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Tx - 1.8MHz to 52MHz (Ham)
Power - 1W - 100W (500mW 6m)
IMD - 99dB
MDS - 130dBm (14MHz 500Hz)
Modes - SSB CW AM FM

*Realtime Panadapter
*Click on Spectrum Display Tune
*Filter shape factors 1.05:1
*No ring filters down to 25Hz
*AGC after brick wall filter
*Graphic Equaliser & Compander
*Variable bandwidth Tx filter
*Iambic Memory Keyer

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SDR-1000 100 Watts	**£995.00**	**Delta-44** Soundcard	**£99.00**
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Real-time spectrum analyser; Plug and Play installation, 2nd IF totally SDR; Easily updated, Simple USB connection; 3 scan modes; S-meter reading S-points - dBm or uV; Triple AGC speeds or manual; Extensive memory feature; Dual real-time spectrum scopes; Bandwidths of: 0.5, 2.5, 3, 4, 6, and 12kHz; SSB sens. typically: 0.3uV; AM Sens: 0.9uV.

Specification

Mode: AM AMN AMS SSB CW NFM
Tuning steps: 1Hz **Image reject**: 60dB
IP3: +5dBm@20kHz **MDS**: -135dBm
Phase Noise: -148 dBc/Hz @ 100kHz
RSSI Accurate: 5dB **RSSI Sensitivity:** 1uV
Scan Speed: 40chs per sec
IFs: 45MHz; 12kHz **Stability:** 10 ppm 0-60C
Antenna: 50 Ohm. **Supply:** 12VDC Unit or PCI

WR-G305 Features

HF-UHF 9kHz-1800MHz Dual Conversion SSB FM AM
Real-time spectrum analyser; Plug and Play installation, 2nd IF totally SDR; Easily updated, Simple USB connection; 3 scan modes; S-meter reading S-points - dBm or uV; Dual Loop variable speed AGC; Manual IF gain; Unlimited memory; Audio filter: Dual real-time spectrum scopes; Multifunction squelch; Graphi hit count; Bandwidths of: 0.5, 2.5, 3, 4, 6, 12 and 220kHz; SSB sens. typically: 0.3uV; FM Sens: 0.7uV.

Specification

Mode: AM AMN AMS SSB CW NFM
Tuning steps: 1Hz **Image reject**: 60dB
IP3: 0dBm@20kHz **MDS**: -135dBm
Phase Noise: -148 dBc/Hz @ 100kHz
RSSI Accurate: 5dB **RSSI Sensitivity:** 1uV
Squelch: Level, noise, voice, CTCSS, DCS
Scan Speed: 60chs per sec max
IFs: 109.65 MHz;12kHz **Stability:** 10 ppm 0-60C
Antenna: 50 Ohm. **Supply:** 12VDC Unit or PCI

WR-G313 Features

HF 9kHz-30MHz (180MHz*) Dual Conversion SSB FM AM
Real-time spectrum analyser; IF Shift & Notch Filter; 2nd IF totally SDR; IF spectrum record, USB connection; 3 scan modes; S-meter reading S-points - dBm or uV; Triple AGC speeds or manual; Extensive memory feature; Dual real-time spectrum scopes; Noise Blanker; Test & Measure features; Bandwidths variable 1Hz - 15kHz; 600 Ohms line output; SSB sens. typically: 0.25uV; AM Sens: 0.9uV.

Specification

Mode: AM AMS SSB DSB ISB CW NFM
Tuning steps: 1Hz **Image reject**: >70dB
IP3: +8.5dBm@20kHz **MDS**: -135dBm
Phase Noise: -148 dBc/Hz @ 100kHz
RSSI Accurate: 2dB **RSSI Sensitivity:** 1uV
Dynamic Range: 95dB
Scan Speed: 40chs per sec
IFs: 45MHz; 16kHz **Stability:** 0.5 ppm 0-60C
Antenna: 50 Ohm. **Supply:** 12VDC Unit or PCI

WR-G315 Features

HF-UHF 9kHz-1800MHz Dual Conversion SSB FM AM
Real-time spectrum analyser; IF Shift & Notch Filter, 2nd IF totally SDR; IF spectrum record, USB connection; 3 scan modes; S-meter reading S-points - dBm or uV; Dual Loop variable speed AGC; Manual IF gain; Unlimited memory; Audio filter: Dual real-time spectrum scopes; Multifunction squelch; Noise Blanker; Bandwidths of: variable 1Hz - 15kHz; SSB sens. typically: 0.25uV; FM Sens: 0.5uV.

Specification

Mode: AM AMS SSB DSB ISB CW NFM
Tuning steps: 1Hz **Image reject**: 60dB typical
IP3: 0dBm@20kHz **MDS**: -135dBm
Phase Noise: -148 dBc/Hz @ 100kHz
RSSI Accurate: 5dB **RSSI Sensitivity:** 1uV
Dynamic Range: 90dB
Squelch: Level, noise, voice, CTCSS, DCS
Scan Speed: 500chs per sec @1kHz steps
IFs: 109.65 MHz;12kHz **Stability:** 0.5 ppm 0-60C
Antenna: 50 Ohm. **Supply:** 12V DC or PCI

Prices

WR-G303i	HF PCI module	**£385.95**	**WR-G305e/WFM/PD**	HF-UHF Ext. USB & Pro-Demod	**£599.95**
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WR-G303e	HF External USB	**£454.95**	**WE-G313i/180**	HF PCI module	**£869.95**
WR-G303E/PD	HF Ext. USB & Pro-Demod	**£528.95**	**WR-G313e**	HF External USB	**£809.95**
WR-G305i/WFM	HF-UHF PCI module	**£469.95**	**WR-G313e/180**	HF External USB	**£999.95**
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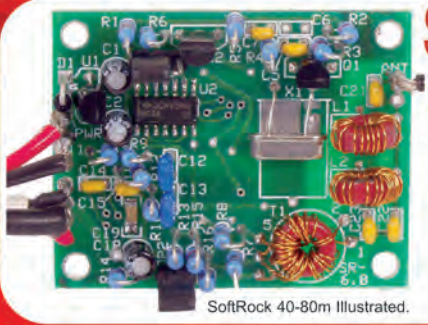
WR-G305e/PD	HF Ext. USB & Pro-Demod	**£528.95**	**WR-DNC3300**	3300MHz down converter	**£174.95**

Software Defined Receivers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Build yourself an SDR radio kit to use in conjunction with your PC. Requires soundcard with sample rate of 48kHz but 96kHz is reccomended for greater coverage. Four kits available, the 40-80m kit covers two bands, the other kits cover CW portions of 160, 20 & 30m. These kits contain 1 PCB plus all the components to make up the board, they do not include an audio cable. There are a number of surface mount components so a certain amount of skill is required plus the right type of equipment. A grounded tip soldering iron (15 to 20W) is required with a small tip, some form of visual magnification is also essential. The kit is supplied with a CD-ROM with builders notes, schematic on PDF and selection of SDR software programs.

* *Software CD provided*
* *Requires PC - with SoundCard*
* *PCB size 38.1 x 48.26mm*
* *Supply 9-12V*
* *Build Time - approx 3 hours*

Prices

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SOFTROCK-V6-160m	160m Kit	**£29.95**
SOFTROCK-V6-20m	20m Kit	**£29.95**
SOFTROCK-V6-30m	30m Kit	**£29.95**

Carriage Charges: A=£3, B=£4, C=£6.95, D=£10, E=£12

december 2006 contents

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Directors: Stephen Hunt & Roger Hall

Editorial Department
☎ 0870 224 7810
Fax: 0870 224 7850

Editor
Rob Mannion G3XFD/EI5IW
rob@pwpublishing.ltd.uk

Production Editor
Donna Vincent G7TZB/M3TZB
donna@pwpublishing.ltd.uk

Technical Editor
NG (Tex) Swann G1TEX/M3NGS
tex@pwpublishing.ltd.uk

Art Department
☎ 0870 224 7820
Fax: 0870 224 7850

Art Editor
Stephen Hunt
steve@pwpublishing.ltd.uk

Typesetting
Peter Eldrett
peter@pwpublishing.ltd.uk

Sales Department
Fax: 0870 224 7850

Advertisements
Roger Hall G4TNT
roger@pwpublishing.ltd.uk
☎ 0207 731 6222

Advertisement Administration
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☎ 0870 224 7820

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Finance Department
☎ 0870 224 7840
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Finance Manager
Alan Burgess
alan@pwpublishing.ltd.uk

Finance Assistant
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Cover subject

The PW Brean DSB transceiver is named after the Brean Down in Somerset, close to the author, **Tim Walford G3PCJ**'s home. The antenna shot shows the **GB2GM** antennas at Poldhu, Cornwall - a set-up that even Marconi would have been proud of.

Design: Steve Hunt
Photographs: Tim Walford G3PCJ and Davey Thomas G3AGA

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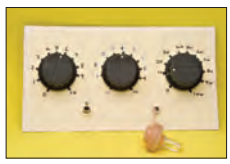

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regulars

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rob mannion's keylines

Rob Mannion G3XFD

The week beginning Monday 2 October was incredibly busy for me. It started with my 60th birthday celebrations at a local hostelry. It was a rare occasion when everyone involved in working for PW Publishing Ltd., was able to be in the same place at the same time. I was presented with several beautiful paintings of countryside views featuring evocative, disused railway arches, painted by a colleague! What better gift for a keen amateur railway historian? (I ignore the 'anorak' term!).

It was my colleagues who suggested the special gifts. Thank you everyone (including the many readers and authors who sent cards) and I'm also very grateful to our resident (very professional) artist, **Margaret Hasted**. Along with the bridge paintings she even painted a birthday card for me!

Club Visits

On Thursday 5 October I had two club visits to undertake in Yorkshire. A visit to **Silcoates School Radio Club** in Wakefield, meant an 0415 start for the long drive to West Yorkshire to arrive in time for lunch with music teacher **Nigel Wears M0SSW** and the keen young club members.

The Silcoates School Radio Club during G3XFD's visit. from left to right - Johnathon Nelmes (On M3 course), Sam M3MHO, Sarah (On M3 course), Johnny 2E0SCJ, David M3TLD, Nigel Wears M0NJW and Chris G1YNH.

I was made most welcome and the club station - **MX0SSW** - was busy on the air from a newly refurbished club room in the school's large attic roof. Thanks to a parent they even have air conditioning - it gets very hot when they're contesting! The school club members (mostly in the 12 to 16 age range) are very talented. I felt very proud to meet them all and have arranged for a year's subscription to *PW* to encourage them further. All school clubs should be supported and I'll do my best to assist.

Incidentally, **David Tattersal M3TLD**, one of the keen operators on duty that day is planning to write an article for *PW* featuring his remarkable short wave listening grandmother! Watch this space.

Nigel M0SSW had kindly arranged a special hotel for me and I was able to recuperate ready for the visit to the **Denby Dale Club**, south of Wakefield. It was due to this club I'd been invited to Silcoates School in addition to the visit to Denby Dale.

The Denby Dale members made me very welcome. The small country town is famous for its huge pies, which are baked on ceremonial occasions. They're very large and take many hours to cook and many hundreds of people to eat them. I missed out on a taste this time but perhaps I'll be lucky on my next visit! Thanks for the welcome Denby Dale!

Rochdale QRP Event

The final event on the long trip (well over 700 miles) was to the Rochdale QRP Mini-Convention at Sudden Parish Church. The misleading title 'Mini' hides an extremely 'real radio' rally. Once again **Ian Brothwell G4EAN** provided his support and together we manned the *PW* stand.

This year saw a group of very welcome American Radio Amateurs attending with their partners. I was also delighted to meet QRP enthusiasts - and especially *PW* readers - from Canada (British Columbia). The wonderful Rochdale event is becoming truly international.

The Rev. **George Dobbs G3RJV** and the G-QRP Club have to be congratulated for the wonderful, spirited occasion. In fact, as George G3RJV is due to retire in 2008, a search for a new home for the Rochdale event is under way. Finally, as the min-convention has such a fascinating history, I've asked him research and write a special feature for *PW* in 2007. I hope to see you in Rochdale next year.

Practical Wireless QRP Contest

My apologies go to **Dr. Neill Taylor G4HLX**, together with those readers waiting for the results tables in the November *PW*. We appear to have had a computer glitch and Table 4 was incorrect. Thanks to Neill G4HLX, the correct Table 4 appears on the contest website at **www.ntay.com/contest/index.html**

We're looking into the problem and once we know what caused the wrong computer file to appear, hopefully we'll avoid the problem in future. Good luck in the 75th anniversary year event!

Rob G3XFD

practical wireless services

Just some of the services *Practical Wireless* offers to readers...

Subscriptions

Subscriptions are available at £33 per annum to UK addresses, £41 Europe Airmail and £50 RoW Airmail.

Components For *PW* Projects

In general all components used in constructing *PW* projects are available from a variety of component suppliers. Where special, or difficult to obtain, components are specified, a supplier will be quoted in the article.

Photocopies & Back Issues

We have a selection of back issues, covering the past three years of *PW*. If you are looking for an article or review that you missed first time around, we can help. If we don't have the whole issue we can always supply a photocopy of the article.

Placing An Order

Orders for back numbers, binders and items from our Book Store should be sent to: **PW Publishing Ltd., Post Sales Department, Arrowsmith Court, Station Approach, Broadstone Dorset BH18 8PW**, with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling. Credit card orders (Access, Mastercard, Eurocard, AMEX or Visa) are also welcome by telephone to Broadstone **0870 224 7830**. An answering machine will accept your order out of office hours and during busy periods in the office. You can also FAX an order, giving full details to Broadstone **0870 224 7850**. The E-mail address is **bookstore@pwpublishing.ltd.uk**

Technical Help

We regret that due to Editorial time scales, replies to technical queries cannot be given over the telephone. Any technical queries by E-mail are very unlikely to receive immediate attention either. So, if you require help with problems relating to topics covered by *PW*, then please write to the Editorial Offices, we will do our best to help and reply by mail.

A new initiative has been launched which is designed to help you obtain your favourite magazines from newsagents. Called **Just Ask!** its aim is to raise awareness that newsagents can stock, order and in some cases even home deliver magazines.

We will be including the **Just Ask!** logo in the pages of this and future issues and have included a newsagent order form to help you to obtain copies.

So keep a look out for the logo and next time you visit your newsagent remember to **Just Ask!** about obtaining copies of your favourite magazines.

amateur radio waves

New TV QRM Problems

● **Dear Rob**

As I was reading the letters section - Amateur Radio Waves - in the November issue of *PW*, my attention was drawn to the letter written by **Sid Smith M0SRS**. I'm also having a great number of problems with a new TV. I purchased a Panasonic model TX/32LXD60, which is a high definition liquid crystal display television receiver. The amount of QRN generated by the receiver is ridiculous and it makes the 144MHz band unusable.

When I called the Panasonic helpline I managed to get through to someone on the seventh attempt! When I explained the problems to the lady at the other end, she (at first) tried to blame just about every other item of electronic equipment in the house other than the television receiver. When I explained that I am a licensed Radio Amateur, her tone changed completely! Up until then I hadn't told her what the TV was interfering with but when this was mentioned she didn't seem surprised.

The lady told me she had heard of the same problem affecting other Radio Amateurs and that she would pass on the news of my difficulties to the technical department. I'm still waiting for a reply from this department!

When I went to buy the TV set from a well known supplier, the first thing I asked the salesman was, "Does it comply with all the EMC regulations?" He said it did and I'm now left wondering if I would have a claim under the law, because the TV is totally unusable for the purpose I purchased as far as I'm concerned. Incidentally, this is the first problem I've ever had with a television receiver causing interference.

I'll look forward to any advice - from *PW* or any of its readers - because as Radio Amateurs we must make our feelings known to the authorities. At the moment it seems that EMC problems can only get worse.

Finally, my advice to anyone thinking about getting an l.c.d. type television receiver is - think long and hard. You could be making a very expensive mistake as I can certainly vouch for!

I have yet to hear what the Panasonic technical department comes up with and intend to keep *PW* readers informed. However, I must say that it's hard to believe that only two *PW* readers seem to be having problems with this type of TV.

Paul Johnson 2E0ENZ
Birkenhead
Merseyside

Please keep us informed Paul! I invite readers to join me on the Topical Talk pages, where I discuss the lack of 'protection' and other difficulties facing our hobby. ***Editor***

Off-Air Frequency Standard

● **Dear Rob**

The article An Off-air Frequency Standard by **Stef Niewiadomski** was of interest to me, as I have a long-standing fascination with frequency control and measurement. Stef has obviously put a good deal of thought into his design and I'm sure anyone with even basic construction skills could make a working copy.

A few years ago, I built a locking standard, which used the BBC-1 TV horizontal synchronisation pulses as a reference and it continues to work well to this day. But with the approaching switch-off of analogue TV I decided to change to a Droitwich standard.

Mine uses a slightly different method of achieving the same result - instead of the mixer and the 2kHz filter in Stef's design, I used a couple of 4029s to divide the 198kHz by 99 to get 2kHz. The other input to the phase detector was 2kHz from the 10MHz oscillator divided by 5000 by a string of 4017s as I had a drawer full of them at the time!

Mine doesn't have the niceties of the extra outputs, just two at 10MHz, which I use to drive my frequency counter and synthesised signal generator. It just shows there's more than one way to skin a cat! By the way, if anyone wants to read about my adventures with frequency standards, my website can be found at **www.freewebs.com/g1hbe**

If I may be permitted, a quick word of assistance to **Sid Smith M0SRS** regarding his noise problems. A couple of years ago my neighbour got a new TV (not a plasma, just a normal tube type) and my 1.8MHz activities became severely curtailed as a result of the wideband noise radiated from the antenna downlead.

As I am on good terms with the lady, I explained the problem and asked if I could try a cure, assuring her that I would not in any way spoil her viewing. She readily agreed and within the hour I had fitted a braid-breaker in line with the antenna lead, which, to my enormous relief, reduced the noise from S9 to S2. Peace reigned once again! I hope this is of some assistance.
Best wishes to everyone.
Andrew Howlett G1HBE
Dukinfield
Cheshire

There's only one thing missing from your website Andrew - a photograph of G1HBE himself! Thanks for the feedback. There's been much interest from readers regarding the techniques for developing frequency standards.

