4KME QTHR. (Stoke on Trent) 0782 503444.

DRAKE remote VFO RV-7 model 1338 and spkr MS-7 model 1531. G3GMY QTHR (Barnet) 081 449 7203.

DRAKE RR3 Rx, any cond, working or not. Drake 1792 Receiver filters. External in/out board ST82765. Rx adaptor MA1103A. Watkins Johnson VLF Rx 340A-7. Drake electronic keyer CW75. Rascal standard type 9442. Looking for any Rascal 1792 related bits. G3YFK (Shrewsbury) 0743 884858.

EDDYSTONE receiver 940 EA12 680X or WHY? G3PKJ QTHR. (Manchester) 061 654 6160.

EDDYSTONE receiver EC10. Preferably Mk II, any condition considered. G4IYL. (Chorely) 0257 273976.

ELECTROSTATIC voltmeter, must measure to 7.5kv minimum, also products from firm 'SSB products' ie Sphinx and canonball tx's; and anything else kw vespa, per laser meter. Manual for HF linear, NEC CQ301 for or photocopy. Philco peoples set model 444. Quad 22 valve amplifiers. (Midlothian) 0875 33291.

FDK 750E for spares - repair. G2HHV QTHR. (Batley) 0924 470667.

GREEN painted estrone LF/C MP/T, white cased Lissen inter valve and small domestic Parmeko transformer. Bernard Litherland G4IMT QTHR. (Chippenham) 0225 891254.

HEATHKIT remote VFO SB644 wanted to use with SB104 tcvr, also interested in ant SB104 accessories. G3WXB. (Eastbourne) 0323 720059.

HEATHKIT remote VFO SB644 wanted to use with SB104 tcvr. Also interested in buying any SB104 line accessories. Ken G3WXB. (Eastbourne) 0323 720059 or fax 0323 738788.

HYGAIN 15 meter trap, part no: 878417 for 12AVQ (384) vertical ant, in gd cond. Cliff G2AQN QTHR. (Scarborough) 0723 582493.

IF transformer (465KHz) for Eddystone transistor receiver, model EC 10 MkII. (Onchan, IOM) 0624 629455.

ICOM AT500 ATU, 2M multimode TX/RX, built in PSU + 25W output. (Swansea) 0792 467363.

ICOM BC-20 or BC-15 ni-cad chrgs. IC-20D VHF amp. IC-30L UHF amp IC-PS3 PSU. Accessories for IC202 and IC402 SSB Tx/Rx. Note - will the amatour in Wilmington with

SM2 ring again. Sorry lost your address. Richard Perzyna G8ITB (Bromley) 0689 852177.

INFO on telequipment 551E cscope, manual, circuits, borrow or purchase. Postage paid. John G4CVA QTHR. (Southwell) 0636 813767.

LINEAR amplifier TL922 or similar. (Stratford upon Avon) 0789 268503.

MANUAL and any other info on wartime. Philips receiver PCR. Also any Eddystone receivers, wanted 870A, EC10, EB35. (Surrey) 0374 128170.

McELROY Bug key, 1.4MHz crystal. G2HAX QTHR. (Reading) 0734 410235.

MOBILE HF rig FT747GX, FT757GX or similar. Must be good cond and sensibly priced. Tel eves only. (Guisborough) 0287 652822.

NATIONAL USA FBX-A Rx plug-in coils, or blank coil forms. HRO power supply with 2.5V heaters. GM2FVV QTHR (Stirling) 0786 811237.

NEWISH North West HF contest group, some success, seeks new operators. Details from G0IEQ QTHR. (Wirral) 051 356 2559.

RACAL 9081 signal gen, service manual or circuit diagrams. Also Kenwood TM221E operating info. G8PYC. (Oxon) 0844 215857.

RADIO constructor - June 1968 article, circuit diagram or info on top band CW/AM rig. All costs paid. G0NID QTHR. (Manchester) 061 998 2921.

ROTATOR G400 or G600. Would consider G5400 AZ/EL if reasonable price. Also dipole of light, high power version 3.67 or 7/14/21/28. G0KTN QTHR. (Melksham) 0225 703726.

SCAM40, complete kit, good working order, Southern England or Midlands. (London) 081 458 2616.

TENTEC Argosy 2, no mods, must be mint. G3YJU QTHR. (Aylesbury) 0296 87983.

TH6 or TH7 yag wanted please - any age or condition considered if complete - also base for 4CX1000A, GM3WOJ QTHR. (Invergoron) 0862 842762.

THERMISTOR heads, Hewlett Packard types X486A, K486A, R486A. In good working condition. GW4JJW QTHR. (Cardiff) 0222 752189.

TOWER crank up, tilt over 40t-60t, preferably South of England to Midlands. Reasonable price. Call G41SK not QTHR. (Alton) 0420 563944.

TRIO 2M tcvr TR 7930, complete, good cond essential. Please ring G40LC anytime. (Stakeford) 0670 855953.

WANTED SP930 and SM220, also transmitter low pass filter. All above for use with Trio TS930S. Lynn G4GJP. (Wirksworth) 0629 823934.

WANTED: A pair of high impedance headphones. G4EBX QTHR. (Derbys) 0773 812766.

WANTED: Clansman VRC321 and VRC353 transceivers. Also want info on Systron Donner model G246A frequency counter. Andy G3JAC QTHR. (Sanderstead) 081 651 2727.

WANTED: FT401 or FT560, working or not, but in good condition. Will collect. G3RUO. (Leicester) 0533 784070.

WANTED: Heathkit HW16 TX/RX. Working or non-working. Details and price to: Mr Marris, 35 Kingswood House, Farnham Road, Slough, Berks, SL2 1DA.

WANTED: Manual for Solartron oscilloscope, model CD1014-3 (must be version 3) Buy, borrow copy and return. G3APV QTHR. (Seascale) 09467 28449.

WANTED: one Hilomast 'pneumatic telescopic' with side mounting brackets, possible NK Module, must be in GWO. Reg. (Leicester) 889903.

WANTED: Round Ecco or other vintage domestic radios in any condition by private collector. G1CEN. (Ealing) 081 993 4946.

WAYNE Kerr capacitance conductance bridge, type B201, require technical and instruction manuals for purchase or loan. Postage expenses paid. Bernie G3VML, 38 Hayley Bell Gardens, Bishops Cleeve, Herts, CM23 3HB, tel: 0279 656391.

YAESU FP200 PSU for FT200 tcvr, working or not. Tony G0BRQ QTHR (Poole) 0202 699834.

EXCHANGE

AEA PK232, bxd with s/ware on Packet AMTOR RTTY Fax CW little used for good dual-band hand-held. G4VIV (Upminster) 0708 445199.

FT707 with mobile bracket, CW filter and 160M. Exchange for PC, cash adjustment if required or will sell for: £325. (Edinburgh) 0875 22718.

ICOM 290H 144MHz all mode tcvr, excellent condition. Exchange for tilt over mast, 45ft or above. (Prestatyn) 0745 854591.

