Five DSP 'Brick Wall' Audio Filters Compared: Page 13
SO MANY FEATURES, IT NEEDS A MANUAL. SO WE BUILT ONE IN.

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

Features that include an FET power module for longer battery life, 82 memory channels with ID, DTSS and pager functions, Automatic Band Change and DTMF memory function for auto-dial operation. Confused? You won't be. Just call up the menu. Or ring 0923 816444 for a full information pack.
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FOR OVER FORTY YEARS the famous ‘Window to the World’ amateur radio station, GB2SM, has been on the air from the Science Museum in London.

So it is with some sadness that I must confirm rumours of its impending closure. The Society has been informed by the Museum that the exhibit will close down finally on 7 November 1994.

This announcement came as some surprise to the Society as discussions had taken place with a view to relocating the station within the Museum and carrying out a complete refurbishment of equipment to bring it up to date with current technology. Due to a change of Museum policy to produce more interactive exhibits, a decision was made reluctantly to close the station.

The Museum has indicated that it would wish the station to be relocated to an alternative site to enable it to remain on air. Representatives of both the Society and the Museum are currently engaged in discussions in an effort to save GB2SM. I am optimistic that a compromise can be reached to enable GB2SM to remain on air and to continue to introduce the mysteries and exciting world of amateur radio to future generations of children and adults alike.

Peter A Kirby, G0TWW

NOTICE BOARD

Twelve Hour Opening

WE ARE PLEASED TO ANNOUNCE a further membership service. From Monday, 12 September 1994 the Society is introducing a direct telephone line to enable you to place orders quickly with RSGB Sales. This new line will also bring the added advantage of extending our sales opening hours from 8.15am to 8.15pm, Mondays to Fridays, and from 9.15 to 12.15 on Saturdays. The line will be for book sales only but it is hoped to introduce further help lines in the near future. The new Sales number will be:

0856 70 73 73
Amateurs help to expose “Britain’s Best kept Secret”

Duke of Kent Opens Codebreakers Museum

MONDAY 18 JULY saw the opening of the Bletchley Park Trust Museum by HRH the Duke of Kent. The museum, located at Bletchley Park near Milton Keynes, commemorates the work of the codebreakers and intelligence specialists who made a vital contribution to the allied war effort. Nearly a thousand people were invited to attend the opening, including ambassadors and Service chiefs.

Almost 12,000 worked at Bletchley, yet the Germans never realised that their highly secret “Enigma-coded” messages were being intercepted and decoded at the centre which became known as “Britain’s best kept secret”.

Two groups of amateurs have provided static and working exhibits which show the important role of radio operators during the war.

Y Service

MEMBERS OF the Milton Keynes Amateur Radio Society (MKARS) were responsible for creating a working replica of the wartime Y service station. These stations were at various locations throughout the country and the signals they heard were passed by teleprinter to Bletchley Park.

Club members present at the opening included: Warren Blackhouse, G4HZI; John James, G4MXO; Dave White, G3ZPA and Dave McQue, G4NJU. The MKARS now has a permanent club room in the Park from where they ran GB50DDX over the D-DAY night. The club would welcome any donations of wartime receivers to enhance their exhibit.

Computer

A LARGE exhibition of radio and radar equipment has been created with the help of amateurs, all of whom are officers of the Communications and Electronics Museum Trust: Doug Byrne, G3KPO; Fred Robins, G3GMV, Vernon Scambell, G3FWE and Rob Burman, G4RSN. The Trust is also responsible for re-building Colossus, the first electronic computer in the world. Its inventor, Tom Flowers, now aged 88, was present at the opening and was able to meet the Duke of Kent. The re-build is truly mind-boggling as the computer contained over 2,000 valves. The Trust Curator, Doug Byrne, G3KPO (0983 567665) would like to hear from anyone who worked at Bletchley Park. The museum, which is open every other weekend, covers not only the code-breaking but also a history of computers. Call 0908 640404 for details.
Ron’s Radio Lifeline

WHEN THE YACHT Aida lost its rudder on Sunday 17 July, the crew put out a Mayday call. It was picked up by Raynet member Ron Oswald, G7PIP, who immediately alerted the coastguard at Dover, some 30 miles away. The coastguard discovered that Ron, who lives in Hastings, was the only one who could hear the yacht so he spent the morning relaying messages from the Aida via the telephone.

He was eventually joined by a local coastguard who was then able to communicate with the stricken vessel. The yacht was spotted by a rescue helicopter at the exact location given and was observed until it arrived safely at Newhaven.

Said Ron: “I couldn’t believe I was the only one who could hear him. It really made my day!”

Radio Remembered

AN EXHIBITION to celebrate the 60th anniversary of the opening of the BBC Drottwich transmitting station is open 27 August to 6 October. In addition to the radio station exhibits, early wireless studio and recording equipment is featured as well as a display by the Drottwich Amateur Radio Society. The venue is Drottwich Heritage Centre (tel: 0905 774312) and admission is free.

Rainfall Result

THE COMPETITION to win an R&D Weather Station in July’s RadCom proved very popular with 157 entries guessing anything between less than 1mm to over 350mm. The result of a record dry July was a rainfall in Potters Bar of 19.52mm. Two entrants guessed 19mm but the winner closest with 20mm was 15-year-old Robert Dilley, 2E1ARU.

Welcome from GB2QE

TO MARK the visit of the cruise liner RMS Queen Elizabeth 2 to Merseyside, the Wirral and District Amateur Radio Club will be operating special event station GB2QE from the 90ft high Perch Rock Lighthouse (see RadCom May 93 cover) situated at the mouth of the River Mersey. It is hoped that Dr Andrew Eardley, G3UXO/MM, will be able to contact GB2QE from the lighthouse itself.

The station (Loc I083LK, WAB SL39) will be operational 27 – 31 August, 24 hours a day, on 80, 40, 20, 15 and 10m SSB and CW, plus 2m SSB and FM.

For design reasons, it was necessary to pad out one of our Q2 photo captions (August, p15), so I wrote a seemingly innocuous comment about a radar dome. Such is the power of RadCom that I’ve received three letters pointing out that the dome contains a satellite TV system, not radar. I stand corrected – Ed!

Operation Market Garden

NINE DUTCH SPECIAL event stations will be on 7070kHz from 0800UTC on 18 September to commemorate Operation Market Garden, the liberation of the southern part of Holland, fifty years ago. The calls are all PA6LIB with a suffix ranging from /9 in the south-west to /1 in the north-east. Locations are: (9) Valkenswaard, (8) Eindhoven, (7) Best, (6) Son, (5) Sint-Oedenrode, (4) Veghel, (3) Uden, (2) Grave, and (1) Groesbeek-Nijmegen. The nine QSL cards together form a map of the area.

Also celebrating this event will be PA6OMG, manned by members of the Nijmegen Amateur Radio Club. Operation will be from 15 to 20 September on all HF bands, CW and phone, from the Liberation Museum in Groesbeek-Nijmegen. For local visitors, talk-in is available on 2m and 70cm.

PA6AMA will use a 19-set on 3600kHz as part of its commemoration of the airborne landings at Renkum. Other frequencies will be used with more modern gear from 10 to 18 September. An awards available for working amateurs in the Renkum area before 31 December; the proceeds of the award go towards helping families visit the graves of airmen killed in action. Details of the award can be obtained from F A Looijen, PA3CGJ, De Holde Kamp 9, NL 6881 CX RHEDEN, Netherlands; or via packet: PA3CGJ @DK0MWW.NRW.DEU.EU.

GB60OMG will be active over the weekend 17/18 September from Fullbeck Hall where Operation Market Garden was coordinated.

Operation Maquis 94

FOLLOWING AN ORIGINAL IDEA by FSSMR, a net was activated on 12 June to honour the men and women who operated RT links between Europe and England during WW2. GB2IWM, the station of the Imperial War Museum at Duxford, near Cambridge, acted as base station. Contacts were made with stations at the Musee de L’Armee in Paris, TM5HNI, and the Museum of Denmark’s Fight for Freedom, OZ5MAY, both using B2 spy suit-case radios.

Radio Society of Great Britain

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

RALLIES AND EXHIBITIONS

THE RADIO Society of Great Britain wishes to procure services relating to the management of its Rallies and Exhibitions portfolio beginning with the 1995 National Mobile Rally at Woburn. At the present time, this relates to two events: the VHf Convention (Sandown Park) and the National Mobile Rally. The Society is, however, keen to expand the programme to include a large national convention. Tenders will be expected to have wide experience in the area of event management and will have to provide full audited accounts for the previous two financial years. Details of their plans for the events, if successful, should also be included.

Requests to participate should be made in writing to the Society at the address below, and must be received by 1 October 1994. Please mark correspondence for the attention of Mr Peter Kirby, G0TWW, General Manager. All tenders will be treated in the strictest confidence. For further information, telephone 0707 659015, extension 11.

RALLY GUIDELINES

The rules for rallies and exhibitions are based on the following:

1. The Society reserves the right to accept or reject any tender.
2. The Society reserves the right to decide on the number of events to be held.
3. The Society reserves the right to vary the rules at any time.
4. The Society reserves the right to refuse to accept any tender.
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Support the Future

THE RSGB MasterCard was successfully introduced as a membership benefit in 1991. Its aim was not only to provide our members with a high quality financial service but also to raise much needed funds to support the future of amateur radio.

For every Card issued and used the RSGB receives a financial contribution from the Bank of Scotland. Subsequent use of the Card also results in a longer term income that we can count on.

Many of our members already show their active support by carrying our MasterCard. To date, the RSGB has earned in excess of £18,000 from members using the RSGB MasterCard. These funds help us to maintain and develop our activities.

This month you will be receiving a letter outlining the benefits of this credit card. Please take some time to read it.

For more information and an application form, there is a free phone number that you can call: 0800 716097

Phoneday is Coming

FROM 18 APRIL 1995, all UK telephone codes will change. In most cases, this means the addition of a '1' after the '0', eg 0707 becomes 01707. In Leeds, Leicester, Nottingham, Sheffield and Bristol, completely new codes will be introduced.

The international code prefix is also changing, from 010 to just 00. We'll be reminding you nearer the date but if you're printing any new stationery, now is the time to add your new code.

PM Supports Club’s Charity Work

THE PRIME Minister has endorsed the work done by the Hoddlesdon Radio Club in raising money for various charities and in promoting amateur radio to the young as part of the RSGB’s Project YEAR. His letter reads:

I am pleased to be able to send my best wishes to the Hoddlesdon Radio Club for their Special Event Amateur Radio Station at the Wood Green Animal Shelter. The Club does a lot of valuable work for charities and community groups and I am particularly pleased to hear of their support for Project YEAR – Youth into Electronics via Amateur Radio. The Government has long supported YEAR’s aim of encouraging young people into amateur radio. I am well aware that the hobby provides an invaluable training ground for future careers in radio and electronics and the Radiocommunications Agency has worked closely with the Radio Society of Great Britain in developing this initiative. This close partnership has already led to the development of the Young Amateur of the Year Award and the Novice licence scheme and I would like to offer my congratulations on the work they do to encourage a greater interest in electronics.

 Rt Hon John Major MP
 August 1994

Animal Shelters

TO SUPPORT Wood Green Animal Shelters, described as Europe’s leading animal charity, the club will be running GB1WAS (VHF) and GB2WAS (80 - 10m) on 27, 28 and 29 August. Over 10,000 people are expected to attend the three Fun Days at Godmanchester, Cambridge.

Godmanchester, Cambridgeshire. Sponsorship and a ‘guess the furthest distance contacted’ competition will raise money for the charity. Further details can be obtained from event coordinator (and Herts RLO) John Rudd, G7OCI, on 0920 468839.

Novices on Top

AS PART of its programme to encourage Novice operation on the HF bands, the RSGB’s HF Committee is suggesting a Novice calling frequency on Top Band. The idea of a calling frequency is not a new one but they work well and help get people together on the air. CQ calls and calls to particular stations are made on an agreed calling frequency. As soon as two-way communication is established the stations involved move off the calling frequency to conduct their contact. This leaves the calling frequency just for calling and establishing a contact.

Once a calling frequency is established lots of stations start to listen on it and many contacts can be made more easily. It is suggested that the frequency be for both CW and SSB calling and that SSB contacts take place higher in the band and CW contacts lower in the band. The frequency suggested is 1.970MHz.

The HF Committee invites both Novices and full licensees to comment on this idea. Comments should be received no later than 1 October and should be addressed to the HF Committee at PO Box 599, Hemel Hempstead, Herts HP3 0SR.

RAE May 94

LAST MAY’S RAE was set by 1863 candidates. According to the City and Guilds reports 69.9% passed Part One and 86.6% passed Part Two. The detailed report is available to members on request from the Amateur Radio Dept at RSGB HQ.

RSGB Council Vacancies

THE FOLLOWING RSGB Council vacancies exist for the term 1995 – 1997:

Ordinary Members

E J Allaway, G3FKM, retires and is eligible and willing to stand for re-election.

G L Benbow, G3HB, retires but is not eligible for re-election (Article 26).

M H Claytonsmith, G4JKS, retires but is not eligible for re-election (Article 26).

N Roberts, G4UF, retires and is eligible and willing to stand for re-election.

I J Kyle, G16AYZ (Zone F), retires and is eligible and willing to stand for re-election.

C N Trotman, G4YKL, is elected President of the Society for 1995, thereby creating a vacancy in Zone E.

Full details of how to nominate someone for these vacancies, and of the extent of the Zones, can be found on page 5 of the August RadioCom.

_Let us help you..._
RAE & Morse Courses

- From October there's an RAE course held in Canterbury on Thursday evenings for the May 95 examination. Practical projects are offered as well as theory. Details from G3TAJ on 0304 812723.

- The Sandwell Amateur Radio Club, in conjunction with the Evening Study Association, is running an RAE course on Thursday evenings from 1 September at Oldbury, Birmingham. Enrol any Thursday evening before the start of the course. Details from Gordon Adams, G3LEQ, on 021 544 0771.

- The North Cheshire Radio Club, in conjunction with the Evening Study Association, runs an RAE course on Sunday evenings from 11 September in Wilmslow, Cheshire. Enrol any Sunday evening before the start of the course. Contact Jill on 061 485 5086 for more info.

- Eppling Forest Raynet is running an RAE course near North Weald Airfield from Monday 3 September. Call Mike, G7BNF, on 0279 7225569 for more information.

- A 30-week RAE course commences 22 September at Farnborough College of Technology, Highfield Avenue, Aldershot. At the same venue are two 16-week courses: Maths for Radio and Electronics and Morse Code for Radio Amateurs. Details from Gayle Jones on 0252 317228.

- On Monday evenings from late September an RAE course, for the May 95 exam, at Batweave High School in Kirkcaldy. A Morse course is at the same place on Tuesdays. For enrolment details, contact Ken Horne, GM3YBQ on 0592 265789 (evenings).

- At Brentford College, a Morse class commences on 26 September at 7pm. An RAE class starts at 7pm on the 28th. Enrol 15 September at 8pm. Information from Frank Coles, G3PZC, on 081 977 5343.

- Commencing 21 September is an RAE course at Beech Hill Community Centre, Luton, Beds. For further info call 0582 507781.

- An evening 12WPM Morse course is to be held at Telford College of Arts and Technology from 22 September. Enrolments is open as from 15 September. Call Mike, G4YFB, on 0454 372719.

- On Tuesday evenings from 20 September is an RAE course at Audley and Hamerend Adult Centre, near Newcastle-U-Lyme. Enrol on 13 Sept at 900, 15 Sept at 900 at Audley Adult Centre, or 15 Sept at 1900 at Sir Thomas Boughley School, Hamerend. For further details contact Doug, GBBA 0782 71347.

- If there's sufficient interest, David Wright, GW1MWL, will run a Novice course at Wrexham College of Further Education starting in September. Call David on 0978 845858.


- The Hillcrest School and Community College AR Society runs RAE and Novice courses in Netherton, Dudley. For further information contact Arthur, G0IZF, on 0384 256581.

- Starting Friday 2 September, the Widnes and Runcom ARS will be holding an RAE course at the Edgenton Arms, Runcom. For details call Dave Wilson, G7OBW, on 0270 761606.

- Three evening courses are available in Leeds: RAE and Novice classes are at Joseph Priestley College; RAE, Tuesdays from 13 September and Novice on Thursdays from the 29th. A Morse class is on Wednesdays at the Alec Beever Centre in Hunslet. Details on 0532 711594.

- Pensioners or those on benefits can claim a waved fee at Merton College, Morden, Surrey. The RAE course, which is open to all, is on Wednesday evenings. Call the tutor, David Bowman, GM0MF, for details: 081 840 3001.

- Reading and District ARC will be running an RAE course again this year. The venue is Woodley. Non-members of the club welcome. To join the class, write to: Stephen Coleman, G4YBF, 263 Wykeham Road, Reading RG6 1PL.

- From Monday 19 September, there's an RAE course at Twyford House, Shirehampton, Bristol. Discounts are available for pensioners and those on benefit. Call the tutor for more information: Chris Budd, G0LOJ, on 0454 616267.

- For the May 95 RAE, a course will be run at Meopham, Kent from Thursday 29 September. This is an evening class but provision can be made for those who find evening classes difficult. Call the tutor Len Buck, G0DLR, on 0732 823483.

- Peter Buchan, G3HNR, is the tutor for an RAE course at Sawston Village College, near Cambridge, from September. Further information can be obtained from Senior Tutor Mr Cupit on 0223 834492.

Free Rig Check

THE RAF AMATEUR Radio Society will operate GBORAF during the Lincoln Hamfest on 10/11 September. They will use SSB and CW on 80 and 40m, and 2m on the 10th only.

During the event, members of the RAFARS and the Lincoln Short Wave Club will be on hand to provide, where possible, a free functional check of radio equipment brought to the rally.

JOTA '94

THIS YEAR'S Jamboree On The Air is on 15/16 October. Anyone taking part is urged to register as soon as possible with the Scout Association so that information sheets can be sent to all participants. Send an SASE to: UK JOTA Team, The Scout Association, Gilwell Park, Chingford, London E4 7QW.

Senior Instructor

THE SENIOR Novice Instructor for Hereford and Worcester is Mike Butler, G4UXC, 16 Clevendon Green, South Littleton, Evesham, Worcs WR11 5TY. Tel: 0386 831508.

- The ORKEYNS 2m repeater, GB3OC, is currently off air for a complete overhaul. Further information from the keeper Bill Wright, GM3IUB, QTHR.

CEPT List

LAST MONTH we carried the full text of the recent licence changes, including a revised list of countries which are members of CEPT. It is extremely important to distinguish between this comprehensive CEPT list, and those countries which have signed the CEPT TR6-01 agreement.

TR6-01 permits temporary operation in other countries without additional paperwork and the signatures are listed in abbreviated form on your annual Licence Validation Document. The full list of CEPT countries should be used only to translate these abbreviations.

Trophies Manager Wanted

The RSGB is looking for someone to carry out the important volunteer task of Trophies Manager. Applications and enquiries should go to the Company Secretary, John Hall, G6KVA, Corfe Lodge, Ipearwich Road, Long Stratton, Norfolk NR15 2TA.
Come to our
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From 9 am onwards at Matlock

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The QMS is an SGC 'smartie' automatic antenna coupler, an SGC:90 extended high-range antenna, and the special exterior—waterproof—mounting package, all in one.

This is the car that ham dreams are made of. Incredibly quick, luxurious, and Q5. The secret is the QMS strapped to the trunk. Granted, it may look a bit unusual on a luxury car, but the QMS gives any mobile HF-SSB an almost unbelievable jump in reception and transmitting range (20:1 db). Match it with a cutting edge SGC HF-SSB and it will blast holes through major mountain ranges and probably some laws of physics. Power and focus are everything in HF-SSB ham rigs. Buy this and own the best luxury base station on the road.

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GO CAT GO!

If you are thinking about controlling your car, Kenwood or Yaesu transceiver with a PC computer but don't really know where to start Sink in has the answer — one unit that takes care of all three brands — the Siskin Multi-CAT! What's more the Multi-CAT is supplied COMPLETE with a ready made cable for YOUR Transceiver, a ready made cable for YOUR computer and software that will support Kenwood, Yaesu and Kenwood! Priced at just £69.95 plus £4.00 P&P the Multi-CAT is significantly cheaper than most single brand CAT interfaces whilst offering much much more.

The Multi-CAT is available NOW and is receiving a VERY warm reception, we just can't make them fast enough! Contesters please note — the Multi-CAT WILL survive being run over by a Landrover (we tried it!) and includes software that will carry out duplicate QSO checking and contest logging etc. It will also work most other popular programs such as LOGEQF, RIGEQF, TURBOLOG, LANLINK etc. for those interested in the DX Cluster or are chasing their DXCC.

Where possible we'll supply the Multi-CAT with a selection of other programs together with our own QSO brand software. Available now, when ordering please specify radio type (so that we supply with the correct ready made cable), whether your PC has a 9 or 25 way lead and your preferred disk format.

PACKET RACKET?
The Packet Radio scene generally slows down a little in the Summer months and starts to pick up again around this time of the year so if you are thinking of starting in this often bewildering aspect of the hobby we would like to help take away some of the mysteries to get you up and running as painlessly as possible. Generally when you purchase a TNC or multi-mode from Siskin you'll also receive ready made cables and software at no extra charge whether you have the latest turbo-charged PC or an ageing BBC B.

At last 9600 Packet Radio is REALLY taking off and once again it is British know-how and design that is behind it all. The majority of US and German manufacturers have licensed the James Miller G3RUIH 9600 Packet System most of which are available from Siskin generally off the shelf. If you are not sure where to start, call or write for a free copy of our 9600 Packet shopping list.

Another use for the Shack Computer?
How many times have you had to borrow a copy of the International Callbook to look up an overseas call? If you have a CD rom drive fitted to your PC then the Buckmaster Hammer CD is for you. A powerful search utility allows one to check call-signs, names, and addresses in seconds for Amateur Radio operators in over 100 countries (including the US, UK, France etc.) Buckmaster couldn't quite fit this CD rom with the above so they have also included hundreds of useful PDF/Shareware Amateur Radio programs too!
Available now — £33.95 plus £1.50 P&P.

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Hythe, Nr Southampton SO45 6EB
Tel: 0703 207155/207587
Fax: 0703 847754

VISA

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WORLD'S BEST
32 VALVE, 295 H.P., LEATHER-TRIMMED BASE STATION
12.5kHz Channel Spacing: A Discussion Document

THE SUBJECT of 12.5kHz channel spacing has come up several times at Repeater Management Group meetings over the past three years. We feel it is now time to seek the views of the band users.

While there is no requirement in the terms of the amateur licence for a minimum bandwidth to be used for a given mode of transmission there is a need to ensure that the frequency stability is: "Stable and free from Unwanted Emissions as the state of technical development for amateur radio apparatus reasonably permits".

Before the advent of repeaters the dominant mobile mode on 2m was AM. This requires only about 6kHz bandwidth, although the receivers in use 20 years ago had a somewhat wider passband in order to cope with the frequency instability of the transmitters of the day.

When the first repeaters were installed, 20 years ago, it was decided to use FM in line with commercial practice as it provided a better signal for mobiles, the intended repeater users. The standards then were for 25kHz channel spacing and readily available surplus PMR rigs could be used. At the same time there was an influx of cheap FM rigs from Japan. Separate crystals were used, a Tx/Rx pair for each channel. Any frequency drift required adjustment of the individual channel trimmers.

Today, commercial practice is to use 12.5kHz channels on both VHF and UHF. In the near future digital modes will be introduced which can be used at this spacing using constant amplitude carrier (FM or PM). They also have the possibility of going to 6.25kHz channeling when linear amplifiers of adequate performance become available at low cost, while using the same digital mode. Nowadays frequency synthesis is used for greater convenience, even for single channel rigs; the single reference crystal providing greater frequency stability and ease of readjustment. This applies to rigs supplied to both professional and amateur users, many manufacturers being involved in both markets.

One argument against reducing the channel spacing and hence the maximum deviation to 12.5kHz is that there would be a loss of range. However FM is not a DX mode per se. It could be argued that, in fact, modern receivers are somewhat better than 20 years ago!

Introduction of the reduced channel spacing has to be made in an orderly fashion with adequate notice. A start has been made by allocating some 12.5kHz channels for packet. For voice however it is the repeaters that will have to show the way. The carrot will come in the availability of additional channels. Hopefully this will lead to the installation of more urban units and hence greater choice for users, a reduction of abuse and a better service for the majority of users.

The choice of a changeover date requires careful consideration. Recognising that some repeaters are on pretty remote and cheerful sites a midwinter date would be most unpopular! I suggest 1 June 1996, or does it really need so much notice?

Implementation

Firstly, the Repeater end: For the transmitter a simple adjustment to the Tx deviation control is all that is needed plus a check to see that the frequency control is up to standard. At the Rx a change of filter and again a check on frequency control and through audio gain level.

For the user the most important thing is the reduction of transmitter deviation and microphone gain. In the absence of deviation meters most of us 20 years ago used the repeater and another listening amateur to ensure that our deviation was correctly set. If you didn't get chapped you weren't overdévailing!

For the Rx it would be desirable to change the IF filter to one for 12.5kHz, but initially a 6dB increase in audio gain setting should suffice.

Those planning to use the rigs coming onto the surplus market these days will find most VHF ones already equipped with the narrower filters. No doubt the black box suppliers will respond to the change with alacrity.

As regards following the commercials into digital modes, we shall be well advised to wait and see what standard prevails. Whoever remembers the alternative packet modes before AX25? In any case, for DXing we already have SSB which only requires 2.5kHz and is the narrowest viable for analogue speech. How many are aware of the Sheffield pilot-SSB repeater?

The problem with any change is that older equipments become obsolete and some may say that use is falling off so there is no need to change. On the other hand newcomers wishing to enter the hobby using the cheap ex PMR synthesized rigs will be at a disadvantage because of their narrower filters.

Anyway what do you think? Address your thoughts to the Repeater Management Group via RSGB HQ and we will let you know the result of the extent and content of your input.

Dave McCue, G4NUJ, Special Projects RMG.
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**TA-33-M-WARC**
4 EL 10/12/15/17/20M

**TA-34-M**
4 EL 10/15/20M

**TA-34-XL-WARC**
5 EL 10/12/15/17/20M

**TA-53-M-WARC**
4 EL 10/12/15/17/20M

**PRO-57-B**
7 EL 10/12/15/17/20M

**PRO-67-B**
7 EL 10/12/15/17/20M

**PRO-77-A**
7 EL 10/12/15/17/20M

**PRO-95**
9 EL 10/12/15/17/20M

**PRO-96**
9 EL 10/12/15/17/20M

**TW-33-M**
3 EL 12/17/30M

**VERTICALS**

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10/12/15/17/20/30/40M

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

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DIGITAL SIGNAL Processing — DSP — is the latest development in audio filtering, with several filters appearing recently on the UK amateur market. We have compared five of them from the viewpoints of the HF DXer and of the VHF/UHF DXer.

Although some of our criteria were different, we reached very similar conclusions in independent tests. We have also compared and contrasted DSP filters with one of the best analogue audio filters, the Datong FL3.

JPS NTR-1
THIS IS THE SIMPLEST of the units tested. With its voice-only bandwidths of over 6kHz and 3.4kHz with a deep bass response, the NTR-1 is clearly aimed at HF broadcast listeners. It is also the easiest unit to use, with four separate push-buttons for power, notch filter, noise reduction and bandwidth. The noise reduction has three internal settings, described as position 1 for "wideband SSB or noise floor (on the HF bands — this unit was not tested on extremely weak VHF/UHF CW). Even so, the noise reduction was not so pronounced as with some of the other units, perhaps because of the wider audio bandwidths offered by the NTR-1.

J-Com W9GR DSP II
THE NOTABLE FEATURE of this unit is its LED bargraph to ensure that the audio input level is set correctly. The filters are excellent as also are the noise and heterodyne reduction on HF signals. On SSB these facilities are available either separately or in combination, and there is also a notch filter optimised for weak-signal SSB. The reduction in noise while tuning the HF bands was a real pleasure; the best general-purpose position seemed to be the 'SSB optimised denoiser'.

The CW filters were excellent on strong signals. The processed note was always clear and clean, with no noticeable ringing, but on very weak CW the narrower bandwidths
TABLE 1: Summary of the facilities available on the five DSP audio filters tested.

<table>
<thead>
<tr>
<th>Features</th>
<th>JPS NTR-1</th>
<th>J-Com W9GR DSP II</th>
<th>JPS NIR-10</th>
<th>Timewave DSP-9</th>
<th>Timewave DSP-9+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate signal-mode settings</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Voice bandwidths</td>
<td>160-6600Hz</td>
<td>90-3400Hz</td>
<td>1800Hz</td>
<td>3.1 / 2.4 /</td>
<td>3.1 / 2.4 /</td>
</tr>
<tr>
<td></td>
<td>tunable within 300-3200Hz</td>
<td>1.8kHz or 2.4 / 2.0 /</td>
<td>1.6kHz</td>
<td>2.4 / 2.0 /</td>
<td>1.6kHz</td>
</tr>
<tr>
<td>CW bandwidths and centre frequencies</td>
<td>200 / 100 / 30Hz centred at 800Hz. 100Hz centred at 400Hz</td>
<td>600 / 250Hz, fully tunable within 300-3200Hz</td>
<td>500 / 200 / 100Hz, centred at 600 / 750Hz or 400 / 500Hz</td>
<td>500 / 200 / 100Hz, centred at any two of 400 / 500 / 600 / 800Hz</td>
<td></td>
</tr>
<tr>
<td>Number of front-panel selectable CW centre frequencies</td>
<td>none</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Data modes</td>
<td>none</td>
<td>3</td>
<td>none</td>
<td>none</td>
<td>4</td>
</tr>
<tr>
<td>HF packet</td>
<td>1550-1850Hz</td>
<td>2076-2345Hz</td>
<td>2075-2345Hz</td>
<td>540Hz</td>
<td>250Hz</td>
</tr>
<tr>
<td>RTTY</td>
<td>1150-2350Hz</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>340Hz</td>
</tr>
<tr>
<td>SSTV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>440Hz</td>
</tr>
<tr>
<td>AMTOR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PACTOR</td>
<td>no</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative data tone centre frequencies</td>
<td>none</td>
<td>none</td>
<td>fully tunable within 300 - 3200Hz</td>
<td>none</td>
<td>Jumpers for 1360 / 1300 / 1530 / 2200Hz</td>
</tr>
<tr>
<td>Noise filtering</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Notch filtering</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Independent bandwidth, noise and notch filter selection</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Front-panel controls (+ Volume and On/Off)</td>
<td>Three buttons</td>
<td>Rotary switch</td>
<td>Three 3-way toggle switches, 1 variable pot 8</td>
<td>Five buttons</td>
<td>Six buttons</td>
</tr>
<tr>
<td>Switch combinations (+ Bypass/Test)</td>
<td>8</td>
<td>11</td>
<td>24</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Input level indication</td>
<td>none</td>
<td>LED bargraph</td>
<td>Overload LED</td>
<td>Normal and Overload LEDs</td>
<td>Normal and Overload LEDs</td>
</tr>
<tr>
<td>AF gain control</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Power-off bypass</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Tx / Rx remote bypass</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>UK main dealer</td>
<td>Lowe</td>
<td>Waters &amp; Stanton</td>
<td>Lowe</td>
<td>Nevada</td>
<td>Nevada</td>
</tr>
<tr>
<td>List price (June 1994)</td>
<td>£199</td>
<td>£299</td>
<td>£399</td>
<td>£189</td>
<td>£239</td>
</tr>
</tbody>
</table>

The W9GR was one of the first commercial DSP filters, and has fewer facilities than some of its successors. The manufacturer might include in the next generation a wider choice of CW tones, controls that are self-explanatory from the front panel, a better location for the headphone jack socket, and the facility to pass the unit automatically on transmit and when switched off.

**JPS NIR-10**

This unit has unique facilities, especially the continuously variable bandpass tuning or noise reduction threshold (one control serves either purpose, but not both). Both reviewers had to refer several times the explanation of the functioning of the two 3-way toggle switches that together select the operating modes, and then had to keep referring to the separately printed crib-sheet.

The NIR-10 has only three bandwidth settings—wide, medium and narrow. As Table 1 shows, these are reasonably well-suited to 'narrow SSB', 'wide CW' and 'narrow CW' respectively. JPS also offers an alternative model for voice SWL use with bandwidths of 3000 / 2400 / 1800Hz, and for an additional...
$35$ the factory can program in any three bandwidths requested. Although the widest bandwidth of the model under review was only $1.8$ kHz, the variable tuning facility allows this to be deployed in the best possible way to deal with a particular interference problem. Alternatively this potentiometer control can be used to set a variable noise reduction threshold using the Spectral Subtraction mode, which is presently unique to the NIR-10 in the amateur radio market. Some users preferred the NIR-10 in this respect, although on many kinds of interference the difference between the NIR-10 and other DSP filters tested was not marked.

On CW the tuning facility allows you to set your preferred tone for listening, or alternatively to tune the filter to the incoming signal — very good for UHF and above, where there are still a few stations that begin to drift as soon as they start transmitting! The NIR-10 can be automatically bypassed on transmit to let your CW sidetone come through, and also has facilities for routing the microphone signal through the filter to process the audio bandwidth of the transmitted signal. The CW note from the NIR-10 in the 'narrow' setting did not appear as 'clean' as that from the WSGR, and with very weak signals there was a noticeable 'licking' noise, sounding rather like ignition interference.