Braid breakers: *These devices work well when the coaxial cable is in good order and there's an acceptable level of terminated signal available at the receiver end. As there is an 'insertion loss' they may not be a solution in all locations.* ***Rob G3XFD***

Veroboard Construction

● **Dear Editor**

I read with interest the comments in Topical Talk (November *PW*). Before retiring I had my own electronics design and manufacturing company for almost 30 years. We used stripboard from day one for virtually all development projects including audio, power supplies and a limited range of high frequency and radio frequency circuits.

We rarely had a problem as a direct result of using the stripboard. Problems that did arise were inevitably caused by the many other aspects of circuit design i.e., incorrect design, incorrect drawings and incorrect build.

With stripboard it's essential to follow a logical pattern (think of crosswords, columns and rows). There are two axis, horizontal and vertical (No computer programs in those early days).

Commence by looking at the board with tracks running vertically. Also consider your circuit from input to output. Place first couple of i.c.s towards bottom of board, for example r.f., mixer and local oscillator, allow adequate space for other components, then consider pins to be linked. Link as close to the i.c. as possible using 26s.w.g. TC wire.

Allocate a +VE rail and -Ve rail or ground at either side of the i.c. Most i.c.s have Pin 8, 14 or 16 as +VE so +VE should be on left of the i.c. and -VE or ground on the right. These supply rails do not have to be the first track on either side of the i.c. but should be spaced to allow for other tracks to assist in linking i.e., if pin 1 was to be linked to pin 7 it would require a track to the left of pin 1.

One good example of the stripboard technique is an SDR Receiver I've just built using 74HC4066 i.c.s. Pins 1, 4, 5 and 6, 7 and ground, 2 and 10, 3 and 9, 8 and 12 are all linked taking a total of four rows and two columns. I then placed components using all the best rules, decoupling and frequency sensitive components as close as possible to the i.c. pins.

Important advice: When you're satisfied you have a correct lay out - you can solder. **But don't do it before this stage!**

Finally, break tracks where necessary (use the correct tool). Don't leave unnecessarily long tracks, as these can be the cause of some of those r.f. problems mentioned in Topical Talk. When complete, you can consider connection to next part of circuit and continue.

One thing I have never understood is the difficulty some readers have in obtaining components, both RS, Farnell amongst others, will take private accounts. They both have the biggest range of components in the UK and their on-line stock can be viewed before setting up an account. Admittedly there are minimum order charges and P&P charges but a bit of planning should allow for this. There are also the smaller companies who advertise in *PW*.

The RS company and Farnell both hold a range of stripboards, which are too big to mention but the most useful (in my view) for general projects is the RS 433-826 (292 x 95 x 1.6mm).

Raymond Atthill G3KTM
Barford St. Martin
Wiltshire

Thank you for a most interesting letter Raymond. I contacted RS Components (they were a trade only organisation) who confirm that they will now serve private individual customers via mail order only. For further information please use the website ***http://www.electrocomponents.com/contact_us.htm*** *or telephone New Customer Reception on* ***(01536) 444079*****. Editor**

Amateur Radio Unprotected?

● **Dear Editor**

I notice in the latest edition (November) of *PW* a letter from **Sid Smith M0SRS**, regarding interference from a plasma TV. In it he states that the Amateur Radio service is "not protected" and I beg to differ!

At the moment we pay a fee for the licence we hold. Being that this fee is taken from us to pursue our hobby, then like any other business transaction a contract has been established between the person/station concerned and Ofcom - or whoever 'this week' - is the current licence issuer!

No mention is made of the fact that there are EU rules regarding suppression of interference from appliances such as TV sets as well as interference to TV sets. I recently had problems on 14MHz across the whole band from a digital TV using the Freeview system. I contacted the manufacturer who at first was unhelpful, until I reminded them of the EU regulations. I now have a trouble free 14MHz band.

I did request help from the RSGB 'as a paying member'. Not even a reply was forthcoming! It would be rather nice to see organisations such as the RSGB - who seem afraid to voice any moans - and if necessary, publications such as *PW,* publicise a proper defence of our rights as licensed Amateurs. I do hope this is published! Yours sincerely

Charles Holloway G4WIE
Harold Wood
Essex

In defence of the RSGB I have to remind readers that various sub-committees are acting on our behalf regarding EMC and our limited rights (as a non protected service). Please join me on the Topical Talk page 65 for further comments and suggestions.

Editor

Spark Transmitter

● **Dear Rob**

It was great to see of photo of a spark transmitter in your 35th Leicester Radio Show Report on page 19 of the November issue (top right photo). The transmitter was being displayed on the Radio Amateur Old Timers' Association (RAOTA) stand and was constructed by **Ken G3RRN** to illustrate an important item of early radio technology. Many visitors to the RAOTA stand were fascinated to see the sort of equipment that their Radio Amateur forebears would have built and used.

May I also point out that RAOTA membership is open to all who are active in Amateur Radio and share the aims of RAOTA. **It is definitely not true** that would-be members have to be licensed for at least 25 years nor that they have to be licensed at all! Full membership of RAOTA **is open to anyone active in Amateur Radio** for at least 25 years. Associate membership is open to those who have not been active in Amateur Radio for 25 years. This is totally irrespective of whether a licence is (or has been) held. Best wishes.

Ian Brothwell, G4EAN, 9H3YI
Secretary & PR officer of RAOTA
56 Arnot Hill Road
Arnold
Nottingham NG5 6LQ
www.raota.org

amateur radio rallies

Radio rallies are held throughout the UK. They're hard work to organise so visit one soon and support your clubs and organisations.

November 12
The 15th Great Northern Hamfest
Contact: Ernie Bailey
Address: 8 Hild Avenue, Cudworth, Barnsley, South Yorkshire S72 8RN
Tel: (01226) 716339 between 1800 and 2000
The 15th Great Northern Hamfest will be held in the Metrodome Leisure Complex, Queens Road, Barnsley, South Yorkshire S71 1AN. Doors open at 1100 for all. The venue is on one level with excellent disabled facilities. All the usual trade stands, with component and specialist interest groups and a large Bring & Buy. Tables are allocated to Radio Amateurs to sell their own equipment at a nominal charge.

November 12
Kempton Radio and Electronics Rally
Contact: Paul Berkeley
Tel: (01737) 279108
E-mail: paul@radiofairs.co.uk
Website: www.radiofairs.co.uk/
The Kempton Radio and Electronics Rally will take place at Kempton Park Racecourse. Show opens at 1000, with tickets available from 0930. Entry £3.50 (under 16s free). There will be RSGB sponsored 'Byte Size' lectures, h.f. special events station and a Bring & Buy.

November 19
Coulsdon ATS Autumn Bazaar
Contact: Andy
E-mail: g8jac@btinternet.com
The Coulsdon Amateur Transmitting Society (CATS) Autumn Bazaar will be held in the Scout Headquarters, Lion Green Road, Coulsdon, Surrey CR5 2RB, at the rear of the council car park (free parking on Sundays!). Gates open at 1000 and it will finish at 1400. This year the organisers have extended the time by popular request.

November 26
Red Rose Winter Rally
Contact: Steve
Tel: (01942) 893573
Website: www.wmrc.org.uk
The West Manchester Radio Club is holding its Red Rose Winter Rally, at Lowton Civic Centre, just off the A580 East Lancashire Road, this is a superb venue, all on one level, with disabled facilities and **free** parking. There will be a low cost Bring & Buy, RSGB bookstall, usual trade stands, component and special interest groups, licensed bar, excellent catering and large social area in which to mingle with fellow Amateurs. One of the few local rallies left! Talk-in on S22. Doors open at 1000.

December 3
The Bishop Auckland Radio Amateurs Club Rally
Contact: Mark
Tel: (01388) 745353
The Bishop Auckland Radio Amateurs Club Rally will be held at Spennymoor Leisure Centre, 32 High Street, Spennymoor, County Durham DL16 6DB. Doors open 1030 and admission is £1.50. There will be the usual radio, computer, electronics and Bring & Buy, as well as catering and bar facilities.

If you're travelling a long distance to a rally, it could be worth 'phoning the contact number to check all is well, before setting off. Look out for representatives from *Practical Wireless* and *RadioUser* at rallies printed in bold.

Letters Recieved by e-mail. A great deal of correspondence intended for 'letters' now arrives via E-mail, and although there's no problem in general, many correspondents are forgetting to provide their postal address. I have to remind readers that although we will not publish a full postal address (unless we are asked to do so), we require it if the letter is to be considered. So, please include your full postal address and callsign with your E-Mail. All letters intended for publication must be clearly marked 'For Publication'. **Editor**

amateur radio news & products

A comprehensive look at what's new in our hobby this month

Stop Press News!

Tony Nailer G4CFY, of Dorchester-based **Spectrum Communications**, announced on 24 October he's purchasing **G2DYM Aerials** and hopes to be in production with 'G2DYM Trap Dipoles' by the end of 2006. Antennas will be available as full or half size types and 150/600W rated versions together with a range of v.h.f. antennas.

Full details from **Spectrum** at **12 Weatherbury Way, Dorchester, Dorset DT1 2EF. Tel: (01305) 262250**.

Macclesfield Wireless Society

The new shack at the **Macclesfield Wireless Society**, funded by a successful bid for National Lottery funding, was officially opened on 18 September. The facilities within the new shack include, a radio working room with two operating posts, one for h.f. and one for v.h.f./u.h.f. and a club meeting room which doubles as a teaching room for the radio licence courses offered by the Society.

Jimmy Read M3EYP presenting Ali Webster G3JQ with a bouquet to celebrate the opening of the Macclesfield Wireless Society's new shack.

The official ribbon-cutting and opening speech was provided by guest-of-honour, **Mrs Ali Webster G3JQ**, a long-standing member of the Macclesfield Wireless Society, and widow of **Dr Eric Webster** (the original G3JQ), founder member of the Society in the 1957. Another founder member, **Brian Horsfall G3GKG** also attended the opening along with current members, ex-members, other Amateurs from Macclesfield and East Cheshire and representatives of **Mid-Cheshire**, **South Cheshire**, **Warrington** and **Stockport** radio clubs. The photograph shows **Jimmy Read M3EYP** (14) presenting Ali Webster G3JQ with a bouquet of flowers to celebrate the opening.

The Macclesfield Wireless Society are a very active club and recently held a field day at Higher Blakelow Farm over the weekend of 30 September/1 October. The club callsign, **GX4MWS/P**, was aired on the h.f. and v.h.f/u.h.f. bands by members of the Society. More field days are being planned for 2007 so keep an eye on **www.gx4mws.com/** for the latest news.

Radio to the Rescue

Geoff G0BYH bicycle mobile, helped 'rescue' Michael M0GKW. (Photo by Ben M3EUO).

The **Braintree Radio Society** recently took part in the **Wireless for the Blind Event** with a portable station located in a beautiful countryside spot on the edge of the old Gosfield Airfield, Essex. The event got off to a shaky start with the set-up on the Friday afternoon being plagued by torrential rain and the danger that the site would turn into a quagmire. Thankfully, the weather, eventually improved, and the station was set-up without further problems. That was once the members had dried out a bit!

The club's callsign **GX3XG** was aired during the event (the call, G3XG, was donated to the club by a member who became blind) and many stations were worked on h.f. and v.h.f. bands. The event turned into a great social event with a supper on the Saturday evening and many members turned-up to have their lunch at the station on the Sunday, which turned out to be warm and sunny.

Despite the event going well, one of the club members noticed that fellow member, **Michael M0GKW** had been gone a while, after announcing that he was taking his rather elderly dog for a walk. As time passed, concern grew and the club members soon realised that Michael had been gone for four hours. His car was still on site, so he had not returned home. A search was initiated and it was of great help that some members belonged to **RAYNET** and that the Essex North Group Controller and Deputy Controller were both on site.

The club's portable station was quickly turned into a 'control' station and the v.h.f. station used to co-ordinate the search team. Eventually, Club Secretary and RAYNET member **John M5AJB**, who lived locally spotted Michael some way off in the distance wandering around and obviously lost. From his vantage point, John was able to direct **Geoff G0BYH** bicyle mobile in the correct direction to collect a somewhat flustered and exhausted walker and his dog, and safely bringing them back to the station.

The club reported, "The episode re-enforces the great benefits of Amateur Radio to the community and is a lesson that not only should Michael have at least taken a hand portable rig with him (and told us where he was going) the rest of us should have made sure that we had hand-helds ready and charged as you never know what might happen during field day events!"

If you'd like to get involved with the Braintree Radio Society take a look at **www.badars.org.uk** for details of meetings and activities.

QRP Winner

The 2006 *PW* 144MHz QRP Contest winner **Chris Owen M0WEN** is rather special as he's only the fourth single operator entrant to come first in 23 contests! As the contest organiser and adjudicator - **Dr. Neill Taylor G4HLX** was unable to attend the Leicester show this year, Chris was presented the trophy by *PW* Editor **Rob G3XFD**.

Bursting with pride at his achievement, Chris brought his own photographer friend and unusually, the Newsdesk had a choice of photographs. Congratulations from the *PW* team Chris and good luck in the 2007 event!

Send all your news and club info to
Donna Vincent G7TZB
at the PW editorial offices
or E-mail:
pwnews@pwpublishing.ltd.uk

Radio Mate

The new Radio Mate compact keypad for the Yaesu FT-817, FT-857 and FT-897 was launched by **bhi** recently. The company's press release states, "The Radio Mate enables users to get the best out of their radio and has been designed to make many of the common functions quick and easy to use by employing a number of fast, effective shortcuts.

The keypad is mounted on a sturdy aluminium plate giving it a quality robust feel. Requiring no external power it connects to the 8-pin CAT interface of the radio. An l.e.d. indicates the current mode, red for the memory mode, green for the direct frequency entry mode and yellow for the modulation mode. There's a sounder to indicate when a frequency has been stored or when using the direct frequency mode. It's suitable for people who find some of the controls on their radio difficult to use or who share a radio and often find their favourite frequency has been changed."

The Radio Mate features include:

* Quick easy band change at touch of a button (by using the onboard memories)
* Quick and easy modulation selection in any mode to any mode by a single selection
* Quick memory function (0-20), press to recall, press and hold to store (Frequency and mode)
* Quick and easy intelligent direct frequency input

The Radio Mate is priced at £99.95 including VAT plus P&P and can be purchased from bhi direct: **Tel: (01444) 870333** or from **Waters and Stanton PLC, Tel: (01702) 206835/204965**
More information can be found at: **www.radio.bhinstrumentation.co.uk/html/ft817_accessories.html#keyboard**

ML&S Open Day

Don't miss the ML&S open day on 2 December. Martin tells us that the Lynch Mob will be talking turkey and doors open at 0900 until 0400 for the usual Christmas festivities, including a barbeque sponsored by Yaesu, Kenwood & Icom and special bargains across a whole range of products. Representatives will be on-site from Yaesu, Icom & Kenwood and FREE parking will be available. Talk in station (S22) via Whitton ARC.
www.hamradio.co.uk

Islands On the Air and Icom Join Forces

The popular **Islands On The Air** (IOTA) programme has been given a major boost thanks to **Icom**. With effect from 1 October 2006, Icom are the new corporate sponsor of the world renowned Islands on the Air (IOTA) programme. This world-wide sponsorship deal is a major boost for IOTA. It teams the world's leading Amateur Radio manufacturer with, arguably, the best DX programme in the world.

The IOTA programme is now set for major expansion in forthcoming years, thanks to the new sponsorship deal. Plans are already in motion to expand the number of IOTA contests and awards and the Icom funding will ensure the success of these developments. The partnership will provide joint promotion and marketing efforts, greatly raising the profile of the IOTA programme throughout the world.

The IOTA programme already has tens of thousands of participants and millions of IOTA contacts are made each year. With the introduction of new web-based software the programme will be even easier to use. The software will revolutionise the processes whereby award applications can be made and checked. It will also give easy access to IOTA information and standings.

Icom America Amateur division manager **Ray Novak N9JA**, explains why IOTA has such an important role to play in securing the future of Amateur Radio 'across the pond'; "As Icom America's Amateur division manager, I see my challenge as keeping the Amateur Radio hobby alive. With today's technological advances, many people no longer look to Amateur Radio as the new and exciting hobby it was 10-15 years ago. As an Amateur Radio manufacturer, it's our duty to do things to create excitement to entice people to participate in this wonderful hobby."

Asked where he thought the Icom sponsorship of IOTA was going to lead, Ray said; "I would hope that IOTA would be one of the things that would attract people to go and get their licence. We want IOTA to have the same profile as the DXCC award in the US. This will not take place over night. It will take time, money and effort. Amateur Radio is one of the least expensive, competitive hobbies in the world. All we have to do is promote it."

Dave Stockley G4ELP, Chairman and founder of Icom (UK) Ltd., said, "Having seen all there is to see over the last 30 years in the UK marketplace, it gives me great pleasure to see that Amateur Radio is still a relevant hobby and that Icom are still at the top, supplying an extensive range of Amateur Radio equipment, and are still integral in supporting the hobby. I think with the new software being introduced into the programme and with other initiatives in place, I think that the IOTA programme will go from strength-to-strength."

Special Event Stations Award

The **Worked All Britain** (WAB) Award organisation has announced a new certificate called the Special Event Stations Award. The intention of the Special Event Stations Award, apart from giving members something to aim for, is to raise awareness of WAB amongst those who activate special event stations. This award will run from 1 January until 31 December each year, commencing 2007. In common with all WAB awards, the award is also open to short wave listeners.

Only contacts with special event stations using a 'GB' prefix will be valid. The WAB area of the Event Station should be ascertained during the contact with them. Certificates may be endorsed for any band/mode. A station may only be claimed once during each 12 month period for any particular endorsement.

A certificate will be awarded for working or hearing 10 stations, with endorsements for each subsequent 10 stations. On working or hearing 100 stations, a further certificate will be awarded. A claim sheet is available for this award but if you are using your own or any logging program, the WAB area of the station should be recorded.

The usual cost of WAB awards applies: £1 per certificate and 50p for each endorsement.
More information on the WAB can be found at: **www.worked-all-britain.co.uk**

Rochdale 2006

The Rochdale **G-QRP Club**'s Mini-Convention, hosted by the **Rev. George Dobbs G3RJV**, took place at **St. Aidan's Church**, Sudden, Rochdale on Saturday 7 October, and seems to be outgrowing its name! Bursting at the seams with really keen Radio Amateurs this year's QRP-dedicated event was packed with people enjoying the many topics and stalls. With a comprehensive list of speakers - the lectures are given in the church itself - it's proving to be a very popular annual occasion for enthusiasts.