CLUB NEWS

DEADLINE - Items for inclusion in the May 1993 issue must be sent to HQ marked "Club News - DIARY", to be received by 19 March latest. If news is received after 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

RSGB CITY OF BRISTOL GROUP - 29, radio servicing by Castle Electronics. Details 0272 672124.

SOUTH BRISTOL ARC - 3, talk 'Resuscitation and First Aid'; 17, talk on Amateur Wine Making; 24, members' quiz evening; 31, voice your opinion/grouses on the Club, with Jean, G0AWX; Apr 7, talk 'Training for a Private Pilot's Licence'. Details 0275 832222 on a Wednesday evening.

BEDFORDSHIRE

BEDFORD & DARC - 'CHANGE OF SECRETARY' Gavin Carmichael, 8B The Close, Bedford MK41 6DP, tel: 0234 365660.

SHEFFORD & DARS - 11, talk 'Recovery of the Olympus Satellite'; 25, junk sale; Apr 8, talk by Nick, G4TXG. Details 0462 700618.

BERKSHIRE

BURNHAM BEECHES RC - 1, Annual General Meeting, video, wine & nibbles; Apr 5, DF Foxhunt, G7HID Fox. Details 0628 25720.

NEWBURY & DARS - 24, talk 'Operating from Afar'. Details 0635 63310.

READING & DARC - 11, club quiz w Maidenhead Club; 20, assist with 3 towers hike; 25, Spring junk sale; Apr 8, talk 'WW2 Radio Equipment, Part 2' by Russell Rixon, G8ORE and Charles Bouville. Details 0734 262949.

BUCKINGHAMSHIRE

AYLESBURY VALE RS - 3, RSGB video evening; 17, Annual General Meeting; Apr 7, talk 'Cellular Telephones' by R Billcliffe, G2BSJ. Details 044 292 6651.

CHESHAM & DARS - 10, talk 'Rig Testing' by Mike, G0KZP; 17, Club CW tutor; 24, CW practice and discussion; 31, construction contest; Apr 14, construction evening - Club CW tutor. Details from Ian M Clarke, G0RTF, tel: 0494 676391.

CAMBRIDGESHIRE

CAMBRIDGE & DARC - 5, talk 'Gliding' by Chris, G3RSE; 19, constructors' and collectors' evening; 26, Annual General Meeting. Details 0763 243570. (daytime).

CHESHIRE

CHESTER & DARS - 2, radio ideas and discussion; 9, talk 'Superheterodynes' by G3SES; 16, talk 'No Radio Without Water' by G6IFA; 23, talk 'Linear Amplifiers' by G4LMF; 30, President's night. Details 0244 336639.

MID-CHESHIRE ARS - 10, talk 'CW' by Dave, G4XUV; 24, presentation 'Packet Radio' by Colin Chadburn; 31, talk by The International Short-Wave League; Apr 7, April Fool lecture by Han, G4XFD. Details from M Baguley, G7LQD, QTHR.

STOCKPORT RS - talk 'Amateur TV' by Robin Dexter, G0ITP; 24, surplus equipment sale. Details 061 439 4952.

CLWYD

CONWAY VALLEY RC - 4, talk 'Repeater Linking Update' by Brian Davies, GW4KAZ; Apr 1, talk 'Receiver Front Ends' by Stuart Rolfe, GW0ET. Details 0492 530725.

WREXHAM ARS - 2, talk; 16, Annual General Meeting; Apr 6, talk 'Test Equipment'. Details 0978 845858.

CO DOWN

BANGOR & DARS - 5, talk 'Medical Electronics' by Jim Brown, G14BXB. Details 0247 460251.

CORNWALL

CORNISH RC - 4, talk 'Power Supplies' by Bert, G3VWK; Apr 1, AGM. Details 0209 820836.

DERBYSHIRE

BOLSOVER ARS - 10, quiz night. Details from G0RXT, 0246 822856.

BUXTON RA - 9, Fox Hunts explained; Apr 13, quiz night plus live Morse. Details 0298 25506.

DERBY & DARS - 3, junk sale; 10, illustrated talk 'The Robin Hood & Ivanhoe Line Schemes' by Stuart Smith of Regional Railways; 24, Annual General Meeting; 31, illustrated talk 'Around the World in 43 Days' by Henry Balen, G4MHB; Apr 7, junk sale. Details 0773 852475.

DEVON

APPLEDORE & DARC - 15, Annual General Meeting followed by RSGB video 'Expedition to

Heard Island 1992'. Details 0237 477301.

TORBAY ARS - 19, talk and film by member of The RNLI. Details 0803 526762.

DORSET

DORSET POLICE ARS - club meets first Thursday each month, at 7.30pm in the Police HQ, Wimborne. Membership open to serving and retired Police officers, Special Constables, civilian employees and their immediate families. Details from Richard Newton, 443 Ringwood Road, Ferndown, Dorset BH22 9AF, tel: 0202 229351.

SOUTH DORSET RS - 2, bring, buy and barter; Apr 6, AGM and presentation of trophies. Details 0305 773860.

EAST SUSSEX

HASTINGS EARC - 21, junk sale. Details 0424 830454.

ESSEX

BRAINTREE & DARS - 15, members' memorabilia. Details 0376 327431.

CHELMSFORD ARS - 2, talk 'Radar II' by Stan Woods; Apr 6, talk on the Essex Water Company's system. Details 0245 260831.

LOUGHTON & DARS - 5, talk 'Decoding HF Data, including CW and RTTY' by John Ray, G8DZH; 19, talk 'Direction Finding on 2m' by Alf Pedley, G0LWF; Apr 2, AGM. Details 081 500 2811.

FIFE

DUNFERMLINE RS - 11, talk 'The Novice Licence' by Ken Horn, GM3YBQ (Queen's Hotel, Inverkeithing); Apr 1, talk 'Hardware or Software' by John, GM4ANB. Details 031 331 4340.

GRAMPIAN

ABERDEEN ARS - 5, junk sale; 12, talk 'PC Public Domain Software Giveaway' by Graham, GM8FFX; 19, talk 'Concrete in Amateur Radio' by Brendon, GM0CQV; 26, beetle drive and family evening; Apr 2, junk sale. Details 0224 706619.

GREATER LONDON

ACTON, BRENTFORD & CHISWICK RC - 16, Low Power Field Day; Details 081 749 9972.

CLIFTON ARS - 5, film evening; 19, talk 'Lecher Lines' by G0PPO; 26, quiz evening; Apr 2, packet evening. Details 081 859 7630.

COULSDON ATS - 8, talk 'Cable Television' by Bob Knight, G3DPW. Details 081 684 0610.

EDGWARE & DARS - 11, bring and show evening - talk about your other hobbies; 25, Morse training. Details 081 953 2164.

HAVERING & DARC - 10, club debate 'The Case for Morse'; 24, video night 'The Russian Space Programme' with Peter Clegg, G3TTB; Apr 14, talk by Steve Fairweather, G6BEL. Details 0708 445135.