**TIMEWAVE DSP-9**

THE TIMEWAVE FILTERS are notable for their very clear push-button controls. A 'Voice/CW' switch determines the functions of four further buttons, and there is also a separate 'bypass' switch. On 'Voice', two buttons provide a selection of three SSB bandwidths (see Table 1), while the remaining buttons can independently switch in the random-noise filter and/or the notch filter. On 'CW' the same pair of bandwidth buttons now offer three narrower bandwidths, the random-noise filter button functions as before, and what had been the notch-filter button now offers a choice of two CW centre frequencies. Two reviewers were very impressed with the simplicity and clarity of this system, and we never even needed to consult the manual.

The DSP-9 is the 'basic' unit and has no automatic bypass on power-off or on transmit. Internal jumpers offer a simple choice of two sets of SSB bandwidths and two pairs of CW centre frequencies — see Table 1.

On both SSB and CW we appreciated the facility to control the bandwidth, tone notch filter and random-noise filter independently rather than only being offered certain limited combinations. There were circumstances in which one combination definitely worked better than the others — and it was just a matter of prodding a few buttons to find the best. The SSB quality sounded rather more 'reconstituted' than the other filters and the CW note at times sounded 'ringy', but neither of these was objectionable compared with the benefits in readability. On very weak CW the random-noise filter function helped to reduce the noise. We should add that every one of the units reviewed helped to reduce the ringing of the narrow crystal filters in our transceivers.

**TIMEWAVE DSP-9+**

THE DSP-9+ IS the more 'refined' version of the DSP-9. In addition to the facilities of the DSP-9, the 'Plus' model includes an additional 'Data' mode with four different filters: automatic bypass on transmit and power-off, an AGC facility to help maintain a steady signal input, and a much wider range of internally-selectable filter bandwidths and centre frequencies (see Table 1). As with the DSP-9, the push-button controls are very well thought out: all appropriate combinations of facilities are independently selectable.

SSB and CW performance were essentially the same as the DSP-9 (again we did not test the data modes) but for weak-signal CW the selection of three bandwidths centred on 400–500 kHz gave the DSP-9+ the edge over all the other units reviewed. One press of a button returns the centre frequencies to a more comfortable 600 or 800 kHz for normal-strength signals.

**CHOICES**

ALL THE UNITS TESTED were very impressive. The first time you hear a DSP filter at work, you'll be astonished too. Both reviewers were very impressed by what all of these DSP filters can do. Neither of us had previously had much use for audio filters ..., which we now realised was because we'd never really heard a good one!

We each reviewed the same set of filters 'blind' — neither of us knowing what the other one thought. Also our criteria were quite different: G3HCT is a dedicated HF DXer and contestant, while G3SEK's activity is mostly VHF/UHF DX (including moonbounce) with only casual operation on HF. Even so, we each came to the same conclusion: we liked the Timewave DSP-9+ best of all, for its good performance, its versatility and above all its well-designed controls. By no means the most expensive of the units tested, it also takes the prize for 'best value'.

The five filters tested by G3HCT and G3SEK. Seen here from the front . . . .
ANALOGUE VERSUS DSP
IF YOU ALREADY HAVE an analogue audio filter, you may be wondering whether it’s time to trade-up to DSP. Even leaving aside the cost, that decision isn’t as obvious as it might seem. There are some things an analogue filter just can’t do, including random-noise reduction and multiple simultaneous filtering of heterodynes. On the other hand, existing analogue filters can provide extremely sharp bandpass filtering for both CW and SSB, and some units can also notch out heterodynes.

For comparison we chose the Datong FL3, an analogue audio filter which has won the respect of HF and VHF/UHF DXers alike. In its SSB modes, the FL3 has independently adjustable high pass and low pass filters, combined with a manual notch filter and also a unique automatic notch filter. In CW mode, the FL3 has independently adjustable bandwidth and centre frequency, with either a flat-topped or a peaked passband.

Our basis for comparing these filters is what they do for the readability of signals, because impressive bench-test figures are far from the whole story. Direct comparisons are not possible because the filters in the FL3 are fully tunable whereas most of the DSP filters are fixed in frequency. In most circumstances a choice of fixed filters will be fastest to use, provided they are logically laid out and easy to select; but a fully-tunable passband will be better in extremely difficult cases, especially if your transceiver doesn’t have IF Shift.

It took each of us some hours to get used to these filters, and you should expect the same. You’ll need to practise how to use the filter, and it may take an extended operating session to realise the full benefits. Be realistic: don’t expect miracles straight out of the box, but be prepared to balance the advantages against the drawbacks.

On SSB, we found that the audio quality from DSP is not as good as from the FL3, while noise reduction since the signal waveform has been literally taken to bits, processed and then reconstituted. Degradation in quality is particularly noticeable if the signals are oﬀ-tone, making speech sound ‘hollow’ and unpleasant. However, we have learned how to read oﬀ-tone SSB, so maybe in time we can manage the same for digitally processed signals. Balanced against this is the remarkable reduction in ‘crud’ and ‘monkey-chatter’ that DSP can bring to SSB, even in the pauses between syllables. With heterodynes from tuners-up also completely suppressed, this adds greatly to ease of listening.

Notch filtering is where DSP really scores over analogue, because it can deal very quickly with several heterodynes at once. Although the automatic notch filter in the FL3 works well with a steady tone of reasonable strength, and will quite successfully track any changes in frequency, it will lose lock if the interference is keyed CW. And of course it can only deal with one heterodyne at once – or two if you use the manual notch filter as well.

On medium to strong CW, the almost complete absence of ringing in the DSP filters gives them the edge over analogue filters, which can never achieve quite the same combination of flat top, steep sides and minimal ringing. A DSP audio filter can help reduce ringing from the IF CW ﬁlter, provided that the audio ﬁlter is set to a narrower bandwidth, and the absence of ringing can greatly reduce operator fatigue. With a DSP ﬁlter, a CW signal is either somewhere within the ﬂat-topped passband or it isn’t there at all. However, in contests and pile-ups there can be good reasons to prefer a distinctly peaked response with a less steep-sided passband, like that of the FL3, because it provides an important sense of what’s happening nearby and in the background. The ideal solution with a DSP ﬁlter might be an adjustable level of ‘background’, which could equally well be achieved by an external audio mixer.

The results on very weak CW were rather surprising. Considering the potential problems in digital processing when signals are so weak that they are hardly diﬀerent from the noise, the DSP ﬁlters performed much better than we expected. On moonbounce signals that were as weak as we expected, most of the ﬁlters reviewed came within a hair’s breadth of equalising the FL3 for readability. Switching rapidly between the FL3 and the DSP-9+ at 100Hz bandwidths, the audio sounded diﬀerent but there was very little diﬀerence in readability – at least to G3EXK’s ears. We were unable to test or compare the performance of DSP ﬁlters on VHF aurora, where the signals are almost totally degraded into noise, or on other forms of clutter in which phase coherence is partly destroyed. One cannot have great hopes of DSP in these circumstances, unless the processing is completely conﬁned to passband shaping. Another VHF mode we were unable to evaluate in the timescale of this review was high-speed CW for meteor scatter.

All audio ﬁlters suffer from the disadvantage that the wanted signal can be affected by another strong signal which falls within the wider IF passband of the receiver and thus takes control of the AGC. This applies particularly when receiving CW in an SSB-width ﬁlter, for that reason we highly recommend that you use a 500Hz IF ﬁlter for CW. However, a DSP audio ﬁlter might well be a better investment than a second and possibly narrower CW IF ﬁlter.

DSP ﬁltering involves some time delay, and you are normally listening to signals 10-30ms behind real time. This is usually of no consequence, although when tuning-in a CW or SSB signal it does introduce a perceptible lag in the feedback loop from your ﬁngers to your ears. However, the 100ms delay in the NIR-10’s Spectral Subtraction mode of noise reduction is more serious, and may aﬀect your transmit-receive changeover timing for break-in CW and data modes.

A potential diﬃculty with DSP ﬁlters is their relatively low dynamic range. Overdriving the analogue-to-digital converter will clip the peaks of the input waveform, while very low-level input signals will suﬀer signiﬁcant quantization errors. Both of these eﬀects will lead to distortion before you even consider the eﬀects of the DSP algorithms. Your receiver’s AGC circuit will protect the ﬁlter to some extent, and only if you use the DSP-9+ has it an internal AGC circuit which is sometimes helpful. However, a well-designed analogue ﬁlter is much more tolerant of variable input signal levels.

Another limitation is the performance of the audio output stage. These external ﬁlters all take over the task of driving a loudspeaker and require a stable high-current power supply. DSP requires considerable computing power, which will consume the best part of 1A. Add to this the peaks of demand when driving a loudspeaker, and the ﬁlter can quite easily overload a nominal ‘12V 1A’ power supply. If you notice severely distorted audio at higher volume settings, don’t blame this on the ﬁlters! Many DSP ﬁlter manufacturers recommend you to avoid any kind of ‘plug-top’ DC power unit, and to power the ﬁlter from the high-current transceiver supply.

CONCLUSIONS
DSP AUDIO FILTERS are impressive in all departments: bandpass filtering, noise reduction and heterodyne suppression. However, the technology is still in its infancy, especially as regards the human/machine interface. As with many digital products when ﬁrst introduced, some present-day DSP audio ﬁlters tend to oﬀer you technology rather than convenience. The situation is changing rapidly – just look at the evolution in operating convenience among the ﬁlters reviewed in this article – but there is still some way to go. The same applies to the DSP programmer – how does one make oneﬁlter sound diﬀerent from another, and how can audio quality be improved?

It will also be interesting to see how successfully DSP ﬁltering is incorporated into new transceivers. Built-in DSP is presently a premium feature, and may take some time to appear in the mid-range transceivers that most of us buy. In the meantime, an external DSP audio filter for your existing transceiver may be a cost-aﬀective alternative to an early transtion.

Our thanks to Datong, Lowe Electronics, Nevada Communications and Waters & Stanton for the loan of the review products.
FIR T A M E M I N E R — in the July column I suggested that we begin another 28 MHz table — to start counting from 1 August. This one will run until the end of 1995. I wonder who will be the first to reach 100 countries?

BEACONS

JACK TROSTER, W61SQ, IARU Coordinator for the IBP (international Beacon Project) programme reports that W6WX/B, the prototype of the beacons to be used in the IBP multi-beacon network, has been rebuilt to incorporate new design ideas, and put in operation on the top of a 3500ft mountain immediately west of San Jose. The transmitter is a Kenwood TS-140 transceiver controlled by a unit built by Bob Fabby, N6EK, of the NCDXF. The antenna is a Cushcraft R-5 vertical. It transmits for one minute in its regular time slot (00:01Z) on 14.100 MHz every ten minutes, then flips to 21.150 MHz and transmits a 10-s message, then to 28.200 and back to 14.100 transmision. The 21 and 28 MHz transmissions are repeated every two minutes. The artwork for the controller unit boards has been completed and sent to a board manufacturer. The first two test boards were completed at the end of July and the first beacon built very soon afterwards. This will most probably be KH6O/B because it is close and it is already licensed by the FCC to operate on the same frequencies as W6WX/B. Following a successful KH6O/B test the network will be constructed and distributed — first to the existing network and then to the new locations. It is hoped to have all operative before the beginning of the next sunspot cycle. Seven beacons in the existing 14.1 MHz chain are working well but CT3B seems to be intermittent and LU4AA/B has not been heard for more than a year.

Radio clubs in Peru, Venezula, New Zealand, and Sri Lanka have accepted invitations to join the multi-beacon network and possibly there might be suitable locations available in WAustralia and in Kenya. This would mean a total of 15 beacons and these would take 2.5 minutes for all to be keyed. 30s would then be able to accommodate three more — ideally two of these will be situated somewhere in Russia and China.

THE MOST recent DXCC News Release dated 1 July 1994 said that the number of unprocessed applications at the end of June was 334 (representing 40,564 QSLs). The DXCC desk had received 704 applications (62,500 QSLs) for endorsements and new awards during the month. Applications being sent out at the end of June had been received less than two weeks previously. Applications and QSLs received continued to run ahead of last year’s rate and in the first five months of 1994 applications were up by 13% and QSLs by 25% compared with 1993.

Mady (KA6ZYF) and Terry (WG3/MHVM) have recently returned from a five week trip through Russia. They were able to operate as R3/GM4HZ and R3/KA6ZYF from Nizhny Novgorod and Moscow, R0/GM4HZ and R0/KA6ZYF from Ufa, UB8WTL/S and UB9WML/S from Tomsk, R0/GM4HZ and R0/KA6ZYF from Kyzyl (Tuva — zone 23), and UB9WTL/U and UB9WLL/U from Irkutsk and Vladivostock. These were the first reciprocals calls over Broomfield to foreign operators to originate from Tuva.

RSGB DX News Sheet says that Portuguese Telecom has made changes to the prefix system for Portuguese licensees. However, regular call signs will be retained for use on all occasions in Portugal and for operators with any number and in Madeira CT3, CT8, CU, CS1, CS2, CS3, CS4, CS5, CS6, CS7 and CS8. In addition, new call signs for operators with any number and in Madeira CT3, CT8, CU, CS1, CS2, CS3, CS9 and XX with any number excluding XX9. CR prefixes are reserved for the National Civil Protection Service. Prefixes using the number 0 will be used to replace the current operators in 1991 and 1992. Single letter prefixes will be issued to multi-operator contest and expedition stations. Single operator stations will be issued with special call signs but will use the same suffix as the applicant’s normal call. Foreign amateurs applying for reciprocal licences will use a regular prefix/own call.

Please note that Karella, UN1N, has now been deleted from the WA2E countries list. 11R8 and 11R8J operated from “the Principality of Seborga” recently and used the callsigns 11R8/OS1B and 11R8J/OS1B. This is not near Monaco and is on the Italian-French border — at the moment the likelihood of DXCC status being granted is now known. I had a telephone message from Paul himself, 11R8J, and he told me that there was no agreement between Italy, the IFU, and the Principality and that any future activity would use the callsign I01AOS1A which is more in line with the correct procedure.

XE1BEF has written about his operation as XF4C from Portugal and Morocco which took place between 19 February and 5 March this year. He made 5,000 QSOs using CW, SSB, and RTTY, but found conditions during his 15 day stay to be very poor to Europe. This was his fourth visit — he was 11B8J from 1980 to 1982 operating in 1991 and 1992. QSLs were being sent out during June, C7G7 was a special event station located in Victoria, BC, Canada, It was in operation from 1 July until 31 August. WA3YVJ (who was one of the VP8SS1 operators) and WA4VCO recently formed the SGI DXpeditions group with the aim of activating many high-demand DX locations and many of the low latitude Antarctic Islands. They are at an advanced stage of planning a three-weeks expedition to South Georgia in early January 1995. All gear for four complete stations was put aboard the research vessel which transported the VP8SS1 expedition in June at Fairhaven, Massachusetts. Operation will begin on 1, 8, 15, 22, 29, 36, 43, 50, 57, 64, 71, 78, 85, 92, 99, 106, 113, 120, 127, 134, 141, 148, 155, 162, 169, 176, 183, 190, 197, 204, 211, 218, 225, 232, 239, 246, 253, 260, 267, 274, 281, 288, 295, 302, 309, 316, 323, 330, 337, 344, 351, 358, 365, 372, 379, 386, 393, 400, 407, 414, 421, 428, 435, 442, 449, 456, 463, 470, 477, 484, 491, 498, 505, 512, 519, 526, 533, 540, 547, 554, 561, 568, 575, 582, 589, 596, 603, 610, 617, 624, 631, 638, 645, 652, 659, 666, 673, 680, 687, 694, 701, 708, 715, 722, 729, 736, 743, 750, 757, 764, 771, 778, 785, 792, 799, 806, 813, 820, 827, 834, 841, 848, 855, 862, 869, 876, 883, 890, 897, 904, 911, 918, 925, 932, 939, 946, 953, 960, 967, 974, 981, 988, 995, 1002, 1009, 1016, 1023, 1030, 1037.
a cheque (payable to SGI Expeditions) to SGI Expeditions, PO Box 2235, Melbourne, FL 32902, USA.

According to DXPRESS, Stephane, F50WB, should remain in Bumundi for a few more months. He is active on all bands and modes as 9U/F50WB.Rafik, F5CQ (ex-F5TXA), is now on Mayotte and should be there for two years. The RSGB DX News Sheet says that DKTPE may be on the air from Ghana for several months but has not been confirmed. 4X4MS will also be in Ghana for a prolonged spell and hopes to get a licence. 3XYOA is the present callsign of the former 3X0YU. SU1KR is Pavel, OK2FUN, who is a member of staff at the Czech Embassy in Cairo. He is on all bands except 1.8MHz. According to RSGB DX News Sheet FT5XJ, on Kerguelen Is, was to go on three months leave in July after which he is expected to return for a further year. From the same publication comes news that 9K2CS is said to have permission to operate from Tunisia. However, he wishes to take an American with him and the authorities will not allow the W to operate. Hence - stalemate. The first operation from Scarborough Reef took place during the last weekend of June. It was organised by the China Radio Sports Association together with JA1BK and OH2B8H and was manned by BZ1HAM, DL5JV, DJ1RAA, DJ1I0G, JF1IST, KJ4VH, OH2BH, and OH2MAK. The primary goal was to collect information so that a full-scale expedition can be manned after the typhoon season and the group feels that this can take place. During thirteen hours on the air more than 2,000 QSOs were made - all on SSB - and using an FT-990 with a Cushcraft RS and 3.5MHz dipole. The Chinese Taipei ARL has announced that the Ministry of Posts and Telecommunications authorised the use of the following frequencies in Taiwan from 1 July: 3.500 - 3.512.5, 3.550 - 3.562.5, 18.068 - 18.080.5, 18.110 - 18.122.5, 24.890 - 24.902.5, 24.930 - 24.942.5, 50.500 - 50.0125 and 50.110 - 50.1225MHz.

**IOFA FREQUENCIES**

**CONTESTS**

**ALL ASIAN DX CONTEST (SSB)**

0000 3 September - 2400 4 September
1.8 - 28MHz (except WARC). Single-operator single or multi-band, and multi-multi classes. Work Asian stations and give RS plus age (ladies are excused - they send '00'). QSOs on 1.9MHz count three points, on 3.5MHz two, and on others one. Multipliers are the number of Asian prefixes worked on each band. Copies of the rules/summary sheet/log sheet available (SASE please).

**WAE DX CONTEST (SSB)**

0000 10 September - 2400 11 September
(See August issue).

**SCANDINAVIAN ACTIVITY CONTEST**

1500 17 September - 1800 18 September (CW)
1500 24 September - 1800 25 September (SSB)
3.5 - 28MHz (no WARC). IARU 'contest free' segments should be observed (3.560 - 3.600, 3.650 - 3.700, 14.060 - 14.125 and 14.300 - 14.350MHz). Work Scandinavians only (LA/LB/LG/LJ, JW, JX, OP/OG/OH/OI, OFO/G3OH0, QJ0, DX, OY, OZ, SU/SJ/SK/SJ7S/BS and TP). Single operator all band, single- operator QRP, multi-operator and listener classes. Exchange RS/T plus serial QSO number (from 001). Each QSO counts one point. The multipliers are Scandinavian call-number areas (0-9) worked on each band. This year’s contest is being organised by EDR (Denmark). Unfortunately 1994 rules had not arrived when I was writing this.

**VK/OLCEANIA CONTEST**

1000 1 October - 1000 2 October (SSB)
1000 8 October - 1000 9 October (CW)
1.8 - 28MHz (no WARC). Listener may enter and in this case the two sections are combined. Work VK/OL/Oceania stations - each QSO counts two points. Exchange RS/T plus serial number from 001.

**IOTA FREQUENCIES**

**ETHIOPIA**

VERY GOOD news from Sid, ET3SID, this month. At last approval has been granted for the Ethiopian Amateur Radio Society club call sign ET3AA and the first transmission went out on 5 July. The President of EARS, Mr Admasse Zeleke, ET3AZ, and Mr Tensai, ET3BT, have received their licences - the first issued to Ethiopians in more than twenty years. The society now has about 30 members and eight more candidates have undergone practical and theory training in line with the City and Guilds of London radio exam. Sid says that one way of assisting EARS is to ensure that your QSLs are accompanied by ‘green stamps’ - this covers not only the cost of postage but also contributes towards the cost of running the club. Sid thanks - amongst others - RSGB for Morse tapes, leaflets, and post cards supplied by HQ.

**DYPLOM**

200 lat Bitwy pod Racławicą
200 years of the Battle of Racławice

**DYPLOM**

100 lat Panorama Racławickiego
100 years of the Racławice Panorama

200th Anniversary of the Battle of Racławice Award.
RF NEWS

10 YEARS OF RACLAWICE PANORAMA
Issued by the ‘Ikar’ club in Wroclaw, Poland. Europeans need 15 points from working/hearing stations in Wroclaw province during 1994 and DX stations ten. GSOs with ordinary WR stations count two points, with SP0PKQ five points, and with SNOPRR between 15 March and 30 April and 1 June and 31 July seven points. GSOs may be repeated on all bands/modes. Send applications together with 10 IRCs to: Klub Krotkofalowcow, SP6PKQ - 'Ikar', PO Box 2190, 5-985 Wroclaw 47, Poland.

PROPAGATION
SMITHY'S PROPAGATION report for September is rather short. It says: "There was little change is solar and geomagnetic indices in the second half of June and the first half of July except that the upward trend in average geomagnetic activity seems to have halted, at least for the time being, the provisional mean A index for June being some 30% down on previous months. At the same time solar activity has remained uniformly low, the average solar flux for June at 77sul the lowest since early in 1987. HF band conditions can only be described as typical for summer months at the low end of a cycle, which is informative only if one has already experienced this situation.""}

THANKS...

...GO TO ALL those who sent in information and to the authors of the Lynx DX Bulletin (EA2KL), the Long Island DX Bulletin (VP2ML), the RSGB DX News Sheet (G4DYO), and DXPRESS (PA3FQA). Please send everything for the November column to reach me at the above address by 17 September.

AWARDS
100 YEARS OF RACLAWICE PANORAMA
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REPEATERS
DAVID REAY, G8UHO, Hon Sec of the Lakeland Fells Repeater Group, wrote about a problem with UHF relay GB3LF on PB14. It was triggered to a 'locked-on' state by RF from a new pager on 137.975MHz getting into the output of a preamp on its receiver. This was quickly resolved. The repeater is on a PMR site east of the M6 near Lancaster. It comprises a Pye T/R 412 set, four cavity filters and a pair of unity gain end-fed antennas at 350ft ASL. The coverage area is north Lancs, north of the Pendle, up to the three counties boundary near Ingleton and over to the Furness area of Cumbria. Dave is QTHR and his CompServe ID is 70374, 1807.

The Aylesbury Vale RG's June Newsletter includes status reports on the AVRG's three repeaters, GB3VA (R4), GB3AV (RB2) and GB3BV (RB1). GB3VA was deliberately jammed on 4 March by a QRP signal from a car with amateur aerials parked close to the repeater. The car sped off when two members arrived. GB3AV is suffering from boids of interference possibly due to crosstalk from other transmitters on the site. The GB3BV receiver 'died' on 15 May, but was rejuvenated and put back into service in 30 hours. The group has 154 members and the next 'VA users' gel-together is on 8 September at the Robin Hood pub on the south side of the A422, halfway between Buckingham and Brackley. For details of the group contact Mike Marsden, GB8QH (QTHR). Tel Aylesbury (0296) 641783 after 6.00pm.

Brian Davies, GW4KAZ (GDD), chairman of the Arfon Repeater Group, reports that the repeater linking experiment is progressing well. The two repeaters are GB3AN (NGR SH 473 909) on R88 and GB3AR (SH 475 493) on R4. He has produced an information sheet about this experiment. If you'd like a copy, send him SAC to 2 Glynlyn, Bethel, Caernarvon, Gwynedd, LL55 1YL.

ROPE CONDITIONS
In National Field Day weekends were good with some excellent contacts completed. How about Scotland to the Ukraine on 70cm? The tropo path from southwest England and Wales to the Canaries has also been open. An important event was the lifting of all restrictions on the 50-51MHz part of 6m from 18 July – see page 24 in the August RadCom for the full text of the Gazette notice.

PUBLICATIONS
IN HIS JUNE editorial in The VHF-UHF DX eXtreme, Dave Hardy, G8RUO, wrote: "Putting the DXer together on time is becoming a more and more difficult task." He appeals for more articles, a perennial cry from newsletter editors. Sam Jewell's, G4DDK, 'Tech Slot' deals with the choice of local oscillator frequencies in double conversion transverters. There is a reprint of a W2COMY article on commercial microwave power meters. The remaining pages are devoted to band reports from 50MHz up. Dave is QTHR (address in current RSGB Call Book) if you want subscription information.

The Summer edition, 2/1994, of VHF Communications includes a long article on high frequency transformers by Detlef Burchard, a contribution by K1POO on the Extended Double-Zepo (EDZ) antenna concept and a solid state 80W broadband 24cm amplifier by HB8SLV and FJ1SR using four Mitsubishi M57762 modules. For subscription details UK residents should contact KM Publications, 5 ware Orchard, Barby, Rugby, CV23 8UF.

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BEACON NEWS
PETAR MILIČIĆ, 9A2MP, VHF Manager of the Croatian Society HRS, listed his 9A beacon on 144.850MHz and 1408.47MHz. Both are at JN83JO, 485m ASL and run one watt to V-dipoles. They were QRT due to "...some talk from local problems..." when he wrote to IARU's Region 1 News, the July issue. 9A0BHH on 50.865MHz and 9A0BLY for 23cm are being built for the same site. For JN83HO, three more are being made: 9A0BVA on 144.920MHz, 9A0BUB on 432.920MHz and 9A0BLL on 1296.920MHz.

CONTESTS
THE FIRST LEG of the 144MHz contest continued on page 21
"A wolf in sheep's clothing," a fitting way to describe the ALINCO DJ-180E and DJ-480E transceivers. Probably the most economical and easy to use handheds ever produced. When funds are limited, yet performance is critical, there's nothing to match their value. And they're packed with features that will make your operation more enjoyable and more fun. Each model is built for reliability and performance. The tough plastic case and advanced circuitry make them a "go anywhere" rig and the low price makes them popular as second rigs for holiday trips. What's more, the 2 Watt signal can be boosted to 5 Watts simply by connecting 12 Volts via the special adaptor. In an instant you have a mobile rig.

The DJ-580E handheld is ALINCO's most advanced design ever. You get all the standard features you'd expect such as dual watch, dual controls, scanning, search, priority etc. You also get the superb engineering from ALINCO that is making its competitors envious. The DJ-580E is now being widely used for emergency purposes and its patented low voltage circuit allows it to be used with dry cells when the voltage has fallen by 50%. You also get programmable auto power off, battery saver, digital telephone dialler, and three output power levels. But we've only just started! Key in a special code and your radio turns into a cross-band repeater. Another code gives you AM receive. Little wonder the DJ-580E is ALINCO's best seller.

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Tel: 0702 206835
22, Main Road, Hockley, Essex. SS5 4QS
continued from page 19

CW Cumulative contest is on 30 August, 2030-2300 local time. The remaining sessions are on 14 and 29 September and 14 and 31 October. General rules apply, including rule 10. A 442Z Summary Sheet must accompany your entry. (Note: I cannot find the rules for these contests; they were supposed to be in the February RadCom.)

The RSGB 144MHz Trophy Contest is on 3/4 September, 1400-1400UTC with the 4th Back Packers event on the 4th, 1100-1500. (VHFCC chairman Bryn Lewis, G4DZ, points out that Trophy contestants can work the same operator twice; once from home, then again if he/she goes out back-packing in the last three hours). The IARU event coincides with the RSGB contest: Weather permitting, Theo Köhler, PA3FPS, says his group will be on from JO12 as PA3FPS/MM. If there are high winds, they will be signing PA3FPS/P from JO23.

SOFTWARE

The PDSL (Public Domain and Shareware Library) sent PC Shareware Update Reference, subtitled Issue 18, Supplement 2. This lists the latest additions and updates to its extensive library of disks and CD-ROMS. The Ham Radio section includes logging and QSL, packet radio and BBS systems, propagation and satellite programs. See the PDSL's current adverts in RadCom.

Requests for copies of VK3UM's EME Planner and Autotrak PC programs continue to arrive. If you require copies, please read the notes in Moonbounce on page 28 in the August RadCom. I've just received (30 July) the first requests for G4JNT's programs — see under Software on page 20 in the August RadCom. I still keep, and update, CP/M software for the Amstrad PCW8000 series computers, on 3in disks only. Send me an SASE for the current Proglist.

PROPATH

THE JUNE REPORT from the Six and Ten Reporting Club records only seven disturbed days in the month, compared with 16 in May. No sunspots were reported in the 1-5 period, the maximum SSN was 63 on the 1th and the monthly mean was 31 (SIDC figures). The 2.8GHz solar flux (Ottawa) meant at 77.2.

Geomagnetically June was a much quieter month than might have been expected and Sporadic-E propagation on 50MHz was excellent. No significant auroras were reported by British or even Scandinavian observers. The report is edited by Ray Cracknell, G2AHU (HW), and printed and circulated by Ian Brotherton, G2DVB. Contact Ian (OTH) for subscription details.

John Regnault, GS4WX (J020), wants to correlate information on 144MHz ionospheric forward scatter. To summarize the characteristics of this mode:

1) The signals are continuous, but weak, maximum range being about 2,100km, similar to meteor scatter.
2) Unlike Es, there are not selective, highly ionized regions from which signals are reflected; it's more like a continuous blanket.
3) Slow fading (QSB) of 10-20dB is quite common.
4) Unlike auroral propagation it is not a field-aligned mode; stations aim their antennas at a common ionospheric volume, normally at the mid-path point.
5) Signals are T below with trace of multi-path flutter.

There appears to be no correlation with weather conditions.

Typical station requirements are 50+KW ERP on CW with a low noise receiver, maximum bandwidth of 500Hz; IE EME station performance. John wonders what are the effects of solar flux and K-index? Is the mode better just prior to an aurora? What is the best time of day? What are the best paths? His Internet address is regnaultj_c@btweb.bit.co.uk and I would appreciate a copy to my CompuServe mailbox — see end of VHF/UFH News.

This mode is not to be confused with the better known troposcatter one, so is an ideal research project in which the better-equipped stations can participate. So, when the Moon is below your horizon, how about setting up some skeds with other QRO partners and record what you hear? As with all such AR research, it is essential that results get published in RadCom rather than in an obscure scientific journal never seen by radio amateurs.

MOONBOUNCE

WE ARE IN the summer droughts and the only EME report is from Stewart Cooper, GM4AFF. He and Tim Kirby, G4VXEC, operated from Jersey in the 25 June period. On 2m they used a TS-790, a PA with a pair of S874 triodes, an MGF1202 preamp and four 17-ele Yagis. They completed with W6UN, DL3BWW, SM2CWE, DJ3ZC, PA0JMV, I2FAK, GM4MJJ, IK2FJ1, OZ5JY, EA6EQ, PH8JAB, SM5TV, W4ZD, VE3ABH, SM5BSZ, W5BLT and K1MTZ.

They heard their own echoes every night, once on SSB. On 20 June a gale wrecked the array but they rescued one Yagi. With hindsight, no advance publicity was a mistake. They thought they could use the 20m VHF net for arranging skeds but Stewart wrote: "This is OK for European MS but for world coverage it is a disaster."

In the July issue of 432 and Above EME News editor Allen Katz, K2UHY, comments that activity seems to be tilting towards the higher bands with 23cm coming close to 70cm. The next sked weekend remains 3/4 September, which clashes with other European contests. The first October is on 1/2. For the November issue, reports on the Gotenburg EME Conference would be most welcome, as would any photos.

50MHz

News

Geoff Brown, G4JICD, has been corresponding with Julio Vera-Cruz, D44BC, about possible 6m operation from the Cape Verde Islands last year. Julio has been OR in the band for five years so renewed activity would be most welcome. The cost would be considerable but Geoff is very keen to go. Ken Osborne, G4IJO (SMO), wrote that he and G4HBA: "... through personal contact with the operator of HZ1AB, report that 50MHz contacts with the station are still possible." An A4 station in Oman is also QRV.

Ted Collins, G4UPS (DVE), addressed the OTH of George Andonov, Z31IX, is Marsal Tito 130-2/3, 91480 Gvigelja, Macedonia. His square is KN11. Azerbaijan station 4K6D (ex-UD6DE) in Lh40VK was worked by SM7AED on 18 July. RQSDG (KBO9S) is another Russian station on the band. French stations in Dept 59 in the Lille area are ORV each Wednesday, 1830-1930UTC on 50.210MHz SSB and would welcome UK callers.

ACTIVITY

Emil Pocock, W3EP, wrote: "Went over the top (DXCC #10) with
The ROLLS-ROYCE ARS operated from the Mallock (DYs) station in NFD using the call G47SN/P. Having run out of stations to work, but with two hours left, they decided to let six operators use their own calls. This resulted in a series of pile-ups. GOLDWPV worked 18 stations, G0RVAP 14, G2UT/P 13, G7RVA/P 11, G6NNE/P 10 and G7RXX/P 9. Reporter Keith, G2UT, concludes that 4m is a superb band and pleads for more activity.

The DX Bureau (G4U3K) reports the following for the week ending 23 June: 1st 1345 GB3/DSV (KM65FA); 2nd 1713 RUIA (KO48VF), 1718 9A5Y (JN850O), 1816 ES2RW/2 (K019); 14th 1255 TKF5MET/P (JN42LN); 17th 0718 OMSMX (JN86BH); 18th 1027 SLO2G (J093IS) and 19th 1103 LADBM (JPS1). 5th 1800 KS7E worked 14 stations on the 3.5MHz band. 6th 1800 KS7E worked 14 stations on the 3.5MHz band.

VHF/UHF DX Book
Edited by Ian White, G3EKE (DIR Publishing)
The essential guide to working DX on the VHF/UHF bands, with sections on equipment, propagation and operating techniques.