As usual, *PW* Editor **Rob G3XFD**, **Fig. 1**, with the valued help of **Ian Brothwell G4EAN**, was kept busy talking to readers and meeting new friends. Keen *PW* advertiser **Will Outram, Fig. 2**, of **Bowood Electronics** (Chesterfield) was so busy serving *PW* readers and other visitors he didn't know where to turn next! Will is aiming to get his M3 licence within the next year in time for Rochdale 2007!

The Rochdale main hall is certainly becoming a tight squeeze as the event attracts more visitors each year, **Fig. 3.** Although, it does become a little less crowded in the hall during the lectures in the church.

This year, saw a group of American and Canadian Amateurs enjoying the day and providing some of the lectures. Visitors also came from the four corners of the UK and Ireland, Germany, Holland, Switzerland and Sweden.


Fig. 1.


Fig. 2.


Fig. 3.

Donation From Cumbria Designs

Ron Taylor G4GXD of **Cumbria Design**, **Fig. 4**, is well known for his superb electronic kits. Ron attended Rochdale to meet his customers and friends. He also donated a Sommerkamp FT-2242D (electrically identical to the FT-101ZD) transceiver to the *PW* Editor. George Dobbs G3RJV had asked if there was a good home for the rig, Rob said there was and he then delivered it to the **King Edward VII School** in **Melton Mowbray**, Leicester, on his 483km (300 mile) return trip to Bournemouth.

When the rig was delivered - later that evening - school radio club organiser, **Peter Treadwell G7PCT**, was delighted. "The rig will soon be put to use by the school club", said Peter as he gratefully accepted the gift. "We hope to be on the air with new antennas very soon and are overwhelmed by Ron Taylor's generous donation to the school club. "


Fig. 4.

(All photos by G4EAN)

Peter Treadwell's comments sum up the atmosphere of friendship at Rochdale and of the G-QRP Club itself. It's a club you could join to enjoy another fascinating aspect of the wonderful Amateur Radio hobby.

Icom UK Sponsors GB150VC

Icom UK Ltd., recently supported the **GB150VC** special event station, commemorating 150 years since the inauguration of the Victoria Cross. The event was a collaboration between the **Vintage Operating Group** (VOG) and the **Cray Valley Radio Society** (CVRS).

Icom supported the event by providing both IC-756PROIII and IC-910H transceivers. The equipment was supplemented by an Icom IC-7400 supplied by **Colin G3SPJ**. With a range of antennas mounted on the shack roof, the station began transmitting at at 0845 on 1 June.

As only a handful of stations had used the GB150 prefix in recent times, the station was in popular demand with a steady flow of callers on 14MHz s.s.b. and c.w. The first four days of operation accounted for 1800 QSOs. The station gained lots of interest with 531 contacts in 36 DXCC and 147 QTH locator squares being achieved.

amateur radio clubs

Keep up-to-date with your local club's activities and meet new friends by joining in!

Club Organisers: please include your event's full address, including its postcode, with any news item sent to us for publication.

HAMPSHIRE
Horndeand & District ARC
Contact: **Stuart Swain GYFYX**
E-mail: **gyfyx@msn.com**
Website: **www.hdarc.co.uk**
Meetings of the Horndean & District Amateur Radio Club are held on the 1st and 4th Tuesday of every month at: the Lovedean Village Hall, 160 Lovedean Lane, Lovedean, Hants, PO8 9SF. Doors open at 1930 and visitors are always welcome. Why not go along to one of these? **November 28th:** Talk by **Dave Bartlett** on 'Egypt, the island of Philae' and **December 5**: Social evening. Please note there will be no meeting on December 26!

KENT
Bromley & District ARS
E-mail: **bdars-news@hotmail.co.uk**
Website: **www.bdars.org**
The Bromley & District Amateur Radio Society meets on the 3rd Tuesady of every month in the Victory Social Club, Kechill Gardens, Hayes, (off B265, Hayles Lane) Kent BR2 7NG. Doors open at 1930 for a 2000 meeting start.

NORTHERN IRELAND
Antrim and District ARS
Contact: **David GI4FUM**
E-mail: **david@gi4fum.net**
Website: **www.gn4siw.co.uk**
The Antrim and District Amateur Radio Society (GN4SIW) meets in Greystone Community Centre on the Ballycraigy Road in Antrim on the 2nd Friday of each month at 1930. Forthcoming meetings include:
November 10: "All about repeaters" - speaker to be confirmed and **16th:** AGM and club dinner at Massereene Golf Club. Guests and new members are very welcome to attend the meetings.

SHROPSHIRE
Telford & District ARS
Contact: **Mike Street G3JKX**
Tel: **(01952) 299677**
E-mail: **1234@tdars.donsun.me.uk**
Website: **www.tdars.org.uk**
Meetings of the Telford & District Amateur Radio Society take place at the Community Centre, Bank Road, Dawley Bank, Telford, Shropshire TF7 2AX every Wednesday (unless otherwise stated and subject to amendment). Doors open at 2000 hours. Forthcoming meetings include:
Nov: 11: Club Calls Contest; **15th:** Surplus Equipment sale; **22nd:** Introduction to new Society Project and 29th: I like my? Talk about it or demo or whatever! Why not go along?

WEST SUSSEX
Horsham ARC
Website: **www.harc.org**
Horsham Amateur Radio Club meet the first Thursday for each month at the **Guide Hall, Denne Road, Horsham, West Sussex. NRQ TQ1** at 2000. The club offfers a variety of lectures covering a wide range of subjects and run two nets.In March and October the club hold a surplus equipment sale at which anybody can bring along items to be auctioned off. The club takes a small commission for this service. Check out the club website for more details and of fortchoming meetings.

Keep your club news coming to **pwnews@pwpublishing.ltd.uk** and **please remember** to include full details of your club, E-mail and telephone contact details and the **postcode** of your meeting venue - it helps potential visitors to find you!

BNC Screw type plug (Small entry) **£1.25**
BNC Solder type plug (Small entry) **£1.25**
BNC Solder type plug (Large entry) **£3.00**
N-Type plug (Small entry) **£3.00**
N-Type plug (La ge entry) **£3.00**
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SO239 Chassis socket (Square) **£1.00**
N-Type Chassis scoket (Round) **£3.00**
N-Type Chassis scoket (Square) **£3.00**
SO239 Double female adapter **£1.00**
PL259 Double male adapter **£1.00**
N-Type Double female **£2.50**
SO239 to BNC adapter **£2.00**
SO239 to N-Type adapter **£3.00**
SO239 to PL259 adapter (Right angle) **£2.50**
SO239 T-Piece adapter (2xPL 1XSO) **£3.00**
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BNC to PL259 adapter (Female to male) **£2.00**
BNC to N-Type adapter (Female to male) **£3.00**
BNC to N-Type adapter (Male to female) **£2.50**
SMA to BNC adapter (Male to female) **£3.95**
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Please add just £2.00 P&P for connector only orders
PLEASE PHONE FOR LARGE CONNECTOR ORDER DISCOUNTS

5ft Poles Heavy Duty (Swaged)

20ft Heavy Duty Swaged Pole Set
These heavy duty aluminium (1.8mm wall) have a lovely push fit finish to give a very strong mast set
1.25" set of four 5ft sections **£29.95**
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Tripod-2 *(free standing with 2-OD for use with 2" joiner or 1.5" pole inside)* **£69.95**
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12" Stand off bracket *(complete with U Bolts)* **£12.00**
12" T & K Bracket *(complete with U Bolts)* **£14.95**
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3-Way Pole Spider for Guy Rope/ wire **£3.95**
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Mast Sleeve/Joiner *(for 1" pole)* **£6.95**
Mast Sleeve/Joiner *(for 1.25" pole)* **£7.95**
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Earth rod including clamp (copper plated) **£9.95**
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Please phone for special 100 metre discounted price

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CS401N Same spec as CS401 but wi h N-type fittings **£59.95**

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RC26 Alignment Bearing for RC5-1/3 ..... **£49.95**
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5" Limpet magnetic SO239 fitting **£12.95**
7" Turbo magnetic 3/8 fitting **£12.95**
7" Turbo magnetic SO239 fitting **£14.95**
Tri-Mag magnetic 3 x 5" 3/8 fitting **£29.95**
Tri-Mag magnetic 3 x 5" SO239 fitting **£29.95**
HKITHD-38 Heavy duty adjustable 3/8 hatch back mount **£29.95**
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RKIT 38 Aluminium 3/8 rail mount to suit 1" oof bar or pole **£12.95**
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RKIT-PR Stainless SO239 rail kit to suit 1" oof bar or pole **£24.95**
PBKIT-SO Right angle SO239 pole kit with 10m cable/PL259 *(ideal for mounting mobile antennas to a 1.25" pole)* **£19.95**

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HF Yagi

HBV-2 2 BAND 2 ELEMENT TRAPPED BEAM FREQ:20-40 Mtrs GAIN:4dBd BOOM:5.00m LONGEST ELEMENT:13.00m POWER:1600 Watts **£399.95**

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ADEX-6400 6 BAND 4 ELEMENT TRAPPED BEAM FREQ:10-12-15-17-20-30 Mtrs GAIN:7.5 dBd BOOM:4.27m LONGEST ELE:10.00m POWER:2000 Watts **£599.95**
40 Mtr RADIAL K T FOR ABOVE **£99.00**

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(slimline lightweight aluminium construction)

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OPTIONAL 10-15-20mtr radial kit **£39.95**

EVX4000 4 BAND VERTICAL FREQ:10-15-20-40 Mtrs GAIN: 3.5dBi HEIGHT: 6.50m POWER: 2000 Watts (wi hout radials) POWER: 500 Watts (with optional radials) **£119.95**
OPTIONAL 10-15-20mtr radial kit **£39.95**
OPTIONAL 40mtr radial kit **£14.95**

EVX5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 7.30m POWER: 2000 Watts (wi hout radials) POWER: 500 Watts (wi h optional radials) **£169.95**
OPTIONAL 10-15-20mtr radial kit **£39.95**
OPTIONAL 40mtr radial kit **£14.95**
OPTIONAL 80mtr radial kit **£16.95**

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MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts **£99.95**
MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts **£49.95**
MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts **£89.95**
(MTD-5 is a crossed di-pole with 4 legs)

ALL PICTURES ARE FOR REFERENCE ONLY

Technical FOR THE TERRIFIED!

This month Tony Nailer G4CFY looks at the techniques for receiving Morse code telegraphy and single sideband transmissions.

Editorial note: Following several critical comments from readers, who specialise in the history of wireless/radio transmission/broadcasting, I feel it's necessary to explain that G4CFY's series is aimed at the less-experienced radio enthusiast. As space is limited, the historical subjects/topics have to be condensed and the articles are of a general nature to provide the necessary background for the main purpose of the series, which is aimed at removing the fear of technology/techniques and theory. Anyone wishing to delve deeper into the fascinating history of our hobby will soon find specialist books and publications, which will expand greatly on this absorbing area of radio. **Rob Mannion G3XFD**

In the previous article in this series, I dealt with various types of receiver and the development of the superhet system. And, although it was not specifically mentioned, the main mode of domestic communication was amplitude modulation (a.m.).

The military, commercial services and Radio Amateurs also used continuous wave (c.w.). Originally referred to as wireless telegraphy, it's now popularly called 'Morse' after **Samuel Morse**, the inventor of the code. With receivers using regenerative detectors it is possible to slightly off-tune the receiver and to generate a 'sidetone' sound to make the Morse audible. However, when superhet receivers came into use, another solution was required.

Morse Signals

A Morse signal transmitted by the use of a keyed carrier, is made up simply by the presence of carrier for the dot and dashes (dits and dahs) and absence of carrier for the spaces in between. The diagram, **Fig. 1**, shows a Morse letter A as received.

Let's now consider a 12 word per minute (12w.p.m.) Morse signal. If the average number of letters in a word is four, then there will be 48 letters per minute. If the average length of a Morse letter is equal to two dahs and a space, and a dah is three spaces, then there will be several units per word.

Therefore, the total units per minute is around 336. As an approximation let's say it's 360 units per minute. This means a dit is worth 0.167 of a second and a dah 0.5 of a second.

When the signal in Fig. 1 is passed through an amplitude detector, the output is either a background ripple caused by noise during the gaps, or a near constant voltage level for the duration of the dit or dah. No actual tone is heard, although some clicking or 'thumping' might be heard. The diagram, **Fig. 2**, shows such an envelope. The overshoot at the leading edge would be caused by the delayed action of any automatic gain control (a.g.c.).

Regenerative Detectors

Regenerative detector receivers produced a tone by mixing the incoming signal with the self oscillating detector, running at a slightly different frequency. The difference between the two frequencies produced the audio tone of the output.

Morse With Superhets

In superhet receivers, the solution was to introduce a signal slightly offset from the intermediate frequency (i.f.). This signal was provided by a beat frequency oscillator (b.f.o.), which could be tuned plus or minus about 3kHz from the centre frequency of the i.f. (see **Fig. 3**).

The signal at the detector would be the same as Fig. 1, although the pulses would then be bursts of the intermediate frequency. At 465kHz, for example, the dit would contain about 78000 cycles of i.f. signal.

A b.f.o. signal injected into the receiver prior to the detector produces sum and difference at the mixer output. A 465kHz i.f. utilising a b.f.o. frequency of 464kHz (as

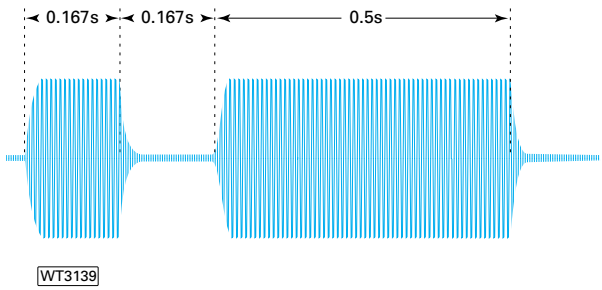


Fig. 1: The diagram depicts the Morse letter A as received (see text for explanation).

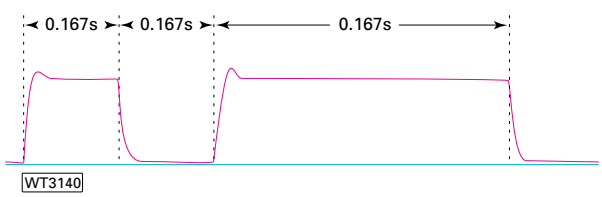


Fig. 2: No Morse side tone is heard in this situation.

the detector is unbalanced) will output both signals together with 929kHz and 1kHz. A Pi network is normally used to remove the r.f./i.f. signal, leaving just the wanted signal and noise in the audio range.

The recovered audio signal should look like the waveform representation, **Fig. 4**, where the pulses will be indicated as bursts of audio at around 1Hz. **Note:** In a 500 millisecond burst there will be 5 cycles of the 1kHz tone.

Superhets & Sideband

When Morse was being used, it didn't usually matter which side of the i.f. centre frequency the b.f.o. was tuned to, as it would have still produced the required audio tone. Although, switching the b.f.o. to either the upper or lower sideband may help in QRM situations (modern rigs often have this facility available for c.w.).

However, the situation changed when single sideband gained in popularity on the Amateur bands. It then became important to position the b.f.o. on the correct side of the i.f. centre frequency or the 'Donald Duck' noises would remain and a good resolved signal would not be reproduced!

Note: Although the technique should be correctly described as single sideband suppressed carrier, within the Amateur Radio hobby we normally refer to it as 'single sideband' or s.s.b. The term suppressed carrier, refers to the fact that the unwanted carrier (ideally we only wish to transmit the selected sideband) has been greatly attenuated and that only either the lower (l.s.b.) or upper (u.s.b.) sideband is actually transmitted.

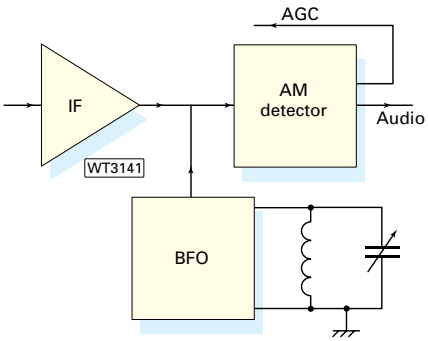


Fig. 3: A beat frequency oscillator (b.f.o.) can be used to produce a side tone.

Looking At SSB

Let's now take a good look at an s.s.b. signal. The average English speaker talks at about 100 words per minute. The majority of words used are single syllables but about 20% are two or more syllables.

I'll assume that there are 120 syllables per minute, this equates to each syllable being about 0.5 seconds long. (Much the same as a Morse dah). The diagram, **Fig. 5**, shows the envelope produced when sounding an extended 'Aahhhhhhhhhh' into an s.s.b. transmitter.

The triangular shapes comprise large volumes of tones of around 400Hz. Then there's a range of tones up to about 800Hz at ever reducing amplitude for a male voice and up to about 12kHz at reducing amplitude for a female voice.

The corresponding transmitted s.s.b. signal will then comprise of one or more frequencies raised by the frequency of the carrier. For example, a 400Hz audio tone and a 9MHz carrier would produce a sideband at 9,000,400Hz (9.0004MHz), whereas a 750Hz tone will produce 9,000,750Hz (9.00075MHz).

When the signals are passed through the processing of a superhet receiver using a 465kHz i.f., those at the detector will then be 465,400Hz (465.4kHz) and 465,750Hz (465.75kHz) respectively. Clearly, if the b.f.o. is placed at 465,000Hz the detected audio signals will be 400Hz and 750Hz as before.

If the b.f.o. is tuned to the high side on 465,800Hz, so the 400Hz tone reproduces correctly, it will cause the other tone to reproduce at just 50Hz. Likewise, if it's tuned to 466,500Hz (to make the 750Hz tone also reproduces correctly, the other one (400Hz) will then be 1100Hz. This proves it can only resolve the signal if it's placed in the same relative position as the originating carrier.

Problems With BFOs

Unfortunately, there were problems with the use of b.f.o.s! Too many signals - together with high levels of b.f.o. injection levels - would overload the detector.

Similarly, too much of the received signal would feed into the b.f.o. itself and cause frequency deviation. Incidentally, it's important to remember that, when using a receiver with a b.f.o., it is usually necessary to back off the r.f. gain to avoid these effects. These effects, of course, then give (false) low signal readings on the S-meter. Conversely, the b.f.o. signal would also be detected, and cause a false high S-meter reading.

Product Detectors

A solution to the problems with the b.f.o. technique, was to take off some signal (before the amplitude detector) and feed it to an add-on product detector.