KINGSTON & DARS - 17, talk 'I followed Rommel' by Joan Nicholis. Details 081 398 1128.

RS OF HARROW - 19, Annual General Meeting. Details 0895 632377.

SOUTHGATE ARC - 11, Rig Check evening by Donald, G4DFB; 25, visit to Kings College, London for lecture on 'Cartography' Apr 8, surplus equipment sale. Details 081 360 2453.

SURREY RCC - 1, surplus sale; Apr 5, AGM. Details 081 660 7517.

SUTTON & CHEAM RS - 6, Annual dinner at Sutton United Football Club; 18, talk 'Cable Television' (provisional). Details 081 644 9945.

WIMBLEDON & DARS - 12, SWR measurements; 26, talk 'Secret Listeners' by Brian Cannon, G8DIU. Details 081 397 0427.

GREATER MANCHESTER

ECCLES & DARS - 2, talk 'PDP-11 Assembly Language' by G8KRG; Apr 6, discussion 'HF NFD Contest'. Details 061-773 7899.

SOUTH MANCHESTER RC - 5, DF preparation; 12, talk 'Tracking in ZL' by G3SHW; 19, surplus equipment sale; 26, talk 'Introduction to Packet Radio' by M Mansfield. Details 061 969 1964.

TRAFFORD ARC - 25, talk 'ORP Construction' by Rev G Dobbs. Details 061 748 9804.

GWYNEDD

DRAGON ARC - 1, St David's Day 'Radio' Eisteddfod - look out for the list of competitive events; 15, amateur radio video show; Apr 5, talk 'Using Camcorder' by Trevor, GW0PZS and Dewi, GW0ABL. Details 0248 600963.

MEIRION ARS - 4, homebrew competition. Details 0341 422 447.

HAMPSHIRE

BASINGSTOKE ARC - 1, talk 'ORP Radio' by Steve, G0JSR and Dawson, G3AHS; 28, 2m Direction Finding Competition - OS185 - Fox Dave, G3ZOI; Apr 5, talk 'Magnetic Loop Antennas' by Len, G3MAO. Details 0256 25517.

HORNDEN & DARC - 4, talk 'Control and Communications/First Action First Aid' by Hampshire Ambulance Service; Apr 1, talk 'F-layer Propagation' by Dr Geoff Grayer, G3NAQ. Details 0705 472846.

ITCHEN VALLEY ARC - 13, Annual General Meeting; 27, surplus equipment/junk sale. Details 0703 736784.

SONY BROADCAST ARTG - 29, talk 'Digital Audio Recording', Details from Stephen Harding, G4JGS, 0256 483454 (W).

HEREFORD AND WORCESTER

BROMSGROVE & DARC - 12, Annual General Meeting. Details 0562 710010.

BROMSGROVE ARS - 9, talk by Herb Asmusen, G0ZTSM, on his travels around the world; 23, noise bridge (construction); Apr 13, aerial construction (2m). Details 0527 546075.

HEREFORD ARS - 5, talk 'Magnetic Loop Antennas' by Bert Mills, GW3LJP; 19, illustrated talk 'The Big Boys of the Union Pacific Railway' by Alan Willis, G4JSN; Apr 2, talk by Rick Logan, G4WXF. Details from Erol G Robinson, 29 Folly Lane, Hereford HR1 1LX.

HERTFORDSHIRE

CHESHUNT & DARC - 3, members' forum; 10, quiz night hosted by Alvin, G1VXD; 24, Chairman's lecture; Apr 14, members' forum. Details 0992 464795.

DACORUM AR&TS - 16, talk 'Aerials'. Details 0442 259620.

HODDESDON RC - 18, talk 'Operating in Sri Lanka' by Doug, G0LUH. Details 081-804 5643.

VERULAM ARC - 23, talk 'Good Radio House-keeping' by Robin Page-Jones, G3JWI. Details 0923 262180.

WELWYN-HATFIELD ARC - 1, talk 'Contesting'; 15, talk 'Constructing a VHF Antenna'; Apr 5, talk 'Computers and the Radio Amateur'. Details 0920 462241.

HUMBERSIDE

BRIDLINGTON & DARS - 4, talk 'DX on 80' by Vic, G4BYG; 18, talk 'The Bombing of Bridlington' by Mr J Langton; Apr 1, talk 'Emergency Services' by Mike Norrie. Details 0262 673635.

GOOLE R&ES - 12, contest planning; 19, talk 'European Radio' by G0GLZ; 26, social evening; 9, Repeater Group report. Details 0405 769130.

GRIMSBY ARS - 4, visit to West Burton Power Station; 18, Spring junk sale; 25, packet evening; Apr 1, talk 'The White Rose Repeater' by J Hey, G3TDZ. Details Grimsby 825899.

NORTH FERRIBY ARS - 12, talk 'Packet Update' by Chris, G6KIA; 26, talk 'Latest Equipment' by Peter Rodmell Electronics; Apr 16, RSGB matters and talk 'My Importing and Exporting Business Experiences' by Norman, G4NJP. Details 0482 650410.

ISLE OF MAN

ISLE OF MAN ARS 'NEW VENUE' The Royal Navy Ass, Regent Street, Douglas. Club meets every Monday 8.30pm. Details from Mrs J Wrigley, GD7DPG.

KENT

BREDHURST RT&S - 4, illustrated talk 'OSCAR Satellites' by R W L Limebear, G3RWL. Details 0634 271548.

DARENTH VALLEY RS - 10, crystal set construction contest; 24, visit to Vintage Wireless Museum; 31, Annual General Meeting; Apr 14, introduction to the use of computers in Amateur Radio. Details 0474 703322.

MAIDSTONE YMCA ARS - 12, talk 'Buying Second-hand Cars' by Tim, G0EIH; 26, talk '2m Propagation' by Brian, G7LJL. Details 0622 670936.

MEDWAY AR&TS - has changed its day of meeting, its QTH and publicity officer. Club now meets at The Community Hall, Calkin Close, Tunbury Avenue, Walderslade, Chatham, Kent every Friday from 7.30pm to 11pm. Old and new members always welcome. Further information from George Packham, G7CEL on 0634 685585.

SOUTH EAST KENT (YMCA) ARC - 3, NOAA evening; 10, South Foreland Lighthouse Operators' meeting and discussion; 24, video TV from the Goodwin Sands; Apr 14, RSGB video 'Amateur Satellites'. Details 0304 372656.

WEST KENT ARS - 19, talk 'The History of Amateur Communications for the Kenya Safari Rally' by Mike Pavely, G3GWD. Details 0892 664960.

LANCASHIRE

BURY RS - For enquiries contact G3HIL, tel: 0204 883212.

MORECAMBE BAY ARS - 'NEW SECRETARY' Mr B A Watson, G0RDH, 7 Branksome Drive, Morecambe LA4 5UJ.

THORNTON CLEVELLEYS ARS - 8, video 'Japanese Morse'; 15, preparation for the Norbreck Rally; 22, talk 'Constructing from Kits'; 29, auction. Details from G4BFH, QTHR.