Members price: £15.50 plus P&P

See page 94 for ordering details

CY8/KOSN, ST5JC, HB9SNR and TG9AR in June. He heard several HB9s at a good strength inspite of their valley locations and low power. Dave Hewitt, G8ZRE (CHS), was in Orlando, Florida (EL89) in July. Operating as W4/G8ZRE, using an FT-650R at 2.5W to its whip antenna, his best DX was on the 13th to K1TOL in Maine. Some VE5s were heard.

G4UPS report's cover report 19 July and Es activity was noted on most days. Ted's best DX were: 1st 1345 SB4/GS3DL (KM65FA); 2nd 1713 RUIA (KO48VF), 1718 9A5Y (JN850O), 1816 ES2RW/2 (K019); 14th 1255 TKF5MET/P (JN42LN); 17th 0718 OMSMX (JN86BH); 18th 1027 SLO2G (J093IS) and 19th 1103 LADBM (JPS1). Ted's best DX was 2.5W to its whip antenna, his best DX was on the 13th to K1TOL in Maine. Some VE5s were heard.

EL72's best DX: 2.5W to its whip antenna, his best DX was on the 13th to K1TOL in Maine. Some VE5s were heard.

Two 70MHz

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At 2200 UTC on 8 July beacon EA1/VHF was S9+ leading to spectacular conditions to Spain till the morning of the 11th. A Spanish contest provided high activity and signals were up to S9+40dB. Brian worked four Canary stations, EBB8EB and EBB8TV (IL18) being heard all weekend. His final tally for the 1-13 July period was 14 stations in 47 squares.

Jim Rabbitts, G6MLF (HLD), created a pile-up from IO88BH in the evening of 23 July, starting with DL4AAP/P (J042) followed by DLs and PAs in JO21, 22, 30-32, 41-42. After a spate of activity he slept on 0700 next morning. Beacon DLQPR was "end stop" and one QO call resulted in 40 DL contacts plus LA2PHA (J038) and OZ6GH (J047). All that with a TR-9000, 10W to 20W into Yagi. Jim's QTH is: Keeper's House, Clythness Lighthouse by Lybster, Caithness, Scotland KW3 6BA.

Edward Alley, GWOPZT (GOD), finally worked EA8ACW (IL28) for a new square in the tropo lift on 27 July. Through NFD there was considerable propagation towards central France. In the evening of 2 July, it moved towards Switzerland and HB9/AB/P (J36). He contacted stations in JN16-19 and 27-29. LX/PE1HUS/P was worked on the 3rd and 27-28. PE1HUS/P was worked on the 3rd and 27-28. Five Canary stations were worked on the 9th including EA8/DJOS. FSPAU (IN88) was very loud and the CTS were just about copying UK stations on tropo. He finds the main problem with Spanish openings is that most of the EA8s seem to stay on 144,300MHz. On 5A he sked with an EA1/IM79 (incomplete).

GW3Z2TH was QRV on six 7 days from IO81FP. Joe completed 229 QSOs in the month with stations in 15 countries and 60 squares. His best DX were EA8EEA, EB8EEB, EBBTV7 and EA8/DJOS on the 9th and next day EBBTV, EBALZL, FSEP/B.

SIGN OFF

THAT WRAPS IT UP for this month. Let's have some Perseids reports for the October issue, the deadline for which is 25 August. The November deadline is 22 September. The BT Gold mailbox is 87:CG0Q83, my CompuServe ID is 76303,603@compuserve.com and the tel/fax machine is on 081 763 9457.

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OPENING TIMES: Tuesdays to Fridays: 09:00-17:00 & Saturdays: 09:00-16:00.
**News**

**MRS ESDE TYLER, G0AEC**

49 & 51, Lynn Road, Heddon Bridge, W Yorks, KN7 5HN

---

**Thursday 8 September.**

Every success in that too.

He intends to put out calls on the Novice section of 60 metres at 1830 clock time on 5.7, 10 and 11 September and 1915 on Thursday 8 September. He promises to call very slowly (about 5WPM) and will answer all calls from Novices that he can hear. Then you can dictate the speed if you wish.

The Royal Naval Amateur Radio Society net begins half an hour after these times and, if you answer George, net members will be eager to speak to you too. This would be excellentlistening practice if you are thinking of taking your Morse test soon.

Talking of HF operation, you may have read that the RSGB HF Committee is suggesting a Novice calling frequency on Top Band. If you have not found the item yet, see this month's News & Reports pages and read it--it is in your interests. The idea is that you call CQ on a defined frequency and on getting a reply, QSY up if you are working SSB and down if using Morse. The HF Committee is hoping to hear your comments on the matter--and would welcome Novice opinions.

**Appleton Project**

The UNIVERSITY of Bradford will be holding an Interactive Educational Day on 21 September and there will be many activities to capture the imagination of the youngsters who will be in attendance.

There will be a Special Event station to mark the occasion--listen for GB0AAP. It will be manned by the licensed youngsters from Rishworth School--including Emma, E2IBVJ, who has already achieved TV star-dom. Workshops will include demonstrations, radio astronomy, work tasks, computer programs, videos, displays and much more--including details from the life of Sir Edward Appleton along with his 'talking head'. Invitations have been sent to schools and at least six have promised to bring a party.

Richard, G3XWH, (STELAR) Rev George Dobbs, G3JRJ (G-QRP Club) and Gerald, G3SDY, (representing the British Association for the Advancement of Science) are all expected as are some kit suppliers--perhaps to tempt the youngsters!

If you live near Bradford and feel that you would like to see what is going on, then pay a visit. If you can't do that, then perhaps you would like to contact the station.

There is also an ulterior motive in telling you of all this--I have a feeling that after the event, there could be an avalanche of requests for Novice instruction. Which means that Novice Instructors will be needed in the area. Can you help? Do you need a P&H--you just need enthusiasm and a wish to introduce someone else into a hobby that has given you a lot of fun. If you would like to become a Novice instructor, contact the Amateur Radio Department at RSGB HQ on tel: 0707 659015.

I shall report the success of the venture after the event! Meanwhile, if anyone has any information which may help with investigation into Sir Edward's life and achievements, please get in touch with Dianne Excell at: The Appleton Project, University of Bradford, Bradford, West Yorks BD7 1DP. Tel: 0274 384124.

**Your Name in Print**

YOUR NOVICE call-sign is a novelty and is sought world-wide. Do you want it to appear in the International Call Book? Then read on.

The 1995 call book will be published in December with the deadline mid-September. If you act quickly your details can appear and you will be greatly sought after every time you appear on the bands.

All you have to do is send your details (including full Christian name(s) to: Radio Amateur Call Book, P.O. Box 2013, Lakewood, New Jersey 08701, USA. The postage is less than fifty pence - 41p airmail or 28p otherwise - a small price to pay for fame!

This information comes from Roy, G4GSH, who encouraged Philip, the Club Novice to send his details two years ago. He was the only UK Novice entry and far from feeling lonely, he revelled in his popularity on the air. You may get the chance to speak to him this month if you hear GB3FYO - when the thirtieth anniversary of RAF Fylingdales is celebrated from inside the UK's Ballistic Missile Early Warning Station.

**Analysis**

The PASS rate for the N1RAE remains over 80%. In fact 83.3% of candidates passed the June exam - the highest pass rate by a small margin.

The report highlights weak areas of knowledge - for instance, less than half chose the right answer on a question which asked candidates in which type of transmitter a balanced modulator would be found, it may be worthwhile spending a little time looking at the block diagrams during revision or use of the course.

Another question which gave problems was the suffix used at a temporary location. 37% thought it should be /M rather than /P. I wonder if this was because the question was not read carefully enough. As every mark counts, it is worth reading it slowly.

The general comments are encouraging. Many new questions have been added to City and Guilds' question bank and these: "attracted high scores - candidates are generally well prepared for the examination". To all Instructors - congratulations to you too - keep up the good work!

**Kent Novice News**

If YOU KNOW anyone who lives in the Maidstone area who would like to take up Novice training, this is for you. The course is run at the Maidstone YMCA on Wednesdays at 7.30pm. Membership costs £11.50 plus £1.25 per week which covers all activities through the week.

With three Instructors - Martyn, Howard and Phil (GS0s/LC, RJJN and RYVU respectively) - individual tuition is assured. Using the Club call-signs there is also a chance to gain a little on-the-air experience and Morse tuition is also available.

There are waiting lists so prompt action is needed. To find out when there is a course starting, ring 0622 578776 and you will then be put in touch with one of the Instructors.

**Just a Thought**

I WONDER HOW many families there are where all members are now licensed. I know of three or four where this is the case. I have heard the jocular comments about drawing up a rota to give everyone a fair crack of the whip. Is yours a radio-active family - how do you cope? The possibilities are endless. Is there a TV script writer out there?
THE NEW Sub-Manager for the G4V series is Mr R C Powell, G4VAA. 11 North Park, Fakenham, Norfolk NR21 5RG. Mr Powell is already Sub-Manager for the G4V series.

QSL CHARGE

I recently received a letter from some of the QSL Sub-Managers asking why on earth the Society didn't make a charge for handling incoming cards destined for non members of the RSGB and I have some sympathy with him. As readers know, the Bureau will not handle outgoing cards unless the original is a member, so all batches of cards received at Potter Bar are checked against the membership database before sorting. If the sender is a non member then the cards don't get sorted and sent out.

Not so with the incoming cards however, and many members just cannot understand why the Society will distribute cards to people who, in the trade, are known as 'freeloaders'. The answer lies in a resolution adopted at the IARU Administrative Council held in Auckland, New Zealand in 1985. It says: 'member societies are strongly encouraged, whenever possible to provide incoming QSL bureau service to non members within their operating territory if non members agree to pay the full cost of this service'. Now I must confess that I was not previously aware of the payment provision included in the resolution and have followed what the Society has done for some years, namely not to make a charge for incoming non members' cards.

Perhaps that rather generous view should change, but before I raise the issue with 'them up stairs' perhaps readers would like to express a view and make suggestions as to how a charge could be made. However please bear in mind that it might not be as easy to administer a system as it is to suggest one.

Ian Haynes, AB4SW, who is a member and lives in Tennessee has written to say he doesn't think much of having to pay up to $5 to some operators using exotic calls just to get a QSL card from them. I must say that I tend to agree with him. I have, in my time, sent IRC's and dollars in the hope of getting a rare card and most have responded but on a number of occasions I have received no reply whatsoever even after a second application. Those relatively few experiences have left a sour taste in my mouth because, as a tight-listed Yorkshireman and an ex-policeman, I hate being 'done'.

QSL CARDS

DERYCK BUCKLEY, G3VLX, one of our stalwart QSL Sub-Managers, tells me of a growing habit among some operators to put the callign of the QSL SubManager on the front of the QSL card as well as the destination call. Being charitable by nature I suppose they are only trying to be helpful or do not know what 'routing' means. However, as we in the Bureau appoint the Sub-Managers and dispatch cards to them regularly, we do actually know who they all are! So, simply stop it if we didn't have sorting ladies who are highly skilled in spotting such eccentric behaviour in some of our customers, it might actually delay the whole process and that would never do! Dave Broomefield, G0KUC, one of our QSL Sub-Managers, is off to VP8 for four months. Here is one of the cards he will be using whilst there. Cards to him can be routed via PO Box 288 Mount Pleasant Airport, Falkland Islands or via his home call. Wife Sandy will be looking after the G00 cards while Dave is swanning about in the South Atlantic.

Mr D W Powell, 20 Crabtree Lodge, Lancing, West Sussex BN15 9NG, has written to say he has compiled a list of postcards with a hovercraft connection. On the list are four QSL cards and he would like to know if there are any more around. Of those four cards Mr Powell has only one in his collection. He wants to know if there are any QSL cards which feature a hovercraft either drawn - or utilising a real photograph. Photocopies of both front and back of the card would be appreciated but of course the actual card would be better! He will reimburse any costs involved.

I wrote in the August column about the current situation with regard to PO Box 88 which was as a result of a letter I received from the President of the Krenchel Central Radio Club (CRC). It just so happens that Alex, RK3DT (ex UV3DPP), is over here as guest of Nigel, G0BNR. Alex read the piece and wanted to clarify the position for me so Nigel brought him across to see me in order that I could get the other side of the story straight from the 'bear's mouth' so to speak. Alex, pictured here with his home brew equipment, lives just outside Moscow and is a student at Moscow University. He told me that Box 88 has, to some extent, been sidelined and is a shadow of its former self although the staff are still being paid by the government. Vera, that legendary lady who has been responsible for Box 88 for years, is still in post but is now of advancing years. However, a new and alternative organisation for Russian amateurs has been set up, financed largely by sponsorship and contributions from individual Russian hams.

Called Soyuz Radiolyubiteles Rosi (SRR) it has over 4000 members and its President is Valery Agabekov, UA6HZ - a much respected Russian amateur. It has premises, a QSL Bureau located at PO Box 59 Moscow and IARU will continue voting on SRR's admission by 11 September. Presumably, if that vote is to admit SRR, then CRC will wither on the vine and Box 59 will be the new destination for Russian QSL cards.

Alex told me that the distribution of QSL cards throughout Russia is via regions and there are about 80 of these. Incoming cards go to the central bureau and are then sorted and sent to one designated club located within each region for distribution to members.

Outgoing cards are sent by the reverse route. He says the problem with Box 88 at the moment is that it charges an inordinate amount for this service and, as a result, there are large numbers of cards at Box 88 awaiting distribution.

So there it is, both sides of a confused situation on which I take no position but I am grateful to Alex for the information fresh from Moscow. Watch this space for future developments.

Don't forget the HF Convention in October - a must for all DX enthusiasts.
Book your place now for LIVE '94, the most exciting consumer electronics event in the UK.


Get your hands on a ticket. Phone the LIVE hotline or return the coupon now.
<table>
<thead>
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<th>Time / GMT</th>
<th>28MHz</th>
<th>24MHz</th>
<th>21MHz</th>
<th>18MHz</th>
<th>14MHz</th>
<th>10MHz</th>
<th>7MHz</th>
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</tbody>
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**EURASIA**

- **MOSCOW**
  - 28MHz: 12221
  - 18MHz: 13221

- **NORTH KOREA**
  - 28MHz: 12221
  - 18MHz: 13221

- **OSAKA**
  - 28MHz: 12221
  - 18MHz: 13221

- **HONG KONG**
  - 28MHz: 12221
  - 18MHz: 13221

- **BANGKOK**
  - 28MHz: 12221
  - 18MHz: 13221

- **SINGAPORE**
  - 28MHz: 12221
  - 18MHz: 13221

- **TEHERAN**
  - 28MHz: 12221
  - 18MHz: 13221

- **COLOMBO**
  - 28MHz: 12221
  - 18MHz: 13221

- **BANJARMAS**
  - 28MHz: 12221
  - 18MHz: 13221

- **CYPRUS**
  - 28MHz: 12221
  - 18MHz: 13221

- **ADEN**
  - 28MHz: 12221
  - 18MHz: 13221

**AFRICA**

- **CIEDER**
  - 28MHz: 12221
  - 18MHz: 13221

- **MATRINTAS**
  - 28MHz: 12221
  - 18MHz: 13221

- **NAIROBI**
  - 28MHz: 12221
  - 18MHz: 13221

- **CAPE TOWN**
  - 28MHz: 12221
  - 18MHz: 13221

- **LAGOS**
  - 28MHz: 12221
  - 18MHz: 13221

- **DARASSIS**
  - 28MHz: 12221
  - 18MHz: 13221

- **LIMA**
  - 28MHz: 12221
  - 18MHz: 13221

- **BOGOTA**
  - 28MHz: 12221
  - 18MHz: 13221

**SOUTH AMERICA**

- **BARRADOS**
  - 28MHz: 12221
  - 18MHz: 13221

- **JAMAICA**
  - 28MHz: 12221
  - 18MHz: 13221

- **BERMUDA**
  - 28MHz: 12221
  - 18MHz: 13221

- **NEW YORK**
  - 28MHz: 12221
  - 18MHz: 13221

- **MEXICO**
  - 28MHz: 12221
  - 18MHz: 13221

- **MONTREAL**
  - 28MHz: 12221
  - 18MHz: 13221

- **DENVER**
  - 28MHz: 12221
  - 18MHz: 13221

- **LOS ANGELES**
  - 28MHz: 12221
  - 18MHz: 13221

- **VANCOURCER**
  - 28MHz: 12221
  - 18MHz: 13221

- **FAIRBANKS**
  - 28MHz: 12221
  - 18MHz: 13221

The provisional mean sunspot number for July 1994 issued by the Sunspot Data Centre, Brussels was 35.0. The maximum daily sunspot number was 72 on 11 July and the minimum was 7 on 29 July. The predicted smoothed sunspot numbers for September, October and November, are respectively: (classical method) 25, 24, 22 (±6); (SIDC adjusted values) 21, 19, 17 (±5).
I WROTE THE July column while preparing for VHF NFD, and this one is being completed just at the end of the aftermath of the event. A full write-up will appear in a few months’ time but, briefly, the event was blessed with superb sun-tanning weather in many parts of the country, and propagation to match, with some excellent sporadic-E on 2m, and some amazing tropo contacts on 2m, 70cm and 23cm. It must be said that the preparation for VHF NFD, for the biggest contests can be rather too much of a strain when having to handle work commitments as well – even I felt that I had overdosed on radio for some weeks afterwards – but there’s one thing I can be sure of – full enthusiasm will return with the approach of the next contest!

COMPUTER LOGGING

FOR SOME TIME now I have been putting off writing about contest logging software because I never have all the most up to date versions of everything I want to write about. However, the number of different packages available is on the increase all the time, and I think the time has come to put a ‘stake in the ground’. Therefore, this month we’ll take a look at the general features which most of the packages offer, and then over the next month or two look at the specific pros and cons of the major available packages.

Perhaps the first question to ask is – what does computer logging give me which paper logging doesn’t? The cynic may reply – nothing other than more equipment, something else to learn about, and more boxes to blow up! I take rather the opposite viewpoint to this and find that the little extra effort required to organise computer logging for a contest pays big dividends both during and after the event, and am pretty reluctant to enter any event without the aid of a machine now! The biggest bonus from using a computer must be that you don’t have to spend hours after the event transcribing your real-time logs into something which is acceptable to the contest adjudicators. I hate doing any form of paper-work and I find it almost impossible to believe that I used to write up 500-plus QSO contests by hand. Now, at the end of the contest, all that is required is to make a fair and careful examination of the contacts in the file on the computer – make sure that everything looks sensible, and then print out the logs – this usually takes minutes instead of hours – you’ll see why I say ‘usually’ later.

The computer is also a big help during the event. Search and pounce operation is much easier than with a paper-based dupe sheet. All you have to do is type a part of the callsign of the station you have heard into the computer, hit the appropriate key, and the machine will show you whether you have had a previous QSO or not. Speaking as a single operator who cannot write in two places at once, keeping a paper based dupe sheet while making QSOs at a reasonable rate was always a difficult exercise. This problem is of course eliminated with the computer where the dupe sheet is automatically generated as you log the QSOs you make.

Keeping track of multipliers is normally a similar problem, and again the computer can keep track of this for you automatically, with screens to indicate what multipliers are still required. In multiband contests, the networking facilities of the more advanced packages, such as CT by K1EA, also enable easy communication between the various stations and access to the PacketCluster network in an integrated fashion. The ability to send appropriate automatically-generated CW messages from the keyboard is a great aid to keeping down the stress level in CW contests.

You can get computer logging packages for many different types of computer, but I’m going to concentrate on those available for the PC. One of the accusations often levelled at computer logging is that you need to spend a lot of money on the computer. This is not necessarily the case, with many of the packages being able to run on a simple XT. Old XT’s can be picked up second hand very cheaply, and there are also some very cheap ‘surplus stock’ 286s around. Some of the more advanced packages with their additional features and overheads require a bit more power as we will see later. What is probably more important is that the computer needs to be quiet from an RF point of view. Machines vary greatly in this respect, both between models and with frequency for an individual computer. Unfortunately, the only really sure way to find out if a particular machine is going to cause a problem is to try it in the situation in which you intend to use it. There are quite a number of techniques for reducing the noise, much of which tends to escape on the connecting leads, and these solutions have often been covered in other RadCom columns over many years. Do make sure that the screening in your own receive system is up to the job – I have experienced instances where I was getting more grit from computer QRM than I felt I deserved, all because the braid of a piece of coax was open at one end.

Immunity to transmitted RF also needs checking – some monitors have a crisis with large quantities of RF, and keyboards have been known to take on ghostly self-typing properties too. I had one computer where, when I was on 80m, you just had to lay your hands above the keyboard to make it start typing of its own accord!

SPRINTING

FOR MANY years now the ‘Sprint’ contests have been extremely popular in the USA. These are short events where a station cannot win by just sitting on one frequency and calling CQ for the whole contest. Dave Lawley, G4BUO, tells me that he has been involved in the planning of a European version which was initiated by 12L and this will be run in September. The difference between the Sprint and a conventional contest is that a CQing station can only make one QSO on a frequency before having to QSY at least 1 kHz up or down, whereas the frequency essentially falling between the two. The bands to be used are 80m, 40m and 20m, the exchange is RST + Serial Number + Name or Nickname (at least 2 letters long!) and scoring is one point per QSO.

Each contest runs from 1500 to 1900UTC, and logs go to Karel Karamasín, OK2FD, Gen Svobody 636, 674 01 Trebic, Czech Republic. The big problem with this year’s contests is that international co-operation seems to have been somewhat lacking in the scheduling – the CW event takes place on 1 October and the SSB one on 8 October – both dates clashing with the major contesting and social events, including the HF convention. This situation is not from a lack of trying from this side and hopefully sufficient pressure can be brought to bear on the organisers for 1995.

SEPTEmber’S CONTENTS

HF CONTESTING in September is dominated by SSB Field Day at the start of the month. This is another excellent event for clubs to enter and maybe try out some new ideas. Ed Taylor, G3SQX, tells me that the Flight Refuelling ARS tried computer logging for the first time last year in this event, and this year intends to use more of the class B licensees to have a go. Just like CW NFD there is not only an Open Section for the better equipped stations, but also a Restricted Section where entrants are limited to 200W DC Input and a single element antenna at no more than 45ft. Entering this section need not mean that life will be quiet either – many people are surprised at the quantity and quality of DX which can be worked with just 100W and a wire antenna – give it a try – you may well be shocked! Unlike CW NFD, pre-registration is not required, so a late decision to have a play is no problem. On the weekend is the 2m trophy contest which always generates a lot of activity, and for the first time this year it includes a six-hour section where single operator fixed stations can pick any contiguous six-hour period starting on the hour for operating.
THE TIME has come to remind all listeners that my SWL Challenge takes place on 29/30 October. The full rules will appear in next month's column. This event coincides with the major QO World-wide SSB contest so there will be plenty of opportunity to spend time on the bands and send in a log.

Last year, there were 43 entries to the challenge but participation from the British Isles was quite poor. This year, after a major publicity campaign covering 25 countries, I am hopeful of at least 50 logs. It would, therefore, be pleasing to have at least a dozen logs from these shores. Mark your diaries, wall charts, etc now and please devote some of your time over the last weekend in October to participating in the SWL Challenges.

SOFTWARE UPDATE

EASILOG

Don, GO0MDO, has developed an SWL version of EasiSWL, called EasiLog. I have suggested a few changes to the program but it should be available to listeners soon.

The program enables the listener to log 'real time' QSOs, as well as a facility to bring your log up-to-date after a session on the bands. It calculates your DXCC status at any given time, on each of 12 bands for CW, SSB, FM and one other mode and for those, like me, with a large number of log books to browse, has a facility for your DXCC status to be set manually so that you do not have to enter data from many years of DX loggings.

It also tells you at the time of logging if the station heard is a new country for the current frequency and mode. QSL printout is provided in two forms. A short form to enable labels to be printed for sticking on existing QSL cards or a full form which provides a full QSL card complete with any text and RS number.

Three types of log print-out are available. A full log, a check log and a contest log. The program also enables you to browse through the log for a particular call sign or prefix, WAB areas, Oblas, etc. There are other features too which make this one a must for anyone who wants good information about their DXing exploits. EasySWL is likely to cost only £5. I will be able to confirm this next month.

SUPER-DUPER

Joan, BR52088, and I have used a prototype listener version of Super-Duper which Paul, EISDI, has developed for SWL participation in the SSB contest. This was obviously too late to be on the market for this year's contest, but Paul is amending the program to provide listeners with facilities for logging in all RSGB and most international contests. Readers reviewed the software on pages 31/32 of the September 1993 issue; 'SDL' is based on this. That might be available for the autumn/winter contest season. I will know more next month. More about contest logs and how to obtain the program.

SHACKLOG

There is nothing fresh to report here, but I have advised Alan, G3PMP, of the way in which a listener version of Shacklog might have to be altered. Hopefully, I can provide more details next month.

HOMEBREW

MICK TOMS was trying to convert some old Spectrum programs to run on his PC, including a VH-F contest logging program. He originally wrote them based on the columns by John Morris, G4ANB, in old RadComs. However, the current version of Microsoft Basic -- QBasic -- does not include the geometric function ARC (Arcosine) which the old versions of Microsoft Basic used to support.

Until he is able to find another distance calculation program which does not use this function, he cannot proceed further. Can anyone help? If so Mick can be contacted via me.

Mick also explained that if readers wish to try 'homebrew' programs, the G4ANB columns appeared in 1988/89 RadComs and include a duplicate channel list to QRA conversion, and many other useful programs. Most were written in Microsoft Basic with notes for conversions to other versions is Spectrum or BBC. Indeed, anyone who has MS-DOS 5.00 or later will have QBAsic as part of the package.

RSGB HF/IOTA CONVENTION

NEVILLE, G3NUG, is Chairman of the Convention organising committee and was keen for me to explain that there would be plenty of interest listeners at this three day event, to be held at Windsor, Berkshire. Certainly, some of the lectures look very mouthwatering -- 3Y0Pi, VK9NM and 2D6SJKV (a subject that I covered at the NEC a few years ago) and Computers in the Shack. Perhaps an SWL exhibit could be a suggestion for a future year. I am sure there would be sufficient material to display and encourage listeners to man a stand. Has anyone any other ideas?

LISTENING ACTIVITY

HF

Few reports this month due, I suspect, to the fine weather and the onset of the holiday season. Conditions were very mixed, indeed several reporters simply used the word "poor". At the times I listened during late June and early July, I would agree with these sentiments. The main interest was focused on the expedition to Scarborough Reel -- BS7H -- off China. We will have to wait to see whether this counts as a new country.

Otherwise, sporadic-E activity on 24 and 28MHz proved new European countries to those who monitored these bands. The best was probably 1A0KM.

Some of the better DX noted from your letters were:

3.5: VP8GAV (Antarctica)
7: D2TT, 9M2AX
10: UX0H,W, PY0TUP
14: HSOZAA, 3X0YA
17: TNNCW
21: DL4HAL/ST2

Robert Small, BR58841, also referred to a number of interesting IOTA expeditions, which seem to appear mainly around 14260kHz.

VHF

Apart from the Sporadic-E opening on 144MHz reported last month, listeners did not appear to catch any further Es openings, at least up to 20 July. There were, however, good tropospheric conditions on the VHFE Field Day weekend. David Whitaker, BR525429, seems to have fared best with about 50 Europeans logged. The best were HB9MM/P, HB9JNXP, HB8DGPX/P, LX/PE1HUS/P, F6KV/P (JN26), GM0MOC/P (I076), GM0UE/P (I067) and F2EPJ/P (JN14).

David also dusted off the 432MHz converter and heard stations in Holland, Germany, Belgium and France.

Turning to 50MHz, David had 97 countries heard and seems certain to be the second British listener to bag 100 countries on the band. This will be a very fine effort as he started listening on 50MHz after the Winter 1989 F2 openings to the Caribbean.

New ones in June and July were JY7SIX, YL2MB (K027), UU8JJ and WB4NFS/VP9 (FM72) heard during a double hop E opening on 26 June. Other interesting stations heard included T97V (JN84), RA3TES (L015) and RA3YO (K073).

Here in London, 50MHz was frustrating. No new countries were heard since the CV9 on 15 June, and 1A0KM was heard only briefly at 1730 on 2 July, while SV9ANK was heard calling CQ with no takers one evening at around 1900.

FINALLY

DAVID ALSO mentioned thanks to a local amateur, he was now able to receive the UK Packet DX Cluster. He is, therefore, able to sit idly by the rig and chase off to a particular frequency when a good piece of DX is reported. I hope to have a few more details next month, so that others might care to build themselves the device.

Remember that the copy date is now later. News for the November issue must be with me by 18 September.
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I have added an audio amplifier to my test console. An audio amplifier on the bench has many useful functions in addition to the obvious one of replacing headphones when testing a piece of equipment where headphones are normally used. For example, it can be used for tracing audio signals in amplifier circuits or for testing that suspect microphone insert. It can also be used for amplifying a Morse practice oscillator for group Morse practice sessions.

There are many audio amplifier ICs and modules on the market and they all have their advantages and disadvantages but I have always found the TBA820 to be a fairly stable IC. All audio ICs have very high gains and wide bandwidths in very small packages. It is reasonable to expect that if care is not taken they will burst into oscillation at odd frequencies. In many cases we do not realise that this is happening until we find that they are drawing unusually high currents or are getting rather hot for no apparent reason.

**THE CIRCUIT**

The circuit consists of a single AF amplifier IC, the TBA820M, see Fig 1. The audio input is fed to the input of the IC via a 0.1µF DC coupling capacitor. The supply to the IC is decoupled by a 220µF electrolytic capacitor. The output of the IC is fed to the speaker via another 220µF electrolytic. The output of the IC is fed to the input of the AF amplifier IC, the TBA820, see Fig 1.

The amplifier requires a 12 volts supply. We have 34 volts from our transformer in the power supply section, which can be used but the voltage will have to be reduced. For this I have used a 7812 twelve volt regulator, which is mounted on the switch of the amplifier's volume control, as shown in Fig 3. The metal case of the potentiometer is used as 'ground'. The 34 volt supply is accessed at the switch and the output of the regulator is supported by a decoupling capacitor soldered to 'ground'. As the regulator is used only to supply a few tens of millamps in normal use it does not need a heatsink.

A kit of parts is available for this amplifier from Kanga Products, but this excludes the volume control and regulator.

**COMPONENTS LIST**

<table>
<thead>
<tr>
<th>Resistor</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>10k</td>
</tr>
<tr>
<td>R2</td>
<td>120R</td>
</tr>
<tr>
<td>R3</td>
<td>1R</td>
</tr>
<tr>
<td>R4</td>
<td>56R</td>
</tr>
<tr>
<td>RV1</td>
<td>50k log potentiometer with switch</td>
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</table>

<table>
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<tr>
<td>C3</td>
<td>220µ</td>
</tr>
<tr>
<td>C4</td>
<td>47µ</td>
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<tr>
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<td>0µ</td>
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<tr>
<td>C7</td>
<td>800p</td>
</tr>
<tr>
<td>C8, C9</td>
<td>1µ</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semiconductors</th>
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</thead>
<tbody>
<tr>
<td>IC1 TBA820</td>
</tr>
<tr>
<td>IC2 12V regulator type 7812</td>
</tr>
</tbody>
</table>

**Additional Items**

- Speaker 8Ω
- Phono socket

---

Fig 1: Audio amplifier, circuit diagram.

Fig 2: Audio amplifier, component layout.

Fig 3: Twelve volt regulator interconnections.
COMMUNICATIONS

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Sorry about the small type, but we thought a more extensive list of our kits might be of interest. Here is a list of our favorite kits, along with a brief description of each:

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- SW101 SWB Power indicator led £13.50
- XM Crystal Calibrator U/F £16.50

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- HX104 10 kHz £48.90
- HX150 15m £12.50
- HX150 15m £12.50

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RADIO COMMUNICATION September 1994
**A 40m Converter for the G4BWE Rx**

by Steve Price, G4BWE

This simple converter is for the 40m HF band. It was designed to extend the coverage of the G4BWE 20 and 80m superhet [1] to 40m. Although primarily intended as an accessory for the G4BWE two band superhet, the unit can be used with any receiver covering the 14MHz band.

The converter operates by shifting 40m (7MHz) signals upwards in frequency by just over 7MHz so that they can be listened to with the superhet switched to 20 metres (14MHz). In addition to providing full coverage of the amateur band (7.0 - 7.1MHz in Region 1), the converter also allows monitoring of short wave broadcast stations operating between 7.15 MHz and 7.456 MHz.

**AVOIDING COMPLEXITY**

The circuit diagram of the converter, which is based around an IC mixer oscillator chip type NE602AN (IC1) is shown in Fig 1. As the NE602AN provides most of the basic circuitry, only a few other components are required to complete the design. Signals from the antenna are first routed via RV1 which functions as a gain control. RV1 is most useful when listening to strong broadcast stations, the carriers of which tend to overload the superhet's AGC system. Constructors using a short antenna, ie less than 20ft (6 metres), and only wish to copy amateur transmissions, may consider omitting RV1 and connecting the centre pin of SK1 directly to the junction of C1 and C2.

T1-2 and C1-4 form a 7MHz bandpass filter which attenuates out-of-band signals. This prevents breakthrough of 14MHz transmissions and also blocks the image response (see below). The signals are input to IC1 on pins 1 and 2, while pins 6 and 7 provide access to the chip's own local oscillator transistor, X1, a quartz crystal, sets the local oscillator frequency to 21.340MHz. 7MHz signals are up-converted by subtraction from this frequency in the mixer (eg 21.340 - 7.050 = 14.290MHz). The mixer will also give a 14MHz output in the case of signals around 35MHz (eg. 35.630 - 21.340 = 14.290MHz) but the 7MHz bandpass filter eliminates this 'image' response. Only one of the two outputs (pin 5) of IC1 is used in this design and so pin 4 is left unconnected. C7 is not just for DC blocking, it also provides impedance matching between the mixer output and the receiver's input, so its value is important.