The product detector is a special mixer which gave isolation between the two signal inputs and provides an output of the difference in frequency between them. The arrangement is shown in **Fig. 6**. This system overcame the detector overload, pulling effects and false S-meter readings.

Switched To SSB

During the 1960s an increasing number of Amateurs on the high frequency (h.f.) bands switched over to s.s.b., especially with the introduction of commercially made rigs. These would often include the c.w., l.s.b. and u.s.b. modes.

The use of a.m. became increasingly difficult, as the presence of an a.m. carrier near a wanted s.s.b. signal on the band would cause an annoying whistle.

Receiver Selectivity

With the move towards exclusive use of s.s.b., which occupies less than half the bandwidth of an a.m. signal, even more signals could crowd into the Amateur

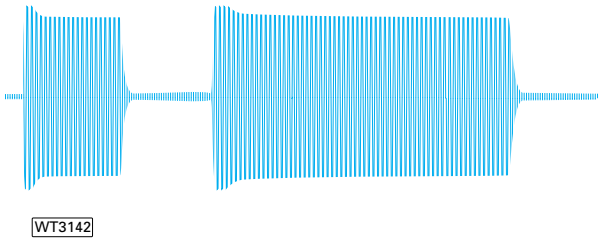


Fig. 4: A diagram depicting a recovered audio waveform.

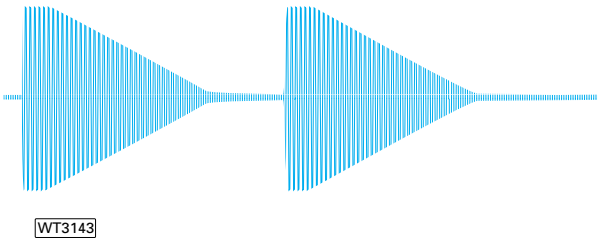


Fig. 5: A diagram, this time depicting a typical s.s.b. transmission, using the human voice as a tone generator (see text).

bands! This meant that receivers with higher selectivity were required.

Traditional multiple stages of band-pass coupled i.f. transformers have an overall bandwidth of some 10kHz. These would accommodate several s.s.b. signals at a time and could not discriminate between wanted and unwanted signals.

Commercially produced Amateur rigs from the early 1970s almost exclusively adopted a block i.f. crystal filter with a bandwidth of 2.4kHz. More recently, audio bandwidths have been trimmed further and narrow bandwidths of 2.1kHz are now common.

Speech Quality

The use of s.s.b. has moved us towards more efficient communications, in respect of the numbers of signals a band can carry together with the ability to select just the wanted signal. However, at the same time the audio quality has become somewhat sanitised.

Together with the use of speech processing of amplitude, and frequency tailoring of bandwidth, Amateur Radio speech has lost both its depth and tonal effects. Indeed, it's often the case that a listener not accustomed to listening to received s.s.b. will find that they are unable to interpret easily what is being said.

PW

That's the lot for this time! I hope this has been enlightening. If you have any questions related to this article you may contact me at **tony@spectrumcomms.co.uk** Any answers which are likely to be lengthy may well become the subject of a future article!

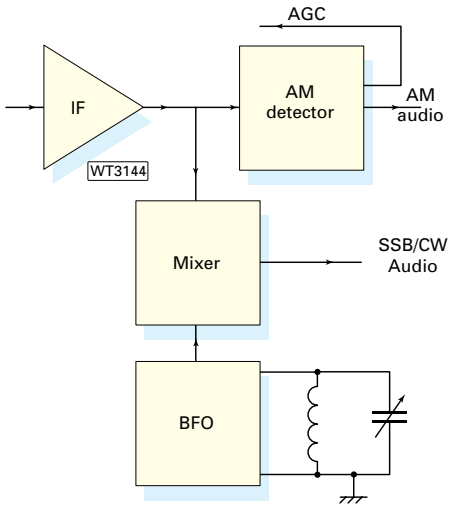
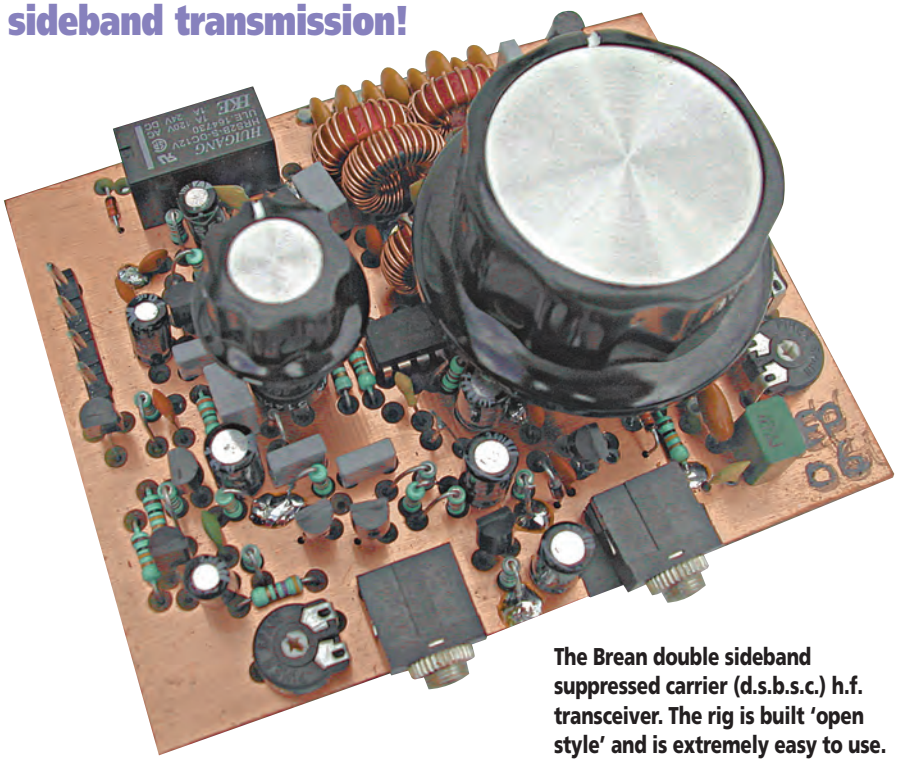


Fig. 6: The product detector overcame many of the difficulties associated with the b.f.o. technique.

The PW Brean DSB Transceiver

Tim Walford G3PCJ describes a simple transceiver using double sideband suppressed carrier. Tim explains there are distinct advantages and an expensive filter isn't required for this form of sideband transmission!



The Brean double sideband suppressed carrier (d.s.b.s.c.) h.f. transceiver. The rig is built 'open style' and is extremely easy to use.

The Brean is a relatively simple 'phone transceiver. It uses double sideband modulation but with a suppressed carrier. This is entirely compatible with other stations using single sideband suppressed carrier (s.s.b.) but has the advantage that it makes the transmitter design much simpler and also works well with the direct conversion (DC) receiver concept.

While the basic design is normally for 3.5MHz, the Brean can be used on any single band up to 14MHz, using either its own crystal or the Mini Mixer kit to retain reasonable frequency coverage.

The Brean is the companion design to the Brent c.w. transceiver, both are named after the modest 'hills' in north-west Somerset. Apart from being a lovely wild spot overlooking the Bristol Channel, Brean Down is famous* for the tests that Marconi conducted from there to Lavernock Point in South Wales during May 1897! As usual, kits for the Brean are available (see the Kits & Bits panel).

The heading photograph shows the prototype 3.5MHz (80m) Brean transceiver, all assembled on an 80 x 100mm board.

***Editorial note:** Brean Down also featured in many of the hair-raising explosive and ordnance tests by the Admiralty during the Second World War. The nearby linked-suspension pier at Birnbeck was saved from demolition and became HMS Birnbeck, the only complete pier 'called up' by the Royal Navy! The infamous Panjandrum explosive wheel was tested in the area and the (lack of) control of the rocket-propelled monster was demonstrated by **Neville Shute** the famous author (then a serving naval officer) as he attempted to steer it with the use of steel cables. Cine film of the tests often appear on satellite TV documentaries and the viewer in 2006 can only admire the bravery of those involved with the tests. The Panjandrum is the same device featured in the BBC Dad's Army episode (Round and Round Went The Big*

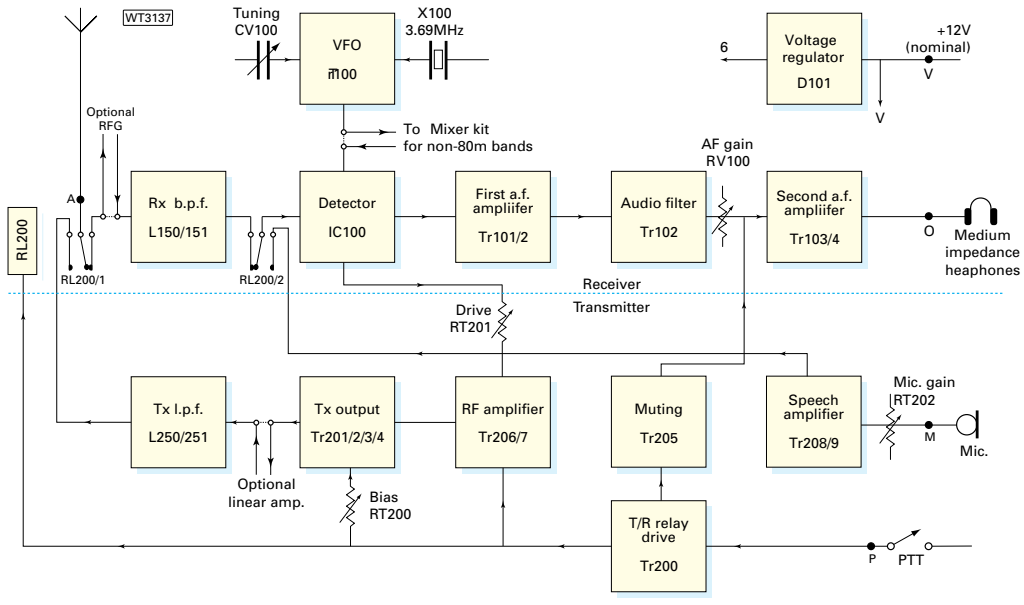


Fig. 1: Block diagram of the Brean transceiver.

Wheel), where Private Pike ***(Ian Lavender****) proudly admits he built a radio with the help of Practical Wireless!* ***G3XFD***

The Design Concept

A double sideband transmitter is much simpler than one for single sideband, as it's not necessary to include complex filters to remove the unwanted sideband. This also makes it easier to operate on many bands.

Fortunately, the Gilbert cell design of balanced mixers, typified by the NE602/612 or 1496 series of devices, will directly produce a double sideband (d.s.b.) output, when the inputs are the desired transmit frequency and the audio modulation.

The output of the carrier (or transmit frequency) is naturally well suppressed due to the inherent balance achieved in making the transistors within the integrated circuit. It's the suppression of the carrier, which distinguishes this mode of transmission from the familiar amplitude modulation (a.m.) currently used by medium frequency (m.f.) and high frequency (h.f.) broadcast stations.

As a result, all that's required for the transmitter is a stable radio frequency (r.f.) oscillator, the balanced modulator previously mentioned, a speech amplifier and the transmitter r.f. amplifier with filtering to remove any harmonics.

Reception of the signal is also relatively simple! The same type of balanced mixer circuit can be used as a product detector and this time the inputs are the same r.f. local oscillator (l.o.) source and the weak incoming r.f. signals. This is the basis of the DC receiver.

The output will be the weak demodulated audio from stations on both sides of the l.o. frequency. This is the fundamental property of a DC receiver, which responds to both lower sideband (l.s.b.) and upper sideband (u.s.b.) signals

The bandwidth of the receiver, or its ability to reject unwanted signals removed from the l.o. frequency, is determined by the bandwidth of the following audio filters. These properties make it possible to use the same balanced mixer for both reception and transmission with a single l.o. signal source, as shown in the block diagram, **Fig. 1**. This leads to a much-simplified overall design and the

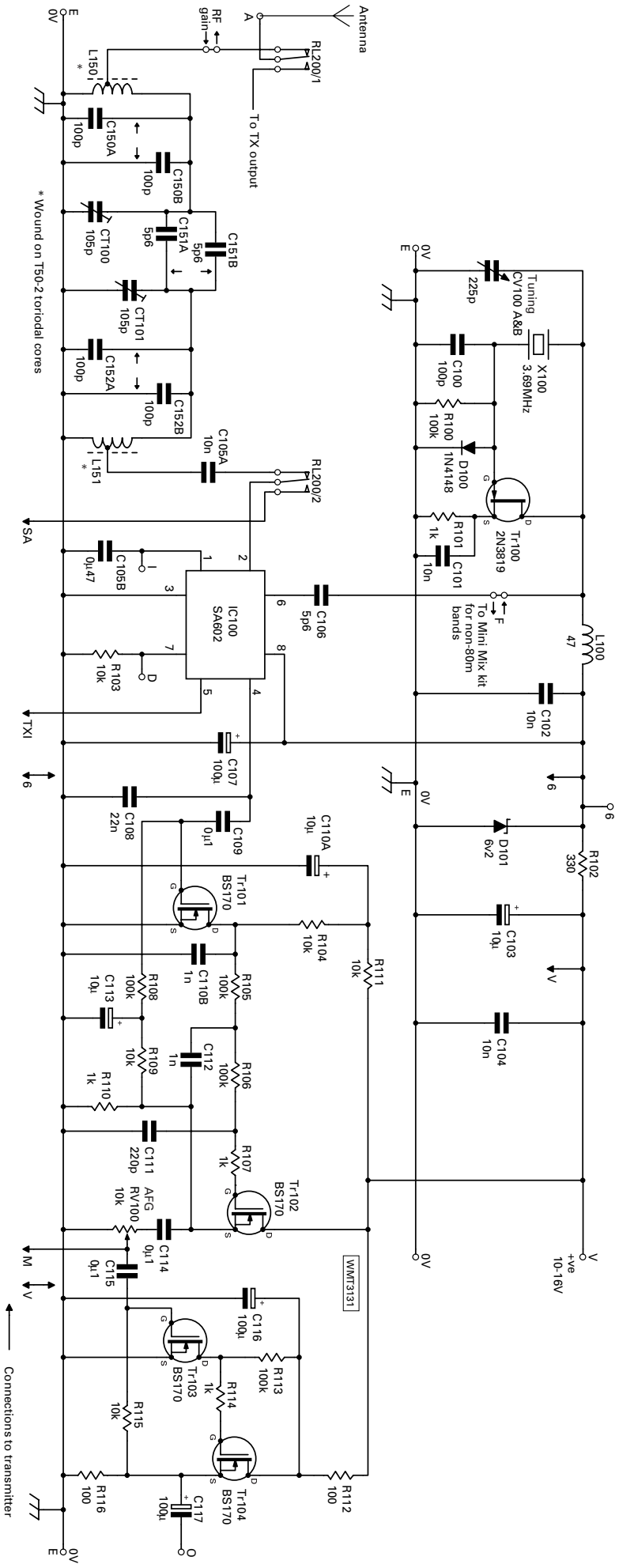


Fig. 2: The Brean receiver circuit diagram.

Band	L150 Turns	L150 Tapped	L151 Turns	L151 Tapped	C150/2 Value(pF) & Connection
80m	38	6 up	38	19 up	200 (100+100)pF in paralle
40m	24	4 up	24	12 up	100 100p single
30m	16	3 up	16	8 up	100 100p single
20m	14	2 up	14	7 up	50 (100+100)pF in series

Table 1: Band dependent band-pass filter data.

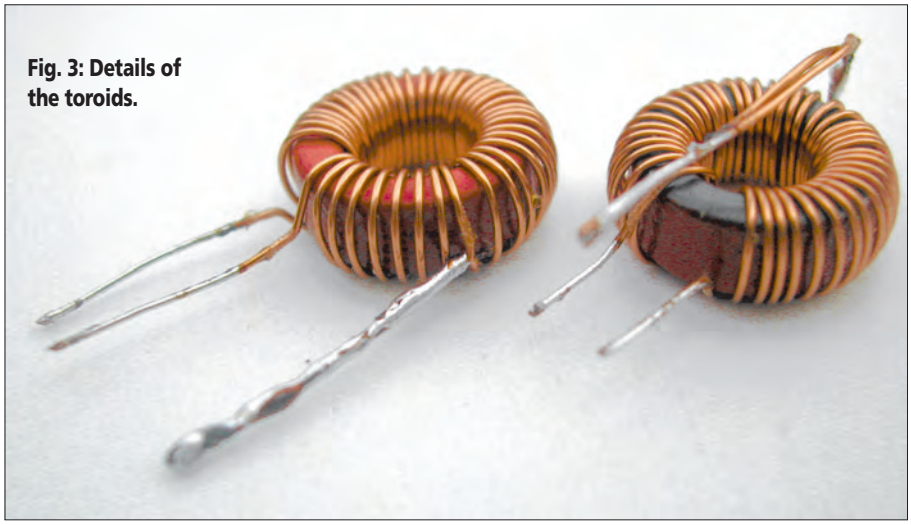


Fig. 3: Details of the toroids.

possibility of laying it out on half a standard 100 x 160mm printed circuit board (p.c.b.).

The l.o. signal source, if operating at the transmit frequency, must not be influenced by any transmitter currents that would cause its frequency to change. If this occurred it would lead to 'FMing' - this is the 'phone equivalent of c.w. chirping!

It just so happens that a common ceramic resonator is available for the lower part of the 3.5MHz 'phone section. The resonator has a sufficiently high *Q* to prevent 'FMing', but is also low enough to allow pulling by varying its load capacitance.

Unfortunately, the same approach is not viable for bands above 3.5MHz due to temperature induced drift problems. The solution is to use either a crystal for higher bands (with a very limited pulling range), or a frequency-mixing scheme. The Mini Mix kit is designed for just this task; enabling the basic 3.5MHz variable frequency oscillator (v.f.o.) tuning range to be transferred up to the desired higher frequency band.

The Receiver

Let's now take a detailed look at the Brean's receiver section. This can be seen in the top section of the block diagram, Fig. 1, with the full receiver circuit shown in **Fig. 2.**

Signals from the antenna in the desired band are selected by the double-tuned r.f. band pass filter associated with L150/151. These filters use tapped inductors to minimise the size of the windings on the small T50-2 toroids (see **Fig. 3**).

Note: There's nothing terribly difficult about making the toroids, so **please** don't be put off!