LEICESTERSHIRE

LEICESTER RS - 1, quarterly progress, open meeting; 15, talk 'My Life in the Fire Service' by Nick, G4CPY; Apr 5, constructors' competition.

LOUGHBOROUGH & DARC - 2, DF equipment; 9, visit by Jandek; 23, talk 'Using a Camera' by Val Williams; 30, visit to Leicester Communications Cable TV. Details Loughborough 218259.

LINCOLNSHIRE

GRANTHAM RC - Mar 2, talk 'Fire Prevention in the Shack'. Details 0476 65743.

SPALDING ARS - 'NEW SECRETARY' D Hoult, G400, Chesplot House, Gosberton Risegate, Spalding, Lincs PE11, 4EU, tel: 0775 750382. 12, talk 'Hospital Radio' by G6ADG.

MERSEYSIDE

HERSKETH ARC - 2, bring & buy. Details 0704 63344.

LIVERPOOL & DARS - 2, quiz; 16, Norbreck Rally preparations; 30, surplus sale. Details from Ian, G4WVX, QTHR.

NORFOLK

NORFOLK ARC - 3, talk 'History of Television in Pictures' by Mike Lemin, G4UUB; 10, talk 'Practical Oscilloscope Part 1 - Audio' by Arnold, G3PTB; 17, talk 'Weather Charts' by Jim, G3YLA; 24, talk 'Practical Oscilloscope Part 2 - RF' by Mike, G4EOL; 28, surplus equipment auction/bring & buy (doors open 10am); Apr 7, AGM; 14, talk 'Pre-Historic Elephant of West Runton' by Dr Tony Stewart. Details from G0KPW 0603618810.

YARMOUTH RC - 11, talk 'Construction of Mains Filters' by G8VPE; 14, visit to London Radio Show by minibus; 25, club quiz night and team selection; Apr 1, inter club quiz at Lowestoft; 8, talk 'Propagation and Satellite Update' by G3IOR. Details Yarmouth 721173.

NORTHAMPTONSHIRE

KETTERING ARS - 23, talk 'Kettering in World War Two' by Mr AH Buksh. Details 0536 514544.

NOTTINGHAMSHIRE

ARC OF NOTTINGHAM - 4, forum/foxhunt forum; 11, talk 'Around the World in 43 Days' by G4MHB; 18, construction exhibition/competition; 25, talk 'Top Band/MW Propagation' by Richard, G3VGV; Apr 1, construction; 8, AGM. Details 0602 232604.

MANSFIELD ARS - 4, talk 'The British Repeater Network' by G8SSL. Details from GONZA, 0623 755288.

NOTTINGHAM RAYNET ARS - 17, talk 'Emergencies don't just happen - they are planned' by Mr Bob Powell. Details from John Foster, G1HTL, 0602 260391.

SOUTH NOTTS ARC - 5, open forum; 12, construction evening; 19, talk 'VHF Linear and PSU Design' by Martin, G6ABU. Details 0602 211069.

SHROPSHIRE

TELFORD & DARS - 10, construction competition; 17, talk 'The RSGB' by Clive, GW4YKL; 24, pre-AGM meeting; 31, Annual General Meeting and presentations. Details 0746 761203.

SOMERSET

YEOVIL ARC - 4, club project 20/80 tcvr final testing, with G3PCJ; 18, club project - any problems? Details 0258 73845.

SOUTH GLAMORGAN

CARDIFF RSGBG - 8, 'Whither Goest The Cardiff RSGB Group?' - a serious discussion on the future direction of the Group. Details 0446 773212.

SOUTH YORKSHIRE

BARNLEY & DARC - 8, talk (provisional); 15, junk sale; 22, Annual General Meeting - starts at 8pm prompt. Details 0226 203448 between 6-7pm Mondays, 6-8pm other days.

STAFFORDSHIRE

CANNOCK CHASE ARS - 'NEW SECRETARY & NEW VENUE' E A Matthews, G3FZW, 2 The Parchments, Lichfield, Staffs WS13 7NA, tel: 0543 262495. Club meets at Littleton Mid-Cannock Miners' Welfare Club, Avon Road, Cannock. Meetings weekly on Thursdays at 8.30pm. 4, talk and demonstration by Castle Electronics. Details from the Secretary.

STRATHCLYDE

WEST OF SCOTLAND ARS - 13, debate 'Has CW had its Day?'; 26, talk 'DFing with a Difference - The Ordinance Survey'; Apr 9, talk 'Making the Best Use of Test Equipment' by GM3AXX, GM4COX and others. Details 0698 350926.

SUFFOLK

BURY ST EDMUNDS ARS - 'NEW SECRETARY' Mrs Frankie Dorrell, G6TJH, tel: 0284 728418.

FELIXSTOWE & DARS - 1, radio related video evening; 13, minibus to Pickett's Lock Rally, pick-up at Orwell Park School 8.30am; 29, Annual General Meeting. Details 0394 273507.

IPSWICH RC - 10, construction contest; 31, visit to BBC Radio Suffolk - names to secretary in advance please; Apr 14, AGM of South Anglia Repeater Gp, Emergency Control Centre, Civic Drive, Ipswich. Details 0473 742072.

LOWESTOFT DISTRICT & PYE ARC - 4, talk/demo by Jim Bacon (provisional); 18, home brew contest and demonstration; Apr 1, inter-club quiz v G1 Yarmouth - a fun evening! Details Lowestoft 546325.

MARTLESHAM RS - 28, VHF Round Table at BT Laboratories. Comprehensive measurements and testing facilities. Technical workshops and talks. Refreshments and parking. Admission by ticket only (BT Laboratories security requirement). Details from G0RRC (under G6GAU in Callbook).

SURREY

ECHELFORD ARS - 11, talk 'Radio with Computers' by P Borrett/J Todd; 25, talk 'Transmitting Aerial Basics' by Gerald Stancey, G3MCK; Apr 8, AGM. Details 0344 843472.

TAYSIDE

DUNDEE ARC - 2, construction night; 9, talk 'See yourself as others see you' by George McKay, GM4YWS; 16, construction night; 23,

talk 'Morse Testing Service' by Wallace Shackleton, GM0GNT. Details from GM4FSB, QTHR.

WARWICKSHIRE

STRATFORD UPON AVON & DARS - 8, talk 'RF Problems Associated with Motor Vehicles' by Tom Dobeedo and Mike Nielsen; 22, surplus sale. Details 060 882 495.

WEST GLAMORGAN

SWANSEA ARS - 4, talk 'Interference and EMC' by a member of the RIS; 13, bus trip to Pickett's Lock. Details from GW3SIY, tel: 0792 403527.

WEST MIDLANDS

SOLIHULL ARS - 18, talk 'EMC and the Motor Vehicle' by Ivor Mantell, G4NRY. Details 021 777 9965 (eves).

SOUTH BIRMINGHAM RS - Details 021 458 1603.