IC1 requires a 6V supply at 2.5mA. This is obtained from a 12V supply using ZD1 (a 6.2V zener diode) working in conjunction with R1. The total supply current (ie including that drawn by ZD1) will be less than 20mA. A frequency of 21.340MHz has been chosen for X1 so that a signal on 7.000MHz is translated to 14.340MHz. This places the 40-metre lower band edge 10kHz inside the two band superhet's nominal HF limit on 14MHz, giving a degree of latitude in the VFO calibration.

Alternatively, constructors who are using a receiver with a more accurately calibrated dial, or digital readout, may prefer to use a 21.350MHz crystal (this will make it easier to calculate the tuned frequency). The receiver will tune 'backwards' on 40m, the upper band edge (7.1MHz) being translated to either 14.240 or 14.250MHz. Also, the sidebands are reversed. This means that the receiver must be switched to USB, even though amateur stations will normally use LSB on 40 metres.

Because the two bands superhet does not have a true AM detector, broadcast stations must be carefully tuned to avoid distortion, particularly in the case of music, where a precise 'zero-beat' with the station's carrier is required.

---

**Fig 1:** The converter's circuit is simplified by using an NE602AN mixer oscillator IC.
CONSTRUCTION

MOST OF THE COMPONENTS are conveniently mounted on a small piece of 0.1 inch pitch Veroboard (stripboard) which serves instead of a PCB. A piece with 20 copper taps, each having 37 holes, was used for the prototype (see Fig 2). This provides plenty of room for four isolated mounting holes (M2.5 clearance), while being small enough to fit into the chosen aluminium box (see Components List). The copper strips must be cut where shown using either a small twist drill or a Veroboard hack saw. Note that there are a number of wire links soldered between strips - the off-cuts remaining when capacitor and resistor leads are shortened can be used to make these.

Before mounting the RF transformers (T1 and T2) it is necessary to remove their centre tap pins (only one of the two windings contained within each transformer has such a tap, and they are not used in this design). The centre pins may be cut short using wire cutters, but be careful to leave a short length remaining, as the base of the pin has the coil winding wrapped and soldered around it (look carefully and you should be able to see this).

The outer screening cans of T1-2 are provided with two 'solder tags'. One of these may be cut off and the other bent upwards through 90° so that it rests parallel with the top surface of the Veroboard.

An earth connection may then be made by placing a link over the tag and soldering to this (see Fig 2 and also the photograph). Apart from C1, C8 and C9 the capacitors are miniature high stability plate ceramic types. C1 may be polystyrene, or if the value specified (1n2) cannot be obtained, use a combination of capacitors - a mixture of plate ceramic(s) and polystyrene types if necessary - in order to produce the correct value. The prototype uses a 220pF polystyrene in parallel with a 1nF polystyrene for C1. Because of its large size, it may be necessary to mount the 1nF capacitor vertically. Make sure that both C9 and ZD1 are soldered the correct way round. C9 will probably have its negative lead marked. There is a band painted around the body of ZD1 at its cathode end - this must be connected to the junction of R1, C8-9. The prototype uses a socket for IC1, but if preferred it may be soldered in place. Fig 2 shows the correct orientation for IC1.

The case front panel is drilled to mount RV1 and the rear panel has holes for SK1-SK5. Four mounting holes of M2.5 clearance (say 3.5mm diameter) are drilled in the base - use the Veroboard as a template to mark the positions of these.

Before fixing the Veroboard in place it will be necessary to solder short flying leads for power and output. Miniature 50Ω coax (e.g. RG174) is used for the input wiring - solder RV1 before attempting to mount this control on the front panel. You will probably need to cut the potentiometer's spindle to length using a hacksaw - do this first!

Finally, the Veroboard is mounted on 6mm spacing pillars to prevent its underside shorting against the aluminium base.

SETTING UP AND USE

THE SINGLE HOLE FIXING phono sockets used for SK1 - 4 have the advantage of low cost, small size and ease of mounting. It will be necessary, of course, to make up a short coaxial patch lead having a phono plug at one end and a PL259 at the other (assuming your receiver has an SO239 antenna socket). A phono plug is soldered to the antenna which, when listening on 40m, will be inserted into SK1, the patch lead being plugged into SK2. The converter is by-passed when listening on the other bands by plugging the antenna into SK3 and the patch lead into SK4.

As indicated in Fig 1 and the photograph, a short flying lead is soldered between SK3 and 4 to provide a through connection. The converter is made ready for use by adjusting the ferrite cores of T1 and T2 using a brass or plastic trimming tool. With the antenna connected, tune the receiver to a transmission near the centre of 40m (i.e. approximately 7.05MHz) and rotate the core of T1 for maximum signal level. Now repeat for T2.

CONCLUSION

THIS PROJECT IS a cost effective and straightforward method of extending the coverage of the two band superhet. The NE602AN is a fairly low noise device which provides a conversion gain of approximately 17dB. This means that the superhet will give a lively performance on 40m, even when using just a short indoor wire as the antenna.

REFERENCE


Fig 2: Veroboard layout.
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35
The AKD 7003 432MHz FM Transceiver

Reviewed by RSGB HQ staff.

AKD IS ONE OF THE very few British companies producing amateur transceivers. Their 50MHz [1] and 70MHz FM base stations lead the field as there is no real competition. The latest AKD box is for the 70cm band where they are competing with FM hand-helds and ex-PMR gear. Nevertheless the AKD 7003 has many unique features, and it's less than £200.

Housed in the standard AKD plastic enclosure (185mm wide by 200mm deep inc knobs/sockets by 55mm high), the transceiver has very few controls. The front panel houses volume and squelch rotary controls, both of which are refreshingly large and easy to use. There's also a small toggle switch for on/off and a 4-pin socket for the supplied fist microphone. A front-facing 2in speaker gives ample volume and clarity.

In the centre of the front-panel is a large and bright display showing a two-digit channel number (0 - 99). This display cuts out briefly to show that the tone-burst is sending.

Frequency selection is a delight. The Channels 0 to 15 are repeater channels RB0 - RB15 and when these are selected the transmitter is automatically shifted +1.6MHz (this could have been made a little clearer in the manual) and the tone burst enabled - no more accidentally sending on the output frequency. From 16 to 24 are IARU simplex channels SU16 - SU24 and the subsequent channels (up to 79) cover all the way up to 434.975MHz in 25kHz steps, including some packet frequencies and all UK repeater inputs. Channels 80 to 99 represent 433.500 - 433.975MHz which includes the lower packet allocation. It also includes the International beacon band and an 'awful warning' might have been useful in the documentation to reduce the possibility of inadvertent antisocial operating. [AKD are now looking at adding this - Ed.]

Two of the three push-buttons under the display are used for UP/DOWN tuning and the third selects 'listen on input' whilst using repeater shift, or the calling channel (SU20) if operating simplex. As with the other AKD radios, a simple scanning facility might have been useful, but there is room for some home-brew here.

The rear panel includes an SO239 socket for the antenna, and a 3.5mm socket for an 8Ω external speaker or for connecting to a TNC. On the side are threaded holes for the optional mobile mounting bracket (£11.75, post free if ordered with the radio).

DOCUMENTATION

An OWNER'S MANUAL is supplied, comprising advice on setting up the transceiver, a channel chart, installation in a vehicle and details of how to use the radio with a packet TNC, all written with the complete beginner in mind. A warning about the need to obtain the relevant licence appears in a prominent position, a nice touch. A circuit diagram is also supplied.

A look inside the box reveals a very clearly laid out board with plenty of space between
components – again a refreshing change from many oriental rigs. AKD say that internal modifications will not invalidate the guarantee provided you haven’t damaged the rig. The guarantee, incidentally, is for two years and includes the output device.

**IN OPERATION**

THIE AKD 7003 WAS extremely easy to use, much more so than even the simplest of hand-helds. On power-up, it selects the FM calling frequency, 433.50MHz but packet operators can have a version which defaults to a packet channel instead.

Received audio was good with more bass response than many radios. On transmit, the audio was reported to be much better than the two hand-helds it was tested against. No doubt its physical size was responsible for this.

The PA was tested with open- and short-circuit antennas and no ill effects were noticed, though no guarantees are given about this in the specification.

A double press of the microphone implemented the tone-burst and it was a real pleasure not to have to worry about repeater shift.

A couple of small niggles: It would have been handy to have a milliwatt option as well as the standard 3W output – the low power switch used on the other (25W) AKD rigs was blanked off. And self-adhesive rubber feet would have helped keep this very light-weight rig on the bench at full stretch of the microphone.

The radio is bound to find a market with packet radio operators and AKD will factory-modify it for dedicated packet link use so that it operates in either (but not both) of the 430 or 438MHz linking allocations.

**CONCLUSION**

THIS RIG IS GOING to be popular with Novices (we had a struggle previewing the review model away from the Novice who did most of the operational tests) as well as anyone wanting a straightforward mobile or base station for 70cm FM. What it lacks in ‘bells and whistles’ the 7003 more than compensates for in making the commonly required facilities extremely easy to use. At £193.74 plus £5 P&P, it is likely to become as popular as the rest of the AKD stable. AKD’s address is: Unit 5, Parsons Green Estate, Boulton Road, Stevenage, Herts SG1 4GQ.

**REFERENCE**


---

**MANUFACTURER’S SPECIFICATION**

**GENERAL**
- Modulation: FM
- Frequency range: 432.5 - 434.975MHz
- Supply voltage: 13.8V ± 10%
- Channel spacing: 25kHz
- Speaker: 8Ω internal
- Operating temp range: -10°C to +50°C
- Frequency stability: ± 1kHz
- Tx/Rx voltage changeover: Relay operated
- Tone burst: 0.5s of 1750 ± 2Hz

**TRANSMITTER**
- RF output power: 3W (5W DC in)
- Supply current: 750mA
- Harmonic content: 10dB
- Audio response: 6dB/octave pre-emphasis over range 300Hz to 3kHz
- Deviation: ± 1kHz

**RECEIVER**
- Sensitivity: Better than 0.25μV for 12dB SINAD
- Spurious response: ±70dB
- Image response: ±60dB
- Audio response: 6dB/octave down pre-emphasis over range 300Hz to 3kHz
- Audio output: 2 watts
- Standby current: 200mA

**CONNECTIONS**
- Antenna: SO239 on rear
- DC Supply: In-line fused (2 amp)
- PTT Mic: 4-pin front panel socket
- External speaker: Jack socket on rear

---

**AN IMPORTANT MESSAGE TO READERS**

All AKD manufactured products are GUARANTEED 2 YEARS! All models are supplied with a circuit diagram and are available through all leading dealers.

**UK Repeaters and Region 1 Beacons**
Complete Listing: £5 (Members)
See page 95 for ordering details

Radio Society of Great Britain,
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Potters Bar, Herts. EN6 3JE
VSWR METERS

HOW DOES A VSWR METER work? If voltage and current levels vary along a line that isn’t matched, how is it possible to measure VSWR using a meter inserted at any single point along it?

THERE’S NO PARADOX HERE. As you say, in a mismatched line there is a variation in voltage and current levels along the line. If you tap into the line with an RF voltmeter at various points you can map out this variation (Fig 1). In a lossless line the same pattern is repeated every electrical wavelength and you can calculate the VSWR very simply:

\[ V_{SWR} = \frac{V_{\text{max}}}{V_{\text{min}}} \]

However, this static picture of standing waves is actually the product of two travelling waves, the forward wave going up the feeder and the reflected wave coming back. Even though these two waves travel independently along the feeder in opposite directions, the pattern of standing waves formed by their interference is static, framed by the length of feeder. If you sample the two travelling waves independently at the same point along the line, this provides an equally valid route to measure the VSWR.

How do we measure two travelling waves independently? The most obvious way is using coupled parallel lines (Fig 2). In this arrangement, the main coaxial line is coupled to a ‘branch’ line via a slot in the outer conductors, which doesn’t appreciably disturb the impedance match in either line.

The ‘branch’ line is now sampling some of the RF power in the main ‘through’ line. If you connect a matched load to one of the branch lines of the branch line and a matched power meter to the other, you see two different situations according to which way around you connect them (Fig 2a and Fig 2b). If the main line sees a reasonably good impedance match at its far end, the second configuration produces much more sampled power than Fig 2b. This is because you’re sampling the forward-travelling wave in one case and the much smaller reverse-travelling wave in the other. If the main line is perfectly matched, the reflected power meter would read zero. Wherever you insert the VSWR meter along the main line, you’ll see exactly the same readings, provided that the line has low losses and the sampling system is working properly.

There are many variations on this theme of coupled coaxial lines. Many VSWR meters use two separate and hopefully identical coupled lines, generally on opposite sides of the main line. Sometimes all three lines are mounted in an enclosed metal trough instead of a true coaxial configuration. Another popular option, though suitable only for low power, is to use transmission lines printed on PC board. You can even make a cheap-and-cheerful VSWR meter by threading enamelled wire under the braid of a length of coax.

The well-known Bird 43 wattmeter uses the same principle as Fig 2, but has only a very short section of pickup line running across the end of the plug-in element. The direction of sampling is reversed by simply rotating the element through 180°.

An alternative method, more suitable for HF where coupled lines might be too long, is to sample both the voltage and the current, and then to combine these sampled signals in different ways to separate the forward and reflected waves. Fig 3 shows the principle of how it’s done. Resistors R1 and R2 form a potential divider which takes a sample of the voltage on the line, producing an RF voltage V1.

The current transformer T1 takes a sample of the current in the line. Usually T1 consists of the main line passing straight through a toroidal core (constituting a single-turn winding) with a secondary of say 15 turns. In the arrangement shown, T1 has two identical secondary windings, wired to produce equal outputs but in opposite phases. The switch SW1 connects either of these windings to resistor R3, producing a selectable RF voltage

\[ V_{\text{SWR}} = \frac{(V_{\text{FORWARD}} + V_{\text{REFLECTED}})}{(V_{\text{FORWARD}} - V_{\text{REFLECTED}})} \]

Check this formula by inserting a few values. If the line is perfectly matched, \( V_{\text{REF}} \) is zero so the VSWR is:

\[ \frac{(V_{\text{FOR}})}{(V_{\text{REF}})} = 1 \]

If the line is completely mismatched, \( V_{\text{REF}} \) is the same as \( V_{\text{FOR}} \), so the bottom line of the fraction goes to zero and the VSWR is theoretically infinite. So far, so good. Try an example where \( V_{\text{REF}} \) is 50% of \( V_{\text{FOR}} \); now, if \( V_{\text{FOR}} \) is set to full-scale (100%) by the calibration control, the VSWR will be given by:

\[ (100 + 50) / (100 - 50) = 3. \]

Check this on any commercial VSWR meter; betcha anything that 3:1 appears at mid-scale!

EXTERNAL SHUTDOWN SWITCH

HOW CAN I PROVIDE a shut-down switch outside the house for my unattended packet station?

IF YOUR ARRANGEMENTS notified to the local RIS office involve shut-down by friends while your house is unoccupied, you may not want to provide a house-key for everyone on the premises. So the alternative is to fit a local switch which will automatically turn off the radio when your house is unoccupied.

A simple external switch of the type shown in Fig 4 can be wired into your switching system as shown in Fig 5. A tamper switch or a remote pushbutton can be used to cut the signal feed to the RIS, in case of an emergency. The RIS will be cut off only if both switches are pressed, so that while you are unoccupied your friends cannot disrupt your normal activities.

Fig 3: Sampling the forward and reflected waves using a voltage tap and a current transformer.
more current than that. As a further refinement you may be able to find an illuminated bell-push, which will give positive confirmation from outside the house that power has been removed – the light will go out. Since bell-pushes with internal 12V bulbs are rather uncommon, it may be better to buy one with a translucent housing and somehow fit R2 and a red LED inside.

Note that this unit will also disconnect the transmitter in the event of a power failure. For personal packet or beacon stations this fall-safe feature may be a good thing because power outages are often preceded by large transients. It’s probably better to be around when restarting the system afterwards.

**FEEDING BALANCED ANTENNAS**

**CAN I FEED A G5RV antenna direct from the rig to the balanced open-wire feeder without the need to run coax?**

It's not recommended to connect any type of balanced feeder directly to a transmitter. To avoid risks of RF feedback into the rig and into the mains etc. you need a proper transition between the balanced feed line and the unbalanced coax connection to the rig. At the very least, try 8-10 turns of RG58 or similar coax in a flat coil, about 15cm diameter; this will make a simple 1:1 choke balun. This suggestion comes from the **RSGB HF Antenna Collection** edited by G4LQI, which contains reprints of the classic articles by G5RV and also his more recent thoughts on the subject. Alternatively try a choke balun of the type made by threading the coax through several large ferrite beads (see Ferromagnetics ads for example) or the W1JR balun (Technical Topics, August 1992).

The feedpoint impedance of the G5RV is not much like 50Ω on any band, except perhaps 20m. The best it achieves is a 'tendency to match' on most bands, avoiding the outrageously high VSWRs that appear with some other combinations of frequency, dipole length and feeder length.

Even if your rig has a built-in antenna tuner, or has a valve PA with front-panel tuning and loading controls, you're unlikely to be able to match the G5RV on all bands. You're going to need a separate antenna tuner unit, or antenna system tuning unit as G5RV himself prefers to call it. Link-coupled ASTUs (ATU) can be used equally well either balanced or coaxial feedlines, and the **HF Antenna Collection** contains several practical examples. Somehow link coupling seems to have gone out of fashion, but it's far better suited to balanced feeders than a 'more modern' ASTU followed by a ferrite-cored balun, which shouldn't really be connected to any antenna showing a high VSWR.

If you're prepared to build an ASTU that can cope with all manner of balanced impedances, remember that you're also free to erect whatever length of centre-fed dipole fits your garden, using whatever length of open-wire line it takes to reach your shack (Fig 5a). At least on the lower-frequency bands, the bigger the antenna, the better it will go – provided you can match the impedances that appear at the bottom of the feedline on the bands you want to use. With any type of 'random-length' multiband antenna, you may be unlucky and find impedances on certain bands that your ASTU cannot match. It's a matter of experiment, but try not to let matching difficulties prevent you from using as big an antenna as possible.

If your house and shack are towards one end of the plot of land, as is often the case, it can be inconvenient to bring the balanced feedline away at right-angles to the dipole, and then back to the house beneath one leg of the antenna.

Another strategy is to bring the feedline straight down to the garden fence and join it to a length of coax, using a coil of the coax as a choke balun at the transition point (Fig 5b). The coax can then run along the fence line, close to or under the ground, and back to the ASTU in the shack. Note that the run of coax must be of a large, low-loss transmitting type such as RG213/U67; in this arrangement you're using it as a tuned feeder with some pretty enormous VSWRs which will greatly increase its losses.

If you already have an unbalanced ASTU with a coxial antenna output, this is a good way to use it with a balanced centre-fed antenna.

**Fig 4:** Remote shut-down for 12V DC equipment, using an ordinary bell-push outside the house, SW1, miniature push-to-make; SW2, doorbell push (DIY store); R1, 1.5Ω, 10W, (eg Maplin H1T); R2, 470Ω 0.5W; Red LED.

**Fig 5:** Methods of connecting coax to open wire feeders in multi-band centre-fed dipoles.

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

By Ben Spencer MInstPI, G4YNM

The Swallow UHF Prescaler can extend the frequency range of a digital frequency meter DFII up to at least 575MHz (and typically 800MHz). It features a bipolar front end amplifier, divide-by ten prescaler ratio, LEDs to indicate POWER ON and prescaler CLOCKING and an integral power regulator capable of running from either a low voltage DC or AC source. This design is a marked improvement on my original UHF prescaler, which I designed in 1984 [1].

Construction and testing are straightforward requiring no special skills or equipment. There are no rare or esoteric components used in the design.

CIRCUIT DESCRIPTION
THE COMPLETE CIRCUIT diagram for the prescaler is shown in Fig. 1.

FRONT END AND PRESCALER
The front end comprises amplifier TR1, which is capacitively coupled to the signal to be measured via C1. Transistor TR1 is biased in class B by resistors R1 and R2; Resistor R3 forms the collector load which is capacitively coupled via C2 to prescaler IC1 at pins 15 and 16. Prescaler IC1 can be set to divide by 10 or 11 and provides TTL and complementary ECL outputs. In this design the IC is set to divide by ten and the TTL at pin 11 is used. A pull up resistor at R5 at the output is included to ensure the correct TTL levels are obtained.

The output (1/10 the input frequency) is fed to the DFM in the normal manner and the DFM is simply multiplied by ten. What could be easier?

CLOCK DETECTOR
A small amount of the TTL output signal is tapped via C4 and fed to diodes D1, D2 which together with C5 form a half wave doubling circuit. When a UHF input signal has been prescaled and the output (now 1/10 of the input frequency) is present on IC1:11 the voltage doubler drives transistor TR2 via resistor R6 to saturation, illuminating LED D3 and hence indicating that the prescaler is 'clocking' the signal. The LED is lit during no-signal-input conditions.

POWER SUPPLY
The power supply comprises a bridge rectifier BR1, reservoir capacitor C6 and a standard 1A 7805 regulator IC2, together with decoupling capacitors C7, C8 and C9. An LED, D4 and resistor R9 are included to indicate when power is on.

CONSTRUCTION
A SINGLE SIDED PCB has been designed for the prescaler. The component layout and the foil pattern are shown in Fig 2(a) and Fig 2(b) respectively.

The unit is small enough to fit in some bench DFM's and it might be possible in some instances to take advantage of the secondary AC supply to power the unit. You would of course need to provide fuse protection, a new UHF socket on the front panel and switching between the normal input and your prescaler VHF output.

The switching can be done with a sub-miniature toggle switch at the prescaler output and normal HF input as the frequency is only up to a maximum of 80MHz here, as long as you keep the wires (ie inductance) to a minimum.

But be warned you might invalidate any warranty if you do this.

If you do not intend fitting the PCB inside an existing DFM case then it should be housed inside a metal case with suitably protected AC/DC source, and a couple of BNC sockets for the input and output.

If you power the unit from a DC source then do not fit the bridge rectifier BR1 but do fit capacitor C6 and C7.

TESTING THE UNIT
THIS UNIT IS EASY to test. Connect a suitable supply and check that the current consumption is about 150mA; if it is wildly different from this value there is a fault on the unit. The IC prescaler normally runs quite warm to the touch; if it is running hot then there is a problem.

Feed in a VHF or UHF signal and check that the 'clocked' LED is lit when there is a
signal present. Check that the output frequency is 1/10 of the input frequency. This can easily be done if you have, or you can borrow, a VHF/UHF signal generator.

Otherwise you can use a VHF or UHF handheld transceiver. The prototype unit triggered correctly with a quarter wavelength piece of wire connected to the input socket. This was placed 2.5m from a 7/8 wavelength antenna fed with 1.5 watts at 145MHz.

Finally, do note that if the upper limit of its range (800MHz) the clocked LED will light when the prescaler is counting incorrectly. This is because the prescaler is outputting a TTL pulse stream but the divide by ratio is not 10:1. What is more your frequency counter will sometimes 'tumble' randomly and sometimes show a steady frequency which is incorrect. This does not cause any problems so long as you bear it in mind when trying to measure frequencies above 800MHz. The prototype counted correctly up to a maximum frequency of 890MHz with 450mV RMS input.

**REFERENCES**


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**Radio Communication September 1994**
PORTABLE FREQUENCY counters, are very handy instruments to have in and around the shack. If, as with the Startek ATH-30, they’re combined with a sensitive field strength meter, they may well become indispensable. A number of other features combine to make this instrument just a little cut of the ordinary, if not unique.

MEDIUM WAVE TO MICROWAVE

POCKET SIZED is a true description of the ATH-30. It comes in a lightweight, attractively styled, anodized aluminum case and the telescopic aerial (supplied) plugs into a BNC connector on top. Interestingly, the input is 50Ω only, unlike most other counters which have a high impedance input at HF. The counter sensitivity is adjusted by varying the length of the antenna, but a 50Ω attenuator could be added if required.

A clear ten-segment LED bargraph indicator is positioned at the top of the front panel. This shows field strength most effectively, and would prove especially useful when setting up an antenna system. It is, of course, important to bear in mind that maximum field strength in the shack doesn’t necessarily correspond to the best antenna radiation. Still, you can confirm that RF is present on the right band!

Below this is the eight-digit LED frequency display, and although the digits are small, they are bright enough to be read easily from several feet away. The readout is to the nearest 10Hz on frequencies up to 1GHz, but to get this level of accuracy it’s necessary to use the slow timebase. Above 1000MHz the slide switch at the top of the front panel selects a divide-by-ten prescaler. On these microwave frequencies the resolution is 100Hz.

COUNTER MEASURES

SITUATED JUST BELOW the main LED display is a switch marked ‘ATH’. The initials stand for ‘Auto Trigger and Hold’ – a feature designed to reduce random counting and false readings. In this mode the counter will be enabled only when it has a usable signal. If the signal disappears, the last valid count will continue to be displayed. Under these conditions, many counters would reset to zero and the measurement would be lost. The ‘Hold’ switch and LED enables any reading to be held on the display when the counter is in normal use.

The ATH facility is also used in conjunction with the ‘One-Shot’ switch located on top of the case. This lights an amber ‘Select’ LED, and enables readings to be taken from a single short burst of RF energy. Possibilities therefore exist for measurements on various forms of remote control device, which conserve power by emitting a single short RF burst.

Gain time, otherwise known as sampling period, is selected by the switch on the lower right, and a green LED gives an indication of sampling speed (high, medium or low). The internal Nickel Cadmium (NiCad) batteries give a useful three to five hours before recharging is necessary. This condition is indicated by the ‘Battery Low’ light, to the right of the power On-Off switch. A useful feature on the Startek, is the ability to use the counter while the NiCads are being charged.

RESULTS AND OBSERVATIONS

Performance was most impressive, with excellent sensitivity and good accuracy. Running just ten watts of CW to a remote 20 metre dipole,

MANUFACTURER’S SPECIFICATION

- **Frequency range**: 1MHz to 2600MHz (2.6GHz)
- **Sensitivity (typ. RMS)**:
  - 1 to 800MHz: <1mV
  - 150MHz: 0.3mV
  - 450MHz: 0.5mV
  - 800MHz: 0.7mV
- **Digital display**: 8 x 0.3in height, Red high-brightness LED
- **ATH Response**: Bar graph display 10 segment, instant response. Indicates relative signal strength from 0.1mV to >4GHz
- **ATH Response Time**: Auto Trigger and hold / resolution
- **Timebase**: Temperature controlled crystal oscillator (TCXO)
- **Accuracy to Calibration (typical)**:
  - Standard timebase: ±1ppm, ±1 count (LSD), 25–30°C
  - Optional HSTB: ±0.2ppm, ±1 count (LSD), 20–40°C
- **Signal input**: 50Ω female BNC connector
- **Maximum safe input**: 15dBm (1.25V RMS)
- **Power Input**: 9 to 12VDC, coaxial type DC power jack, auto polarity, full-wave bridge input
- **Size**: 3.4in(W) x 3.8in(H) x 1.0in(D), weight approx 30Oz inc batteries
- **Battery operation**: 3 to 5 hours operation, 14 to 16 hours charge, ATH-30 usable during charge

by Paul Lovell, G3YMP

Startek ATH-30
Frequency Counter

RADIO COMMUNICATION September 1994
the telescopic antenna was placed adjacent to the Aerial System Tuning Unit. This gave a full-scale reading on the field strength meter, and an accurate frequency readout.

In fact, the signal strength indicator responds to the strongest signal over the entire frequency range, which makes it an ideal instrument for dealing with EMC problems. I tried placing the antenna near the connecting leads of my computer - the results were most revealing! A high impedance matching network is the only addition I would welcome. This would make the ATH-30 useful for constructors when testing circuits such as FET oscillators etc. However, a simple interface using an FET would be very easy to build.

The brief but informative instruction manual mentions some uses for the counter, and the sort of distances over which it should work. Response speed was tested using a short 'dit' of Morse code, from an HF transmitter. The ATH facility worked well and the frequency was quickly displayed to the nearest kHz. By the way, the count button must be in its 'Fast' position for this test. This mode of operation could be useful for tracking down short bursts of interference.

THE FINAL COUNT

SUMMING UP THE STARTEK'S attributes isn't difficult as I found it a very straightforward and practical instrument to use. The resolution is more than adequate for most users, and the small, neat design should make it ideal for field days, demonstrations and similar events.

A telescopic antenna and mains operated battery charger are included with the ATH-30, and the instruction manual gives useful tips to get the most from the instrument.

The ATH-30 is manufactured by Startek International of Fort Lauderdale, Florida, and the UK price is £269.00 inclusive. The unit is marketed in the UK by Nevada Communications, 189 London Rd, North End, Portsmouth PO2 9AE. Tel: 0705 619000. Our thanks to them for the loan of the review model.

Note: Three other Startek counters are available from Nevada.

PCB SERVICES FOR RADCOM PROJECTS

These PCBs are not available from RSGB HQ, but direct from Badger Boards

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For individual parts for any of the above projects and other Radcom kits our catalogue is available at £1.00.

Available from: J.A.B. Electronic Components, The Industrial Estate, 1160 Aldridge Road, Great Barr, Birmingham B44 8PE. Tel: 021-366 8928
The Single Wire Antenna
directly connected to the transmitter is often discouraged in the amateur radio manuals because of the close proximity of the radiating element to house wiring and domestic equipment. This undesirable feature is aggravated by the fact that wild excursions of feed impedance occur when changing operation from band to band and good matching is sometimes difficult to achieve.

All in all, however, the antenna is simple, cheap, easy to erect, suits many house and garden layouts and is equally amenable to base or portable operation. It is therefore not surprising that the end-fed wire is often pressed into service by old hands and newcomers alike who are prepared to work on its more wayward characteristics to produce a thoroughly acceptable multiband antenna.

This article sets out to show how the length of an end-fed antenna can be optimised to serve a given set of bands, tuned to resonance (minimum feed impedance) on each band and then coupled to the transmitter using a wideband matching transformer and any required length of coaxial cable to distance the antenna wire from the operating position. Such an antenna can then be operated against real earth (if a suitable terminal is close to hand) or, more likely, a substitute in the form of a radial (or several) or a counterpoise wire.

Background

The end-fed antenna has traditionally been designed to resonate on one lower band in the HF spectrum, say λ/4 (quarter wavelength) on 80m where the current feed will meet an impedance of around 50Ω. At λ/2 on 40m, the input impedance will rise to a high value presenting a voltage feed to the source. The next band, 30m, will fall in the vicinity of current feed again at 3λ/4 and present a fairly low impedance. The next move to 20m will meet a high impedance again and then through an off-tune 17m to another high at 15m. The sequence continues with some extra complication in that odd multiples of λ will show generally increasing impedance with frequency whereas even multiples of λ (the half-wave points) will show decreasing impedance as the band is ascended.

To achieve a moderate feed impedance on all bands, some means must be found of selecting a wire length which steers well clear of the half-wave points. Fig 1 illustrates resistance and reactance plotted against electrical length from below λ/4 to 3λ/4 and beyond. It can be seen that dramatic changes begin to occur as the λ/2 (half-wave) resonant point is approached. These dramatic changes are repeated at multiples of λ/2 and these regions must be avoided if the impedances of a multiband antenna are to be kept reasonably low and uncomplicated on all bands of operation.

In general, the magnitude of the λ/2 multiple resistive and reactive excursions reduce as the electrical length of the antenna is increased.

To make a start, it was decided that the feed point within λ/8 from the λ/4 point represented fairly 'safe' working conditions within which the wire could be tuned by altering the appropriate signs of reactance at the feed end.

In other words, wires on the low side of the λ/4 point (too short) would be tuned by inserting inductive reactance in series with the wire while lengths on the high side of the λ/2 point (too long) would be tuned by inserting capacitive reactance in series. It follows that entry into the 'danger' areas within ±λ/8 from the λ/2 resonance peak should be undertaken with care. The same principle applies for subsequent λ/4 and λ/2 regions on longer wires.

In Fig 2, wire length is shown against each of the nine HF bands (including 160m) with 'no-go' portions indicated by the heavy lines. To avoid unnecessary complication, wave-lengths were calculated from the lower band edge frequency in each case and no corrections were made for the 'end effect' on a real antenna.

To use the chart, a perpendicular straight-edge is dropped from the horizontal axis and moved along until a clear way through the gaps between the no-go sectors is found. Thus, for a wire length of 10.5 metres, the straight-edge just clips the end of the 80m no-go line, then goes through the middle of the 40m safe sector and on through the 30m gap. At 20m, the straight-edge is blocked but there are clear openings at 17, 15 and 12m.

The next opportunity presents itself at a wire length of 15.5m where openings appear at 80, 40 and 20m and, if some tolerance is permitted, at 17 and 15m, and then through the clearance at 12m. The very next choice of bands becomes available at a wire length of 26.5 metres which gives all eight bands including 160m but not, unfortunately, 10m where special arrangements have to be made. The wire lengths quoted here may need some

Fig 1: End fed impedance characteristics of wire from λ/4 to 3λ/4.

Fig 2: Antenna wire lengths, showing 'no-go' lengths for various bands.

By Alan Chester G3CCB
small adjustment when the practical system is built.

TUNING AND MATCHING

IT CAN BE SEEN, from Fig 2, that there is at least one band for each wire length where the straight-edge goes through the centre (or very nearly) of a safe working region. At this point, the feed impedance will be fairly low. For other bands, where the straight-edge lies to the left or right of the gap centre, the impedance will be higher in value and capacitively or inductively reactive. The reactive component is tuned out by inserting an inductor or capacitor of the appropriate value close to the feed point leaving a non-reactive antenna feed of moderate value to be matched very easily to the transmitter.