Different combinations of the 100pF capacitors C150/2 and trimmers, with a suitable number of turns on the toroids, enable one set of parts to operate on any band, from 3.5 to 14MHz. The p.c.b. has several holes for installing the three 'fixed' tuning capacitors (as either a single actual capacitor, or a pair in either series or parallel) so take a little care over these.

The band dependent bandpass filter data is given in the **Table 1**. (the 30m band is included for completeness in case somebody wishes to use it for c.w. working!). The tap positions, given in 'turns up' from the ground end, are designed to match to 50Ω for the antenna, and 1.5kΩ for the mixer. The transmit receiver relay, when not activated, connects this filter to the antenna and one of the mixer IC100 inputs. The other half of this (balanced) mixer input is grounded for both a.f. and r.f. signals.

The mixer's l.o. input is from the 2N3819 oscillator, Tr100, using a 3.69MHz ceramic resonator for frequency control. This can be pulled down by approximately 70kHz with the simple tuning arrangements provided by the p.c.b. mounted PolyVaricon tuning capacitor.

The normal tuning uses both sections of CV100 to achieve as large a tuning range as possible and might therefore be a little 'tender' to operate! However, the instructions include suggestions for improvements by optional additions!

The l.o. feeds the SA602 balanced mixer IC100, either directly for 3.5MHz, or indirectly via the points F and the Mini Mixer kit for a wider tuning range on higher bands. Crystals are available for 7 and 14MHz (20 and 40m) but the tuning range will be limited to a few kilohertz!

There's some bandwidth limiting on the output of the mixer, which itself has a gain of about 10, prior to the first high gain audio stage using a BS170 m.o.s.f.e.t., Tr101. This feeds a second BS170, Tr102, which acts as a buffer in together with the main second order audio filter R105/5 C111/2. This defines the receiver bandwidth to about 3kHz (the normal minimum for speech signals).

The direct current (d.c.) feedback around Tr101/2, through R108/9, ensures that the d.c. voltage across R110 is just over 2V - sufficient to just turn Tr101 on. The buffer, Tr102, feeds the audio frequency (a.f.) gain potentiometer, which is actually a shafted preset control.

Note: If you plan to put the rig in a proper case this is best changed to a 4.7kΩ log potentiometer.

During transmission, receiver muting is applied as a 'short' circuit by Tr205, just after the a.f. gain potentiometer. The audio output stages comprise another fed back pair of BS170s, Tr103/4, with further gain and a higher standing current in the buffer stage. This makes it suitable for driving modern 32Ω stereo headphones (series connected).

The Transmitter

The block diagram for the transmitter is the lower half of Fig 1, with the full circuit shown in **Fig. 4**. Transmit/receive (T/R) control from the microphone's push-to-talk switch (p.t.t.) is achieved by Tr200 which activates RL200 and also applies power to the transmit r.f. amplifier Tr206/7.

The speech amplifier (you guessed!) is another pair of BS170s. The amplifier is left on permanently to avoid nasty T/R 'thumps'.

The microphone (dynamic CB radio types are fine) feeds the microphone gain preset, RT202, that's adjusted to ensure that the output of IC100 does not limit during speech peaks.

If c.w. is required by the injection of a keyed tone, this can also be fed into the input of the speech amplifier. The mixer IC100 (now connected to the speech amplifier by RL200) acts as a balanced modulator, using the same l.o. signal as for reception.

The output of the modulator is first buffered by Tr207 and then amplified by Tr206. These is yet another d.c. coupled pair of BS170s but with the r.f. drive preset RT201 between them, which is adjusted to just prevent clipping in the output stage.

The r.f. output stage comprises three BS170s, Tr201/2/3, connected directly in parallel to reduce the dissipation in each device. A significant standing current is required for linear operation, which is necessary to preserve the modulating audio. Their dissipation is the limiting factor for higher supply voltage operation and hence a higher r.f. output.

The direct antenna load of 50Ω results in a nominal 1.5W of peak r.f. using a 13.8V supply.

The input capacitance of the three BS170s cannot be ignored either - it requires another moderately powerful buffer stage to drive them on the higher bands - hence the inclusion of Tr204

between the transmitter amplifier and output devices. During reception, all four of these devices, Tr201, 2, 3 and 4 have their bias removed by D201 to ensure that their currents fall to zero and they cool down!

The output low-pass (l.p.f.) filter comprises double π half-wave filters whose cut off frequency is adjusted to be just above the chosen operating band. The number of turns on the small T50-2 toroids L250/251 (**Fig. 5**) varies with the band.

Like the receiver's band-pass filter, there are combinations of the fixed high voltage capacitors (single, series or parallel) for the four 'main' filter capacitors C250/1/2/3. The band dependent l.p.f. data is provided in **Table 2**.

Assembling The Brean

There's nothing particularly difficult in the assembly of the Brean, even though the p.c.b. is rather full! As usual, I advise that it should be built in stages, each is tested and any problems corrected before the next stage is started.

The construction should begin with a few large parts whose position is un-ambiguous, the pre-sets, sockets, trimmers and the tuning capacitor.

Note: It's essential to make certain that the sleeve connection of the headphones socket is isolated from the ground plane (I suggest you use a small piece of pvc tape under the socket).

The PolyVaricon tuning capacitor should have its trimmers first set for the least capacity and then its back should be covered with insulating tape to prevent the nuts and bolts touching the ground plane on which it sits. (The variable capacitor is secured by a wire strap over its body).

For the receiver, the sequence starts with the Zener stabilised 6V supply, followed by the a.f. amplifiers, whose d.c. voltages can be measured and assessed for a.f. with the aid of a screwdriver and a finger to produce hum! Next, the local oscillator should be checked by listening on another receiver, **Note:** Please be aware that a very low minimum capacitance may cause the oscillator to stop.

The tests continue with d.c. checks on the mixer and finally, the r.f. filters (which

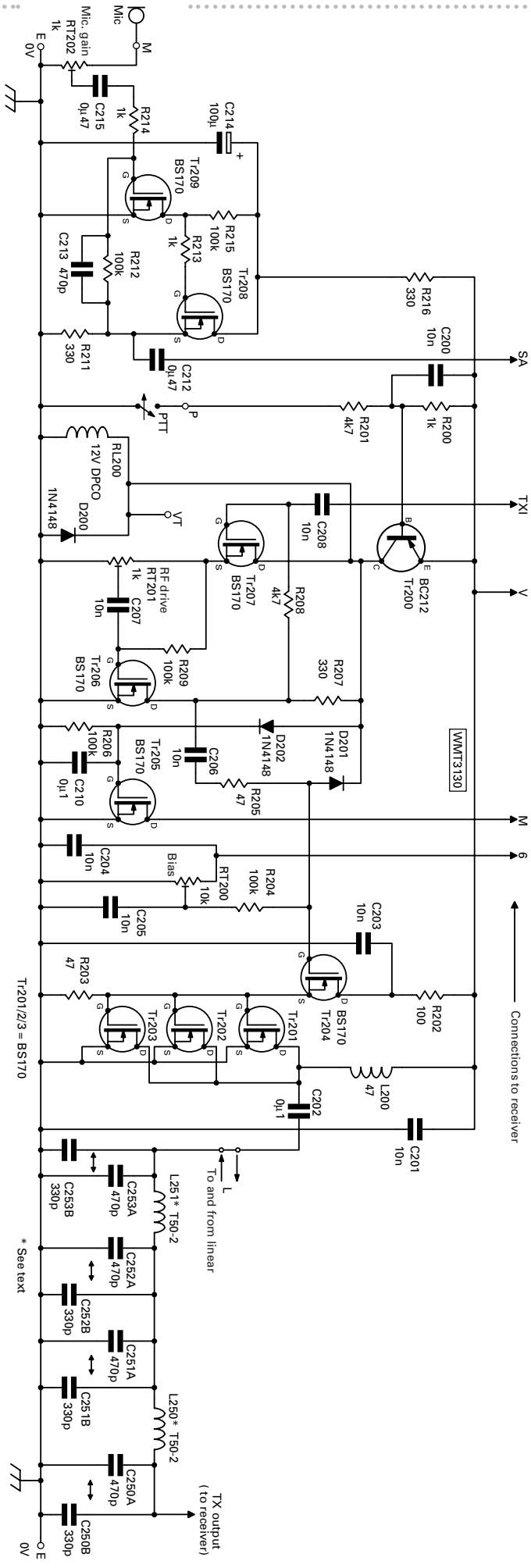


Fig. 4: The circuit diagram of the transmitter.

Band	L250 & L251 Value (µH)	Turns (on T50-2)	C250/1/2/3 Value (pF)	Connection
80m	2	20	800	(330+470)pF in parallel
40m	1	14	400	470p single cap.
30m	0.7	12	300	330p single cap.
20m	0.5	10	200	(330+470)pF in series

Table 2: Band dependent band-pass filter data.

are adjusted using off air signals). **Note**: Don't rush the winding process of the tapped toroids! There's nothing really difficult and once the process is finished, they can be settled in the spaces near the trimmer capacitors.

The transmitter construction sequence starts with the control circuitry, followed by the speech amplifier. When completed these should enable the operator to hear their voice on another receiver when the p.t.t. is operated.

The assembly is continued by the construction of the r.f. amplifier, the output devices and then the transmitter low-pass filters. The inductors for the l.p.f.s are easy to wind as they do not have any taps.

The rig's supply current must then be measured. It should be possible to obtain an increase of about 100mA as Tr201, 2, 3 and 4 are turned on by the bias preset Tr200 (with the p.t.t. switch closed). Take care not to keep it in transmit for more than a minute until it's estimated just how hot these devices become during transmission!

Setting Up & Operating

To start the setting up and operating process, it's necessary to produce crude c.w. (with the p.t.t. closed) by temporarily grounding point I, which unbalances the mixer. **Note:** This method **is not suitable** for working c.w. stations!

Next, adjust the r.f drive preset RT201 until the transceiver is producing about half maximum output - 500mW (it should eventually produce 1.5W on a 13.8V supply). Then remove the ground from point I and advance the microphone gain preset, RT202, while the technical term 'Aarhhhhhhhh', etc., is sounded steadily into the microphone.

At some point, as RT202 is advanced, the r.f. output will stop increasing as limiting begins in IC100. When it does, it's necessary to then reduce RT202 back a little from the point first reached. During this adjustment **it's important** to keep the r.f. output down to below 1W, if necessary by adjusting RT201, to ensure that the limiting is not caused by the output stage.

Having set the microphone gain with RT202, it's necessary to increase the r.f. drive preset, RT201, for just below maximum output, this time just avoiding limiting in the output transistors.

Using the Brean is very simple! Just tune in the other station for best clarity of speech. This will place your l.o. frequency on the other station's transmit frequency. Then all you do is press the p.t.t. switch and talk!

The other station can use either sideband while transmitting to the Brean. The operator should also be able to hear either of the Brean's sidebands (assuming there are no other signals). Both sidebands should be of equal amplitude and clarity.

As ever, I will be delighted to hear how you have got on with the Brean. The next project to wet your appetite is an All Band traditional VFO! **PW**

Kits & Bits

Kits for the Brean transceiver are available from Walford Electronics. They include all parts, to build them 'open' style as in the accompanying photographs. Prices are:-

Brean 3.5MHz (80m) transceiver: £44.

Mini Mixer kit (state band required) 7, 10, or 14MHz, cost £14.

7.159 or 14.318MHz crystals cost £2 each.

Post and packaging £3 per order. Please send your orders with a cheque direct to **Walford Electronics, Upton Bridge Farm, Long Sutton, Langport, Somerset TA10 9NJ**. Website **www.users.globalnet.co.uk/~walfor**

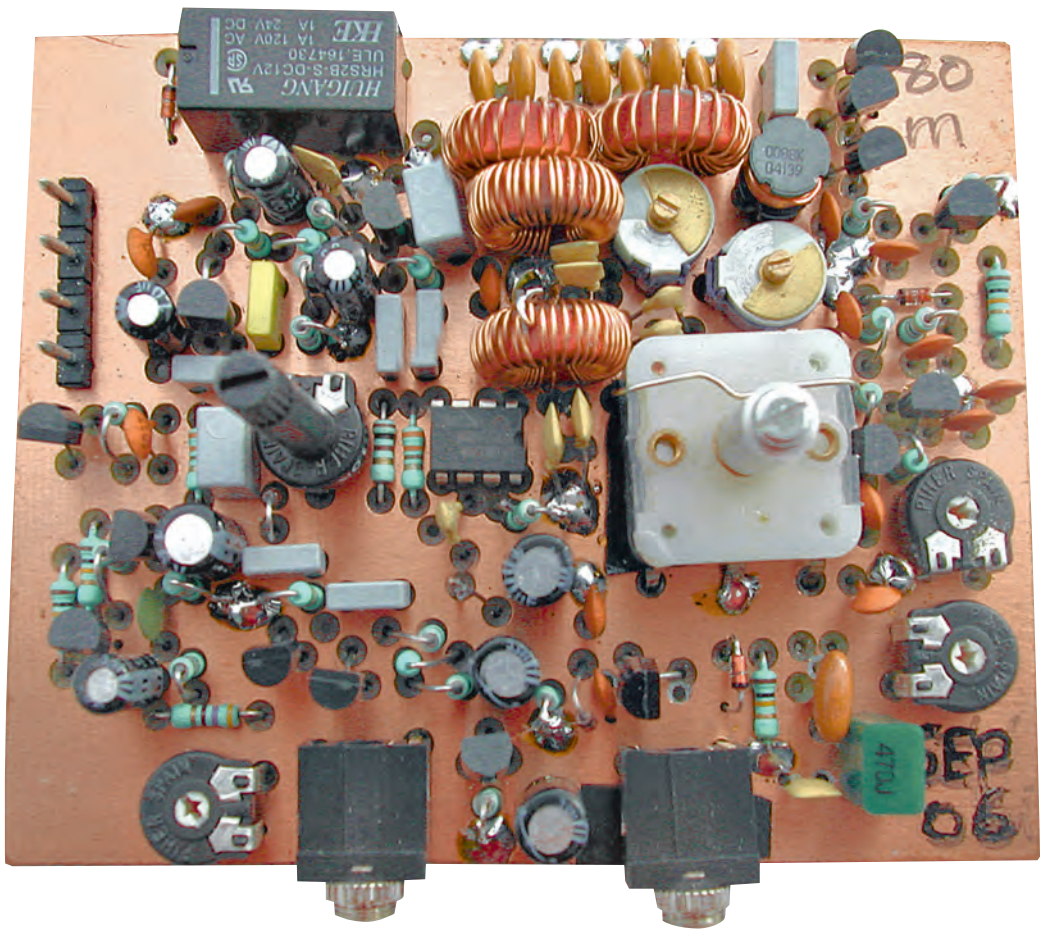


Fig. 5: Close-up details of the finished project. The filter toroids are just to the right of the relay.

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The Doublet Antenna At GB2GM

Many Radio Amateurs - on holiday in Cornwall - envy the wonderful location of the GB2GM station at Poldhu. Davey Thomas G3AGA, shares the story behind the station's antennas that many of us would like for ourselves!

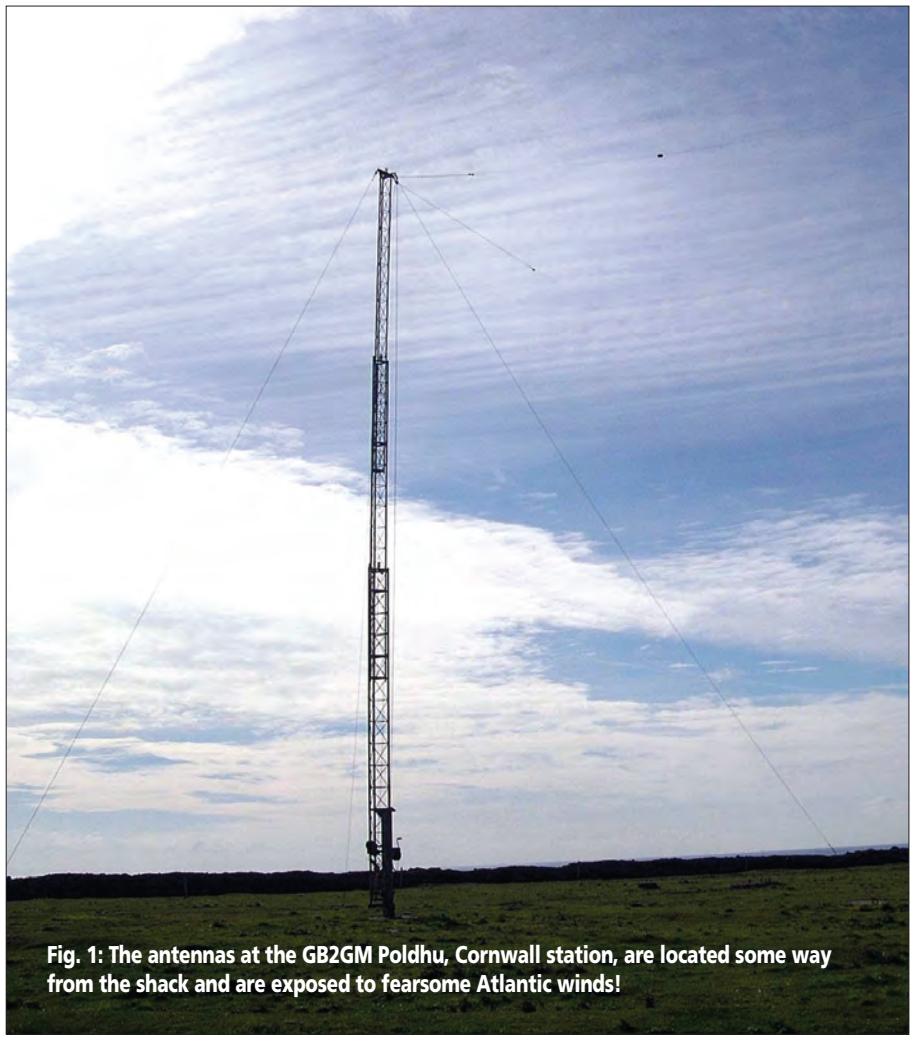

Fig. 1: The antennas at the GB2GM Poldhu, Cornwall station, are located some way from the shack and are exposed to fearsome Atlantic winds!

Due to the changing seasons and the run-down towards the sunspot minimum we decided recently to convert a 3.5MHz dipole at GB2GM station at Poldhu, into a doublet in the interests of greater flexibility. Although an excellent antenna for 80m, the dipole was essentially a 'one-band' antenna whereas a doublet is a convenient multi-bander. The following is an account of the problems involved in the change and the steps taken to overcome them.