STOURBRIDGE & DARS - 15, Annual General Meeting. Details 0384 423938.

WOLVERHAMPTON ARS - 9, visit to Royal Mail Post Sorting Office; 30, homebrew competition Novice and Senior Class; Apr 13, junk sale. Details from Mrs M Bentley, 9 Tinkers Castle Road, Swisdon, Wolverhampton WV5 7HF.

WEST SUSSEX

CHICHESTER & DARC - 2, talk on Fire Brigade communications; 16, preparations for the AGM; Apr 6, Annual General Meeting. Details Chichester 573541.

WEST YORKSHIRE

DENBY DALE ARS - 17, talk 'Wavemeters and GDO's' by Gerald, G3SDY; Apr 7, surplus sale. Details 0484 429238.

HALIFAX & DARS - talk 'RSGB' by Pete Sheppard, G4EJP, Zone A Council Member Details Halifax 202306.

KEIGHLEY ARS - 11, talk 'The Sky - The Beauty and the Wonder' by Mr Dougherty; 25, talk 'Transatlantic on 2 Metres' by G3OTE; Apr 8, junk sale. Details 0274 496222.

NORTHERN HEIGHTS AR&ES - 3, talk 'Amateur TV' by Geoff Barber and John Grantham. Details Halifax 360574.

TODMORDEN & DARS - 1, talk 'Getting Started in the Thirties' by Leslie, G3UI with help from John, G0DWL; Apr 5, video night. Details Halifax 882038.

WILTSHIRE

TROWBRIDGE & DARC - 3, talk 'Direct Conversion Rx' by G0BBL; 17, event planning evening. 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'.

6 MARCH

VHF Convention - Sandown Park Exhibition Centre, Esher, Surrey. One-day exhibition and lecture programme. Specialist groups. Morse tests (by prior booking). Presentation of trophies. Comprehensive trade exhibition. Stand bookings to Les Hawkyard, G5HD, 0409 281 342. Details from Geoff Stone, G3FZL, 081 699 6940.

13/14 MARCH

LONDON AR&C Show - Picketts Lock Centre, Picketts Lock Lane, Edmonton, London N9. Large trade presence, free parking; lectures; facilities for the disabled; bring & buy; Special Interest Group section. Talk-in on 2m/70cm. Details 0923 678770.

14 MARCH

WYTHALL RC Radio Rally. - Wythall Park, Silver Street, Wythall (nr Birmingham), on the A435, 2 miles from jct 3/M42). Opens 11am, closes 5pm. Usual traders in three halls; bar and refreshments; bring & buy stall run by the club. Talk-in on S22. Admission still only 50p. Details Chris, G0EYO, 021 430 7267.

21 MARCH

NORBRECK Radio Rally - Radio, Electronics & Computing Exhibition - Norbreck Castle Hotel Exhibition Centre, Queens Promenade, North Shore, Blackpool. Doors open 11am - 5pm; (10.45 for disabled visitors through ramped entrance); admission £1.50, over 65s £1, under 4s free; Free car parking and free shuttle service; Novice Licence details and practical demonstrations; bring & buy stall; radio talk-in on S22; competitions for NARSA associated club stands; your home constructed items and an inter-club quiz; hotel accommodation; bars and restaurants; assistance for disabled visitors; RSGB stand. Details from Peter Denton, G6CGF, 051 630 5790.

TIVERTON RC Annual Rally - Pannier Market, Tiverton. Easy access, only minutes from jct 27 on M5. Doors open 10am; free parking; two halls of trade stands; bring & buy; mobile snack bar. Further displays and full refreshments facilities in the club room bar. Talk-in on S22. Details from G4TSW, Mid Devon Rally, PO Box 3, Tiverton, Devon.

28 MARCH

BOURNEMOUTH RS - 6th Annual Sale - Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth. Doors open 11am to 5pm; talk-in from G1BRS on 2m S22; amateur radio and computer traders; clubs and specialist groups; excellent refreshments. Admission £1 including free raffle ticket. Details from Ian, G2BDV QTHR, 0202 886887.

MAGNUM Rally - Magnum Leisure Centre, Irvine, Ayrshire. Usual traders; bring & buy; lucky programme prize; raffle etc. Details from Peter, G6MFCI 0294 72253.

PONTEFRACT & DARS 13th Annual Components Fair & Spring Rally - Carleton Community Centre, Carleton, nr Pontefract. Admission by prize programme - 3 prizes plus free prize draw for lady visitors; traders; bring & buy; bookstall etc; licensed bar; hot & cold snacks; 2m talk-in. Car boot spaces available. Details from Colin Wilkinson, 0977 677006.

4 APRIL

LAUNCESTON 7th AR Rally - Launceston College. Doors open 10.30am. Two large halls; well-known traders; large bring & buy; official Morse test (applications thro' usual channels); hot snacks from 7am. Talk-in on S22. Details from Maggie 0566 777027.

WHITE ROSE ARS Radio Rally - Change of venue to: Alerton High School, King Lane, Leeds 17. Four large main halls plus catering and bar facilities. Detail from A A Bartram, G7ELS, PO Box 73, Leeds LS1 5AR.

18 APRIL

CAMBRIDGESHIRE RG AR Rally - Philips Telecom PMR Catering Centre, St Andrews Road, Chesterton, Cambridge. Doors open 10.30am; trade stalls; bring & buy; auction; hot food and drinks. Details from Mike, G6COO 0223 358985 x 3310.

MARKE-BY-THE-SEA Radio Rally - Marske Leisure Centre, High Street, Marske-by-the-Sea. Doors open 11am; usual traders; bring & buy; refreshments. Talk-in on S22. Details from Mic, G7ION, 0287 610030.

SWANSEA ARS Rally - Swansea Leisure Centre, on the Swansea-Mumbles A4067 coast road. Doors open 10.30am; trade stands; bring & buy; bookstall; RSGB area representatives; Repeater groups; VHF demo stations; full catering. Talk-in on S22 via GB25WR. Details from Roger Williams, GW4HSH, 0792 404422.

24 APRIL

MARCONI Birthday Exhibition - Puckpool Park Wireless Museum, Seaview, Isle of Wight. Free admission to public and plenty of free parking. Details from Douglas, G3KPO, QTHR 0983 567665.

25 APRIL

BRIDLINGTON & DARS East Yorkshire Rally - The Spa, Bridlington. Doors open 11am (10.30 for disabled visitors). Trade and Club Stands; refreshments; bar; tombola; Bring & Buy etc. Details Norman A Bedford, G4NJP, 0262 673635.

BURY RS Hamfest - Bury Leisure Centre, Bolton Street, Bury. Details from Laurence, G4KLT, 061 762 9308 (eves).

IRISH RTS Annual General Meeting - Royal Hotel, Bray, Co Wicklow. In conjunction with the AGM a Radio & Electronics Exhibition will be held at the same venue between 11am and 5pm. The Exhibition will comprise all the usual trade stands; Bring & Buy and special displays. Parking available. Admission £1 adults, 50p children. Details Sean Donelan, E14GK, (01)2821420.