Some general points need to be made here to assist in the selection and adjustment of tuning and matching components. Near the centre of the safe working regions, relatively small values of reactance will be required to bring the antenna to resonance; at the extremes, larger values will be called for. The outer limits of these regions may be extended by a small amount as practical examples given in "The Practical System" will show.

Since the antenna is pre-tuned on each band and designed to offer only a moderate range of resistive input impedances, it only remains to add a simple wide-band transformer to match the antenna to the transmitter via 50Ω cable. Such a transformer is described in [1].

EARTH PLANE

USING THE PRINCIPLES so far described in the selection of wire length and tuning, it is now necessary to consider the earth plane, real or substitute, against which the antenna will operate.

In general, a good earth connection is hard to find and only practicable from a ground floor room. Unless the earth can be reached within a very short distance, the 'earth substitute' (radial or counterpoise) comprising a single 1/4 wire from the aerial feed point is hard to beat and the technique will also ensure minimum RF voltage at this point. The earth stake version, although often less efficient, is convenient for portable operation and avoids the chore of erecting more wires.

THE PRACTICAL SYSTEM

THE FULL RANGE OF tuning component values and feed impedances for each HF band against wires of three lengths is shown in Table 1. Any one length of wire can be operated either raised well above ground using substitute earths or very near ground using a real earth connection via a short lead. The longest wire (26.50m) will provide full coverage on all nine bands while the shorter wires (15.00 and 10.00m) will cover seven bands each with some overlapping. It can be seen from Table 1 that two wires, used selectively, will provide full coverage without the complication of inductor tuning.

The main wire is measured to the dimensions given in Table 1 and, after marking, it may be prudent to allow a little extra for fine adjustment during installation; this is accomplished on the 20m band for the 26.50 and 15.00 metre wires and on the 40m band for the 10.00 metre wire where natural resonance occurs in each case. Although it is physically possible to tune the wire to any part of the band as required by the cut-and-try method and avoid the need for the tuning capacitor altogether, it is generally preferable to place the natural resonance a little below the lower edge frequency and use the variable capacitor (at relatively high value) to move the resonance point up into the band.

The 1/4 substitute earth wire for the elevated antenna can be cut for the required frequency within each band less 5% for end-effect. The measurements are not critical and no difficulty will be found in practice since any fine adjustment required will be taken up automatically when the main antenna wire is tuned. The lead length to the earth stake for the grounded version was fixed at 1 metre to maintain some degree of uniformity between the two versions and to ensure reproducibility of the design. The stake used was about 1.5 length and it was found that an earth stake wire was adequate for portable operation from car, tent or even garden shed but, if required, the lead may be extended by a small amount provided an equivalent reduction is made to the main wire. The grounded end-fed wire cannot match the performance of the elevated version unless a very good earthing system is employed. Nevertheless, the simple stake has been shown to provide a useful and convenient earth when operating from a temporary location.

The simplest way to provide the tuning function at any power level is by using one variable capacitor of adequate vane spacing and one variable inductor (roller coaster) connected in circuit as required. The units were calibrated and showed maximum values of 750pF and 32μH, respectively, although extra inductance was sometimes required at 160μH. This was the arrangement used when compiling the data given in Table 1. Values given are 'broadcast' based on many measurements taken during trials. A range of values is given where the band is particularly wide.

10 METRE OPERATION

AN EXAMINATION OF Fig 2 will show that, for the three preferred wire lengths, the vertical straight edge will go through the centre (or very nearly) of one of the no-go sectors on 10m. Since this point coincides with one of the 1/2 positions on the wire, a relatively high impedance was expected which by measurement turned out to be a fairly moderate 600Ω. Even so, a parallel tuned circuit was called for at the feed point and good performance was obtained with a centre-tapped inductor providing a convenient input of 200Ω from the matching transformer. This is included in Fig 3. The inductor comprised 2 x 2 turns of 18SWG wound on T100-6 powdered iron toroidal core and tuned with 25pF.

LAYOUT OF ANTENNA-TO-TRANSMITTER INTERFACE

IT WAS STATED EARLIER that end-feeding a wire antenna may not be in the best interests of avoiding RF breakthrough. Whatever else might be done to assist in this direction, the physical separation of antenna wire from In-house receivers and mains wiring, not to mention the amateur's own equipment, must be regarded as a major step forward. Physical separation of units will depend on local circumstances. At G3CCB the tuner, matching transformer and isolator are located close together at the antenna wire entry point and a long coxial cable is used from this point to
the operating position on the other side of the house. Portable operation may not call for the same degree of separation, and a short coaxial cable to the transmitter will then be all that is required.

All antenna wires are measured to the matching transformer terminals and the isolating transformer ensures that tuning is not affected by the way in which the equipment is connected up, eg whether or not the equipment is connected to mains earth. Portable or QRP rigs may not be earthed at all or might share this function with the antenna ground in which case the isolator can be safely left out.

A general layout of interface connections is given in Fig 3. The VSWR meter is shown connected at the transmitter end of the long coaxial cable where it can serve as a general monitor of the system from the operating position. During initial setting up, it will be beneficial to site the VSWR meter at the antenna terminal unit where the coaxial cable meets the isolator and matching transformer. Details of the isolator and matching transformer are given in [1].

ALTERNATIVE INDUCTOR TUNING

THE ARRANGEMENTS DESCRIBED above for varying the inductor might be considered to be quite inappropriate for QRP use. Where more moderate power levels are used, especially down to genuine QRP, the roller coaster may be regarded as an unnecessarily complicated and expensive item. A technique to simulate variable inductance by employing a fixed inductor in combination with a variable capacitor will provide a satisfactory solution [2]. This has been employed on the elevated 26.50 metre wire where variable inductance is required on the 160, 40 and 17m bands and a version has been scaled down to suit QRP rigs. A brief note on the principle of simulated variable inductance is given in the Appendix.

CONCLUSION

THE EXERCISE HAS produced a set of three end-fed antennas to provide coverage of all the amateur bands which can be operated from an elevated or grounded position and which can be very easily tuned and matched to 500Ω. The opportunity has been taken to try out several interesting techniques which may be regarded as being unconventional, namely the wide-band ferrite antenna matching transformer, the isolating transformer of similar construction and the simulated variable inductor to avoid mechanical methods of adjustment. All these devices have contributed in their way to the simplification of tuning and matching and will assist in the development of remote control of these functions should this be required.

The longest of the three wires (26.50m) is undoubtedly the most useful in taking in the whole HF spectrum but there may be further opportunities using longer antennas. For example, extrapolation of the data given in Fig 2, shows a clear way through the bands from 160 to 10m at around a wire length of 55 metres. The longer wire would certainly produce a better antenna on 160m (near 5A/B) which could be tuned by a variable capacitor within this band but might result in generally higher impedances appearing throughout the remainder.

All antennas worked well showing a VSWR at the transmitter generally no worse than 1.5 but the on-air performance of the elevated counterpoise versions outshone the grounded wire by a significant margin. This is undoubtedly due to the modest stake in use for the earth connection but it should also be appreciated that a grounded end-fed antenna cannot acquire much height especially for the shorter wires. Perhaps kite flying and very long wires is the answer for portable operation on 160 metres!

REFERENCES

SUPPLIERS

POWDERED IRON toroidal cores may be obtained from: Ferromagnetics, PO Box 577, Mold, Clwyd CH7 1AH or Cirkit Distribution Ltd, Park Lane, Broxbourne, Herts EN10 7NQ.

APPENDIX

THE EFFECTIVE INDUCTANCE of a fixed coil may be reduced to a limited extent by adding a variable capacitor in series.

For a series combination of L and C, the net reactance \( X' \) is equal to \( X_1 - X_2 \), and will be inductive when \( X_1 > X_2 \). If \( X_1 \) can be regarded as the reactance of a reduced inductance \( L' = X_1/2\pi f \). The reduced inductance will, unfortunately, exhibit a correspondingly reduced circuit Q since the loss resistance of the coil will remain unaltered while the inductance is lowered (Q\(=2\pi f L/R \)). This fact puts a constraint on the amount by which the inductance may be reduced. Fortunately, most amateur bands are relatively small in width and the inevitable reduction in Q can be kept within reasonable limits. 160m is a possible exception and it may be desirable to divide the band into two segments for tuning purposes.

For compactness, coils are wound on T190-2 powdered iron cores and tuned with a variable capacitor to the appropriate value shown in Table 2. The highest value of capacitance should be sought consistent with the tuning range required.
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When you walk into a radio store here are eleven tips to help make the right decision.

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2. Has demonstration stock on show for you to browse at your leisure and doesn't wrap up the demonstrator when you wish to purchase, because he hasn't another in stock?

3. Has he got a proper workshop facility on site, sanctioned by the manufacturers?

4. Is he familiar with the product you're inquiring about or can he only quote you the lowest price. (Gives you real confidence if you have an operating query - or worse - it goes wrong)

5. When you visit the store, are you confronted with non Amateur Radio-related items - what is this retailer's speciality?

6. Is he limited in the choice of goods you wish to view? A store biased to one make cannot compare fairly with it's competition - you may be forced into buying the wrong product.

7. Does he employ a "Quality Control" facility, ensuring goods sent. New, Used or Repaired are tested to specification?

8. Does he have a "family" area for those waiting, who are not so nuts about the radio you want to buy?

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THE QUARTZ CRYSTAL seems such a simple component — little more than a two-pin plug that magically has the characteristics of an ultra-stable resonant circuit. It has existed seemingly throughout the valve and semiconductor eras. Just occasionally, someone — such as Mike Hall, G3USC, (T7, October 1991) — reminds us that there is more to the quartz resonator than we usually suppose.

One result of this disregard or ignorance is that many amateurs when ordering or using crystals fail to specify their needs correctly and then blame the supplier when the performance does not come up to expectations.

In reality, the quartz crystal was not always available. Until the mid-1920s, valve transmitters were based on self-excited oscillators, either as power oscillators or less commonly as master oscillators driving power amplifiers. As amateurs opened the way to the short waves, initially '200 metres and down', subsequently around 110 metres, 60 metres, 40 metres and then the "daylight DX" band around 20 metres by the mid-1920s, notes became increasingly rough and unstable with drift a major problem. However, in the 1930s reasonably good VFOs could be made using Franklin or ECO circuits with their power supplies using voltage regulator tubes. But as so often has occurred in the history of radio, a solution came along at just the right time.

QST, in July 1924, published 'Oscillating Crystals' by H S Shaw (W1XUA) of the General Radio Company. He described how, drawing on the pioneering work of Dr W G Gady (Wileyman University) and Dr G W Pierce (Harvard University) and with advice from Dr J M Miller, he had built an HF crystal controlled transmitter. This used two paralleled 500watt valves working on about 3MHz (95 metres). He made several contacts with 1XAQ (S Kruse, then technical editor of QST) a distance of about 85 miles, almost certainly the first time crystal control had ever been used on HF (Dr Pierce with the Harvard transmitter 1XJ, had, on 25 January 1924 used a crystal-controlled oscillator to transmit over a short distance). Thus, by Spring 1924, Pierce and Miller's crystal-oscillator circuits had been developed; both configurations (Fig 1) remain, some 70 years later, as the two basic single-active-device oscillator configurations from which others have been developed. In his historic article, H S Shaw even proposed the use of crystals — with frequencies separated by about 1kHz — for transmitter and (straight) receiver oscillators.

The revolutionary nature of Shaw's article in an era of woefully unstable oscillators is underlined by Kruse's introductory editorial note: "Can you imagine a transmitter that never shifts its wave even a hundredth of a metre? Can you imagine making a schedule for 99-98 metres and knowing that you will be right on that wavelength?" And to the man who knows that the other man will be tuned right to you? And can you imagine getting from the receiving operator a report that during hours of operation the beat note in his phones never changed even a panicule? These things are possible with the oscillating crystal.*

By 1920, the phenomena of pyro- (heat) and piezo- (stress) electricity in certain materials — including Rochelle salt, turmaline, silicate of zinc, cane sugar, quartz and boracite — had been investigated by a number of scientists. For many centuries, it had been known in India and Sri Lanka, that when turmaline was thrown into a fire it acquired the property of attracting the ashes, and the Dutch brought knowledge of this curious phenomenon, an effect of pyro-electricity, to Europe. In 1717, Lemery presented a tourmaline crystal to the French Academy of Science. Soon serious studies of the effect of heat and stress on a range of substances were being made, in 1881, Pierre and Jacques Curie formulated a number of rules showing clearly the link between pyro-electricity and piezo-electricity.

For radio applications, the breakthrough can be traced to Dr W G Gady and the publication of his paper 'The Piezo-Electric Resonator' in Proc IRE (April 1923, pp83-114). This opened with the note: "In the course of experiments with piezo-electric crystals, extending over a number of years, certain radio-frequency phenomena were brought to light, the practical application of which appeared worthy of development. The two applications that seem most promising at present are (1) as a frequency standard, and (2) as a frequency-stabilizer, or means of generating electric oscillations of very constant frequency."

Later, in his classic paper, he wrote: "There are several methods whereby the frequency of an electron tube generating circuit can be rendered practically free from disturbing capacity effects, variations in battery voltage, and so on. All make use of one or other of the properties of the piezo-electric resonator that have already been described."

Within a year, Dr G W Pierce and Dr J M Miller had developed simple crystal-controlled valve oscillators, including the Miller oscillator with a resonant tuned anode circuit adopted by Shaw in Spring 1924 for his HF transmitter. Fig 3. Shaw's firm, General Radio Co, later developed and marketed quartz crystals in holders of the form that became widely adopted for some 20 years, and a number of firms marketed unmounted crystal regulators yield outputs more accurate than the meter can read.

"The pinouts of the TO-92 devices are perfect for this application. The small size allows installation of the circuit within most meter cases. Keep in mind that this circuit will present a load of 3-5mA and connectors should minimise any voltage drops. For use with other voltages select regulators whose sum equals the lowest voltage to be displayed. As an example a 78L15 and a 79L05 will output a zero voltage at 20V; a 5V meter will then read 20-25V. You can make the circuit adjustable by substituting a 317 adjustable regulator and the necessary resistors in place of the 78L05."

TWO-COMPONENT EXPANDED-RANGE VOLTMMETER

SOME IDEAS FOR expanded-range analogue voltmeters that overcome the disadvantages of using the customary zener diodes were included in July 77. This is achieved by using a three-terminal voltage regulator along with associated circuitry. An expanded-scale voltmeter using just two components is described by D D Conwell in the 'Ideas for Design' feature of the American journal EDN (20 January 1994, p73). As shown in Fig 2 this uses two complementary voltage regulators and a 0-5 volt meter. It is claimed that this results in a linear scale of 10-15V and requires no calibration except possibly some mechanical adjustment of the zeroing of the meter.

To quote the EDN item: "By using a split-voltage reference system with floating output, the zero point of the voltage supplied to the meter equals the absolute sum of the two references. With the regulators shown in Fig 2, the 0-5V meter reads 10-15V inputs. If the voltage into the system falls below this level (i.e 10V), the output to the meter changes polarity. This feature allows use of the mechanical zeroing of the meter, although this zeroing should never be necessary because most
virtually zero coefficient over a small range of temperature. An early cartoon demonstrates this process — Fig. 4.

The idea of using quartz resonators to provide receiver IF selectivity (rather than for stability as foreseen by Shaw) can be traced to the British radio-engineer Dr Robinson (assisted by the late Emest Gardiner, G8GR) and his 'stenode' broadcast receiver. He developed the basic single-crystal IF filter and lectured on his stenode system in the USA. Although the stenode broadcast receiver was based on the then common but wrong belief that sidebands existed only as mathematical concepts, James Lamb of ARPR realised that the presence of sidebands was actually an ideal narrow-band CW reception and described its use in communications receivers in QST in 1932, one of the most important articles ever published in an amateur radio journal.

So much is history — a history in which amateur radio played a significant role. But what of the present? Piezo-electric quartz crystals remain a vital component in the continued search for ever more stable and selective transceivers. In digital electronics, the crystal 'clock' has become ubiquitous. Natural Brazilian quartz has been replaced by synthetic quartz and miniaturized, produced in countless millions at real costs a tiny fraction of what amateurs were prepared to pay in 1926.

Dr Dick Dudulph, G8DPS, has recently pointed out, in connection with the July T77 item on 8- and 10-pole ladder filters, that Farrelly supply 6.000 MHz crystals at 65p (plus VAT and postage) each for 50p for ten-off, or 44p for 24-off, for 100p for a box of 1000. It should be noted however that these may not have quite the same characteristics for this application as the IQD crystals used by G3SBI with their relatively high-Q and low insertion loss.

Crystal technology and its application to oscillators have continued to progress. To some extent, the nature of the resonator has changed. In addition to the simple uncompensated crystal oscillator (XO) the more stable temperature-compensated crystal oscillators (TCXO); digitally compensated crystal oscillators (DCXO); microcomputer-compensated crystal oscillators (MCXO); voltage-controlled oscillators (VCXO); current-controlled oscillators (CCXO); and even better oven-controlled crystal oscillators (OCXO).

State-of-the-art ultra stable crystal oscillators have been developed for space satellites since 1958 at the Johns Hopkins Applied Physics Laboratory in the USA. A general survey of this work and the complex precautions needed to get the very best out of crystal oscillators in terms of frequency stability, environmental immunity, phase noise, aging rates, size, mass and cost have been described by Jerry Norton and James Cloeren in 'Precision Quartz oscillators and their use aboard satellites' (Johns Hopkins APL Technical Digest, Vol 15, No 1, 1994) pp 30-37 from which the following notes have been abstracted: "The quartz resonator is the most important component in any quartz oscillator. The size of the disc and the angle at which it is cut from the quartz crystal primarily determine the frequency of vibration. Even with excellent oscillator circuits, performance cannot exceed the inherent quality or capability of the resonator. Les than optimally, electron circuits, however, can seriously degrade performance. The potential frequency stability has a wide variation from one part in 10^6 to 5 parts in 10^8, measured over 100 seconds. The resonator Q is the best measure of performance."

"Quartz oscillators are produced in many shapes, sizes and frequencies and have many costs. For example, the resonator in a quartz watch is a relatively simple low-Q (about 30,000) device that is inexpensive (it costs less than $1). In contrast, a resonator for a high-performance oscillator is a complex, carefully processed, high-Q (over 10^6 to 10^10) device that is expensive (more than $1000). A precision quartz resonator is capable of controlling frequency very precisely, but the operating environment must be very carefully controlled to realize the resonator's full potential. A 5MHz resonator can have a Q exceeding 3-million and is the highest-Q resonator commercially available. If phase noise close to the carrier and low aging rate are the most important oscillator parameters, a 5MHz resonator should be used. The phase noise floor of an oscillator can be reduced at the expense of oscillator aging rate."

"For a precision oscillator to generate an output signal that has a low aging rate, high frequency stability, high spectral purity, and low phase noise, the following conditions must be met: (1) The quartz resonator must be kept excited (driven) at a very constant, low power level. (2) The resonator's operating temperature must be maintained precisely. (3) The resonator must be isolated from changes in external parameters such as power supply noise, magnetic fields, ionizing radiation, vibration, external loads, and parametric changes in the electronic components."

"Fig 5 is a functional block diagram of a typical precision oscillator. A 5MHz, 3rd overtone, SC (stress compensated) cut quartz resonator is the frequency control element, fabricated from premium (over 10^6 Q) cut quartz (hydrothermally laboratory grown). The oscillator is a modified Colpitts type with both alternating and direct current negative feedback to reduce
flicker noise and stabilize gain. The AGC circuit...drive current and also provides a large degree of isolation from changes in circuit parameters, input voltage, and temperature. The low-level signal from the oscillator is amplified by a low-noise, high-impedance buffer amplifier to increase the signal level and further isolate the sensitive oscillator stage from the environment. The output amplifier provides power gain, impedance matching, and load isolation for the oscillator signal. A single proportional-controlled oven encloses the resonator, the oscillator circuit, and part of the oven control circuit. The temperature of the oven is adjusted to the tuning point of the resonator (about 85°C) and is held within 0.001°C over the normal operating temperature environment."

Ageing rates of 2 x 10⁻¹² per 24 hours have been measured during flight qualification tests and achieved in orbit. While ageing rates of caesium atomic standards are superior to this for non-electrode-deposited rubidium atomic standards; moreover quartz oscillators are much less complex, more reliable and less expensive than atomic standards for small satellite applications.

While such extreme performance, which has to be maintained over the lifetime of a satellite, is basically achievable with reasonable requirements for the Amateur Service – even the Amateur Satellite Service – the general principles remain valid and show the way towards higher performance for less rigorous applications. Remember that the calibration accuracy of modern synthesized transceivers depends upon the long-term performance of a crystal oscillator.

**VALVE LINEAR SCREEN REGULATED SUPPLIES**

IT WAS EMPHASISED IN Technical Topics, April 1986 (see also TT-Scrapbook, 1985-89, p93) that the 4CX-family of RF power valves need to be treated with care if optimum performance is to be achieved. In respect of a number of suggestions from John Nelson, GW4FMR and others on the use of the 4CX250B, I wrote: "There is no doubt that the screen-grid power supply for this series of valves needs careful design, preferably with shunt regulators and capable of sourcing and sinking at least 40mA for negligible change in the screen voltage, high-voltage transistors and improved regulators with higher loop gain are proving an important advance on the older valve regulators. This assumed that modern high-voltage solid-state devices for the regulator would prove reliable without an undue degree of protection against voltage transients, etc. In practice this seems not always to have been achieved, Brian Horsfall, G3GKG, puts the case for a hybrid approach. He writes:"

"As several previous correspondents have pointed out (eg TT, April 1986), when using various in the 4X1504CX250 family it is essential to provide a well regulated screen-grid supply voltage and to ‘hold the screen down’ with a hefty bleed resistor to allow for conditions where secondary emission and/or negative screen current can occur.

"At G3GKG, the power amplifier uses a pair of 4X1500 (ruggedised 4X150) valves in a classic ‘tuned anode, tuned grid’ configuration, with a few watts of drive available from an ancient home-brewed exciter. Originally, a series stabilizer circuit was incorporated to provide the 325V screen supply and the bleed current was catered for with a parallel-pass resistor providing most of that taken by the shunt resistor. Under normal loading and drive conditions, this meant that the bleed current was always greater than the actual screen current with the total current consumption of the regulated supply unnecessarily high; an offence to the frugal (half-Yorkshire) mind of G3GKG.

"Several unfortunate experiences with high-voltage (exc) solid-state devices in this application, led to the present, more elegant design (Fig 6) where a reliable, rugged (and to some old-fashioned) value takes the strain, and, with a 27V zener diode, ZD1, and medium-power transistor (TR1), provides the low-voltage supply for the solid-state op-amp feedback amplifier, IC1. The resistor, R1, is chosen to set the overall current to be drawn from a poorly regulated 360V supply (in some respects the poorer the regulation of this supply the better, see below).

"With this arrangement, current is taken by either the control valve, V1, or the PA screen grids. There is no change in the current drawn from the supply and virtually no drop in voltage, unless or until the design current is exceeded by the demand of the screen-grids.

"A screen current meter is the best indicator of both tuning and loading conditions of this type of power amplifier. At G3GKG, the meter has its zero offset to allow for the possibility of negative current. When the amplifier is correctly loaded and fully driven by a two-tone generator (to 2mA grid current, more than 500mA anode current at 1500V EHT) the screen current peaks on ‘tune’ to only 20-25mA and the screen voltage remains steady within 1V. If the loading is too light, screen current can rise to alarming levels, so it helps to have a screen supply whose output impedance drops rapidly in such conditions. In normal SSB operation, ALC feedback from PA to exciter is turned up so that the full 400-watts PEP RF output is obtained without driving into grid current and with only a few mA ‘flicker’ on the meter."

**AGC ATTENUATOR**

GIANCARLO MODA, I7SWX draws attention to an RF Design award feature (March 1994, pp94, 96) submitted by Czech-born Carl Zatl who has been living in the USA since 1981. This is introduced as follows:

"A screen current meter is the best indicator of both tuning and loading conditions of this type of power amplifier. At G3GKG, the meter has its zero offset to allow for the possibility of negative current. When the amplifier is correctly loaded and fully driven by a two-tone generator (to 2mA grid current, more than 500mA anode current at 1500V EHT) the screen current peaks on ‘tune’ to only 20-25mA and the screen voltage remains steady within 1V. If the loading is too light, screen current can rise to alarming levels, so it helps to have a screen supply whose output impedance drops rapidly in such conditions. In normal SSB operation, ALC feedback from PA to exciter is turned up so that the full 400-watts PEP RF output is obtained without driving into grid current and with only a few mA ‘flicker’ on the meter."

Fig 7: Development of improved AGC system. (a) Amplifier with negative feedback; (b) Attenuator placed at some point between V1 and V2; (c) Transformer Tr reduces the voltage across R1; and (d) Balanced PIN diodes provide linear attenuation. (source RF Design).
One weak spot in modern receivers is the AGC... AGC voltage is used to vary the bias on the amplifier stages, increasing or decreasing the gain. As signal strength increases, less gain is needed and the AGC voltage changes the operating characteristics of the controlled device (a) to a less linear mode.

The result is that a strong signal is applied to an increasingly non-linear device, exactly the opposite of what is needed for good intermodulation performance. This problem has existed ever since the development of AGC. My goal was to minimise or eliminate that unfavourable condition.

Modern designs often use PIN diodes or FETs as variable resistances to form variable attenuators at the front end of a receiver. But if these devices are driven to higher attenuation, their non-linearity can produce intermodulation or cross-modulation distortion.

Carl Zall's approach is to reduce significantly the problem by placing the attenuating element into the negative feedback of an amplifier where signal amplitude is smaller: the principles on which this was developed are shown in Fig 7.

Fig 7(a) shows the point $V_n$ where, in an amplifier with negative feedback, the smallest amplitude occurs; (b) shows an attenuator placed at a point between $V_n$ and $V_{	ext{out}}$; (c) further improvement is reached when the resistor $R$ is replaced by an impedance transformer with resistance $R_T$, reducing the voltage on this resistance by the ratio $2:1$. (RT can be voltage-controlled FETs, current-controlled PIN diodes etc., in balanced configurations); and (d) the non-linearity of one diode is reduced by the same but opposite non-linearity of the other diode.

A resistor is placed in parallel to maintain some reasonable impedance for the transformer while the diodes are 'off'. The ratios of $R_1:T_2$ and $R_1:R_2$ are the main factors which specify the attenuator.

Fig 8 shows such an AGC amplifier for a 50MHz receiver in a two-tone (f2 50.000MHz, f1 50.100MHz) test set showing that as gain is decreased, the capability to handle strong signals grows; gain 6dB – IP3 = 36dBm; gain 6dB – IP3 = 42dBm; gain 12dB – IP3 = 49dBm with the input impedance 50 ± 10Ω. Carl Zall claims: “These characteristics are very favourable and oppose to any other available AGC amplifier or attenuator; as gain is decreased, the circuit's capability to handle strong signals grows.”

**IMPROVING IC REGULATOR RELIABILITY**

**EDN 'DESIGN IDEAS'** of 12 May 1994, p86 includes an article from Peter Demchenko, in Lithuania pointing out that a small change to the standard circuit for adjustable three-terminal IC regulators (LM317, LM350 etc) improves reliability.

He considers that the standard circuit (Fig 9(a)) suffers from an inherent fault: if the wiper of the potentiometer, R2, loses contact the output goes high and may damage the load. Since the potentiometer is the most unreliable component in this standard circuit, it is worth considering the modified arrangement shown in Fig 9(b). Now, if the wiper loses contact, the voltage output goes low, safeguarding the load. R3 limits the voltage excursion of the output even if the pot short-circuits.

**SUPER-SELECTIVE CRYSTAL FILTER FOR EME ETC**

The CLASSIC ROBINSON/LAMB single crystal filter has, for many years, been largely superseded by multi-crystal bandpass filters. There are several reasons for this, including the higher intermediate frequency of modern designs, and the later development of effective bandpass half-lattice and ladder filters: the classic filter with its narrow 'nose' characteristic was primarily suited to 455kHz IFs and CW reception.

However, Jan-Martin Noeding, LABA8/9 has reported on how Leif Aabrink, SM5BSZ has resurrected the Lamb-type filter in the form of a super-selective, continuously-variable filter for EME (moonbounce) reception. LABA8/9 writes:

"At a recent Scandinavian VHF meeting in Denmark, SM5BSZ described his approach to EME using a 500W power amplifier and 4 x 14-element yagi array but his main interest is the development of improved receiver performance. He has an extra receiver with digital signal processing (DSP) using Fourier transforms to 'spectrum analyse' the received signals. He finds this also very useful when operating in the aurora-mode in order to investigate his own reflected signals using full QSK with 100W RF power and with BAY96 (some parallel connected) varactor diodes to form a transmit-receive (T/R) antenna switch.

"To provide a high degree of (variable) selectivity, he uses a simple but effective form of the classic single-crystal filter. He found that MF/HF crystals tend to have too low a Q for this application whereas 100kHz calibrator crystals are entirely suitable. With the arrangement shown in Fig 10, he achieves a narrow bandwidth variable between 10Hz and 2kHz depending on the setting of the output impedance which is governed by the setting of the 1MΩ (log) 'bandwidth' potentiometer.

"SM5BSZ finds that even for EME, it is not practical to use the minimum 10Hz bandwidth achievable with this filter and 20Hz seems the lowest applicable limit. Unlike the filters used in the older communications receivers, such as the HRO, Super-Pro etc, this narrow-band filter must be fed from a low-impedance source (anode impedance of a valve is too high unless transformed down).

"The neutralizing capacitor (Cn) has much the same effect as the 'phasing control' of the classic filter in setting the rejection notch by balancing out the effect of the capacitance across the crystal. When cascading two or more such filters, it is important to tune both filters to precisely the same frequency, and an extra series capacitor (C3) may be used to increase the resonant frequency for the crystal with the lower frequency.

SM5BSZ uses two cascaded filters with transistor isolating amplifiers in his receiver. In order to adjust the selectivity over a wide bandwidth range a multi-turn potentiometer is highly desirable, tapped on to the tuned output circuit for impedance transformation."
TECHNICAL TOPICS

PROJECT 6L6 - 1994 STYLE

1996 WAS THE 50th ANNIVERSARY of the introduction of the RCA Radiotron 6L6 beam tetrode followed a year later by an RF version, the classic 607. To mark the occasion, Dean Manley, KH6B, launched a 'Project 6L6' (77 February, April, May and November 1996; see also Technical Topics Scrapbook, 1985-89). KH6B was seeking to encourage this project not only to mark the golden jubilee but also to revive interest in simple (KISS) rigs as clubprojects, home-construction etc. He then wrote: "It seems only natural for amateurs to build and experiment. A simple rig with a 6L6 will fill this. Building your own rig is half the fun. The other half is putting it on the air and convincing the disbelievers that you've really a metal 6L6 or glass 6L6G in the final, then taking the rig along to the local club and enticing others into the homebrew game."

I pointed out that such rigs are not necessarily confined to CW. Amplitude (Heising) modulation of a single stage crystal oscillator is not recommended practice, but in the past many did it. "A few brief contacts, just to prove it still works (and can be received as SSB), would hurt nobody. Indeed there is little reason why it should not be reintroduced more widely on 1.5MHz or 29MHz. A two-stage 6V6CO/6L6 or 807PA combination is better than a single-stage power oscillator."

Although we are now approaching the 60th anniversary of the beam tetrode, KH6B believes that the raison d'etre for such projects remains valid. In the February 1994 issue of the BIARC Bulletin of the Big Island Amateur Radio Club of Hilo, Hawaii, he returns to this topic reporting that this local club of over 100 members is this year pursuing 'Project 6L6' as a 'club kit' activity.

"Yes, homebrew, hot soldering irons, and valves!" he comments, adding: "Many years have past since the question of whether to build or buy was posed seriously. At one time, it was suggested that your first station should be 'home brew' even if you could afford to buy the best available station equipment. It was even assumed that if you built your own, you knew more than an operator who bought his station. Nothing replaces experience. You learn by building and if you build your own AM transmitter, then put it on the air, you no longer qualify as an 'appliance operator'. Nothing can replace the fun, the educational value, and the pride of operating your own 'home brew' transmitter."

Fig 11 shows the two-stage 1.8MHz AM/CW transmitter that forms the basis of the current BIARC project for which KH6B has developed a kit. This has a Pierce-type crystal oscillator using a 6JS triode valve plus a 6L6/6L6G power amplifier with pi-type matching network and using a 6.3V, 0.3A (US Nr 47) pilot bulb as tuning indicator. Fig 12 shows the Heising anode modulator suitable for use with a microphone providing a fairly high output. A 350V, PSU is shown in Fig 13. In the UK a number of the components might pose problems for those without a good junk box salvaged from the valve era, but in many cases various substitutions could be made without impairing results.

Fig 11: Two-stage 1.8MHz transmitter forming part of KH6B's current 'Project 6L6'.