Somewhat Unusual

The situation here in Poldhu at GB2GM is somewhat unusual, in that most of the antennas are located some distance from the shack, **Fig. 1** and fed by RG213 coaxial cable.

The cable is run underground to various distribution points adjacent to the antennas. In the case of the 3.5MHz dipole the coaxial run is about 68m (180ft) in length.

Doublet Requirements

The doublet requires the use of a tuned and balanced feeder. In the case under review, two options had to be considered. Either install a new feeder-run (600Ω, above ground) from the shack to the antenna or re-use the existing coaxial cable in conjunction with a remote tuning system.

Equipment Selection

Option one was discarded immediately because it would breach our arrangement with the National Trust regarding additional 'hardware' out on the field at this historic Marconi site.

Option two required the selection of a remote tuning device, which could be fixed to a post close to the antenna. It would then be connected by a length of balanced 400/600Ω feeder to the antenna, see **Fig. 2** for the circuits..

The choice of remote tuners is limited and only two manufacturers were contacted. The final choice was **SGC Inc.**, from the USA and who advertise quite widely in the Amateur Radio press. They were most helpful when it came to the selection of a unit from their range of tuners.

As it turned out, the cheapest model (the SG-239) would meet our requirements in all respects except that, (like all the tuners we looked at), it normally has a separate 12V d.c. feed.

We (the club members) were anxious to avoid, if possible, having to 'pull' an additional cable for a d.c. supply all the way out to the antenna distribution point via the underground duct!

Incidentally, the model of the SGC tuner we chose for use at GB2GM, **Fig. 3**, is limited to 100W of r.f. and is therefore, not suitable for high powered installations. Additionally, the '239 is not weather-proofed

The Power Supply

It seems that SGC had apparently not considered the alternative of supplying the required d.c. supply down the coaxial cable and could not offer any advice on the subject. However, having had some experience with masthead amplifiers which used coaxially fed d.c. supplies it was decided to go ahead and try this method with the SGC-239 tuner.

An SGC-239 tuner was purchased from **Waters & Stanton** in Hockley, Essex.

Some tests were then carried out at my station, G3AGA ,which showed that the '239 tuner (see Fig. 2) can be powered satisfactorily with d.c. via the coaxial cable feeder **provided that suitable filters** are fitted at either end of the cable.

Cornish Weather

For those who are not familiar with the Poldhu site it should be pointed out that the site is very exposed to the Cornish weather and suffers from high winds - straight off the Atlantic - with gusts up to 130 to 145kph (80-90mph) every winter. The wind can even exceed 160kph (100 mph) on rare occasions, usually accompanied by driving rain!

Bearing the weather in mind, the SGC tuner was mounted in an ABS weatherproof box and this container was mounted inside a second, larger, plastic box, **Fig. 4**. This arrangement successfully withstood the regular gale force winds and heavy rain of late October.

The System

As already briefly explained, the main coaxial feed is through about 68m of RG213 cable. This is linked to the SGC tuner in its weatherproof box.

A balanced feed is required from the box to the antenna and in the first instance, a length - approximately 15.4m (50ft) of so-called 'heavy duty' 450Ω slotted line was used. This line was made from copper coated steel wire and was quite substantial but proved unable to withstand continuous flexing. It lasted only 36 hours when one of Poldhu's strong wind gusts ripped it away, leaving behind just a few inches of feeder at the anchor point!

The 450Ω line was repaired and strengthened but it lasted only 48 hours!

The replacement is a length of home-brewed open wire line made up from 16s.w.g. stranded copper with 75mm (3in) fibreglass spacers every 685mm (27in). It weathered the winter storms undamaged!

Encouraging Results.

The results have been encouraging. Although the auto-tuner seems capable of reducing the v.s.w.r. to an acceptable level on most bands (without the need for an a.t.u.) in the shack, (i.e. the v.s.w.r at the rig is < 1.5:1), a combined a.t.u./v.s.w.r. meter is used but is normally left switched to the 'straight through' position.

Note: At GB2GM the only exception is a narrow range of frequencies near 3.7MHz where the v.s.w.r. rises to 2:1 and a 'tweak' with the manual a.t.u. is needed. The SGC tuner sometimes takes several seconds to optimise its tuning when changing bands. On changing bands the best method seems to be to switch to c.w., press the key, watch the v.s.w.r. meter until it settles down, then check the final v.s.w.r and (if necessary) adjust the a.t.u. We can then revert to the desired operating mode.

Stations have been worked on all the bands and reports have been up to expectations - remembering that a doublet is very much a compromise. The Poldhu station has an excellent h.f. location, as it's set on the top of a cliff, 46m (150ft) directly above the Atlantic - just a few blades of grass between GB2GM and Newfoundland and under these conditions even a compromise antenna can provide many satisfactory contacts! We've had some excellent DX.

Few, if any, sites would have the same problems as GB2GM but anyone who is looking for a multi-band antenna should at least consider the doublet. Old fashioned they might be but they work well if they're properly set up.

PW

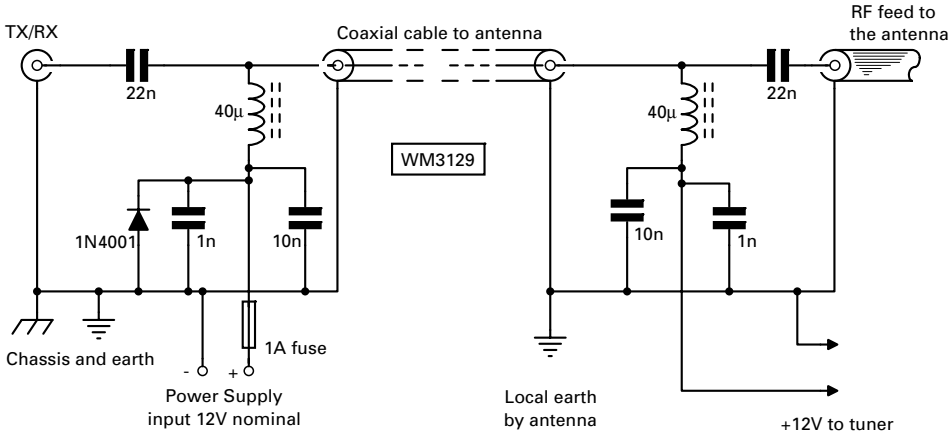

Fig. 2: The circuits for the system adopted at GB2GM (see text).

Fig. 3: The SGC SG-239 a.a.t.u. mounted in its box, ready to be sealed into the external casing.

Note: The Doublet has now been converted into a Marconi T for the 1.8MHz beacon, GB3SSS and will operate on 1.960MHz from Nov - Jan.

Fig. 4: The SGC-239 mounted - and fully weather-proofed against the Cornish weather - at the antenna-feed point.

Toroid Ready-Reckoner Tables

Stefan Niewiadomski has used a spread-sheet calculator to create tables of values of toriodal inductances. He shares these tables with you now - saying that they should cover most, if not all of your needs.

Recently, I was faced with the task of calculating lots of inductance values for some toroid-based low-pass filters. Then I needed to choose the best wire gauge to wind the coils with. It then struck me that life would be easier with a spread-sheet on the computer, that calculated all the values I might need. I could then simply read them off a list.

The Tables

The tables presented here should make life easier for everyone. The main table, **Table 1,** shows the inductance in µH versus the number of turns wound on various popular powdered-iron and ferrite toroid cores.

Values of inductance are tabulated for the inductance value created with the number of turns, from 40 down to 1, values, that are likely to cover most applications. Each formula I've used to calculate the inductance values (that are not in Table 1) are also given.

The most commonly-used powdered-iron cores in Amateur Radio circuits are the T37, T50 and T68 cores. The number part refers to the diameter of the core in hundredths of an inch. The most often used core material, is either the '-2' or the '-6' variants. This number indicates the exact composition of the core material. And many of these toroids are colour-coded for quick identification.

The core material mixture called 'type 2' has the finished toroids dipped in a red 'paint' for identification purposes. So, these are often just referred to as the 'red mix'. Cores of this mix type, are used with frequencies in the 0.25-10MHz range.

The -6 mix core, again referring to the colour, is called the 'yellow' mix. This material is typically used in the frequency range 3-40MHz. Toriods with these cores are used most often in tuned circuits and filters.

Another manufacturer of toroidal cores has a different numbering system and this starts with 'FT'. The most commonly-used ferrite cores by Amateurs are the FT37 and FT50 type cores, using the '-43' and '-61' core material variants. Again, this refers to the exact composition of the ferrite material used.

In the case of the FT cores, no colour coding is used. You should be careful to keep the cores well labelled, and not to mix them up. These cores are used in chokes, and transformers of many types (including narrow-band, broad-band and transmission line), baluns, and switched-mode power supplies.

Note: These cores should not be used in tuned circuits, even though their relatively high AL value seems to offer high inductance for few turns.

As the toroids have the turns wound through the central hole, there's a problem with the maximum number of turns that can be put on any core. The number of turns is a function of the core and the wire diameter. The table, **Table 2**, shows wire gauge versus the approximate maximum number of turns that can be fitted on a core for the T37, T50, T68, FT37 and FT50 cores.

The values shown in Table 2, are only for single layer windings that should always be used on toroids for r.f. inductors. This form has the lowest inter-winding capacitance and so has the highest *Q* for the coil.

Some transformer and choke designs wound on toroids call for bifilliar, or even trifilliar windings. Bifilliar or trifilliar windings have two or three wires twisted together to form a single 'wire', before being wound on the toroid.

The number of turns of such windings that can be accommodated on a core depends on the number of twists per inch and the 'bendability' of the twisted wire combination, and so these windings are not included in Table 2. I'm afraid you'll have to experiment if such a winding is needed.

Toroidal cores labelled T37 have an outside diameter on 0.375in (hence the 37 in the code). Types labelled T50 have an outside diameter of 0.50in, and T68 types have an outside diameter of 0.68 inch. Because of the differing sizes, for a given wire gauge considerably more turns can be wound on a T68 core than on a T37 core and this is reflected in Table 2.

Although the FT37 and FT50 toroids also have outside diameters of 0.375 and 0.50 inch respectively, the cores have smaller inside diameters than the T37 and T50 types In case, then they're able to accommodate fewer turns than their T37 and T50 counterparts.

To cater for various wire gauges the diameters are given in Standard Wire Gauge (s.w.g.), American Wire Gauge (a.w.g.) and in mm. Using the table, you'll be able to determine the thickest wire that can be used to wind a particular inductance (as calculated from Table 1) on a specific core. Another way of looking at this is that if a minimum wire diameter is needed because of the current carrying specification of the inductor, (for example in a high-current r.f. choke), then you can determine the size of core that's needed to create the inductor with that wire diameter?

A good rule of thumb is to fill the toroid with no more than about 75% of its capacity. You should spread the windings evenly around the core and separate the leads leaving the core by about 30° to reduce the distributed capacitance of the winding.

In **Table 3**, I've shown the specific inductance values (A_L) for a fuller range of toroids not covered in Tables 1 and 2. You may come across these toroids and need to calculate an inductance value. The equations, shown below, will allow you to do this yourself.

Core Colour A_L Turns	T37-2 Red 40 L(uH)	T37-6 Yellow 30 L(uH)	T50-2 Red 49 L(uH)	T50-6 Yellow 40 L(uH)	T68-2 Red 57 L(uH)	T68-6 Yellow 47 L(uH)	FT37-43 None 420 L(uH)	FT37-61 None 55.3 L(uH)	FT50-43 None 523 L(uH)	FT50-61 None 68 L(uH)
40	6.40	4.80	7.84	6.40	9.12	7.52	672	88.5	837	108.8
39	6.08	4.56	7.45	6.08	8.67	7.15	639	84.1	795	103.4
38	5.78	4.33	7.08	5.78	8.23	6.79	606	79.9	755	98.2
37	5.48	4.11	6.71	5.48	7.80	6.43	575	75.7	716	93.1
36	5.18	3.89	6.35	5.18	7.39	6.09	544	71.7	678	88.1
35	4.90	3.68	6.00	4.90	6.98	5.76	515	67.7	641	83.3
34	4.62	3.47	5.66	4.62	6.59	5.43	486	63.9	605	78.6
33	4.36	3.27	5.34	4.36	6.21	5.12	457	60.2	570	74.1
32	4.10	3.07	5.02	4.10	5.84	4.81	430	56.6	536	69.6
31	3.84	2.88	4.71	3.84	5.48	5.48	404	53.1	503	65.3
30	3.60	2.70	4.41	3.60	5.13	4.23	378	49.8	471	61.2
29	3.36	2.52	4.12	3.36	4.79	3.95	353	46.5	440	57.2
28	3.14	2.35	3.84	3.14	4.47	3.68	329	43.4	410	53.3
27	2.92	2.19	3.57	2.92	4.16	3.43	306	40.3	381	49.6
26	2.70	2.03	3.31	2.70	3.85	3.18	284	37.4	354	46.0
25	2.50	1.88	3.06	2.50	3.56	2.94	263	34.6	327	42.5
24	2.30	1.73	2.82	2.30	3.28	2.71	242	31.9	301	39.2
23	2.12	1.59	2.59	2.12	3.02	2.49	222	29.3	277	36.0
22	1.94	1.45	2.37	1.94	2.76	2.27	203	26.8	253	32.9
21	1.76	1.32	2.16	1.76	2.51	2.07	185	24.4	231	30.0
20	1.60	1.20	1.96	1.60	2.28	1.88	168	22.1	209	27.2
19	1.44	1.08	1.77	1.44	2.06	1.70	152	20.0	189	24.5
18	1.30	0.972	1.59	1.30	1.85	1.52	136	17.9	169	22.0
17	1.16	0.867	1.42	1.16	1.65	1.36	121	16.0	151	19.7
16	1.02	0.768	1.25	1.02	1.46	1.20	108	14.2	134	17.4
15	0.900	0.675	1.10	0.900	1.28	1.06	94.5	12.4	118	15.3
14	0.784	0.588	0.960	0.784	1.12	0.921	82.3	10.8	103	13.3
13	0.676	0.507	0.828	0.676	0.963	0.794	71.0	9.35	88.4	11.5
12	0.576	0.432	0.706	0.576	0.821	0.677	60.5	7.96	75.3	9.79
11	0.484	0.363	0.593	0.484	0.690	0.569	50.8	6.69	63.3	8.23
10	0.400	0.300	0.490	0.400	0.570	0.470	42.0	5.53	52.3	6.80
9	0.324	0.243	0.397	0.324	0.462	0.381	34.0	4.48	42.4	5.51
8	0.256	0.192	0.314	0.256	0.365	0.301	26.9	3.54	33.5	4.35
7	0.196	0.147	0.240	0.196	0.279	0.230	20.6	2.71	25.6	3.33
6	0.144	0.108	0.176	0.144	0.205	0.169	15.1	1.99	18.8	2.45
5	0.100	0.0750	0.123	0.100	0.143	0.118	10.5	1.38	13.1	1.70
4	0.0640	0.0480	0.0784	0.0640	0.0912	0.0752	6.72	0.885	8.37	1.09
3	0.0360	0.0270	0.0441	0.0360	0.0513	0.0423	3.78	0.498	4.71	0.612
2	0.0160	0.0120	0.0196	0.0160	0.0228	0.0188	1.68	0.221	2.09	0.272
1	0.00400	0.00300	0.00490	0.00400	0.00570	0.00470	0.420	0.0553	0.523	0.0680

Table 1: Tabulating turns against the inductance values created on varying toroidal cores.

Wire Size	Maximum number of turn for each core by wire size. Core	T37	T50	T68		FT37	FT50
2.03mm 14swg 12awg		3	6	9		1	3
1.63mm 16swg 14awg		5	8	12		2	7
1.22mm 18swg 16awg		7	11	15		4	10
0.914mm 20swg 19awg		10	17	23		9	16
0.711mm 22swg 21awg		14	25	32		13	22
0.559mm 24swg 23awg		20	33	41		18	30
0.457mm 26swg 25awg		27	42	54		24	38
0.376mm 28swg 27awg		36	56	70		32	50

Table 2: Tabulating the wire thickness against the maximum number of turns that can be placed as a single layer on toriodal cores.

Core Type (size)	-2 (Red)	-6 (Yellow)
T12	20	17
T16	22	19
T20	25	22
T25	34	27
T30	43	36
T37	40	30
T44	52	42
T50	49	40
T68	57	47
T80	55	45
T94	84	70
T106	135	116
T130	110	96
T157	140	115
T184	240	195
T200	120	100

Table 3: Both the material and the core size affect the AL value of the cores. See the box marked 'The Maths' to see how to use this value.

Appendix: The Maths

The inductance of a toroidal coil is given by:

$$L(\mu H) = \frac{A_L \times N^2}{10000} \qquad \text{Eq. 1}$$

where A_L is μH/100turns
and
L is the inductance (in μH),
N is the number of turns.

Q: What is the inductance of a 16 turn winding on a T37-2 toroid?

A: Referring to the manufacturer's data, the T37-2 toroid has an A_L value of 40 (microhenries per 100 turns). Therefore the inductance is given by:

$$L = \frac{40 \times 16^2}{10000} = \frac{10240}{10000} = 1.02\mu H$$

Another view of this relationship is how many turns on a toroid are needed for a particular inductance value? Eq. 1 can be re-arranged to:

$$N = 100\sqrt{\frac{L}{A_L}} \qquad \text{Eq. 2}$$

For example: If I have a T68-6 inductor and I want to wind an inductor of 3μH, how many turns does it need?

A: From the manufacturer's data, the T68-6 toroid has an A_L value of 47. Therefore the number of turns is given by:

$$N = 100\sqrt{\frac{3}{47}} = 25.26\text{turns}$$

The answer above throws up an interesting question: how do we wind the extra 0.26 turns on a toroid? The answer of course is that we can't. A turn on a toroidal core is counted as a pass through the middle of the core, which is like a logical value, either a yes or a no. We can wind either 25 or 26 turns on the toroid, but nothing in between. It would be interesting to know how much inductance do 25 and 26 turn windings have so we can select the one that's closest to the inductance we need. We can either make two more calculations, or consult Table 1. This table makes the iteration to the final value much easier.

For the FT-range of ferrite toroids the A_L value is commonly expressed in mH per 1000 turns. Equation 1 is therefore modified to:

$$L(mH) = \frac{A_L \times N^2}{1000000} \qquad \text{Eq. 3}$$

where A_L is mH/1000turns
and
L is the inductance (in mH),
N is the number of turns.