2 MAY

ANGLO-SCOTTISH Rally - Tait Hall, Kelso. Details Bruce, GM4UIB, 0573 224654 (eves).

BATC Rally - Harlaxton Manor, Nr Grantham, just off the A1 (signposted). Usual traders, Bring & Buy, bar and refreshments, lecture programme, demonstrations and flea market. Talk-in. Family venue. Details: Paul G8MJW, 0522 703348.

3 MAY

MID CHESHIRE ARS Rally - Civic Hall, Winsford. Doors open 11am (10.30 for disabled visitors). Full catering and ample car parking. Details: David G4XUV, 0606 77787.

9 MAY

MARS/DRAYTON Mobile Rally - Drayton Manor Park, Tamworth, Staffs. Doors open 10.30am. Details: Peter G6DRN, 021-443 1189. Traders bookings Norman G8BHE, 021-422 9787 (eves).

9th YEOVIL QRP Convention - Preston Centre, Monks Dale, Yeovil. Doors open 9am. Admission £1.50. QRP related lectures; display of home-made QRP equipment; on-air QRP stations using callsign GB2LOW; trade stands orientated to QRP components etc; a chronological display of working vintage radio; refreshments available throughout the day. Details: G3CQR, 0935 813054.

16 MAY

RSGB'93 Exhibition - NEC Birmingham. Details from Norman Miller, G3MNV, 0277 225563.

30 MAY

17th EAST SUFFOLK Wireless Revival - Maidenhill Sports Centre, Ipswich. Doors open 10am-4pm. Car boot sale, Bring & Buy; all usual traders and displays. Talk-in on S22 GB4SWR. Organised jointly by Ipswich RC, Martlesham RS and Felixstowe & DARS. Details: Bob Baal G7HZV, 0394 271257.

MAIDSTONE YMCA Radio Rally Route: M20 jct 4,5,6 or 7, then A229 Loose Village 2 mi south of Maidstone. Doors open 10.30am (10am for severely disabled visitors). Entry £1 per adult. OSX G8TRF (S22) and G3YSC (10FM & SU22). Exhibition station GX3TRF (on HF). All day video show etc for juniors. Refreshments available. Bring & Buy tables for hire (DIY). YMCA Sports Centre. Details 0622 743317 for pre-rally booking of camping/caravanning facilities. Trade bookings etc 0622 750709 (before 9.30pm).

6 JUNE

25th SPALDING Mobile Rally. Details: Mr T Kettlewell, G4TWR, 0775 722940.

13 JUNE

24th ELVASTON CASTLE National Radio Rally - Elvaston Castle Country Park, nr Derby. Details from John Robson, G4PZY, tel & fax: 0332 767994; trade enquiries: Peter Neal, G3WUF, tel & fax 0332 700265 (eves).

33rd RNARS Annual Mobile Rally - new venue Sports Field, HMS Collingwood, Fareham. Details: Cliff G4UJR, 0703 557469.

20 JUNE

DENBY DALE & DARS Annual Mobile Rally - Shelley High School (6 miles SE of Huddersfield on B6116). Details from Phil, G4FSQ, 0484 644827.

NEWBURY & DARS Annual Car Boot Sale - Ackland Hall, Cold Ash. Details: N Jaques, 0635 863310.

27 JUNE

36th LONGLEAT AR Rally. Details from Shaun, G8VPG, QTHR 0225 873 098.

4 JULY

KINGS LYNN ARC Rally. Details 0553 841189.

YORK Radio Rally. Details from Andy Suter, G0GX1 0904 708164.

11 JULY

HORNCastle Amateur Radio, Electronics and Computing Fair. Details T Nightingale, G6CZV, 0507 522482.

SUSSEX AR&C Fair. Details & traders' booking: Ron Bray, G8VEH, QTHR 0903 763978 (H) 0273 415654 (W).

25 JULY

COLCHESTER Radio & Computer Rally. Details: Frank, G3FJL, 0206 851189.

NORFOLK AR Rally. Details Sheila, G0KWP, 0603 618810.

SCARBOROUGH Radio Electronics & Computer Rally. Details from Ross Neilson, G4NZZ, 0723 514767.

1 AUGUST

McMICHAEL Rally and Car Boot Sale. Details Neil, G0SVN or Roy, G4XYN, 0628 25952. (This rally was originally scheduled for 18 July).

8 AUGUST

DERBY & DARS Mobile Rally. Details from Martin Shardlow, G3S2J QTHR - Tel: 0332 556875 or via packet @ GB7LNT.

22 AUGUST

WEST MANCHESTER RC Summer Rally. Details: G1IOO, 0204 24104 (evenings).

29 AUGUST

TORBAY ARS Mobile Rally. Details G3HTX QTHR, 0803 526762.

5 SEPTEMBER

BRISTOL Radio Rally (incorporating Bristol Computer & Electronics Fayre). Details from Muriel Baker, G4YZR, 62 Court Farm Road, Whitchurch, Bristol BS14 0EG, tel: 0275 834282.

MILTON KEYNES & DARS 7th Annual Radio Boot Sale. Details Ray, G1LRU, 0908 660798.

VANGE ARS Annual Rally. Details Mike Musgrave, G4NVT, 0268 543025.

11 SEPTEMBER

SCOTTISH AR Convention - Cardonal College, Glasgow. Details Tom Hughes, GM3EDZ, 041 862 5753.

12 SEPTEMBER

BARTG Rally - Sandown Exhibition Centre. Details Peter Nicol, 38 Mitten Avenue, Rubery, Rednal, Birmingham B45 0JB, 021 453 2676.

LINCOLN SWC Hamfest. Details from Denis, G1XZG, 0522 684214.

19 SEPTEMBER

PETERBOROUGH R&ES East of England Rally. Details from Mike, G0CVZ 0733 222588.



WE HAVE BEEN advised of the deaths of the following radio amateurs:

G0CCH	Mr M Weinstock	9.08.92
G0EIW	Mr C Morgan	27.12.92
G0GKT	Mr ME Clark	26.12.92
G0MUG	Mr WR Grundy	
G0NOI	Mr CV Nichols	7.01.93
G0RHX	Mr J Anders	29.11.92
G1VIH	Mr D O'Byrne	20.12.92
G2ANB	Mr R Brand	4.01.93
G2BYK	Mr J Payne	Jan 93
G2FOS	Mr JK Birch	10.12.92
G3AQS	Mr RE Miller	Nov 92
G3MSE	Mr N Dunwell	17.12.92
G3NJT	Mr D Tranmer	17.01.93
G3OHI	Mr AR Batty	4.01.93
G3OZA	Mr RH Truman	28.12.92
G3OZM	Mr DP Jackson	29.12.92
G3XOM	Mr HJ Manning	26.12.92
G3YJH	Mr DG Wickett	4.01.93
G4BZY	Mr P Ling	13.12.92
G4CR	Mr GA Richards	2.10.92
G4GU	Mr A Laband	23.12.92
G4VYD	Mr D Wheeler	3.01.93
G4WJP	Mr CA Wadsworth	
G5FF	Mr A Blackman	25.01.93
G5HX	Mr KT Cleaver	May 92
G6YG	Mr AB Starks-Field	
GBWAS	Mr T Parr	16.12.92
GM4KTJ	Mr EI Fraser	31.12.92
GW3ICF	Mr F Redfern	Dec 92
GW3UGI	Mr FR Pritchard	18.01.93
RS94163	Mr KA Bisher	9.01.93
RS94648	Mr DF Porter	11.01.93
DL9PU	Mr H Ripperger	2.01.93
VK6JZ	Mr J Garratt	

24/25/26 SEPTEMBER

RSGB International HF Convention - 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.