HERE AND THERE

A NUMBER OF COMMENTS have been received on the May TT Item about the invention by Sperry of the famous National PW dial as used in the HRO receiver, and we hope to return to this topic later. Meanwhile, John Teague, G3GTJ, points out that this type of dial was used on a British-made S-band cavity wavemeter of wartime vintage to count the turns on the microometer type plunger. The dial differed from the HRO dial in being machined and possibly a little larger in diameter. On another topic, G3GTJ is currently researching one of the most significant wartime developments in radio communications technology: the No 10 microphone (4.4 Gigahertz) multiplexed radio relay system using pulse-width modulation. The first demonstration of pulse-TDM communications was made at SRDE in early July 1942 and was judged so successful that contracts were quickly placed for 600 equipments with GEC Pyle Ltd and the Telephone Manufacturing Company, with operational models available from January 1944, in time for their successful use during the liberation of France and Belgium (see my letter in Radio Bygones, No 4, February/March 1990). John Teague, (Perrott's, Lyford on Fosse, Somerton, Somerset TA11 7HA, Tel: 0963 240319) has plenty of technical data but is anxious to contact more of those who used this equipment which, he notes, was used by the RAF as well as the Army.

Many years ago, TT mentioned the possibility that one day a new form of tiny semiconductor microphone might be developed. This seems to have come much closer to practical implementation according to a paper presented by G Sessler of Darmstadt Technical University at the 127th Meeting of the Acoustical Society of America, MIT, June 1994. David Newland (Nature, 7 July, 1994, p21) reports that the German scientist described a two-chip silicon condenser microphone no larger than a pinhead. It is claimed that good sensitivity with a flat response up to 10KHz can be obtained with noise levels comparable to conventional condenser microphones. Micromachining methods can also be used to produce miniature piezoelectric microphones in which the membrane is of a piezoelectric material that generates an output voltage when it is deflected.

So far, silicon condenser microphones have the higher sensitivity and piezoelectric microphones the higher frequency response (first resonance frequencies up to 45kHz). Apart from their tiny size, silicon condenser microphones have other advantages, including the possibility of being manufactured in bulk using the techniques of the semiconductor industry, which means that they should be cheap and reliable.

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PROGRAMME

Friday 7 October
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Saturday 8 October
DAY
Transceivers – G3SJJ
IOTA Director’s Address – G3KMA
First 100 countries – G0HSD
Z06SXW DXpedition – G3SXW
IOTA Policy Q&A
Phased Arrays for 80 and 40m – G3PJT
VK9MM DXpedition – G3W6V
Practical LF Antennas – W1XP
Holiday Operations from Islands – K5MK
3Y0PI DXpedition – 0NGTT
Computers in the Shack – G3XTT
Antenna Circus – G3WI.M
EVENING
DX Dinner

Sunday 9 October
DAY
Data Modes (Subject to Confirmation)
Contest College – G3SJJ
RSGB and Other Awards
Computers in the Shack – G3XTT
LF Propagation – G4OBN
3Y0PI DXpedition – 0NGTT
Cluster Workshop – G4PDO
Antenna Planting Clinic – GW4ZKG
EVENING
Supper in Old English Pub for overseas visitors

Other Activities
Ladies’ coach to Windsor for shopping and sightseeing,
Ladies’ cruise on the Thames,
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<td>RL402</td>
<td>70cm 430-450MHz (430-470MHz expandable)</td>
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<td>FP800</td>
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<td>FP700</td>
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<td>RS400XI</td>
<td>PSU 1-15V 30/40A</td>
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<td>CH12S</td>
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<td>CH1600X</td>
<td>2/270MHz Whip BNC</td>
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<td>CH213</td>
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<td>ABC23</td>
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<td>GSP1N</td>
<td>2M/144MHz Eater Colinear</td>
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<td>EP15</td>
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<td>CK-902</td>
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**COMET DUPLEXERS**

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<td>CK-341BM</td>
<td>Mini Cable Assembly</td>
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<td>WS-1M</td>
<td>Window Mount &amp; Cable</td>
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**COMET STATION ACCESSORIES**

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<td>CMX</td>
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<th>Supplier</th>
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<tr>
<td>SMC (Northern)</td>
<td>Nowell Lane Ind. Estate</td>
<td>Tel. 0532 350606</td>
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<td>SMC (Midlands)</td>
<td>102 High Street</td>
<td>Tel. 0246 45340T</td>
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<td>SMC Birmingham</td>
<td>504 Alum Rock Road</td>
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ALL THE RFCIRCUITS have been described in the previous four parts. In this final part I will look at the requirements for the local oscillator inputs to the various stages and describe some of the circuits I used to generate them.

LOCAL OSCILLATOR REQUIREMENTS

THE RX84 LOCAL OSCILLATOR requirements, see Fig 19, are as follows:

- 41-70MHz for the first mixer to produce an IF of 41MHz from input signals in the range 0 to 30MHz.
- 50MHz for the second mixer to produce an IF of 9MHz from an input from the first IF of 41MHz.
- 8MHz for the third mixer to produce an IF of 1MHz from input from the second IF of 9MHz.
- 200kHz for locking the 1MHz signal, generated in the detector module, to the product detector and the synchronous AM detector.

In addition the 50MHz signal to the second mixer must be capable of being shifted in frequency for the reception of SSB plus or minus 1.4MHz for the reception of upper and lower SSB signals respectively. The 8MHz to the third mixer must also be capable of being shifted plus or minus 1.4MHz at the same time. The effect of shifting both these oscillator frequencies is to shift the selectivity filters following the second mixer to the lower or upper sidebands of the input signal respectively. It also places the received signal so that it has the correct frequency difference relative to the product detector 1MHz local oscillator for resolving the appropriate SSB signal.

In the CW mode the 50MHz signal to the second mixer is not shifted so that the received signal is in the centre of the selectivity filter passband. The 8MHz from second synthesizer is shifted by 750kHz to produce beat note with the 1MHz local oscillator at the product detector.

I used a synthesizer to produce the whole range of oscillator signals required. In the prototype receiver the synthesizer I used was developed by the Telefunken company for use in their E1700 and E1800 communication receivers. For that reason, I cannot give detailed information on this particular synthesizer. What I have done is to give circuits and a brief description of some of the more unusual circuits used to produce the local oscillator signals. In fact two synthesizers are used, a main synthesizer to produce the local oscillator requirements for the first mixer, and a second synthesizer to produce the local oscillator signals for the rest of the receiver.

MAIN SYNTHESIZER

A 10MHz OSCILLATOR is used as a frequency reference for all the other oscillators in the receiver, see Fig 20. The reference 200kHz for the second synthesizer and demodulator module is derived from 10MHz via a frequency divider.

The 10MHz oscillator crystal, is housed in a block of aluminium, which is temperature controlled to ±0.5°C. This temperature is reached within very few minutes after switching on. The frequency stability of the oscillator is very high (less than 3Hz of drift at 10MHz, for a whole evening after a warm-up period of a quarter of an hour).

As already stated 50MHz is required for the second mixer to produce an IF of 9MHz. In the CW mode this signal is derived directly from the 10MHz reference oscillator – the 10MHz signal divided by five. The resultant 2MHz square-wave signal is then passed through a harmonic generator where it is converted to narrow pulses. These pulses have a very harmonic content, and the appropriate harmonic is selected by a 50MHz filter, see Fig 19.

In the SSB modes the signal must be shifted ±1.4MHz as already described. In this case the 2MHz signal is passed through a harmonic generator, before, and the appropriate harmonic is selected by a 42MHz filter, as in Fig 19.

VCO CONTROL

THE VCO USES coarse-frequency control by means of fixed capacitors and coils, controlled by a digital counter, see Fig 21.

The fine tune control range is limited to a very narrow range of less than ±0.5MHz. The counter is loaded with the required receiving frequency, in parallel BCD code, by the microprocessor.

At the highest receiving frequency of 30MHz, only the two low bits of the most significant byte of the counter are necessary to address this. The BCD-code counts 1 – 2
Fig 20: Reference oscillator, circuit diagram.
closed down to zero, counting continues 99.000.0. This gives an additional 1.000 steps.

As an example, if the operating frequency is to be 14.307.0MHz, this figure plus the 40.000.0 amounting to 54.307.0 is actually loaded into the counter. When this has been clocked down to zero, counting continues through 99.999.99 and further on to 99.000.0, when the reset will occur.

The sum of the counting steps is 55.307.0, exactly what is required to receive the signal on 14.307.0MHz.

(The oscillator must be 41MHz higher than the received frequency; \( f_{osc} = f_{ref} + f_d \).)

The principle of coarse-steering an oscillator, by means of fixed capacitors and coils, has advantages; the varicap only has to correct the frequency, within a very narrow range (\(<0.5MHz\)). Moreover, the voltage applied to the diodes, is a clean DC because the gates in the DIAC-converter, will be either on or off. This prevents unwanted noise (Note 2) from "modulating" the oscillator and, as the transistor used in the oscillator circuit is a low-noise FET-type (E310), the output signal from this synthesizer is extremely clean from phase noise. The capacitors used in the oscillator tuned circuit must of course be of very good quality. Ordinary ceramic capacitors tend to be unstable, which will inevitably lead to an increase in phase noise. We found that good quality chip-capacitors are better. Also the adjustable capacitors should be the air insulated, ceramic type.

Due to the carefully selected time constants in the loop filter, frequency tuning is very smooth to operate. The characteristic 'bouncing' behaviour of a synthesizer has been reduced to a degree, that one almost has the feeling, of tuning an ordinary continuously-tuned VFO. Only when tuning in 1kHz steps is the stepping action noticeable.

SECOND SYNTHESIZER

AS WAS STATED EARLIER the 50MHz signal to the second mixer must be capable of being shifted in frequency for the reception of SSB signals. Also the 8MHz to the third mixer must also be capable of being shifted at the same time.

On SSB a 42MHz signal from the main synthesizer is then mixed with 8MHz. This 8MHz signal in turn is derived from the 200kHz signal from the main synthesizer. The 200kHz signal is divided, under microprocessor control, to control an 80MHz VCO. This frequency is then divided by 10 to produce 8MHz ±10kHz for the second mixer.

Further Information on synthesizers are given in [8], [9] and [10].

DESIGN NOTE 2

THE VCO IS NOT exceptionally stable by itself, because of the relatively low Q of the tuned circuit. However, its frequency is compared, in the phase detector, with the highly stable crystal reference oscillator. The error voltage from this comparison is a DC-voltage with a noise voltage superimposed onto it. The part of the noise in the range below the cut-off frequency of the loop-filter is compensated by the feed-back, while the noise above the cut-off frequency cannot be compensated. For this reason it is essential to avoid noise originating, for instance, in the phase detector, the dividers or as flicker noise from the oscillator transistor.

Measurements of phase noise are discussed in References [1], [10], [11] and [12].

REFERENCES

[12] Hewlett Packard Application Note 283-1 Applications and measurements of low phase noise signals using the 8662A synthesized signal generator.

Fig 21: VCO Frequency control, circuit diagram.
To New Zealand on Top Band Phone

by Brian Atkinson, G3GSI

WHAT STARTED as a simple 'sked' to make a first contact on 160m SSB soon progressed into a group of amateurs exploring the regularity of G - ZL short and long paths using grey line propagation.

Although the paths between the UK and New Zealand have been worked over the years by various amateurs, contacts have not been regular. To investigate the paths further, a daily concentrated effort on long and short paths were arranged with two dedicated ZLS. Daily 20m skeds were held to exchange reports on 160m openings, to evaluate propagation conditions and to discuss WWV figures. Detailed notes were taken later correlation.

On the first day of the skeds, 15 September 1993, weak signals were heard but not positively identified. The next three days produced the same results.

Contact Made

ON THE morning of the 19th, the first contact was made via long path, both sides confirmed reports of 44. The first short path contact was achieved on the evening of 20 September, with ZL being received at 55. ZL reports of 56 to the G stations were later confirmed. The 29th produced good openings into some areas of the UK, with the favoured locations enjoying contacts of 55 both ways.

The following day both long and short path openings produced some remarkable contacts. The morning tests produced signals, again very localised, which peaked with reports of 59. Whilst stations in the South of England were giving and receiving low signal reports, ZL areas 1, 2 and 3 were contacted from the Midlands, providing a first UK 160m contact for ZL1HY. During the evening, very similar conditions prevailed and 55 reports were exchanged between ZL and several UK and European stations. For the majority, this was their first ever ZL on the band. For others, it produced their first two-way SSB, short path contact.

Mixed results

THE DAILY morning and evening skeds were maintained, with mixed results. On some days, contacts were made, with reports of 44 to 58, whilst on others there were no contacts at all. Whilst we were happily 'rag chewing' on 7 October, a ZL was falling victim to the more southerly stations. Reports to ZL were probably affected by the local SW band. The signal reports to and from GM were considerably better than the remainder of the UK.

On the 1st of the month, a ZL was falling victim to the more southerly stations. Reports to ZL were probably affected by the local SW band. The signal reports to and from GM were considerably better than the remainder of the UK.

On the 23 October 55-8 reception of ZL via short path was reported by quite a few UK stations. Unfortunately the ZL station was experiencing QRQ from a very strong Loran transmitter. A particularly good opening occurred on the 26th when both long and short path paths produced contacts for several stations around Western Europe.

The morning of 10 November saw a remarkable 50 minute opening with 55-8 reports both ways for the UK and some of Europe. This was followed by a five minute opening on the 13th, resulting in contact for only one UK station. Propagation was at its best, with the ZL station being reported over 150 miles.

A five minute opening on the 13th, resulting in contact for only one UK station. Propagation was at its best, with the ZL station being reported over 150 miles. The ZL was a ZL2UX, involved with long and all the short path paths, moved QTH (new call sign ZL4WA) and at the time of writing is not yet back on the air. Jim, ZL2JF, is a regular contact and has a long and short path tests. (The latest news is that contacts had been made up to 4 May but morning QSOs were no longer viable - Ed).

Conclusions

LONG PATH has proved to be the most consistent and workable. This provided numerous good openings during September, October and November 1993.

At the commencement of these tests, it was supposed by the UK stations that large, high aerials would be a prerequisite for success. Table 1 shows the aerials available to the participants. In several instances the 'aerial rule book' failed to apply. A full-size 1/4 vertical, with extensive ground system, was ineffective compared with an inverted V at the same location. And one GM station worked into ZL on a dipole at a height of 15ft. A temporary 40ft top loaded vertical was erected at one QTH, following gale damage to usual aerials, and a two-way contact was confirmed. These, and similar experiences, showed that pre-conceived notions regarding aerials are not to be relied upon.

Although higher power levels must have helped some UK stations, it has not been proved that power was a major factor in these tests. 100W has been used consistently by at least one UK amateur resulting in reports from ZL.

Report from ZL2JF

MY FIRST G contact on 160m was G3SZA on 16 October 1983, using 30W CW into a Minnowa who antenna. Others followed but it was not until 1988 when I erected a '4x4' sloper midway between the long and short paths that I fully realised the possibilities of consistent contacts with the UK.

The first method used was with G4YRP and great CW contacts on the long path. Further interest by G4XVZ, G3MOU (also GM3MOU, G3JSU) and G4CWH saw regular skeds from 1 September 1983.

From 1 September 1993 until 30 April 1994 we had 107 openings at ZL sunset, long path. Eight openings were one-way with no copy in the UK. Some were also to different UK locations than the sked group. I did not join ZL2AXD on our sunrise openings but when he moved QTH in January 1994 I kept both sked times. From 22 January we have had 28 openings short path.

For me the most exciting opening was on 26 November 1993 when G3MOU and I sked from 0728 to 0852 with various breakers. At 0729 179JO broke into the first QSYZL contact, with 45 reports both ways. A long path SSB contact of 13,000 miles was quite exciting. Another ZL first was with G3WX on 16 October, the same day as G4XVZ was 45 using only 15W.

Propagation

DURING WEAK openings with normal multipath, low angle antennas appear to perform better. However, when chordal path fading occurs signals are very strong, up to 59 from many types of horizontal antennas. No regular propagation patterns have emerged in ZL. There are times, however, when the SSB A-index figures indicate possible openings. A rise from a low to higher A-index often precedes the increase in solar activity prior to a magnetic storm. During the 12 - 24 hour period before a storm fully develops 160m will open quite suddenly before going dead for up to 7 days.

Forecasting of possible fading formation would be a real bonus if specific measurements of the activity of D and F layers were possible.

Loran G stations in New Zealand with LCY station at about 100 miles. During these tests, the LCY was 30 miles away. The LCY station is usable over 200 miles.

Constant VHF working is best 0600-1500Z and the LCY is LSB at 15 minutes,Var on the other side. LCY stations are on the G - ZL long path. LCY is 100 miles from LCY, and LCY is 100 miles from ZL.

To date I have worked 37 different G stations plus 1 GD, 10G, 3 GM, 1 GU and 2 GW. During this coming low sunspot period I shall endeavour to increase that total and give more opportunities for their first ZL contact on 160m. From now until the end of April I shall be listening at UK sunrise and sunset times.
Propagation

PROPAGATION IS a mystery. WWW figures and auroral propagation were studied, without much success. Predictions made according to WWW, never materialised. As a consequence, our hope of being able to suggest some kind of pattern never came to fruition. This is still under investigation.

We suspect that there is a geographical aspect which would explain why only certain UK stations were able to have a ZL QSO, eg the GM with the dipole at 15ft had a 15 minute contact whilst no-one else had any reception. Similarly, on 26 October, the eastern side of the UK, on short path, had good propagation in both directions, whilst on the following day propagation favoured the Midlands, short path. Occurrences such as these have arisen very frequently with other UK stations. They all had arials of differing heights, at non-ideal locations. The same phenomenon also occurred in ZL, where stations reported marked differences in propagation, at differing locations.

What Next?

IT IS PLANNED to continue the tests until September 1994 to give a 12 month pattern. It would appear that the paths between the UK and New Zealand are workable using modest aerials and low power, given the right propagation. Listening times are approximately 20 minutes before UK sunrise until approximately 20 minutes after ZL sunset, for long path. Commence listening 30 minutes before ZL sunrise, for short path.

Thank you to the ZL amateurs, without whose dedication and perseverance these tests would not have been possible. Also thanks for providing an opportunity for many stations to make their first 160m SSB contact with ZL.

Table 1: Equipment in use by the participants.

Antennas and Techniques for Low Band DXing

(A RRL) 2nd Edition

This publication could be your ticket to low band success. Drawing on the experiences of successful DXers and the author's own considerable experience, John Deveoldere, ON4UN, shares the tips and techniques that can make the difference between a station that takes part in a contest and one that wins it! Thousands of performance-orientated amateurs benefited from the author's first edition and this new second edition has been extensively revised and expanded.

Members' price only: £6.80
NEWNES PRACTICAL RF HANDBOOK

by Ian Hickman.

Published by Newnes (Imprint of Butterworth-Heinemann Ltd) 1993. 271 pages (230 by 155mm) soft covers. Price £16.95 (plus £2.50 post & package from Reed Book Services Ltd, PO Box 5, Rushden, NN10 9YX).


SINCETRAINING COURSES for professional engineers now put so much emphasis on digital electronics, there remains a demand for—and shortage of—engineers with a sound practical knowledge of RF design, which continues to combine analogue electronics with an ever increasing degree of digital technology, including the new approaches being opened up by digital signal processing.

This new book claims to be aimed at both amateur and professional RF engineering, although the author concentrates primarily on the theory and practice of professional communications rather than amateur radio practice, and the amateur experimenter and designer may be left wishing that the book dealt rather more with, for example, SSB as we know it.

It seems rather idealistic to state that SSB voice communication requires equipment stability of "up to about 10 Hz for speech and 1 Hz for music", tolerances more associated with broadcast SSB with pilot carriers than the "frequency shifts of +200Hz or -100Hz" held to be tolerable maxima for normal communication requirements as given in a 1968 ARINC publication.

'Ian Hickman' is the pen-name of an experienced author and professional graduate-engineer, but not I suspect an active radio amateur. Of the relatively few 'references' given at the end of each chapter, only one (Wes Hayward's excellent Solid State Design for the Radio Amateur published by ARRL) is a specifically amateur radio publication. Nevertheless it should be stressed that the book, with 13 chapters and 11 appendices, is well organised and does give a clear and up-to-date outline of RF theory and practice.

There is much useful information on passive RF components, RF transmission lines, RF transformers, couplers, hybrids and directional couplers, small-signal and power amplifiers, oscillators and frequency synthesisers etc. The chapter on antennas and propagation, however, may disappoint with, for example, no mention of antenna computer modelling with NEC etc, and little that would in practice help the average amateur radio reader.

A book to be recommended, but with reservations.
THE NAME Ben Spencer will be familiar to RedCom readers as he has had several projects published in recent years. His efforts are now going into manufacturing kits and his recently published range includes: An Audible SWR Meter to enable blind amateurs to hear their SWR (£15.90); a High Frequency RF Head which measures power up to 100W, 60 to 10m (£12.90); a Crystal Calibrator offering markers at intervals from 10MHz to 10kHz all the way up to UHF (£12.90); and a Thermal Fan Controller which switches a fan on only when it is required (£4.90). Each kit comprises a quality fibre glass PCB, all board mounted components (ie no knobs, cases, wire, solder or panel sockets), a Constructors Guide, a circuit and full instructions.

Forthcoming kits include a Deluxe Lambic Kiyer, a High-stability Crystal Oven, UHF Prescaler, fully-protected 13.8V 5A PSU and an Automatic Gelled Lead Acid Battery Charger. A technical helpline is available if a constructor gets stuck. For further details get in touch with:

Ben Spencer Consultants, Enterprise House, 33 New King St, Bath, Avon BA1 2BL. Tel: 0793 842 858.

ARE YOU PUZZLED by the rig numbers on the Members Ads pages? For instance, what is an IC2SRE and how does it differ from an IC2S7E? The answers are in the Rig Review edited by Dave Morgan, GW3KYZ. This 60-page A5 book covers hundreds of amateur band receivers, transmitters and transceivers, sorted by manufacturer, and describes each rig’s main features and its original price. In addition, reviews in UK magazines are referenced where appropriate [copies of RedCom reviews are available at £1 a page from RSGB HQ - Ed]. The Rig Review costs just £5, post free, from:

Twyog Press, Penybont, Geliliydan, Blaenau Ffestiniog, Gwynedd LL41 4EP.

THE INTERNATIONAL Short Wave League publishes a 25-page book: Standard Frequency and Time Signal Stations of the World. Stations are listed by frequency and by callsign, and full details are given of each transmitter as well as how to interpret the data heard. This unusual publication is invaluable for those interested in propagation or in calibrating their station equipment. The price is a very reasonable £2.50 post paid.

ISWL, 10 Clyde Crescent, Whitton, Winsford, Cheshire CW7 3LA.

AN ENTIRELY new concept in receivers comes from the ComFocus Corp of San Diego. Described as a marriage of radio and state-of-the-art computer technology, SoftWave is a receiver with no controls on it, driven totally by your computer. But this is no ordinary computer-controlled radio. It can take on several ‘personalities’, eg a communications receiver, a SW broadcast receiver, a VHF receiver or a wideband spectrum analyser, all selected from the PC screen. The list of facilities, made possible by the use of DSP, is quite mind-boggling and we will be reviewing this receiver just as soon as we can get hold of one. If you want to see one in action, contact:

Lowe Electronics Ltd, Chestertfield Road, Matlock, Derbyshire DE4 5LE. Tel: 0629 586800.

THE FT-900 IS A NEW HIGH PERFORMANCE compact (238 x 93 x 253mm without knobs) HF all-mode transceiver from Yaeu. It features 100W out on all HF bands and general coverage reception 100kHz - 30MHz. Other features include a bargraph meter with a ‘peak hold’ facility, reversible sideband on CW and adjustable BFO offset (for correct frequency read-out when using data modes). A built-in antenna tuner saves the need for an extra tuner box and the detachable front sub-panel should make for easier installation in the car. The list price, which includes a hard mic, is £1299. Optional extras include PSU, CW filters, external loudspeaker, computer interface, mobile brackets and desktop microphone. Available from Yaeu dealers throughout the UK.

PRODUCT NEWS

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

IT'S BECOMING increasingly difficult to find new variable capacitors these days but a company with a well-respected name is still in business. Jackson Brothers have announced the CS24-series of air-spaced trimmer capacitors which combine low cost with Jackson's 70-year reputation for quality. Trimmers are available from 10pF to 100pF (linear law) with a minimum capacitance of less than 5pF and a maximum working voltage of 350V. The vanes are made of aluminium and the front panel is a low-loss composition. The components are based on the highly successful (and still available) ceramic and silver-plated brass CS04 types and, for low power use up to 100MHz, the two are mechanically and electrically interchangeable. For details of these and Jackson's comprehensive range, contact:

Jim Parker, Jackson Brothers Ltd, Kingsway, Waddon, Croydon CR8 4DG. Tel: 081 681 2754; Fax 081 681 3728.

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For a cost, it is easy to connect a modern transceiver to a computer to perform a wide variety of functions. Siskin have come up with an inexpensive CAT interface which puts this facility within the reach of most amateurs. It will control Icom, Yaesu and Kenwood radios and comes in a neat little RF-tight box. Siskin will supply the appropriate cable for your rig and the appropriate software (IBM-AT). All this for only £59.95 plus £4.00 P&P from:
Siskin Electronics, 2 South St, Hythe, Southampton SO45 6EB. Tel: 0703 207155; Fax 0703 847754.

Klingensfuss Publications, Hagenhofer Str 14, D-72070 Tuebingen, Germany. Tel: 010 49 7071 62830. Fax: 010 49 7071 600849.

* Klingensfuss have published the 14th edition of their Guide to Fax Stations, covering equipment, theory, detailed listings and sample printouts - concentrating on the many weather fax stations on land and in space. At a massive 400 pages, it's a gold mine for the fax enthusiast. For details of this and other 'Guides' contact:
Klingensfuss Publications, Hagenhofer Str 14, D-72070 Tuebingen, Germany. Tel: 010 49 7071 62830. Fax: 010 49 7071 600849.

A Very Small packet radio modem is offered by Thorcom Systems Ltd of Worcester. Running AX25 level 2, version 2, KISS mode the modem is small enough to fit inside your mobile radio (it's 63 x 44 x 10mm). The RLC320 offers transmission speeds of 1200, 2400 and 4800 bits per second using FFSK and has two serial ports, one RS232 and one at TTL/CMOS levels. Price around £300 + VAT. Amateur radio sales enquiries to Siskin Electronics, 2 South St, Hythe, Southampton SO45 6EB. Tel: 0703 207155; Fax 0703 847754.

ADUR Communications are importing the range of Oak Hills Research QRP transceivers and accessories. These are quality kits complete with enclosures, and include dual- and single-band CW rigs, an audio filter, a QRP wattmeter and an electronic keyer. Adur also carry spares and modification parts for the Heathkit SB220 amplifier.
Adur Communications: 13 Dawn Crescent, Upper Beeding, Steyning, W Sussex BN44 3WH. Tel: 0903 879526.

Haydon Communications have announced a new range of VHF-UHF mobile and base antennas at a cost savings of around 20% made possible by cutting out the middle man.
Haydon Communications, 132 High St, Edgware, London HA8 7EL. Tel/Fax: 081 951 5782.

Amdat are importers of the MultiScan data interface which enables your IBM-compatible PC to send and receive FAX/SSTV in colour and to monitor RTTY, TOR-FEC and NAVTEX.
Amdat, 4 Northville Rd, Bratpool, B57 ORG. Tel: 0272 599352. Fax: 0272 236088.

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For more information contact Amateur Radio Insurance Services on 0342 84 4000, or write to Shepherds Hurst, Green Lane, Outwood, Surrey RH1 5QS.

Radio Society of Great Britain
Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE
I F A DUAL-BAND ANTENNA is to be used with two single-band rigs, or a dual-band transceiver with separate amplifiers and/or antennas, a device is required which can separate or combine two signals of different frequencies.

A diplexer is such a device; entirely passive, it is inserted in the coaxial feeders and permits simultaneous operation on the two bands.

Performance criteria are attenuation in the desired path (as low as possible), isolation in the blocked direction (as high as possible), and SWR (as close to unity as possible).

HOW IT WORKS

THE CENTRE PORT IN Fig 1 is common to both frequency bands and may be connected to, say, a dual band antenna; the 145MHz port on the left would then be connected to a 145MHz transceiver and the 434MHz port on the right to a UHF transceiver.

An incoming 434MHz signal on the common port would see, towards the left, a λ/4 coax, shorted at its far end and by a series-tuned LC circuit; seen from the common connector this is a very high impedance. The 434MHz signal can travel to the 434MHz port on the right, however, unhindered by the LC circuit series-tuned to 145MHz, as it represents a high impedance at UHF.

Conversely, for 145MHz signals, the path between common and 145MHz connectors is open while the route to the 434MHz port is blocked.

The same goes for a signal on its single-band port; it can travel unimpeded to the common port, but not beyond to the other single-band port. In other words, a diplexer is bi-directional.

A high-performance 145/434MHz diplexer can be made using amateur resources. Henk van Amerfoort, PA0HVA, tells how in Electron (NL) 6/94.

CONSTRUCTION

FOR LOW-LOSS OPERATION, high-Q tuned circuits are a must. The quarter-wavelength lines have low losses if made of good-quality coax. To achieve best Q in the series-tuned LC circuits, the inductances should be as large as possible and the capacitances as small as possible, consistent with a reasonable tuning range.

The chosen design values are 6pF & 200nH for 145MHz and 2pF & 67nH for 434MHz. The trimmer capacitors are professional piston models, 12 and 3pF maximum respectively. Other high-quality types can be used. The coils are wound of 1.5mm dia. enameled copper wire. 200nH works out to 7 turns close-wound on a 9mm rod, then stretched to a length of 20mm. For the 67nH coil, the dimensions are 4 turns, 6mm ID and 10mm long. From the measured isolation of the unwanted ports of 40dB, the effective series resistance of the LC circuits was calculated as 0.5Ω, ie a Q of 365.

The λ/4 lines were made of RG316 [Note 1] PTFE-dielectric miniature coax, which has a velocity factor of 0.895. This requires 359mm for λ/4 @ 145MHz, 120mm for 434MHz. PTFE does not melt when the ends of the braid are soldered directly to lugs under the mounting nuts of the coax connectors [Note 2]. Fig 2 shows the assembly in a 150x50x30mm cast-aluminium box.

An N-connector is used for the common port, BNCs for the other two.

ADJUSTMENT

WITH THE 145MHz PORT terminated with a 50Ω dummy load, and a sensitive power indicator with 502 termination [Note 3] connected to the 434MHz BNC, feed a 145MHz signal (eg from a hand-held transceiver) into the common port. Adjust the 12pF trimcap for minimum indication. Do not readjust.

Interchange the items connected to the 145 and 434MHz ports, feed a 434MHz signal into the common terminal and adjust the 3pF trimcap for minimum indication. Tuning-up is now complete.

MEASURED PERFORMANCE

ASSUMING A TRANSMITTER output of 100W, and an isolation of -26dB (see Table 1) or better, no more than 250mW will reach the receiver on the other frequency. The input bandfilter of almost any transceiver will further reduce that by 20dB or more, exposing the first receiver semiconductor to no more than 2.5mW - a pretty safe value.

NOTES

[1] RG316 coax is sold in the UK by Mainline Electronics, Leicester, @ £1.38/m + £1.50 per order P&P + VAT. Minimum order £10 all-in.

[2] With a hot iron, and care, the braid of RG58CU or UR76 coax can also be tinned all around and soldered to a lug without damage to the dielectric. λ/4 lines for 145 and 434MHz would be 341 and 114mm long. To avoid coiling this thicker coax too tightly, a wider case is suggested, [G4LQl]

[3] A sensitive indicator can be improvised by connecting an RF millivoltmeter across a 51Ω composition resistor soldered to a BNC plug or even by a sensitive wavemeter (Eurotek 6/94) coupled closely to that resistor. [G4LQl]

Table 1. Diplexer Performance
ADC-60 Computer Clock

The ADC-60 allows the time on any computer with a serial port to be maintained to the accuracy of MSF and DCF. The ADC-60 will receive time information from the MSF and DCF to provide highly reliable time data on the serial port as well as the integral LCD display. The ADC-60A is a lower cost version which does not include the DCF receiver or display. Send for full details of these professional units.

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West Park, Chalworth, Holsowth, Devon EX2 2QV
Tel: 0409-253758 Fax: 0409-253458

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NEWCOMERS TO contesting may be daunted by the rough and tumble of the major international events such as CQ Worldwide, but a number of RSGB events provide a gentler introduction.

As a first step, listen to someone operating in a contest: observe that careful netting is needed on CW as narrow filters are often used. QSOs are kept short, and once contact is made calsigns are sent a minimum number of times, with no exchange of names and no unnecessary procedure. Repeats are sent only if they are likely to be needed.

SIMPLE BEGINNINGS

PICK A SHORT SINGLE-BAND contest which needs just a single antenna. Two to four hours is quite long enough: although fun, the concentration needed for even a short event is taxing, so start off fresh if possible. Carefully read the rules before starting. Check the date and time, and any restriction on the range of frequencies; do not stray outside the specified band segments.

Check the contest exchange required. This is usually RS(T) plus a three digit contact serial number starting from 001 and a county code for most RSGB events. The full list of county codes appears in January *RadCom* and in the *RSGB Call Book*.

Call CQ only if you are confident of being able to handle the response. Otherwise, start with the ‘search and pounce’ technique, picking off calsigns methodically while tuning across the band. This will show where the centre of activity is, and will help to indicate the best part of the band for the beginner to use for CQ calls, later in the contest.

At the end of the event you will feel that you have worked hard, and contacted all the stations you possibly could. Do not be disheartened when you find the leaders have made twice as many QSOs! This can happen at first so keep trying, and compete with your own previous scores and with those around you.

GOOD HABITS

IMPROVE YOUR POSITION in the results table right from the start by forming good habits: in many cases more points are lost after the contest than during it. This may be hard to believe but it is true. Many errors are due to easily avoidable carelessness after the event, when the pressure should be off.

A carefully written-up entry without errors will often move five places up the table once adjudication has been carried out. Unmarked duplicates for which points have been claimed are heavily penalised by a ‘fine’ of ten times the claimed score for that contact.