And Equation 2 is modified to:

$$N = 1000\sqrt{\frac{L}{A_L}} \qquad \text{Eq. 4}$$

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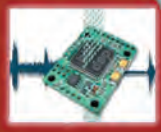

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The Trials & Tribulations of QSLing

If you're new to the hobby Michael Goodwin G7NBE, a keen QSL collector himself, passes on some helpful information. It seems that patience is indeed a virtue needed by anyone waiting for a card to arrive!

At one time or another we've probably all heard the comment, "I've been licensed for two years. During that time I've sent out hundreds of QSL cards and not received one in return." If you've experienced the problem, you'll probably have asked, "What went wrong?" My article aims to help answer the questions and explain some of the reasons for the inevitable delays!

Let's start right at the beginning by stating that if you send out all your outgoing cards by a QSL Bureau, you shouldn't expect the return cards in a couple of weeks. You've posted the cards but what happens to them after they've left the post box?

Bureau Sorted

When they arrive at the outgoing QSL bureau, the cards will be sorted and bundled together with cards from other Amateurs. Next, they'll be posted to the individual bureau for each of countries of the Amateur you're QSLing with.

Some countries have only a few active Amateurs and that country's bureau may be run by just a few Amateurs. It will often be run by locals who are willing to put in a few hours of their time each month.

Not Very Active

The Amateur that you've contacted and wish to QSL with, may not be very active. Indeed, it may take some time for the operator's envelope to fill up and be posted.

Eventually, however, the other operator will receive the envelope containing your card. But they may be busy, have run out of QSL cards or be involved in a pile-up every evening!

After a period, the other operator will find the time to send a reply to your card. It will then be posted to their own national QSL bureau and the whole process is repeated in reverse. It's not surprising that the whole process may involve a time scale of years rather than weeks!

Every Contact?

Some Radio Amateurs send a QSL card for every contact that they make. Others may never send, or even request a QSL card. However, most Radio Amateurs lie somewhere between these two extremes.

Maybe QSLing is a bit like stamp collecting? The beginner indiscriminately collects every stamp they can get hold of. In our case, the newly licensed Amateur gets a batch of cards printed and sends one out for every contact, even to the local Amateur just down the road.

After a while, the stamp collector realises that they cannot collect an example of every stamp ever issued and decides to collect stamps from a single country or of a certain type. Paralleling this, the keen QSL collecting Radio Amateur is likely to be influenced by the way their interest in radio develops.

Direct Or Via Bureau?

The next question you're likely to ask will probably be, "Should I use the bureau or not to use the bureau?" In replying I'll now look at the various options.

If you want to use the **Radio Society of Great Britain** (RSGB) QSL Bureau, you may make use of the **incoming** service if you are a licensed Amateur, **even if you are not a member of the society**. You can use this method by sending (to the Sub Manager for your callsign group) stamped self-addressed envelopes, preferably of the size 190mm x 130mm, for collection of your cards.

However **only RSGB members** may make use of the **outgoing** service to send cards. To obtain full details of the RSGB QSL Bureau, addresses of the sub-managers, or membership details contact RSGB headquarters at **Lambda House**, **Cranborne Road**, **Potters Bar**, **Hertfordshire EN6 3JE** or via their website **http://www.rsgb.org/**

Need To QSL Quickly?

Perhaps you need to QSL quickly? Or you need the final card for an award? Or is the station one of just a few active in that country? To help in this situation, let's now take a look at the various problems and how to get round them!

Some countries have very small national organisations with possibly a very slow or an almost non existent QSL bureau system. Despite this, the direct approach might help and the addresses of Amateurs can often be obtained from call books or

CDROMs carrying the same information to be displayed on your computer.

Using the CDROM approach for QSLing: Two of the best CD ROM buys are the *Practical Wireless* CD ROM*, which contains both UK and Ireland callsigns and the RSGB CD, which contains the UK callsigns and the callsign data for over 20 other European Countries). Callbooks and CDs are usually revised annually.

Alternatively, **QRZ.com**, (American based) is a website with a large database of Amateur Radio callsigns. It lists operators' names and addresses, with additional information about the operator, their station and activities.

Important note:** A new PW Callsign CD ROM will be published in 2007. Please keep a look out for further announcements in the magazine. **Editor

The QSL Manager

If there's a QSL Manager involved (this requirement is usually widely publicised), you'll need to send the card to them. Incidentally, the QSL Manager is the person who does the administrative work for a very busy Amateur or group of operators (perhaps a special DX group).

Absolute Minimum

When you've chosen to QSL direct you should send an International Reply Coupon (IRC) as an absolute minimum. An IRC can usually be exchanged for stamp(s) to the value of return postage. But you do need to be aware that a few countries postal authorities will not exchange IRCs for stamps. **Note:** If a callsign is listed on **QRZ.com** there will usually be a note to this effect on the address page.

You'll also need to send a self-addressed envelope, preferably one with a self-adhesive closure. **Note:** The best types to use are those with a waxed paper strip, which is removed to expose the sticky edge. This is because the self-seal envelopes with matching low-tack surfaces can dry out quickly in tropical countries, (imagine having to lick hundreds of envelopes with unpleasant tasting gum strips!).

When you fold the stamped-addressed envelope be careful not to have the fold at the top of the envelope containing it. This helps to avoid it being cut in two by a letter-opener!

The necessity of the self-addressed envelope was brought to my attention when I sent a QSL card and an IRC to **Zoki Z37HWX**, a very active Amateur in both Albania and Macedonia. I learned that he had to turn my original envelope inside out and seal it with adhesive tape. The moral here is two-fold (pun intended!). Is it fair to expect a popular station to provide their own envelopes and paperwork for you? Additionally, we must not assume that a wholesale stationery store is just around the corner from the DX station we're working!

A short note explaining why you need the return QSL card does no harm. Additionally, if you need extra information on the card (for example) you can note that 'your card will be one of the last I need to achieve the DX Century Award', or 'I am collecting 70MHz QSL Cards for the RSGB Four Metre Award. **Note:** The 70MHz award requires evidence of contacts between an individual and 45 other stations in different postal districts. Therefore it would help if you could include the first two letters of your postcode on the QSL card, or the postcode of the district you were in if working portable.

Increasing Contacts & Cards

One way of increasing your contacts on specific bands or modes (and eventually your QSL card collection) could be through contesting. You may already enjoy contesting either as an individual, or as a member of a group or club. However, if you're new to the hobby, you may have heard contests and wondered what was going on. You may have been quite confused by the procedures involved and a little information may help!

Working contests: There are two ways in which you can get involved in contests and increase your number of contacts and QSL cards for the bands or modes of interest.

The first step is to give points to competing stations, but to do this you have to listen to the way the competing stations are conducting their contacts. In most contests competing stations will give out a signal report and a serial number. This is often in a format such as: 59001, this being a 5&9 report and their first contact, serial number 001, the corresponding station will return with its report.

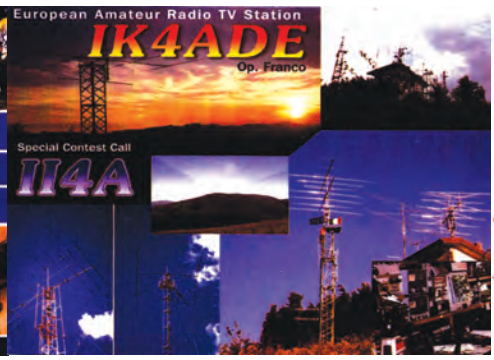
There might be other details exchanged. On the h.f. bands these could be details of the zones or districts within the station's own country. But some contests may require contacts to be between different continents or to stations only in certain countries.

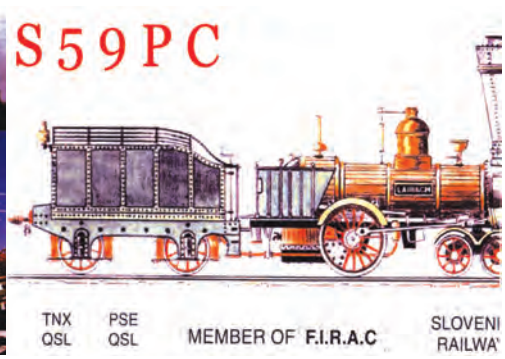
VHF/UHF Contesting

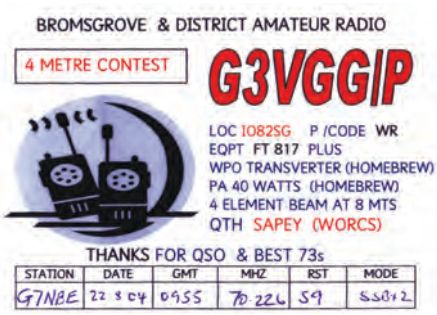
In the case of v.h.f./u.h.f. contest the details needed might include the IARU Locator, the postcode, the name of the town or distance and direction to the nearest town, it could take the form: 'G7NBE from M3BBB you are 59011 in IO92AA situated 9km North of Birmingham.'

If you have the relevant details about your station you can give out a few points by replying to a "CQ Contest" call. **Don't ask for a QSL card during the contact!** Contest stations can be busy, so be as brief as possible and afterwards you can request QSL cards, either direct or by the bureau. You will usually find that the reply rates are quite high because the serious contesters want you to call them again during subsequent contests.

Secondly, you could try entering a contest yourself! An ideal event would be the *Practical Wireless* 144MHz QRP Contest. Usually held in June, in co-ordination with the RSGB Second two Metre Backpackers' Contest. However, you need to be aware that if you operate portable (/P), possibly in order to enter one or both contests, that you could only claim an award for working as a portable station, i.e. not mixing portable operation with base station operation QSL cards.







Special Interests

Some Amateurs may take a special interest in the v.h.f./u.h.f and microwave bands. Amateur satellite communications, h.f. bands or data modes can also become a speciality. As these special interests develop the individual may wish to collect cards as a record of their achievements and/or as a way of providing evidence to claim awards.

Certainly, some bands and modes seem to be populated by more enthusiastic individuals than others! For example, I've found that contacts through Amateur Radio satellites are very likely to result in a return card.

Six metres (50MHz) isn't known as the 'magic' band just because of its propagation characteristics, but also for the enthusiasm of its devotees. The 70MHz band (Four metres), the 'friendly band' speaks for itself and you would be unlucky not to receive a return QSL card for a 70MHz contact. Most of the operators on 70MHz have involved themselves in some effort to get onto the band, I don't suppose they consider it much more of an effort to send a QSL card to another enthusiast.

Rare Square?

If you are in the enviable position of being in a rare square or country, you could probably hand sketch your QSL cards on the back of old wrapping paper and people will thank you profusely for your card! However, if you are one of the lesser mortals, 'the two a penny' Radio Amateur then you'll need to consider your QSL image.

A neat, well designed, uncluttered card with an interesting image will help. Perhaps an amusing cartoon, a local scene or a photograph of your shack or antennas may be the extra incentive to result in a return card from an Amateur who might be unable to send return cards for every contact.

It can be helpful to have your callsign printed on both sides of your cards. This approach avoids the necessity of the recipient having to flip the card over when verifying your contact and possibly transposing the letters of your callsign.

Be sure to keep to postcard sized QSL cards! An oversized QSL card will be folded across the centre if it passes through a bureau.

Don't make the basic mistake of entering an incorrect time or date on your QSL Card. If you do and the receiving Amateur is too busy to check through their logbook, you may well get your card back marked, "Sorry - not in log."

Important advice: You may need to be cautious about advertising the addressee's status as a Radio Amateur on envelopes sent to certain countries especially when sending 'Green stamps' (US$ Bank notes) as a way of paying for return postage and QSL card expenses. Care has to be taken because some postal workers have worked out that letters with callsigns after recipients names can be an indicator of the letter containing bank notes. It may be best, under these circumstances to omit callsigns from both the sender's and the recipient's names and addresses, on both outgoing and return envelopes.

Electronic QSL Cards

You can receive QSL cards electronically. To try this method you can log onto **eqsl.cc**, although you will have to register on the site. Incidentally, you may be quite surprised by how many eQSL cards you have already been sent. These will have been archived on the site and you can of course reply to these with your own eQSLs.

Warning: You need to be aware that eQSL Cards will not be acceptable as evidence for most awards!

The **American Radio Relay League** (ARRL) at **225 Main Street, Newington, CT, 06111-1494, USA**, **www.arrl.org** devised a system, in September 2003, called the ARRL's Logbook of the World (LoTW).

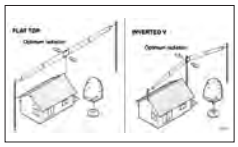
The LoTW acts as a repository of log records from Radio Amateurs around the world. Two matching QSOs (from both log records) need to submitted in order to generate a QSL that can be used for ARRL awards.

The system uses software developed by the ARRL to convert a log file in 'abrillo' or 'ADIF' file format into a data file for submission to the ARRL LoTW. Obviously, safeguards are built into the system to prove the Amateur's status and identity to prevent false log entries being downloaded.

Finally, I would like to point out that I really enjoy collecting QSL cards and find the variety of types and styles a fascinating subject in itself. I hope that this short article may encourage some readers to take a greater interest in sending and collecting QSL cards. **PW**

Shown throughout the article are just a few cards from Michael Goodwin G7NBE's QSL collection.

New! Yaesu YA-30 Broadband Antenna



The Yaesu YA-30 pre-assembled multi-band, commercial-grade folded dipole is designed to get HF operators owners on the air fast. No ATU required. Covering all amateur bands from 1.9 to 30 MHz [VSWR < 2:1 1.9-18 MHz, VSWR <2.5:1 18-30 MHz]. It is 80.3 feet (24m) long and can handle up to 150 watts. The YA-30 can be installed as a Flat Top or an Inverted-V. This antenna is identical to the Icom IC-AH710. **£199.95** (RRP: £319)

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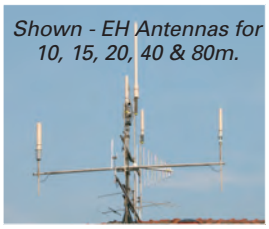
Complete system for Yaesu, Icom & Kenwood transceivers.

The New MyDEL ML-S Mobile Microphone with gooseneck boom fits under the sun visor hinge. Features a PTT remote control with rubber O-Ring for connecting to gear lever. Unit is powered from transceiver. Includes FREE connecting lead to your rig.

NEW LOW PRICE: £29.95



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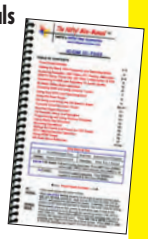

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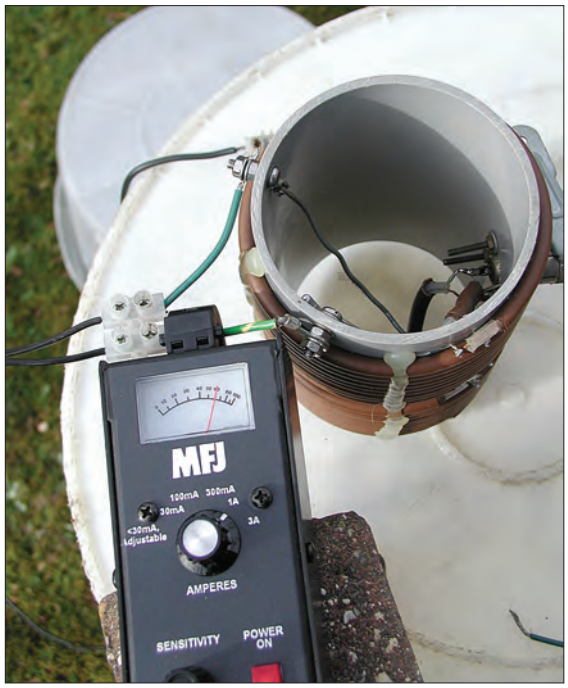
Antenna Workshop

Peter Dodd G3LDO, looks at the off-centre fed dipole and considers it could be an ideal antenna for multiple-band working.



Current measurements on the twin feeder conductors (telephone line) to OCFD. A PA0SE coaxial balun is used to match the twin feeder to the coaxial cable feeder.

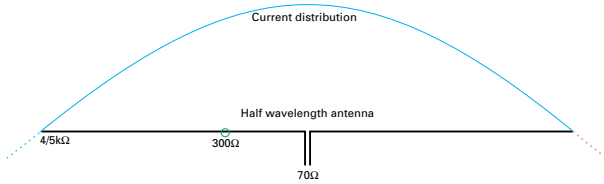


Fig. 1: The current distribution and impedance feedpoints on a half-wave dipole.

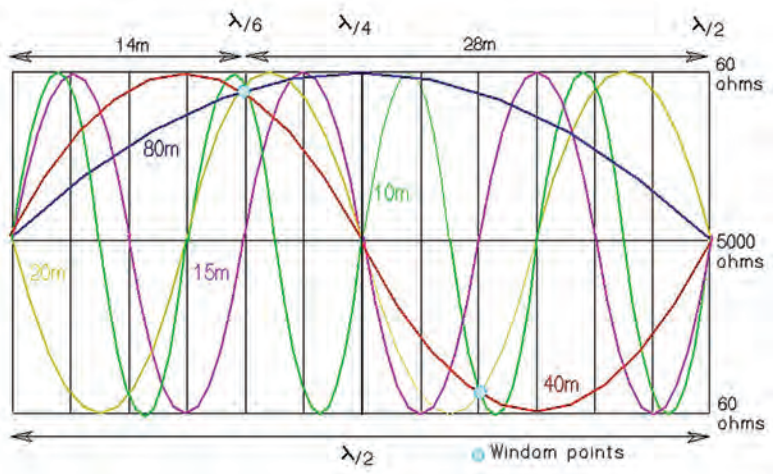


Fig. 2: The current distribution on a half-wave length of wire for 3.5MHz superimposed on the current distribution on other higher bands. Some of the bands coincide at one-sixth of a wavelength (3.5MHz) from the ends, a point that DJ2KY described as a 'Windom point'.

In the Antenna Workshop, December 2003 *PW,* I mentioned the necessity of using a balanced feeder cable in a multi-band dipole arrangement. I also stressed the importance of using twin feeder both to minimise losses and the need of having equal currents in each conductor of the twin feeder.

The reason I gave, was that with balanced feed there's little or no radiation from the feeder. Furthermore, such a feeder has less chance of picking up electrical interference on receive.

It's probable that the case for strictly balanced feeder derived from commercial practice where power output was often quite high and even a small degree of imbalance resulted in high levels of r.f. at the operating position. Feeder line imbalance could also result in power loss in long transmission line lengths.