26 SEPTEMBER

THE THREE COUNTIES Rally - Malvern. Details Eddy Cotton, G4PQZ, 0905 773181.

9th NORTH WAKEFIELD RC Rally. Details from John, G4RCG, 0924 362144.

GB CALLS

The list below shows all special event stations licensed for operation during this month. These call signs are valid for use from the date given but the period of operation may vary from 1-28 days.

1 MARCH

GB1SS Sedburgh School Shuttle
GB2GMM Guglielmo Marconi Memorial
GB2SDD Saint David's Day
GB4LON London Amateur Radio Show
GB4XXX 'X' Nett DX-Pedition
GB0LCP Langrish County Primary School

5 MARCH

GB4STD St. Dunstan's

9 MARCH

GB0RJS Ravensthorpe Junior School

12 MARCH

GB2CDV Coastal Defence Ventnor

16 MARCH

GB0HLC Harrogate Ladies College
GB1HLC Harrogate Ladies College

19 MARCH

GB4MIL Mersea Island Lifeboat

20 MARCH

GB4SEI Spring Exhibition & Int. Day

25 MARCH

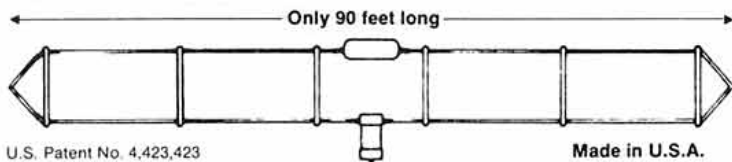
GB2SEG Scottish Expedition Group

27 MARCH

GB4AC Air Cadets



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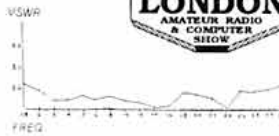
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The LAST WORD

/AM IN SOUTH AFRICA

I read with interest the letter 'AM is Dangerous' by G4OUC (*The Last Word*, January). I appreciate his concern for air safety and also the work load possibly created for the CAA, but he looks at the situation with a rather narrow viewpoint. Not everyone wishes to operate /AM but those few who would, should be given the chance to work this mode, naturally taking into consideration the various technical requirements and procedures for safe operation.

There are other aspects to consider; for instance all /AM operation may not be from powered flights. In South Africa they have a thriving facet of amateur radio called BACAR, 'Balloon Carrying Amateur Radio' which is basically a Met balloon which lifts various VHF/UHF and/or HF transceivers plus data transmitters. This can be activated as a /AM repeater or some other configuration. Great fun is had by the launching teams, recovery teams, and the normal radio amateur making QSOs through BACAR. I wonder if the issue of /AM to the UK would permit this interesting operation?

Another facet of /AM in South Africa has been the operation of amateur radio from a helicopter doing rush hour traffic watch above the city of Johannesburg, and in the Transvaal where the Mountain Rescue Service used amateurs flying in SAAF helicopters to provide communications with volunteer ground search teams during search and rescue operations in the Transvaal and Drakensburg Mountains. This service proved to be of great value to rescue operations and the helicopter crews experienced no hazards from the radios. Of course in the UK the rescue services are much better equipped, but who knows when a disaster could strike and operations by, say, Raynet might be possible if /AM were permitted.

Finally there are also possibilities for microlite and hot air balloon enthusiasts who might like to operate radios whilst airborne. So /AM need not be dangerous and could provide pleasure and fun or perhaps even save a life. Like anything that is self-regulating there are always users and abusers; maybe qualified Civil Aviation engineers who are amateurs could become advisers/inspectors of any installation used by amateurs on /AM operation.

Tony Selmes G4KLF/ZS1D/A452N

CELEBRITY NEEDED?

At last! For a quarter of a century I've wondered why amateur radio has never really caught the imagination of the general public. Like a friend opening a window in a stuffy room, J Hossack, GM3DKW, has penned a welcome draught of fresh thinking (*The Last Word*, February). His letter prompts a line of thought that must surely have gone through the minds of so many radio amateurs over the years - but none of us has taken the initiative and said so; let alone done anything about it.

Do we really want to keep ourselves to ourselves and limit the numbers? If the answer is "yes", then don't pursue the matter. But if, as I strongly suspect, the answer is "no" we should be encouraging exposure - through all the media. There are many tales to tell: Many adventures (yes, adventures), stories to catch the imagination of the least technically minded, stories to intrigue and excite, stories to fire the imagination.

It would appear that all of the 'popular' sports and hobbies have a leading character such as Patrick Moore. But it must also be true that many popular hobbies - even with as many, or greater, numbers of enthusiasts as amateur radio, are not as widely recognized simply because there are no characters with such high profiles in their ranks.

Surely this doesn't mean we have to remain introverted? Or does it? Perhaps this is the beginning!

Peter Dowles G3VNP

HISTORIC QSLs

Do any of your readers know of any association or radio amateur who maintains a QSL card collection other than for one amateur station? The Wireless Institute of Australia has built up a collection of nearly 400,000 QSL cards, both pre-war and recent QSLs derived from the generous donation of cards of people who believe that DXing and QSLing is an important part of the history of amateur radio.

We are anxious to contact anybody who has formed a similar collection with a view to exchanging QSLs. Please write to the Hon Curator, Ken Matchett, VK3TL, 4 Sunrise Hill Road, Montrose, Vic 3765, Australia.

Ken Matchett VK3TL

RSGB ON PACKET

Firstly may I echo Ian Brothwell's letter (*The Last Word*, January) and congratulate you and your staff on substantially improving *RadCom*. In particular the presentation and the wide spectrum of articles. I was pleased to see a review of some data equipment (AMT-3) followed by an explanation of AMTOR. This is a good way to explain some of the rarer aspects of our hobby.

My second point relates to packet radio/AMTOR and the need for the RSGB to be represented, contactable and to be able to put its view forward on the variety of amateur radio topics that are debated on the data network. Weekly and local news, rally information, DX and other such useful information is promulgated by *GB2RS*, but it is very much a one way and impersonal affair. The RSGB would be able to enter debates, reply to the many constructive ways (and ignore the destructive ones!) of improving amateur radio, squash some of the ridiculous statements and be able to provide sound, personal and valid advice to RSGB members only (a cunning way to increase membership!). All we need is an RSGB official on packet, perhaps from your good offices, or indeed a BBS where messages can be left?