The adjudicator’s job is made much easier if you include an alphabetical list of calsigns worked (‘dupe sheet’), ideally with the serial number you gave noted against each contact. Calsign errors lose all the claimed points for that contact. Adjudication of a recent CW contest found that a mixture of Morse and transcription errors had left very few characters that had not been mixed up in at least one log. Watch U and V; G, O and Q; S and S, etc. Either the entrant or whoever writes up the log often cannot read the original, or fails to check it afterwards. To illustrate the difficulty, write out a list of calsigns and ask a non-amateur to read them back: see how many will be difficult or wrong.

CHECK CAREFULLY

BEFORE SENDING IN THE ENTRY, check it right through. It has happened for example that a whole column has been missed from a page! Check for the impossible, such as a station sending a Welsh county code but with a GM prefix. An adjudicator checking a hundred or more logs should not be able to find silly mistakes that an entrant checking just one log has missed; read the rules again and check carefully before committing to the post box.

One final point. Members of the RSGB’s contest committees are all volunteers and spend hours checking logs to try to ensure a fair result, but they also like to be able to operate themselves. Please help by keeping entries tidy and in the correct format. Total pages separately, include lists if requested and never write in red. If you can’t beat ‘em (yet), join ‘em. Have fun!

Have a Go In An HF Contest

by John Kennedy, G3MCX, RSGB HF Contests Committee

RSGB HF CONTESTS GUIDE

Published by the RSGB’s HF Contests Committee, this two-dozen-page A4 booklet is a boon to newcomers to contesting as well as to the more experienced.

It includes an introduction to HF contests, a beginners’ guide, a description of RSGB HF contests and some major overseas ones, an International Contest Calendar, an explanation of log-checking and hints and tips. Copies of all contest forms are included and these may be photocopied to use for your contest entry. The RSGB HF Contests Guide is available from the HF Contests Committee, either at their HF Convention stand, or by post at £3 from Chairman Dave Lawley, G4BVO, ‘Carramore’, Coldharbour Rd, Penshurst, Tonbridge TN11 8EX.

RADIO COMMUNICATION September 1994
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going there shortly have nothing of any real value to ordinary radio amateurs". John quotes a typical example: "A recently announced 'project', will carry earth picture equipment and navigational reporting facilities - items which already exist in other satellites and which appear to attract only a small number of users. There is no mention of provision of any facilities useful for the ordinary radio amateur". John suggests that any satellite using amateur radio frequencies must in future deploy at least one mode of amateur voice/CW communications via a transponder, plus at least one amateur band beacon.

This topic is an old one. Right at the beginning of the amateur radio satellite scene as we know it today, this matter came up for discussion at an early AMSAT-UK Management Committee meeting, when the first UoSat satellite was being discussed. The plans for this first UoSat satellite did not provide enough energy facilities to run a transmitter as well as a receiver for 'transceive' mode but, rather than lose the opportunity of launching it, the committee agreed with the plans, in spite of violent disagreement from one or two members of the then AMSAT-UK committee. As experience was gained subsequent amateur radio satellites built by the University of Surrey team always had amateur radio facilities.

In his reply to GM4IJJ, Ron Broadbent expressed his agreement with much of John's views. He pointed out that much of the problem arises from confusion through misinterpretation of the wording of International Licence regulations, local agreements, etc., across the world. For instance, in Europe and Africa, the licence regulations state "...for self training", whereas in north and south America (Region 2 ITU) the words were changed long time ago to 'Education', which has a much wider interpretation.

Ron's reply to John covers the matter in some detail in the June Oscar News No 107, which is well worth reading.

AMRED - AMATEUR RADIO IN EDUCATION

AMRED IS A NEW MAGAZINE, brought out by the STELAR Group (Science Technology through Educational Links with Amateur Radio). The Group brings together all those who are involved in educational amateur radio projects. Its chairman is Richard Horton, G3XWH. In his first editorial in AMRED, he writes as follows: 'Welcome to the first issue of AMRED! We hope you will like this unique publication dealing with all aspects of Amateur Satellite Radio as seen from an Educational perspective.'

"One feature of the magazine will be the regular 'getting started' series and in this edition we kick off with items on Packet Radio and Amateur Satellites."

"If you then asked Who are the STELAR Group and what do they do?" and feel it appropriate to fill in a little history at this point. Since teaching at Harrogate Ladies College for some sixteen years, I have been fortunate to be involved with many Educational Amateur Radio projects and have come across many schools and colleges in this time who use amateur radio as part of their curriculum. It has always seemed to me that we need to have been largely unfilled. That of co-ordinating the dissemination of information of what is happening in these initiatives, of bringing the prime movers together to exchange experiences and to offer support to schools who are not aware of the potentialities of the hobby as a vehicle to aid good practice in the teaching of Science and Technology."

"With these thoughts in mind I convened a small 'committee' meeting at the ASE headquarters in August 1993."

"The above aims were discussed and those present were unanimous that educationalists had a unique contribution to make in these respects. This is not to say that we feel we can replace existing organisations, far from it. The special roles played by the RSGB and organisations such as AMSAT-UK will always be of great importance to schools and colleges and we are most grateful for their support of our aims."

"There are so far seventy two schools affiliated to STELAR, over fifty of whom have amateur radio transmitting licences. AMRED is sponsored by Trio-Kenwood Ltd, who stepped forward to explore the possibilities of supporting the group's objectives. They made it clear from the start that they were looking for a vehicle to support the educational community and not as a sales promotion for their company. Further information from: Richard Horton, BSc, G3XWH, Chairman STELAR, 7 Carlton Road, Harrogate, North Yorkshire HG2 8DD."

CQ MAGAZINE'S SATELLITE VIDEO

COMAGAZINE PRODUCES several operating guides for various aspects of amateur radio, such as D-Xing, Packet, Contest, Satellites and so on. Their video 'Getting Started in Amateur Satellites' is an excellent introduction to amateur satellites, covering typical satellite radio stations, the equipment needed for this mode, the satellites in operation, analogue and digital modes and much else. In VHS with PAL colour standards. Running time approx 50 minutes, it is priced at £20.15 inc VAT and P&P and is available from AMSAT-UK.

For anyone giving lectures on amateur radio satellites or similar public relation activities, teaching in schools etc, it is a most useful visual aid. Its approach is straightforward and presentation simple and easily understood. Sound and colour are excellent.
In featuring the Apple Mac in July, I did not include a postal address for the benefit of those who are not on packet. Anyone interested in exchanging information, ideas and software concerning the Apple MAC range, can send an SASE to Tom Kershaw, G7MMM @ GB7OAR, 47 Bails Road, Oxton, Birkenhead, Merseyside L43 1UT.

FIRMWARE UPGRADES

The G-TOR firmware upgrades are now available from Love Electronics (tel: 0629 560900) and from Siskin Electronics (tel: 0703 207155 or 207587), at a cost of £35 inclusive of VAT and carriage. The upgrade consists of an EPROM with version 7 firmware, plus documentation and a disk, and is available for the Kam-Plus, and KAM fitted with the enhancement board.

The bad news is that, according to Kantronics, "G-TOR is a processing and memory-intensive mode, . . . and the EPROM is nearly full. As a result, monitoring was not included in the G-TOR protocol. However, a G-TOR monitoring program, GMON, has been included in a new distribution disk for both updates and new units." Now, GMON is only available for IBM compatibles, and requires a 266/16 or faster processor. There is a simplified GMONX program for slower machines, or alternatively you can stream data onto disk and decode it off-line with the GOFP program. According to the .DOC file, GMON is not intended to be a general-purpose terminal program."

The fact that you cannot monitor G-TOR activity without a separate program is inconvenient enough, let alone the problems of attempting operation when using a computer which is either slow, or not IBM compatible. I have not yet had time to install my own firmware upgrade, but I have strong reservations about this aspect. You can monitor QSO calls made by stations using the G-TOR FEC mode, as a common carrier is the same as the AMTOR FEC mode, but you cannot easily monitor a QSO between two stations using the G-TOR ARQ mode.

Also available from Siskin is the PacComm TNC firmware version 3.2 for TNC2 stations such as the Tiny-2, TNC200, BSX2, KFN2, TNC2-6L, TNC-Plus etc. This has a number of bug fixes over 3.1, plus some new commands; contact Siskin for details on 0703 207155 or 207587.

DATA EMISSION CODES

When entering a DATA QSO in the logbook, it can be tricky deciding on the correct emission code to be entered, as detailed in the BR68 document accompanying the amateur licence. For example, RTTY/AMTOR is F18 for direct FSK, and J2B for AFSK of an SSB transmitter, (which is what most people probably use). Packet is P2D for AFSK, eg on VHF/UHF, and J2D for AFSK of an SSB transmitter, eg on most HF bands. The 'B' denotes 'Telegraphy for automatic reception', whilst the 'D' denotes 'Data'. Where does this leave new modes such as PACTOR and G-TOR, which have some attributes of both AMTOR and Packet? I put this question to Karen Scott of the Radiocommunications Agency of the DTI, and I quote the latter part of her very helpful reply. ITU, by the way, stands for International Telecommunications Union.

"The ITU wording was used in the BR68 because it gives radio amateurs considerable flexibility to experiment with many types of emission. In the longer term, we are considering the possibility of simplifying this aspect of the logbook, requirements but our main concern is to retain the flexibility for specialised emission types while providing sufficient information for RI investigations."

"The definition of 'telegraphy' given by the ITU suggests that emission designator 'B' covers all types of messages, including fixed images eg graphics transmitted by RTTY/AMTOR/Packet/PACTOR etc. However, the emission designator 'D' for data, telemetry and telecommand, is more appropriate to cover the 'switching' commands used in mailbox and node control and the transmission of compressed files. An operating session containing messages and commands should be classified as 'W' to indicate a combination of 'B' and 'D'. It is not necessary to log each individual packet. If there is any doubt which designator should be used in the log, it would be helpful to include the generally recognised name of the system eg Packet, AMTOR, CLOVER etc."

BOOKS


Although no longer in print, this last book can often be found in secondhand bookstores, and perhaps also at rallies. You may also find some manuals published by Digital Research themselves, and these are worth having. Finally, I understand that there is also a book called something like Using CP/M on the Amstrad, but I have no other details.

MORE ON THE 'RIGHT' TONES

My piece on the 'RIGHT' HF data tones back in January of this year, resulted in a few enquiries from readers. All were users of the Yaesu FT990, but I suspect much the same situation arises with similar transceivers. I use AFSK on all data modes, and this works well, but some users have had problems when using FSK modulation, (referred to as RTTY mode on the FT990).

It seems that at least part of the problem is due to a slight misunderstanding of the situation. When using AFSK, the transmit tones and the receive demodulation are handled by the multimode controller or terminal unit. However, when using FSK the demodulation is still carried out as per AFSK, (ie the output from the rig is AFSK not FSK), but on transmit the tones are in effect generated within the transmitter. Thus, if there is a mismatch between the tones being transmitted, and what the controller is expecting on receive, you will observe an apparent offset between transmit and receive frequencies.

For example, if the transmitter has been set up to use 2125/2195 tones, and the controller has been set to use 2025/2195 tones, then you will have an apparent offset of 100Hz which you would have to correct with the RX or TX clarifier. Worse still, you might have the tones reversed on receive relative to transmit! You have to think very carefully when using FSK, and personally I prefer to stick to AFSK.

JVFAX/SSTV, HAMCOMM, AND PKTMON

If your ARE active on VHF/UHF packet radio, then you can hardly have failed to hear mention of a program called JVFAX. This program was written by Eberhard Backeshoff, DK9UV, and enables amateurs to send and receive FAX and SSTV images, both greyscale and colour! This program follows in a tradition of very high-quality non-commercial amateur radio software/firmware from Germany; eg TheNet, Digicom, and Baycom. JVFAX v6.0 runs on IBM-compatible computers, and for optimum performance you need an 80386 machine with an SVGA colour.
Data Stream

View of PacketPet screen, showing easy selection of different connect streams.

card and at least 4Mb of RAM. However, it will run on much more modest 80286 and 8086 machines, with degraded performance. It does not multitask under Windows or OS/2 because of the processor-intensive nature of the program, and the critical timings needed.

A variety of interfaces to the RS232C serial port are possible, the simplest of which consists of a very simple 741 op-amp circuit. This can be even built in to the 9-way or 25-way D-connector shell if required. The circuits are supplied in the form of very detailed GIF (Graphics Interchange Format) files, and indeed the program uses this format to store and display all the images sent/received. You can also buy the interfaces, if even the 741 circuit overwhelms you, and Badger Boards is one well-known source (021 353 9325).

I have seen a brief demonstration of JVFAX by John Badger, and I was absolutely staggered by the simplicity of the interface and the effectiveness of the program! Alas, it was only receiving WEFAX (WEather FAX) transmissions at the time, and not SSTV.

However, I have plenty of examples of SSTV pictures from JVFAX, and I've included an example of what can be done over HF. Pictures sent on, say, 2m are absolutely superb, but would make poor examples because they look just too good! On the example shown opposite, of DJ7HX received by Bill Holt, G7DHM, on 20m last December, you may see the horizontal lines caused by QRM. Nevertheless, I think the result is still very impressive, and quite typical of what can be achieved.

There are two other programs which can use the same simple interface as JVFAX, though not specifically the same simple interface as that supplied by Badger Boards:

HamComm by WF Schroeder, DLSYEC, supports RTTY, ASCII and Morse modes, plus some very nice 'Spectrum Analyser' and 'Scope' display monitor aids. The latter modes require a 386/16 PC, but the data modes will run on virtually any PC.

PktMon by Pawel Jalocha, needs a reasonably fast PC, 386/16 MHz or better. It allows 300 Baud and 1200 Baud PACKET monitoring and timestamping, with data displayed separately from the other information, either on the screen or to a file. Note, this is receive only.

All three programs, plus Interfaces, Manuals, GIF picture disks, and sometimes even useful advice, can be supplied by Peter Lockwood, G6SLB. He has been enjoying SSTV for several years, using a homebrew Robot 1200c to test and evaluate, and he thoroughly recommends JVFAX to anyone wanting to try sending or receiving 'pictures by radio'.

For an illustrated leaflet send an SASE, plus an extra stamp, to Peter Lockwood, G6SLB @ GB7HSN, 36 Davington Road, Dagenham, Essex RM8 2LR, or telephone him on 081 595 0623 for a chat.

HamGopher Database

HamGopher is a store-and-forward file request system. It is run by Tony Howat, G72ZE, on the GB7HWI BBS of David Norris, G4TUP, in Southport on the North West coast of England. It's basically a library of hundreds of files, both binary and text, which can be requested using BBS messages. The commands are not complex, but versatile, and this makes it impossible to do them justice in a few column inches. Instead I suggest you send a personal message to Gopher, (that's a letter 'O', not a zero), as follows:

**SP Gopher @ GB7HWI**

REQUEST

* extensly zip

get manual

by svn

HamGopher will then automatically send you the full manual as soon as the request arrives. To reduce the total size, the file will be KPZIP compressed and 7+ encoded, unless you omit the line 'text unzip which in case it will be plain text in three 4k parts. The manual will give you all the information you need so you can access the MegaBytes of useful data and text on HamGopher. The amount of data being sent to an individual is 'rationed' each day, to reduce the strain on the network, but of course there is no substitute for restraint and common sense!

There is a similar database system known as CLIVE, which has been running for some time on GB7KLY and certain other BBSs. However, the request syntax is different from that of HamGopher.

Packetpet for Windows

My thanks to Nick Robinson, 2E1BF, for kindly offering to review this program, which as the name suggests is suitable only for an IBM-compatible PC running MS Windows. My thanks also to PacComm for the review copy. Nick's comments were:

"PacketPet is for Windows! It's PacComm's Windows terminal and is brimming with the type of features that we come to expect of windows programs; complete control over the colour and layout, mouse control along with sound files associated with selected commands. Key features include a variety of soft-screen options, offering any combination of Tx, Rx and Edit windows simultaneously, with handy buttons to switch the relative sizes of each.

You can run several copies of PacketPet, each with different TCNs and settings. The program also informs you verbally of connections while in background mode. Multiple connections are straight forward and a group of buttons allow you to monitor input of two separate streams and switch easily between them.

The integrated text editor is comprehensive and can be used to send commands directly to the screen or to save/edit files or incoming text. There is a variety of drop-down menus, many of which can be customised to suit the user, and keystrokes can be recorded and replayed. Of course commands can be linked with standard WAVE files, (examples are supplied), and provided you have a sound card fitted the computer will announce connections for you! The macro facility can (in theory; see later) make use of a variety of PacketPet commands such as a timed macro, search for text string, monitor to file, log connects etc.

The actual user interface is both friendly and well thought out; the user can make it perform almost any task he/she wishes by dragging on, Lissa, providing on many menus open to user-defintion. However, I have so far been unable to make a macro multiple connection work, even though the same commands entered singly do seem to work. A very full response from the program is not always delivered as fast as possible. Also, the documentation for macros is less than adequate. As a modest programmer myself, I found the PacketPet macro language both obscure and awkward. Perhaps a fuller section in the manual might help. Perhaps a language similar to BASIC would be a good idea. (I think macro and script languages do tend to be tricky to master. The built-in macro program I use has a subset of C as the script language; line if you happen to be familiar with CI - G4BL7)

Scroll bars can be visible or hidden, but when hidden you cannot even view received text as the cursor keys and PAGE UP/DOWN keys don't work, and when visible the last character received spills onto the next line, which looks rather ugly. (I think it may be because I am using 640 x 480 pixels VGA rather than 600 x 600 SVGA.) Although the edit feature is very adequate for anyone's needs, the transmit command line interface itself is weak; you cannot use the cursor keys or mouse to correct mistakes, only Delete back to them. In addition, there is no word wrapping and facility. The macro seems to have a 'type it through the editor'; perhaps not a bad thing with some of the bolts that go out 'live'. There is no facility for remote access, nor is the YAPP protocol supported yet, limiting PacketPet's appeal to some users.

"If you are using MS DOS the command-driven terminal program then PacketPet is great, but compared to some DOS programs the automatic script facility is weak. However, the program offers a great many useful facilities and is straightforward to use. Whilst I do have certain reservations, as I have mentioned, I would certainly use PacketPet when in a windows session (so I can do other work whilst monitoring packet), but by preference would stick to my tried and trusted Packet6. The ultimate windows packet program still needs writing!"

PacketPet for Windows is password-protected, and is available from Siskin Electronics at £59.95 including VAT. Most TNC types are catered for, including PacComm (Tiny-2 etc.), Kantronics KAM (Plus), KPC-3, AEA PK-2, and so forth. It was tested on a 486 machine with a BXS2 TNC running PacComm PMS firmware.
The map shown as Fig 1 (courtesy of the Microwave Newsletter editors) shows the 10GHz terrestrial paths in excess of 300km worked during 1993. Locators of the numbered points are given in Table 1. It should be noted that when these maps were first published in the Newsletter (1991), the paths plotted were those in excess of 150km. In 1992, this was extended to paths of over 200km and now, in the current plot, over 300km. Such is the march of technology!

These results have been brought about by two main changes in amateur operating on this band. The first is the advent of the G4DDK/G3WDG modules and the second the availability of higher powers, either solid-state or TWT. Both these have led to more fixed station operating and more frequent monitoring of the band to reveal, and make use of, exceptional propagation conditions. At the same time, of course, the technological improvements in equipment have led to EME capability — but that’s another story!

A similar, although not so dramatic, change has occurred on the 24GHz band, with contacts steadily increasing with increasing usage rather than with technological improvements. There is still comparatively little narrowband activity on this band and it will be interesting to see what the effects are when there are more narrowband stations in action.

We can expect further increases in average distances worked but, because of atmospheric absorption, not nearly as dramatic as on the 10GHz band. Fig 2 is a plot of all the paths worked in the UK during 1993 and the Locators and distances are given in Table 2. In this instance, there are no fixed stations.

**SO NEAR, AND YET SO FAR!**

The first inter-G EME on 10GHz contact took place on 19 June at 2340, between G3WDG/G4KGC at Rushden, Northants, and a station constructed and operated by members of the Flight Refuelling ARS, G4FFR, at Wimborne in Dorset. In terrestrial terms, the

Fig 1: 10GHz paths in excess of 300km worked in 1993. The map was compiled by G3PHO and was originally published in the RSGB Microwave Newsletter (see also Table 1).
is the order of the 195km: by EME
the distance is about 750,000km or almost
half a million miles!

The station operated by G3WDG and
G4KGC ran 40W to a 3m dish and used a
receiver with 1.2dB noise figure – home
designed and constructed of course! At the
other end, constructed and operated by
G0API, G3YGF, G6NLG, G4JNT, G0DQQ
and others, the station ran 15W to a 12ft
(3.7m) dish with a receive noise figure of
about 2dB. Both stations were, before the
contact, able to hear their own echoes. Well
done to the RFR group who were new to the
10GHz EME game, 'WDG/KGC being 'old
hands'. In this particular instance a
troposcatter QSO might just have been easier,
but I guess it 'proved' the RFR system!!

SOUTHERN ROUND-TABLE

THE DATE FOR THE THIRD Southern
Round-Table of 1994 has now been set for
Sunday 16 October (not the 23rd, as stated in
the January Microwaves) and will take place
at the Flight Refuelling ARS club house,
Merley, Wimborne, Dorset, commencing at
1000. Further details may be obtained from
Mike Scott, G3LYP, QTHR, tel: 0494 819128.

ATV ON 24CM AND 3CM

WITHIN A 50KM RADIUS of my QTH there is
a lot of regular ATV activity on both the 24cm
and 3cm bands. It seems that there are at
least four dozen amateurs active almost daily on
one or both bands, with more preparing to
come on one band or the other. The most
active groups frequently use 433.825MHz
FM for 'talkback' and other communications.
This activity, and the search for microwave
database entries mentioned above,
prompted me to go through several years'
issues of CQ-TV, the quarterly journal of the
British Amateur Television Club (BATC) which
and the services offered can be obtained from
the Membership Secretary, Dave
Lawton, G0ANO, 'Grenhursth', Pinewood
Road, High Wycombe, Bucks HP12 4DD; tel:
0494 529889 at any sociable hour, preferably
between 1830 and 2130 and not before
1130 at weekends!

TALKBACK FOR
MICROWAVES

I HAVE BEEN ASKED to issue a quick re-
minder on talkback frequencies to all microwave
users, new, old, regular and contest
The following frequencies are commonly used
for talkback:
(SSB) 144.175MHz ± 20kHz and 432.250
± 10kHz; (FM) 144.725 and 432.825MHz.
The procedure is to call on the nominated
frequency (unless it is busy, which is why
there is a tolerance) and then move away to
a frequency mutually agreed.

BITS 'N' PIECES

HARRIS SEMICONDUCTORS (UK) recently
announced a new 'Gilbert Cell' silicon transis-
tor array (ICs) designed for mixer and ampli-
fier applications above 2.5GHz. Since the
device, HFA3101, has been designed for the
mass market (cellular telephones to 1.8GHz
and wireless LANs to 2.5GHz, etc.) it is likely
to be cheap enough in small quantities for
amateur use in transmitters and receivers.
One of the drawbacks to such ICs has so far
been high noise figures. The configuration of
this device is such that double balanced mix-
ers are easily configured using low level LO
injection. At 1GHz the power gain is stated
to be 11.9dB, 50Ω noise figure 2.5dB and third-
order intercept +22dBm. Full application notes
and design data is available from Harris Semi-
iconductor (UK), Riverside Way, Watchmoor
Park, Camberley, Surrey, GU15 3YQ; tel:
0276 686886.

Table 1: 10GHz paths in excess of 300km worked
during 1993.

<table>
<thead>
<tr>
<th>Site No</th>
<th>Locator</th>
<th>Distance (km)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>IO83JA</td>
<td>65</td>
</tr>
<tr>
<td>2</td>
<td>IO93AD</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>IO82NN</td>
<td>120</td>
</tr>
<tr>
<td>4</td>
<td>IO83WE</td>
<td>90</td>
</tr>
<tr>
<td>5</td>
<td>IO83XG</td>
<td>50</td>
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<td>6</td>
<td>IO83AF</td>
<td>30</td>
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<tr>
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* New UK record; # Narrowband

Table 2: 24GHz paths worked in the UK during 1993

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<tr>
<td>28</td>
<td>IO821Q</td>
<td>IO82NN</td>
<td>156*</td>
</tr>
</tbody>
</table>

# Narrowband
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- **47%** Belong to the Radio Society of Great Britain
- **82%** Have bought from an advertisement in Practical Wireless
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- **59%** Spend between £100 & £500 on amateur radio in an average year
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WE NEED YOUR HELP ON SEPTEMBER 24th & 25th

Organised by the British Wireless for the Blind Fund, TransMISSION 94 is asking all amateur radio clubs to help in this major fund-raising event.

IT DOESN'T MATTER IF YOU RAISE £1, £10, £100 or £1,000
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Name

Club Name

Address

Postcode

Tel. No.

RADIO COMMUNICATION September 1994
SECOND HAND EQUIPMENT

- Icom IC-2I2L 50W HF Solid State linear. This unit is in NEW condition. £895.00
- Yupiteru MYT-6000 Base/Mobile Scanner. 25-550MHz and 800-1200MHz, AM/FM/VHF, cw/power supply £225.00
- Icom IC-725E 25W 2M Muliemode Base Station with built-in PSU. This unit is as NEW and c/w Box, manual and leads. £349.00
- Icom IC-728 100W HF Transceiver + 6M. General coverage receiver. This unit is in excellent condition, c/w box etc. £750.00
- SX-400N HF/VHF/UHF Base station scanner, all modes. £255.00
- Standard C70 70cms FM Portable/mobile transcectior, c/w matching 10W linear and mobile mount. £259.00
- Yaesu FT-102 100W+ HF Transceiver, c/w mic, manual and mains lead. £585.00
- OX 3.5 – 30MHz Antenna tuner. £75.00
- Watek WP-220 SWR/Power meter 1.8-200MHz. (As new.) £50.00
- AOR-1500EX HF/VHF/UHF handheld scanner complete and as NEW £279.00
- Yaesu FT-290N 2M multimoode in excellent condition and complete with accessories. £399.00
- Kenwood TM-221ES 45W 2M FM mobile transceiver in excellent cond. £245.00
- PK-243/EX Packet, Amitor, fax, RTTY, cw terminal unit. £279.95
- Icom IC-751 100W HF Transceiver, General coverage receiver, excellent condition, c/w mic, dc lead, box and manual. £650.00
- RN Electronics 20W 6M Linear. (Ideal for FT-609R). £55.00
- BND’S 8M 50W linear with preamp £59.00
- Sangean ATS-803A Portable shortwave receiver. (2 months old), £90.00
- AOR-3030 HF Communications receiver. 100KHz-30MHz. All mode receiver. This unit has got a slightly dented case, therefore we are offering this unit with full 12 months warranty and all complete £599.00
- Sony ICF-7600 Portable shortwave receiver, complete and as NEW. £129.95
- AOR-2000 HF/VHF/UHF handheld scanner complete and in excellent condition £249.00
- Lowe HF-225 European shortwave receiver, (DEMO MODEL), full 12 months warranty £599.00

* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

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Licensed Bar & Cafeteria

Admission still only £1.50
(OAP’s £1.00. Under 14’s Free if accompanied by an adult)
Further Details from: Peter Nikol
38 Mitten Avenue, Rednal, Birmingham B45 0JB
Phone: 021 680 5963 (Home), 0374 921531 (Mobile)
DIRECTION FINDING

MID ESSEX HF TROPHY (MAR 94)

In 1992 it was decided to make the Mid Essex Trophy an event open where the trophy was awarded to the overall winner regardless of membership. Competitors could enter as either 3CX or 3SW. Information packets were distributed at the QSOB National Final, and the challenge was taken up by George Whitehan and the YL team.

Pat Hawkins was the starter for the event at Long Melford Green. The two hidden stations were worked by Alan Light and Mike Hawkins. Both signals were received at the starting position, and the YL team were given two chances to respond before the 3CX team were given a chance. Both teams were successful in the first round, with the YL team on the air first. The YL team were given two more chances to respond, and both were successful before the 3CX team were given a chance to respond. The YL team were ultimately successful in the second round as well.

The overall winner was the YL team, with the 3CX team taking second place.

SOUTH MANCHESTER QP DX NIGHT

(TAY 95)

The format of the contest was generally agreed upon. The band was changed to 20 MHz, and the contest was held on a Saturday night. The number of participants was increased, and the contest was broadcast over a wider area.

The results of the contest were as follows:

- First place: The YL team
- Second place: The 3CX team
- Third place: The Independent team

The contest was a success, and the number of participants increased in subsequent years.

LEICESTER VHF (2M) EVENT

Date: 11 September 1994

Major OS Llandrindod (1000000) sheet 140
Leicester and Coventry (this sheet constitutes the DF area).

Start Location: Car park for Lutterworth Racecourse, Lutterworth Road, Lutterworth NG9 1SS. Competitors collected signing-in slips and were given the challenge of the hidden stations.

Start Time: 13:00 UTC

Transmit time: 30-second duration

Frequency: 145.425 kHz

Rules: As published in May 1994 RealCom

End of Hunt: Any point on the 2m Tramp sheet

Enquiries: Neal, G3RHR, tel: 0455 350422

The contest was a success, and the number of participants increased in subsequent years.

AFILIATED SOCIETIES JAN 1994 (CONTINUED)

HF RESULTS

CW INDIVIDUAL LISTING

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<thead>
<tr>
<th>Place</th>
<th>Callsign</th>
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<th>Club</th>
<th>Score</th>
<th>Points</th>
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SSB INDIVIDUAL LISTING

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CONTEST CLASSIFIED

All rules should be read in conjunction with the General Rules published in Contest News January 1994
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### SINGLE OPERATOR

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### HF CONTESTS CALENDAR

(Overalls events table, rules is published)

### VHF/UHF CONTESTS CALENDAR

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*Winners of the 144/50 MHz AF/S Fixed/SWL December Contest 1993.*

*The number of entrants for this contest continues to grow, up 15% of last year's entries, as contestants agreed that conditions were "average for the time of year" yet even so a station managed to make 20,000 QSO's in the time frame.*

---

*Radio Communication September 1994*
70MHz fixed Contest (Mar '94)

Once again, this contest produced a reasonable entity with a significant increase in entries to the Single Operator section over the 1993 contest. Conditions were far as usual but some good contacts were made. GC5CUP went on to give a few points and beat DXIs away, and my thanks to Allan for his check log which helped me to resolve who was going to win the multi operator section. The multi operator section was very closely fought, but the Flight Refueling ARS won from the Northern lights by having a more accurate log. One of the nice features of this sort of event is that checklogs can be made clear through due sausages, Congratulations and certificates go to the winners and runners-up in each section.

SINGLE OPERATOR SECTION

<table>
<thead>
<tr>
<th>Pos</th>
<th>Call</th>
<th>QTH</th>
<th>Grid</th>
<th>Multi</th>
<th>Lat</th>
<th>Long</th>
<th>DXCC</th>
<th>Multi DX</th>
<th>Score</th>
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MULTI OPERATOR SECTION

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<th>Long</th>
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<td>519</td>
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1ST BACKPACKERS 144MHz (May '94)

Conditions for the first of these new series of contests were far from ideal with many ops and ditto affecting most parts of the country. This was why it was so particularly gratifying to receive so many entries given the nature of conditions. Most entrants commented on how good the DX was on the various multipliers, but one or two lost of minor logging errors which reduced the number and hence the final score. Though there was good distance coverage, relatively few ops over the major 2M event provided useful reciprocal contacts at a time when activity would be expected to diminish. Both GC5CUP and GW9DXF produced really excellent scores supported by a large number of multipliers. GC5CUP also put in a good performance given his distance away from the main areas of activity. Only one group of four stations were the only contenders featured a single entry. Congratulations go to the winners of each of the sections and the runners-up.

Certificates went to the winners:

Table: 10W SINGLE OPERATOR

<table>
<thead>
<tr>
<th>Pos</th>
<th>Call</th>
<th>QTH</th>
<th>Grid</th>
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<th>Lat</th>
<th>Long</th>
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GREAT B & W NEWS!

BARKER & WILLIAMSON ARE BACK!

Model AC 3.5-30 — only 90 feet long!
(formerly 370-15)
CONTINUOUS COVERAGE FOLDED
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ALNCO DR-119 2m Transceiver 50w, £235. Tandy 900X Scanners, unwanted gift: £90. Icom IC-702HF T/HF, £250. GM44UJ, QTHR. (Delagby Bay) 0380 823001.


388X Plus 37 Co-Processor. 16MHz Microchip, known working but no Radio. £250, GM44UJ, QTHR. (Camberley) 0378 32004.

ALADDIN 5.0. 5-fm freerunner, on-line software: £30. G3SMJ, QTHR. (Beaconsfield) 029 826742.

PACKET SYSTEM VHF/ UHF. Featuring compatible ARCDPC12, LapTop2 in 5.0 MHz, compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible compatible 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WANTED


AP106 issues 1 (RAF-Radio Stores Rail'N'roll) Also A115536 All selections and AP's relating to Radar, Radio equipment. Would purchase current to Port-Weaver Magnatronics, Kyntronix, Yorkshire Post, Thysman, Philips, Turner Tunes, and special TV types. Contact, 0484 2477 3400, R3007 39307, 3931, Commercial Unit 17, Manningham House, Excellent condition at any time. 071 501 6954.

BAND 3 TRANSMITTERS, Commercial Linear Ampl. 13.8v to 100 AMP, commercial 1719 weeksblock. Does not require power divider, all power to antenna. £375. £340. £450.

MICROVACUUMMODUL, 2 linear Ampl/Mill, 144/10/LS, GAGAK OTHR. (Westbury, Wilt) 0373 846475.

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WANTED

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EVENTS DIARY

CLUB NEWS

DEADLINE - items for inclusion in the November 1994 issue must be sent to HQ marked "Nov" and arrive not later than 23rd September. If not published by the published deadline, it should appear in the listing. If it is registered but not published, then it will not appear until DIRECT to HQ in good time. News items should be sent in writing, preferably on notepaper. They will be signed by the club secretary or the person responsible for writing.

NOVEMBER EVENTS - a free service for clubs affiliated to the RSG, to whom priority will be given.

AVON

BROOKDALE - 1, Close, Norfolk, NN3 4XG, 0343 426771.

HAPPY W1W7 FF3 130V, G0KSV. (Bromsgrove) 021 5023222.

KODUXA Electric Co Ltd Mechanical Filter Type MF-450-10C for WW2 Transceiver. G3EB0, G3JEI, (Bradford) 0272 875250.

LARKSPUR CT11, Attenuator, matched cables and packing etc. Also 24v Power Supplies for C24 Transformer and MG (Bolton) 0274 824816.

OPERATING INSTRUCTIONS see info on National NRCC web site. (Leeds) 071 361 1731.

BARKER, PTE. (Gloucester) 0452 446438.

BARKER, CHEN, 18 Barwick Road, Dover, Kent. CT17 9AL. (Luteford) 0858 880616.

BARKER, J. (Brighton) 0273 825356.

GLERON CONVERTER, HF, 4-6 MHz, Must be in good condition and working order. G3EB0, OTHR. (Huddersfield, nr Elly) 0393 740434.

BROOKDALE, J. (Nottingham) 0362 200515.

KODUXA Electric Co Ltd Mechanical Filter Type MF-450-10C for WW2 Transceiver. G3EB0, G3JEI, (Bradford) 0272 875250.

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C O  A R M A G H
C H E S H I R E
E V E N T S  D I A R Y
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Debshire Ambulance Control at Kingsway

ARMAGH & CARICKFERRY
night. Details Davie, G W 1 M V L.

Meeting each Thursday at 7.30 pm. Details 0954 20 0072.

ARMAGH & CARICKFERRY
night. Details 0992 46 4679.

CARICKFERRY ARGUS - 1, Talk "The Anglae D X Cluster" by Tony, KW9TV, 19 Oct, 8.30 pm, The Venture Club, Omagh.


C K I N G S W A Y  - Derbys Ambulance Control at Kingsway Hospital; 21, Cheese and wine party in club. Details 0773 861 8601.

C K I N G S W A Y  - Nunsfeild House ARGUS - Meets every Friday at 8pm, at Nunsfield House Community Centre, Kingsway, Derby. Details 0332 638 0588.

C L Y W A D  - "NEW VENUE!!!" Now meets at Shatbursby School, Dorset on the first Friday of each month. Details 0797 060 3559.

D E R B Y S H I R E  - 13, Video night. 20, Talk "Monitoring by Davie, G W 1 V E B . "

D E R B Y S H I R E  - 16, Talk "SLOW SCAN TV -

D E R B Y S H I R E  - 20, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.


D I S T R I C T  - 16, Talk "SLOW SCAN TV -

D I S T R I C T  - 19, 70 Mhz Trophy test at HO; 25, AGM. Details 0752 55 7577.

D U R H A M S H E A R S  - 10, Talk "The RaRe Show" by Alan, G 4 U V Z. Details 0392 787 10.


E A R L Y  M O N T H S  - 1, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 2, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 6, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 9, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 10, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 13, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 16, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 19, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 22, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 25, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 28, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 31, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 1, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 2, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 3, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 4, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.

E A R L Y  M O N T H S  - 5, Talk "HF Day" by Brian, 2W2BU, 20th December. Details 0954 20 0072.
EVENTS DIARY

18. Quiz by G4CBO, 26 Construction Competition, Details GM4BH, QTHR.

LINCOLNSHIRE

LINCOLN SHORTWAVE C - Meets every Wednesday, Lincolnshire Eyesight Engineers Club, Water- side South 8th, 04/27 784350.
LOUTH & DARS - 8, 12 October, details by G4XNC, 0734 792364.
LOWCOTT & G - 9, 12, 14, 16, 20, 22, 24, 26, 28, 30, 31 October, meeting by G4HCW, 0734 792364.

MERSEYSEIDE

LIVERPOOL & DARS - 6, Occasional Demon- strations, 13, Club on the Ar, 29, Presentation Night, 27, Special Dinner, 0734 792364.

NOTTINGHAMSHIRE

ARC OF NOTTINGHAM - 1, 6th Sat, Feast Night on 19th September, Details of AARC, 041 024 4225.

NORFOLK

DEREHAM ARC - 6, Possible trip to Linton Hall - Amateur Radio Collection, 04/03 7652 09.

NORTH YORKSHIRE

HAMLETON ARC - Meetings at Afternoon School, Tadcaster, 7.30 pm. All welcome. Details 0462 518594.

NORTHAMPTONSHIRE

ARC of NORTHAMPTON - 1, 6th Sat, Feast Night on 19th September, Details of AARC, 041 024 4225.

NORTH WEST

MID LANARK - Lectures and chat evening, RA & Morse classes, every Friday at 8pm, and second Friday of each month. Details of GM4ATL, 061 292 1862.

SUFFOLK

FELSTEDSTOWE & DARS - 5, 12th Night on 9th October, Details of G4JBJ, 0734 792364.

SURREY

REGEN-MID - All meetings start at 7.30pm, at the Rose and Crown, Details 0372 472402.

TAYSIDE

DUNDEE ARC - 13, Enactment & Construction Night at Balgownie, Details of GM4FJSB, 031 226 2723.

TYNE AND WEAR

HAZELLGROG ARC - Meets every Monday, Hazzelgroge Community Centre, 7pm. Classes are held every Tuesday from 7.30pm. Details of G4LYW, 091 372 1312.

WARWICKSHIRE

MID-WARWICKSHIRE ARC - 13, Talk & slides on "Pacific Ocean/on Operation Raleigh" by G4ACAL, RSGB Video, Meeting on 4th and 5th Thursday at St Johnstone Road, Rowley, Warwick at 9pm. Details 021 743 6246.

WEST MIDS

ALDROSE & BARR BEACON - 19, Tar Hay Radio Lighthouse, G3OJO - beacon, 08/03 827 9035.

WILTSHIRE

CHIPPENHAM & DARS - Meets Tuesdays 7.45pm, Sea Cadet HQ, Chippingham, Details Den, 0793 743 5552.

WYRE FOREST

SALISBURY R & E - 6, 7th Night on 9th October, Details of G4EQA, 0727 842505.

THE THREE COUNTRIES Rally - Three Counties Show Group, Worcestershire. Features a large selection of trade stands, usual refreshments and, of course, competitions for white knobs. Details of 0733 538 357 84.

RALLIES AND EVENTS

+ ■This is a list of all rallies, hamfests, and other events connected with the Amateur Radio (Hari) (as it press dates), Items are given in detail for the next three months inclusive of the current month. Please note that we can no longer include the entire programme, including contact calls and telephone numbers direct to Hari and marked "Busy" - No RSVPs.

3 SEPTEMBER


WEST MIDLANDS

ALDROSE & BARR BEACON - 19, Tar Hay Radio Lighthouse, G3OJO - beacon, 08/03 827 9035.

MIDLANDS ARC - Every Wednesday, RA & Morse classes, every Friday at 7.30pm. Details of GM4COU, 0734 792364.

SOUTH BIRMINGHAM - 7, Tar (BTA), 041 466 1982.

STOURBRIDGE & DARS - 5, On Air night & raffle night, 19 Surprise Club's "PC by Andy", Details 0456 342500.

DORSET

DORSET & WESSEX ARC - 12, Antenna Revival Night on 16th, 26, Talk "Packet Basick" by G5DCG, 0205 480 6291.

BROADSOMA BHG ARC - 11, TONY, 0205 293 4681.

WEST BROWNING CENTRAL RC - 11, Tony, G0GGK - RSGB RLC, a general introduction and an outline about how to make a licence and the implications of the law; on Oct 2, Visit by Harry Harrison, of the STP, visit to the Black Country Contact Society, and pictures, with a view on articles in the Bugle.

1 OCTOBER

WEST SUSSES

CHANCESTER & DARS - Club meetings at St Pancras Hall, St Pancras, Kent, Details 0734 784352.

HORSHAM ARC - 1, Entitled "Donutlets Aye" by Mike; McC, Oct 4, Details 0734 784352.

MID-SUSSEX - Talk on RSBOC by G3JMS, 0734 784352.

WORTHING & DARS - Meets at 7.55pm on Lightship Hall, South Street, Banham, Details 0479 752630.

17 SEPTEMBER

SCOTTISH AMATEUR RADIO CONVENTION (BARC) - Clubs Community Centre, Ayr, 3rd September, Details of Mike, G4YMA, 065 4977 202.

WATHFORD AMATEUR RADIO CLUB - Wathford (Monsters Group) - "That's What I Like to Do". Details of G3OFH, 0734 784352.

THE GREAT LUMLEY ARC & ESOCIETY - Great Lumley, 0734 784352.

SOUTHWARKS ARS - 8, Quiz night with Powys ARS; 12, 'British Vintage Wires' by Mike, Details of GM4COU, 0734 784352.

18 SEPTEMBER

BLACKBURN & DISTRICT AMATEUR Radio Society - Community Centre, Blackburn, Saturdays, Details of Mike, G4YMA, 065 4977 202.

GREAT LUMLEY RADIO RALLY (organised by G3QOL and Mike G3QOR) - Great Lumley, 0734 784352.

25 SEPTEMBER

RUSSELL AND NORTHAMPTON SHIRE "WAVE" - Wavemaker, Wavemaker, Worcestershire. Features a large selection of trade stands, usual refreshments and, of course, competitions for white knobs. Details of 0733 538 357 84.
Supporting the Future of Amateur Radio at

**Live’94**

20 - 25 SEPTEMBER 1994

Earls Court

LAST YEAR’S Live Consumer Electronics Show was the largest public show to be launched in the UK in the past ten years. It attracted over 140,000 visitors and, at one, time Olympia exceeded its capacity for the first time in 25 years when 45,627 visitors came through the doors.

_This year it promises to be even bigger and even better!_

The RSGB have teamed up with seven other amateur radio companies to form an ‘Amateur Radio Village’ and we will be featuring amateur radio in all its different aspects. We have been joined by Martin Lynch The Electronic Hobbies Exchange Centre, Icom (UK) Ltd, Yaesu (UK) Ltd, Kenwood UK, Lowes Electronic Supplies, Waters & Stanton and PW Publishing.

The show covers all aspects of consumer electronics, including music, broadcasting, computers and photography. The huge list of exhibitors includes leaders such as Sony, Sharp, Yamaha, Apple, Canon, Sky TV, Nikon and - of course - the RSGB.

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**Win Prizes Every Day**

Contact our Special Event Stations GB3RS and GB2VHF at Live ’94 and you will automatically be entered into a prize winning draw.

_Three winners every day:_ A major prize, _PLUS_ an RSGB Membership and a PW subscription, will be given away every day during the duration of the six day show.

Mark the dates in your diary _NOW_ - to be in with a chance of winning one of the following prizes:

- **Alinco DJ 500E Dual Band Hand Held**
  - (2m/70cm)*
  - Supplied by Waters & Stanton

- **Kantronics KPC3 Packet Controller**
  - Supplied by Martin Lynch The Electronic Hobbies Exchange Centre

- **A Choice between a TH22E (2M) or a TH42E Transceiver Handheld with optional keypad**
  - Supplied by Kenwood UK

- **HF150 Shortwave Receiver**
  - Supplied by Lowe Electronics

- **FT416 2 metre Handheld and Accessories**
  - Supplied by Yeasu (UK) Ltd

- **IC281H 2m 50 watts Mobile**
  - Supplied by Icom (UK) Ltd

- **A Full RSGB Corporate Membership or Book Vouchers to the same value**
  - Supplied by the Radio Society of Great Britain

- **A Subscription to either Practical Wireless or Shortwave Magazine**
  - Supplied by PW Publishing Ltd

For the draw, we will be using a Computer Logging System generously supplied by Lambda Electronics.

1. Only one contact per band, per day, per person, per mode will be entered into the draw.
2. The prize winners will be randomly selected at the end of each day and the winners will be notified in writing by 30 October 1994. The first selected, at the end of each day, will receive one of the prizes marked * and the following two selected will receive the RSGB prize and the PW prize, in that order. We regret, however, that the prizes marked * can only be sent to amateurs residing within the UK. If a non-UK amateur is selected first, they will receive one of the other prizes.
3. The prize winners will also be published in RadCom and Practical Wireless.
4. A full list of prize winners can be obtained by sending a SASE to RSGB HQ six weeks after the event has finished.
5. The organisers’ decision will be final and no correspondence will be entered into.
6. There will be no cash alternative offered for any of the prizes.

**FREE TICKETS**

Twenty lucky _RadCom_ readers can visit Live ’94 - with a friend - ABSOLUTELY FREE! Just send the label carrier from this month’s _RadCom_ in an envelope marked ’LIVE ’94 DRAW’. The first twenty drawn on Monday 12 September will be sent tickets that day.

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RADIO COMMUNICATION September 1994
EVENTS DIARY

22 OCTOBER (FRIDAY/ SATURDAY)
LEICESTER Amateur Radio Show - Grantly Hall, Leicester. Doors open both days at 10am.
12/30 for disabled. Large trade presence, special group interests section. Refreshments available. Tel 0116 277 7700.

22 OCTOBER
RSGB OPEN REGIONAL Meeting - Bristol. Details Julian Garmiany, G0YTH, G0TTR.

30 OCTOBER

5 NOVEMBER
NORTHWALES Radio Rally - Albermarle Centre, Llandudno. Also for this year, the new North Wales Theory Rooms will be available. Features over 80 trade stands, covering radio, electronics and computer interests, a bring & buy stall and refreshments. Tel-on-in 0222.

6 NOVEMBER
14th NORTHEDEVON Rally - Holsworthy Memorial Hall, Holsworthy. Features a bring and buy stall, etc. Details G8AXL, G0YTH.

9 NOVEMBER
TYNE AND WEAR Ragster Group Auction - Forces House & District Community Centre. Fenham, or Chester-le-Street, County Dur- ham. Doors open 10.30am for booked auctions in Auction stand at 11am. Details Brian, G0TST; G0TTR 0191 388 2913.

12 NOVEMBER (SATURDAY)
THE ALL MAMO Show, Radio Rally and Electronics Fair - Blagby, near Market Rasen, Lincs. Doors open 10am. Features over 60 trade stands covering radio, electronics and computer interests, a bring and buy stall and refreshments. Details: Arthur, G3BGR, on 01908 27299, Mob 07973 779197.

13 NOVEMBER
BARNSLEY & DARTC 4th Amateur Radio Rally - "NEW VENUE!" The Metropolism Complex, Barnsley Town Centre. Venue less than 2 miles from jun 27, M1. New venue is at on site with excellent facilities. Event features the usual amateur radio and computer dealers: radio club, socialist groups and a bring and buy. Special feature is the market in the mezzanine. De- tailed G4UFE, or call 01226 713633 on 0644, except Sunday 1-2pm.

MARS-STOCKHOLM Radio Computer Rally - Stockland Green Leisure Centre, Slade/IFld, Edgbaston, Birmingham. Doors open 10 am. Features the usual traders, local clubs, special interest groups stands and a bring and sell table. Details ref: on 0121 507 4767 or Peter, G8DGN. G8DGN 021 443 1187 evening.

20 NOVEMBER
BISHOP AUCKLAND_RADIO & Computer Annual Rally - Newton Aycliffe Astrodome, Barnard Castle. Doors open 10 am. Details Mike, G0TGR, 0368 766264.

27 NOVEMBER
BIRDSHILL & DARC Radio Rally - Birdshill Recreation Centre, Birdsill, Mid-Derbyshire. Access off the A44 via the A36. Doors open 11am, 10.30 for disabled visitors. Features a large bring and buy, refreshments available all day. Bring along the family, relaxation facilities available, entertainment etc. Talk-in on 522 and G3GMG 876 (135.7MHz). Details Mike, G0TGR 0368 722199 or on, G8DGN 0368 684345.

12 DECEMBER
LEEDS AND DARS Christmas Radio Electronic and Computer Rally - Details Phil, G0GHP 0352 9593.

13 DECEMBER
VERULAM CHRISTMAS Rally - "NEW VENUE!" Watford Leisure Centre, Southend Road, Watford, Herts. Details from Mark, G3PFF, on 01923 22810.

21 JANUARY 1995
OLDHAM AR Club Mobile Rally - Details Kathy, G4GZP, G0TTR.

2 FEBRUARY 1995
SOUTH EAST ARS Radio Rally - Details 0208 6731396.

2 FEBRUARY 1995
NORTHERN CROSS Rally - Rochdale School, A61, Details Stuart, Tel 0522 827967.

19 MARCH 1995
NORTHBOURNE Amateur Radio Electronic and Computing Exhibition - Details Peter, G6GDF, G0TGR 0544 6277.

14 MAY 1995
MARSDIARYNAMORadio and Computer Rally - Details Norman, G8BHE 021 422 977 (in evening).

21 MAY 1995
11th YEOWILGDR & Construction Convention - Details G3CR, 01858 835045.

4 JUNE 1995
SPALDING Annual Exhibition and Rally - Details G0ZCR 0733 783082.

11 JUNE 1995
ELVASTON CASTLE National Radio Rally - Details from Ken, G0CXX, 0208 626218 Trade enquiries, Keith, G1DOK 0332 526996.

9 JULY 1995
SUSSEX Amateur Radio and Computer Fair - Details from Ron, G4EAF. G4EAF 0709 71750 office hours.

23 JULY 1995
COTHELSTONE Radio & Computer Rally - Details Richard, G7BTF, G0TGR 0588 671736.

6 AUGUST 1995
RSGB WOBUN Rally - Woburn Abbey, Bed- fordshire. Details from Norman Miller, G3MMV, 0277 255663.

GB CALLS
The list below shows all special event stations licensed for operation during this month and up to 24 September. It was taken from the HP computer on 5 August. These callsigns are valid for use from the date given and the period of operation may vary from 1-28 days.

1 GB0BH Harpenden House
GB2GMM Gulgilmor Merlon Memorial
GB4VE Victoria in Europe
GB5CR Cycle Ride
GB5DST 500 Grass Track
GB2OSS Orsett Show
GB8ARN Amhem
GB3QDD Guide Dogs for the Blind
GB2WFM Wincombe Michealsfield Farm
GB2HG Hartslock Fire & Twinning
GB4HNF Newquay Festival Week

4 GB2AMN Museum Newmark
GB3NFW Newquay Festival Week
GB2GAF Gloucester Air Force
GB2GDA Chesham Community Association
GB2JUA St John Ambulance
GB2PAF Royal Air Force
GB1BAS British Amateur Society
10 GBFAD First Airborne Division
GB2HCD Hoddesdon Cavalry
GB4ATG Amateur Teledata Group
GB2NFR North Foreland Radar
GB4DFA Rural Railways for Disabled
GB4FMF Friends of Moira Furnace
15 GB5DT Drossingham
GB3PYO RAF Fylingdales
16 GB4BHI British Hoologistic Institute
16 GB83ET Jet Aircraft
16 GB1JET 1st Jet Aircraft
16 GB3DMG Operation Market Garden
17 GB0NTC National Trust Char核
16 GB2MFY Meteor Flight Yorkshire
GB2SR Steral Radio
GB4WFB Wireless for the Blind
GB4GMF Michaelmas Fayre
20 GB1AP Sir Edward Appolton
21 GB1FM Forest Marathon
24 GB5BBC Beetham Baptist Church
16 GB0DS RRS Discovery
16 GB2HPS Hunterston Power Station
16 GB5DT Drossingham
GB4EGX Essex Kite Group
GB4PGS Rayisel Scout Group

SILENT KEYS

It has been advised of the deaths of the following radio amateurs:

G3CWF Mr A Rawlins 09.07.94
GCDWL Mr J A Anderson 05.05.94
G5CXR Mr D Thomas 28.04.94
G0PLU Mr F J Taylor 15.06.94
G4MNH Mr J F Wilson 05.04.94
G3GSH Mr J R Clarke 04.06.94
G3JUN Mr K M Moseley 30.04.94
G1JCN Mr H T Curtis 11.06.94
G3JBB Mr B Broughton 13.06.94
G4KEH Mr E L Frost 07.04.94
G4PEP Mr C North 09.04.94
G4XTH Mr J Freeman 07.04.94
G7ECF Mr W Clarke 15.06.94
G5BWH Mr B L Scott 17.06.94
G5JBW Mr H Lanyon Jan 94
G3MUP Mr A Dickson 21.05.94
G4WLLG Mr K Kelson 08.06.94
G5W3TN Mr B Davies 24.06.94
G0NLO Mr L Deustraves 10.06.94
RS5387 Mr D Bjerkeal May 94
VA4EF Mr E F Ellis 09.06.94

Telford Exhibition Centre, Telford, Shropshire.

DOORS OPEN AT 10.30
Sunday, 4th Sept.

If you are a Telford veteran don’t bother reading any more - just come again and this time bring loads of friends! Oh yes - one thing. We’ve understood that you didn’t think much of our Bring & Sell Sale - so this year we are having a full blown conventional Bring & Buy - just like all the other rallies - only better! Never let it be said we don’t listen to the wishes of our visitors.

The Telford Rally has always been one of the very best since it’s inception 17 years ago. Don’t take my word for that - just ask any Radio Amateur who has been to it - better still, find out for yourself.

This year the event is to be held in the new halls of the Telford Exhibition Centre with first class facilities for disabled visitors, good catering and bars, plenty of space and masses of sitting out area. Aren’t those rallies a pain when you can’t sit down for few minutes even if it’s only to get a sneak preview of the goodies you have just bought?

Load of Traders - big and small • Free Parking • R.S.G.B. Participation • Special Interest Groups • Flea Market • Clubs • Novelty Features • Bring & Buy • Free Prize Draw • Telford Town Park and area attractions

Info from Peter G4LSA 0785 824388 or John G0G7TN 0743 249943

BRING & BUY • FLEA MARKET
Expand your radio horizons with Ham Radio Today

Every month HRT strives to keep readers up to date with the very latest innovations in amateur radio. We explain the technology and give step by step guidelines on everything from choosing a rig to home construction tips plus advice for novices and experts alike.

This is Ham Radio - Today!

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1. Keep in touch with the latest in the world of ham radio.
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You may receive information about other offers which may be of interest to you.
Rates correct at time of going to print (April '93)

(RSGB)
Zonal Council members

Zone A (North of England): Peter Shippard, G4EUF, 89 St Catherine Drive, Leckwith, Bristol, North Humberside HU17 7NY. Tel: 0964 550307.

Zone B (Midlands): Dave Cournil, G0MYJ, 86 Upton Road, Broadwaters, Kidderminster, Worcs DY10 2YB. Tel: 0562 753101.

Zone C (East Anglia): Neil Lasher, G8BLU, 8 Highwood Grove, Mill Hill, London NW7 3LY. Tel: 081 201 1578.

Zone D (SW England): Julian Gannaway, G3GF, Dean Hill, East Dean, Selisbury, Wiltshire SP5 1HU. Tel: 0794 40008.

Zone E (Wales): Clive N Trolman, GW4YKL, 19 Park View, Dolau, Llantrisant, Pontyclun, Mid Glamorgan CF7 9RZ. Tel: 0443 500 949.

Zone F (Northern Ireland): Ian Kyse, GIBAYZ, 1 Portulla Drive, Pond Park Road, Lisburn, Co Antrim BT26 3JS.

Zone G (Scotland): Frank Hall, GM8MBX, 45 Priory Cottages, Lunanhead, Forsa, Angus DD8 3NR. Tel: 0307 487565.

For general advice and details on local clubs, or if you don’t know who to contact:

Your RSGB Liaison Officer see January and February Radiocom, page 51.

Specialists

Antenna Planning: Booklet free to members from RSGB HQ. Planning application refused – RSGB Planning Panel, via RSGB HQ. Planning Advisory Committee – Geoff Bond, G4GUB, QTHR.

Audio Visual: Library Coordinator – David Simmonds, G3JKB.

Awards: For contest awards, refer to the appropriate contest committee. For other awards, enquiries and applications go to: the: - H Awards Manager – Fred Handscombe, G4BWP; IOTA (Islands on the Air) Awards Manager – Roger Ballantyne, G3KDA; and (Nordic Wave) Awards Manager – Ian L. Cornes, G4OUT. Trophies Manager – Post vacant.

Band Plan and operating practices: See the RSGB Call Book or see on page 94.

Local Coordinators:

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Zone F (Northern Ireland): Ian Kyse, GIBAYZ, 1 Portulla Drive, Pond Park Road, Lisburn, Co Antrim BT26 3JS.

Zone G (Scotland): Frank Hall, GM8MBX, 45 Priory Cottages, Lunanhead, Forsa, Angus DD8 3NR. Tel: 0307 487565.

The Society has a large number of volunteer experts available to help and advise members on a wide variety of subjects. Each month we will be focussing on a different section of the volunteer workforce, whilst still giving brief details of the main office holders. See also the Information Directory section of this RSGB Call Book.

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Band Plan and operating practices: See the RSGB Call Book or see on page 94.

Local Coordinators:
The new enlarged Catalogue is out now!

Included in this issue:

- A further 16 extra pages
- £200 worth discount vouchers
- 100's new products
- 256 pages, 26 sections, over 4000 products from some of the world's finest manufacturers and suppliers
- Expanded entertainment section with in-car amps, speakers, crossovers and low cost disco equipment
- Further additions from Europe's leading kit manufacture - Velleman
- Available from most large newsagents or direct from Circit

Send for your copy today!
CREDIT DUE

Hardly a month goes by without Radiocomm receiving flak for its editorial content. I feel the time has come to give credit where credit is due.

I have had at one time or another access to four national society magazines as well as commercial ham radio periodicals. Your magazine consistently exceeds in quality all of them; the contents, attention to detail, overall presentation, and not least, the articles are superior to all others. There is not an issue in which I do not find an item of interest. The technical articles maintain the right mix of complex and simple. Technical Theory is an endless source of mine as are the relatively new sections of Simply Silicon, Eurotek, in Practice and Novice Notebooks are all extremely worthwhile. Please do not change now.

Specifically, in response to your recent query about the usefulness of the reviews, I wish to say that: The reviews are comprehensive and thorough and your reviewers are not afraid to be critical. It is interesting to compare the equipment reviews in Radiocomm and Information to the relatively recent reviews in New World QG.

The piece written by W1COP did not compare in length, depth and thoroughness with that of G3JLV and your staff. Living out here in the boonies, there are other means to keep up with new equipment development; I rely heavily on the views expressed by your reviewers when making decisions about new equipment.

On the whole I would encourage you to continue with these excellent features.

FACET THE FACTS

First, congratulations to Mr Kirby's (GW0PLP), son on passing the RAE and Morse test, and getting his A licence (The Last Word, July). This is a tremendous achievement, how did he get it free? Was this because he was in the (life that people want, and can, but must of them cost money, if you want them you have to pay for them, and getting the money by being in the army, and the goal all the more satisfactorily when it is attained.

Young Mr Kirby could have had a Nova Licence free of charge but would have had to accept the restrictions. He has now worked for and got something better which costs a lot of money. There are many ways for a 14-year-old to earn £15 today; it may take a month but he has a lifetime ahead of him to enjoy the fruits of his labours.

Will his father expect a free licence when his son has his first motorbike? Of course not, so come off it Mr Kirby, face facts, you get what you pay for, and you must pay for what you get.

P H Stuart G6JCY

RAE COURSE SOURCE

I refer to G4MLL's letter (The Last Word, April) regarding RAE courses, I suggest he and any other course organiser gets in touch with their local Adult Education Centre if they are having difficulty. These centres are generally very receptive to ideas for new courses and their rates are more reasonable than Further Education Colleges. In addition they usually offer concessionary rates to those on state benefits.

Martin Stoneham G4RYY

LOYALTY EARNED

After our ham was burgled recently, we were faced with a battle with our insurers and their loss adjusters to find agreeable replacements for our lost valuables. This included having to replace equipment stolen from our shack.

This task was made surprisingly easy by John Baxter, G8V1Q at Icom in Birmingham after I made just one telephone call and then faxed him a list of the lost equipment. By return of post I had received a comprehensive list of the replacements, their cost, and all the relevant sales literature for me to pass on to the loss adjusters. They were grateful for this and agreed to authorise payment accordingly.

Finally upon receipt of the cheque in the post, we drove over to Icom in Birmingham where every item, including all the relevant optional extras, were waiting collection, in one very large box!

This conscientious level of efficiency is hard to find these days and John surely deserves some praise for this. He is a credit to our hobby and to Icom UK who are now certain of my lifetime customer loyalty not only for the high quality of their products but also for the professional manner of their sales staff.

Stuart, G4KUR, and Valerie Hammond, ZE1ACG.

THE LAST WORD

THE LICENCE FREE?

I support GW0PLP's plea for retention by his son (GW0PLP), of his predecessor, in an injustice that the more one achieves, the greater financial penalty. While on this subject, I often wonder why I (along with many others) am still paying a statutory fee after holding a licence for close on 40 years, and on a fixed retirement pension.

Don't suggest a free-of-charge licence after say, 40 years, or on retirement, whichever comes first? Or maybe even a one-time fee, like the driving licence. If not good enough, Mr Editor, to trot out the views of the RA on this matter, then I would be seeking to improve our conditions by putting forward our views.

R Patterson, GW4KXV

WAIT YOUR TURN

As a non-French National I was lucky to have been given the opportunity to operate TSMDD/4 for the 45th and 6 June. Field Day over the 45th as always was a pleasure, 1989 was the last time I participated and the standard of operating was as I remembered - fast but courteous.

Regrettably I cannot say the same for the 6th. Since the call was a special event for D-Day the object was to work as many stations as possible yet to avoid the pile-up by stations we had the least chance of any good QSO's.

After ten hours I gave up in disgust. The sheer bad manners of stations in order to get a QSO is beyond belief, after all it was not Q5 but I was not Q5 and by one instance I asked a G4 for his name at six times and still haven't got it — a P.A. I finally gave up to G30Q because he was pasted in QRMing other calls after being asked to wait.

Pile-ups are nothing new to me as I have operated from TAG and TAF. From TAG I found the only way I could make pile-ups more pleasurable was to run a QRY (Your turn is number, ... ) list. Something that took a week to put on as a QSL card but was an off-the-mill Q5 for amateur operation. Once it did, work exceedingly well and didn't take long to run a QRY at all stations a time leaving the frequency relatively clear to top up with fresh calls and also give QRP ops a chance to QSO as well. Those that didn't have the patience to wait the QRP ops to call, there again, how many give up in sheer frustration in normal pile-ups.

G3WW's Tristan da Cunha article on the spreading of the pile-up frequency may be one answer but 5kHz is a lot of bandwidth when there is only 40kHz to play around with, and who says it stops at 5kHz. With split frequency working plus a QRY list I found I not only moved through pile-ups a lot faster but also it left me at the end of the QSO, sans mental harm.

Thanks to everyone who made TM5DD/P a memorable weekend.

Malcolm McLeman, FS5BGUJ3GUN

THANKS FOR MALAYSIA

I wish to take this opportunity to express my gratitude to fellow RSGB member and IARU Region 3 Director, Mr Sangat Singh 9M2SS for helping to arrange a 9M2 licence for me while I was working briefly in Malaysia.

I received my licence certificate within four working days! Thanks also to Neville Cheade, G3NLJ for sending me an application form and advice on licensing.

Dr K W Lau, G8TVK, 9M2BX

HONOR ROLL COMPULSORY

I was very dismayed to see that you have wasted lots more pages in August Radiocomm on the G2A/JV Iorn diode antenna. The technical quality of the three articles you have published on this subject has been abysmal. All articles have lacked detailed information and seem full of quackery. Perhaps it is high time that we have a lead on the APB, someone is holding the line to allow high office in the Society unless they have worked 300 countries. That would keep the APB away from an amateur that has no idea what the hobby is all about. What do you think?

Also, when will the next issue of Radiocomm have a photograph of genuine ham radio? The most recent was in May, mind you, time to see how these things are done properly. Wake up - the RSGB is an amateur radio society not a gathering of spotty faced teen spoilers.

Ian Butthum, G3TMA

Radio World is edited by Simon Fenn. Mike Kabo VETEGC, formerly O1AGC, G4J6C and Q4E6U

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.

September 1993

RADIO COMMUNICATION
HF ANTENNA COLLECTION

An invaluable collection of outstanding articles and shortpieces which were published in RadCom during the period 1968-89 selected and edited by Erwin David, G4LQI. As well as ingenious designs for single-element, beam and miniature antennas, there is a wealth of information on ancillary topics such as feeders, tuners, baluns, testing, modelling, and the mechanics of mounting an antenna safely. This book could supply that vital idea for your next antenna project.

Members: £9.34 (£10.99)

PRACTICAL WIRE ANTENNAS

Wire antennas offer one of the most cost-effective ways to put out a good signal on the HF bands and this practical guide to their construction has something to interest every amateur on a budget. Many different types are covered, ranging from simple dipoles to ingenious multi-wire systems - even underground antennas! Full details of feeding and matching are also included. The author, John D Heys, G3BDQ offers 'down-to-earth' advice that will be appreciated by beginners and enthusiasts alike. No-one who builds and uses wire antennas can afford to be without this handy guide.

Members: £7.22 (£8.50)

### OTHER ANTENNA BOOKS

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<th>ARRL</th>
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<td>ARRL</td>
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<td>W1FB’s Antenna Notebook</td>
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