With the increasing popularity of packet radio and AMTOR it surely makes sense for our society to be represented and be the voice of reason, sanity and common sense in the wilderness of packet radio. What do other members think?

S Oxlade G4YLA

[Many RSGB volunteers are already available on the packet radio network. The use of amateur radio by HQ staff to conduct the Society's work, however, strays perilously close to the business use of our hobby, which is quite rightly prohibited - Ed]

VOTE FOR SMALL RALLIES

Although traders are important and their attendance at rallies is welcome, the rallies are primarily for radio amateurs. There are plenty who enjoy the smaller events at least as much as the large ones and are grateful to those who devote much effort to running them.

Many radio amateurs find the larger events too demanding physically, geographically and financially, besides being the complete antithesis of a pleasant social occasion.

I guess that most of us enjoy both kinds of event but in proportions which differ. To suggest that pleasant local rallies should be abandoned for the dubious possibility of improving the supermarket sized events is a very bad idea and quite foreign to the spirit of amateur radio.

Bob Pearson G4FHU

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.

CLUBBING TOGETHER

With reference to the future of amateur radio in the UK, I wonder if we have our priorities wrong. I refer mainly to the current discussion relating to Aeronautical Mobile, Code-free Licences, Novice Bandplans and Phone Patch.

If we are to believe that there is a definite need to introduce new members into our hobby, I would doubt that the granting of Aeronautical Mobile in times of recession would swell club membership and even RSGB membership. Also, given the current state of some of the repeater traffic, I dread the thought of phone patch in the UK.

Coming to a more realistic level, why not permit non-licensed people to use amateur radio equipment while under supervision at their local radio club. This would surely help to promote club membership, and affiliated clubs to the RSGB. If we feel that some policing is needed, why not issue 'Provisional Licences' which must be used under supervision of the main licence holder. (For example if the club call was G3CLUB then each provisional operator would sign G3CLUB/1, G3CLUB/2). There could also be further conditions imposed where the 'provisional' licensed member has to be a fully paid-up member of their local club.

My reason for making this suggestion is that I am a novice licence instructor and have been adopted by my local ATC group, to help get a novice scheme up and running. I feel that there is something missing from the training because the youngsters cannot even utter a single word without first having obtained a callsign.

I support the Novice training programme, but feel that there have been a few omissions, why do the Novice Bands not include the 432MHz packet frequency. Instead we have a number of Novices who have to access their local BBS via 433MHz to gain access to 432MHz to gain access to 144MHz etc. Think of all the unnecessary QRM generated to arrive at the final destination by 'legal' means. The same also applies to my 'B' call which is seen on the HF band via a packet node, through several routes, but I am not allowed to directly connect there.

You will notice that I have not addressed the CW aspects of the licence. I have been an active amateur radio 'B' licence holder for 12 years and have no particular desire to learn CW, so will quite happily say if you want to get access to the crowded HF bands then CW is a 'filter' to weed out the interested from the non-interested but would not support the idea of its need for emergency traffic, shared band usage etc.

In summary, we need to:

1. Have a licence similar to the provisional driver's licence.
2. Promote a good sound reason for being a club member.
3. Generate some extra revenue and members for the RSGB.
4. Allow flexibility for modes like packet, and satellites that do not follow the 'normal' QSO rules of operation.

Alan Ralph G8XLA

Novice Instructor, ATC Radio Officer

[See page 7 for some good news - Ed.]

BLETCHLEY PARK

While clearing up all the bits and pieces at our club it has come to my notice that there is a great number of allocated unclaimed certificates for the special event that the Milton Keynes Scout Amateur Radio Group held in June 1992 at Bletchley Park Station X. If any reader has still not applied for the award, the requirements were to work the station twice either on different bands/modes/days. Could they please send an A4 size SAE with log extract to me. It would be a shame to throw these nice certificates away. Overall the station was a great success with 528 contacts being made over the weekend. The Park is still in jeopardy of being demolished, but the fight to save it is still going on.

Phil Orchard G0EYZ

LABEL IT LARGE

I wonder if other amateurs have found, as I have, that the most popular stand at any rally is the Bring and Buy Stall? However, people who take the trouble to lug equipment sometimes a long distance, tend to spoil their chances of selling it by writing out a label so small it cannot be read from the other side of the table. So come on chaps - try a BIG LABEL, then perhaps some of us without 20.20 vision may know what it is you are trying to sell and what price you are asking. Who knows? You may even sell it.

Arthur Cockerill G4UTV

RSGB BOOK CASE

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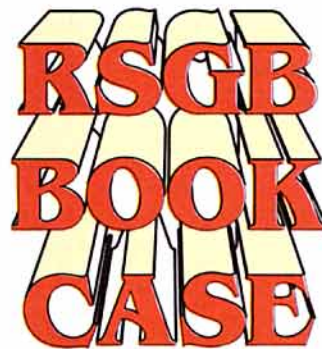
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The display advertisement copy date for our
May 1993 issue will be 10th March 1993

MULTIBAND MAGIC



IC-W21ET

Dual-Band FM Transceiver

ICOM are proud to announce this latest compact addition to the highly popular W21 series of transceivers.

The new IC-W21ET covers the 144 and 430MHz bands, main features include:

- Simultaneous UHF receive on two bands.
- Automatic repeater memory recall function
- AI switch for easy function recall
- Whisper function for telephone-style QSO's
- Battery power check



IC-X2E

Dual-Band FM Transceiver

This versatile hand-held allows you to monitor one band while transmitting on the other.

The IC-X2E covers the popular 430 and 1200MHz bands. Some main features include:

- Simultaneous receive on both bands
- 60 memory channels and 2 call channels
- Clock with useful on/off timer
- Scan functions and priority watch
- Pager and code squelch functions

IC-3230 Dual-Band FM Transceiver

The compact IC-3230H gives complete dual-band capability, a large function display provides simultaneous readouts of both main and sub operations. Telephone-style QSO is possible using both bands. Extended receiver coverage (not guaranteed) includes; 118.000-135.995MHz (AM), 136.000-174.000MHz (FM) & 420.000-480.000 MHz (FM).



IC-2410 Dual-Band FM Transceiver

The compact IC-2410 has all the usual ICOM dual-band innovations plus the ability to be remote controlled via the mic or another transceiver. Easy to operate, independent volume control and squelch switches and a full 25 watts output power are at hand to make the IC-2410 a truly versatile mobile. Maximise your operating power with the IC-2410.

IC-901 Dual-Band FM Transceiver

The IC-901 has to be the most sophisticated Amateur mobile in the world. Modular design enables personalized installation and multi-band expansion. Advanced features such as 6-band capability, fibre-optic connection and full duplex crossband operation make this an impressive transceiver system capable of system upgrading.



ICOM manufacture a full range of Amateur base-stations, transceivers and receivers capable of operating on all popular frequencies and beyond. No matter what your requirement ICOM have the radio for you.

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