With the relatively lower power Amateur transmissions, a degree of transmission line imbalance may not be a problem. And there's a chance that it might even be beneficial, provided that the transceiver is not located a long way from the antenna.

The feedpoint impedance of a half-wavelength (λ/2) wire is low in the centre, where the current is high. Conversely, at the ends, where the current is almost zero, the feedpoint impedance is high. Generally, the feedpoint impedance at the centre is around 60Ω and it rises to around 5kΩ at the ends.

Single-Band Antenna

A single-band antenna would enable you to select a feedpoint that would match any impedance of feeder that you might choose to use, as shown in **Fig. 1**. With the half-wave dipole it's usual to employ 50Ω coaxial cable for convenience.

However, the use of 50Ω coaxial cable isn't suitable for feeding a multi-band antenna. Feeding such an antenna needs some modification.

One arrangement of a multi-band antenna, known as the Windom or off-centre-fed dipole (OCFD) was first published by **DJ2KY**, in the German national radio society (DARC) publication *QTC* back in 1974. The diagram in **Fig. 2** is based on a diagram from DJ2KY's original article and shows the current distributions on a length of wire that's half-wavelength long at 3.5MHz (80m). Also shown (superimposed) are the current distributions for other, higher frequency bands.

The impedance levels shown may seem strange, with the highest impedance set in the centre and the lowest at top and bottom. But the impedance is related to the current amplitude – the greater the current the lower the impedance.

Look closely and you'll see that the current amplitudes of the superimposed curves coincide at a point one-sixth of a wavelength from the ends. This was the point that DJ2KY described as a 'Windom point'.

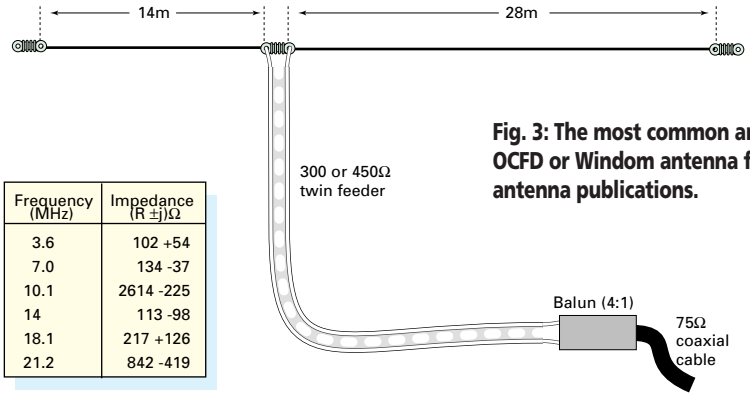


Fig. 3: The most common arrangement of the OCFD or Windom antenna found in most antenna publications.

Frequency (MHz)	Impedance (R ±j)Ω
3.6	102 +54
7.0	134 -37
10.1	2614 -225
14	113 -98
18.1	217 +126
21.2	842 -419

Table 1: Calculated impedances of the OCFD using EZNEC4.

Frequency (MHz)	Current	
	L1 (mA)	L2 (mA)
3.7	320	280
7.0	90	220
10.1	450	500
14.2	330	280
18.1	430	480
21.3	90	120

Table 2: Measured currents on the OCFD twin feeder.

Current Distribution

However, the current distributions shown in Fig. 2 are idealistic, as they represent the current distributions of an antenna in free space. In practice, these currents can, and indeed will most likely, have slightly different amplitudes and phases due to the proximity of the ground.

Furthermore, the amplitudes of the current variations along the antenna element may not be constant on the higher frequencies when the antenna is fed off centre. Nevertheless, the impedances found at the λ/6 point are fairly close together on some bands and the free space impedances of a half-wave length of wire on 3.6MHz has been calculated using *EZNEC4* as shown in **Table 1**.

When the antenna is modelled close to the ground the impedances shown in Table 1 do change but, with the exception of 10 and 21MHz, are still within the range 100 to 200Ω. Such an antenna can be fed with 300Ω ladder line or with coaxial cable feeding into a 4:1 balun at the feedpoint.

The most common OCFD antenna arrangement seems the be the one shown in **Fig. 3**. Because of the layout variations that I've mentioned above, you'll find lots of variations.

I set out to construct an OCFD using a nominal 42m (138ft) length for the wire element. Because my mast is about two-thirds of the way down the garden the layout ended up being a cross between an inverted-L and an inverted-V, with the apex about 14.6m (48ft) high.

At the end of the longer section, the support point is only at an 8.5m (28ft) level, while the end of the short section is a mere 4m above ground. This asymmetric layout placed the feedpoint about 12m (40ft) above ground.

Originally, I fed the antenna with 450Ω ladder line from a balun at ground level, as shown in Fig 3. For some reason the s.w.r. measurements were all over the place, unless the outer braid of the coaxial cable feed to the shack was earthed at the point were it connected to the balun.

Twin Line

I then replaced the 450Ω ladder with twin line telephone drop wire (this is the external wire used by BT to connect house telephones to the nearest telegraph pole). The conductors of this material are made from 1mm diameter high tensile wire spaced at 3.3mm (centre-to-centre).

A local Radio Amateur, **Frank James G0LOF**, who gave me a length of this material, claims to have measured the impedance as 120Ω. The telephone wire feeder improved the s.w.r., although whether this was due to losses or a better overall match I'm unable to say.

With regard to the performance of the feeder, the relative conductor currents did not differ as much as expected. The measured values (see heading photo for the operation) are given in **Table 2**.

It would appear that, unlike the simple half-wave dipole, the configuration of the OCFD varies from constructor to constructor.

In a letter to me recently, **G3FBN** says "My version...the overall length is 139ft (42.37m) long, the short leg is 46ft 4in, (14.1m) the long leg is 92ft 8in (28.25m). I feed it with 75Ω TV coaxial cable, via a home-brew 4:1 balun at the feedpoint.

Eight Turns

"The balun at the feedpoint, comprises eight turns of 70Ω twin feeder tightly wrapped and taped to a length of 9mm ferrite rod. All of this is enclosed in a plastic 'T' electrical conduit onto which is mounted an SO-239 socket and suitable terminals for connecting the antenna wires.

"I am currently using a TS-2000 or a TS-570D both fitted with an auto a.t.u. I seldom need to use the main a.t.u., the s.w.r. is within the range acceptable to both rigs. The bands covered are 3.5, 7, 14, 18, 24 and 28MHz, but the s.w.r. is too high on 10 and 21MHz and I have to use alternative antennas for those bands."

I'm indebted to **G3GRO** for a copy of the **Crawley Amateur Radio Club** newsletter. While describing his experiments with an OCFD antenna in the newsletter, G3GRO says "...For many years I had an 80m OCFD fed with 300Ω ribbon feeder via a home-made 6:1 ferrite transformer, nominally 139ft (42.37m) long and running in a straight line up at 40ft (12.2m) above ground.

"This worked very well on 40m and bands above, but the s.w.r. at the band edges on 80m rose to around 2.5:1." The text then goes on to describe a series of tests with different feed configurations of the antenna using 300Ω twin feeder fed via a commercial 6:1 transformer mounted at ground level. To connect the transformer to the shack G3GRO used 50Ω coaxial cable.

The newsletter reads, "The s.w.r. results using this arrangement were variable and depended on the feeder length and grounding of the 50Ω coaxial outer etc. before it went into the house.

"With all these variables it proved difficult to optimise the antenna length - nominally 41.5m overall. G3GRO improved the s.w.r. compromise by changing the antenna configuration.

Ferrite Transformer

"The ferrite transformer was placed at the feedpoint of the antenna and fed with 50Ω coaxial cable more or less vertically down to ground level. At this point a current choke was inserted into the feeder.

"The choke comprised a number of turns of RG58U coaxial feeder wound on a powdered-iron toroid Type T240-15 (red). The outer of the coaxial cable was connected to the earth system as before. Other members of the Crawley club, notably **Lech G3KAU**, have also had success with this design of OCFD."

After reading the newsletter, which supported my own findings, I feel that most OCFD builders are in general agreement regarding the position of the antenna feedpoint. Many of the differences noted, relate to the feed arrangements.

I would encourage readers to experiment with this antenna. Altering the overall length is quite easy, moving the feedpoint can be achieved by making one end longer and the other a little shorter.

These changes can be made easier to adjust by making the top section longer than required and then folding back the excess length at the end insulators to lie along the elements themselves. The excess lengths can be temporarily held in place with clothes pegs while measurements are made.

PW

Promoting Your Club To The Outside World

In the first of a series of occasional articles, Rob Mannion G3XFD encourages Amateur Radio Clubs to promote their activities to the wider world. On the way Rob provides some suggestions, ideas and discusses how you can avoid some of the pitfalls. "Don't hide you light under a bushel" is the G3XFD mantra!

There's no doubt and it's obvious from my meetings with many Radio Amateurs within the UK, that they consider our hobby is very much an unknown 'back room' pastime to the general public. And - although I cringe a little whenever I mention it - the first thing that ill-informed journalists think of whenever Amateur Radio is mentioned is of course, **Tony Hancock** and the classic 'Radio Ham' programme.

On the few occasions during the year, whenever Amateur Radio hits the headlines in some form or other, the media sometimes think sensibly and contact those in the hobby for comment. Invariably the young journalist (it's usually someone just starting their career) has only done a little research and will know of the BBC Hancock programme. That's when the keen listener might hear a sigh of resignation coming from *PW* and other informed sources!

Don't get me wrong readers - I think the late Tony Hancock certainly made some hilarious programmes in conjunction with his essential scriptwriters, Messrs. **Galton** and **Simpson**. However, as funny as it was, the Radio Ham and the even funnier 'The Blood Donor' are humorous entertainment rather than informative documentaries. For example, how many of us would think that a pint of blood would be an 'Armful' as featured in such an enjoyably comic fashion in the programme?

Having set the scene and expressing the feeling of many Amateurs that our hobby is only 'Silly Season' news (the traditional term for when Parliament is in recession and there's not much 'hard news' about) the aim of this article is to help everyone involved in the hobby to promote our activities to the outside world.

A False Impression?

For many years, backed up by my visits to the USA, I have admired where Amateur Radio has seemingly basked in the appreciative light of public approval. An approval that is lacking here in the UK. However, I have recently had the opportunity to reconsider this (perhaps false) impression.

The opportunity to reconsider my somewhat rosy image of the public perception of Amateur Radio across the Atlantic came when I registered with the American **QRZ.com** website. This superb website has many different areas, ranging from buying/selling to chat forums and opinion slots.

I've often used the QRZ.com site as a guest (I thoroughly recommend it to *PW* readers) but I decided to register to get the full facilities. The first question I 'posted' on the website could (on reflection) have been phrased in a better way but it certainly got results! My post was entitled, "Why is the Amateur Radio hobby so respected in the USA?"

There were some very interesting replies to my first posting! Some were helpful, using historical reasons to present their argument - but some were downright rude, sarcastic and certainly highlighted the difference between our cultures! In fact, several correspondents (obviously so surprised that I would pose such a silly question) thought that the topic had been set-up as an example of humorous sarcasm! It was then I discovered that (maybe) the Amateur radio hobby in the USA doesn't have the exalted position in society as I thought!

Incidentally, I posted my topic because I wanted to get as much feedback as possible before writing this article. And, although I was rather embarrassed at some of the comments, all the feedback was helpful. In a strange way, the reaction from some of the QRZ.com correspondents re-assured me that the problems we have in promoting the hobby in the UK, Ireland and Europe aren't unique. This conclusion led me to further believe that we must all work together to blow the dust off our public image!

Success & Enthusiasm

In the USA it seems that those active in Amateur Radio have some success promoting their enthusiasm. There's also some apparent apathy as we have here in the UK.

On the positive side, one East Coast American Amateur mentioned that his club joins in a local seafood fair and festival. The response is positive, their pubic image benefits greatly and he was proud of his club's success.

This club knows how to promote itself! The Silvercoates School in Wakefield, Yorkshire is a relatively new but very busy club with some really keen young Amateurs. The club is run and organised by Nigel Wears M0SSW who literally 'fizzes' with enthusiasm for Amateur Radio and the club's activities. The club call - MX0SSW - is regularly activated at lunchtime, evening and during contests.

However, (and I found this rather surprising) it appears that CB radio has an even higher profile in the USA than I thought. A question commonly directed to American Amateurs seems to be, "Is that a CB antenna you've got on your car Sir?"

To me, the mixed response was surprising, as the American persona is mostly somewhat more flamboyant than our rather reticent approach over here! However, some UK and Irish clubs are extremely successful in promoting themselves and their activities. The *PW* newsdesk E-mail in-box is proof to that!

Unfortunately though, very often we often get correspondence asking us to, "Please look at our website to see if there's anything you can use for the *PW* news." Such correspondence is hardly likely to promote a club's image very well. Something different is needed to get a busy news editor's attention!

The Secretary & PR Officer

Many clubs appoint a special public relations/press officer but some overload their honorary secretaries by asking them to take up the job. Of course, I fully realise that nowadays fewer people within our hobby want to take up committee jobs and it's one of the main reasons why clubs close. Despite this, recently I've met several club secretaries who are only in their teens or twenties and it's most encouraging!

Once appointed, the person with your club's promotional activities should be given as much support as possible. If you have an idea - such as attending a local carnival or other special event - make sure everyone knows about it. Sometimes, we aren't the best at communicating our ideas!

Distance learning is so easy nowadays so, why not consider letting your PR/Press Officer committee member undertake a training course to help? Such courses often include advice on how to prepare press releases and news items. A course may cost as much as £300 but it could prove to be a great investment. It's also possible to share the expertise between clubs.

Additionally, why not equip your club with the best camera you can afford? Some of the photographs we get to accompany stories (often they come without photographs) leave much to be desired. It's a great pity because we really wish to do the best we can in presenting your news item. If we were to print the really bad shots, the effect could be the opposite of what you intended!

Nowadays, in-focus photographs are much easier to achieve and recently a remarkably good quality photograph of a group I was visiting was taken with a mobile 'phone camera. Even the one-use cameras with built-in flash units are effective. Don't forget, a photograph can make a story and there's no real excuse for not providing a picture in most cases.

Attracting Attention

In my own experience, attracting the attention of the 'outside world' to your club's activities can be the most difficult thing to do. Despite this, when you muster the extra effort and attract attention it can often be very worthwhile.

Your local newspaper - or radio broadcaster - may not be interested in what your club's meetings are to be in the next few weeks but they may prick their ears up if you've decided to make a carnival float look like a giant old fashioned valve! Accompanying the valve (I've seen one made from rolled up transparent pvc sheeting and black plastic for the valve base) you could have a tableau depicting the history of the hobby.

Nothing bores the news editor more than looking at lists of meetings. You really have to attract their attention with something unusual if you can **and always provide that photograph**! It may not be used but if you have a remarkably elderly or younger member at your club, the journalist may possibly see another story you've missed!

The Poole Radio Society have the right idea - their fold out publicity leaflet provides all the information a prospective club member would need. Additionally, the club makes sure that there's always someone on hand to talk to the general public during events they attend, effectively supporting their promotional leaflet.

In fact, although your club may not have many people below the age of 50, you could have a real character-in-waiting at each meeting. For example, some years ago in Lancashire I met the late **Harry Hardisty G0HHL**. I was delighted when Harry shared his story of the time he was one of the many policeman on duty at the Queen's Coronation in 1953. His story was fascinating (he was right next to a BBC television control vehicle and saw much of the drama as the engineers struggled to keep the outside broadcast on the air). Harry's experience would have certainly attracted the interest of news editors and promoted our hobby at the same time.

There can also be some amazing stories behind the efforts of people of all ages as they struggle again adversity to enjoy the hobby. Obviously, such a story has to be handled in a sensitive way to concentrate on the person's success. But with the enthusiasm demonstrated by members of the **Radio Amateurs Invalid & Blind Club** (RAIBC), such achievements often bring smiles to the faces of the most worldy-wise (and jaded) news editors.

Here To Help

As Editor of *PW* my dedicated aim is share my own enthusiasm for our hobby through the magazine, my own activities and outlook. Additionally, everyone who helps produce the magazine on the behalf of readers, is keen to help you get the best publicity and support for your club.

If you need advice on how to present an article about your club, please contact me at the office. If you need advice on photography please contact **Tex Swann G1TEX** at the office (Tex has much experience in helping to run a local club himself). **Donna Vincent G7TZB** (Group Production Editor) will also be pleased to help you regarding advice on presenting news stories.

Finally, I'm planning to produce a short advice sheet with some useful tips to help you promote your club effectively. To help me prepare the advice sheet your input would be most welcome! How about passing on your own ideas and techniques? I'm always surprised at how little I knew yesterday and how much I learned today! There's no doubt you can pass on some of your own knowledge to the *PW* team.

PW

In the Shop

with Harry Leeming G3LLL

Harry G3LLL rounds-off his chat on speech processing, before moving onto a sticky problem with the FT-101ZD and replacing relays.

Following on from the October issue, where I covered speech processing, I would like to point out that even without going to the expense of special microphones, the clarity of the audio response can often be much improved by the simple expedient of attenuating the lower frequencies. The diagram, **Fig. 1**, shows a simple local/DX switch that can be fitted to almost any microphone.

For instance, with a Shure 444 microphone, disconnecting the existing leads from the VOX switch, which is not needed with most rigs and shorting them together can easily achieve good results. You can then use this switch to either short-out, or bring into circuit a capacitor wired as shown in Fig. 1, into the live audio lead. The value of the capacitor should be chosen so that its reactance is about equal to the rig's microphone input impedance at the higher audio frequencies. This will reduce your audio gain but once the microphone gain control is advanced to compensate, you will have a rising response. This emphasises the frequency range that's required to get clear speech across.

The best value for the capacitor is subject to trial and error. This will depend on the characteristics of your voice, rig and microphone. To start, on a rig with an input impedance of 1KΩ, try 5nF, or for the older 50KΩ rigs, such as the Yaesu FT-101E, try 2nF (2.2nF). Too low a value will give a very thin sound with insufficient microphone gain. However, a little experimenting can make the difference between being read at '5&3' and 'sorry old man I can hear you there but I can't read you'. Next time, I will look at amplitude processing and limiting but for now let's move onto other matters.

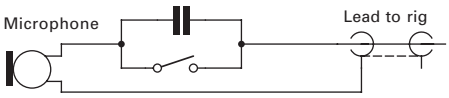


Fig.1: A simple local/DX switch that can be fitted to almost any microphone.

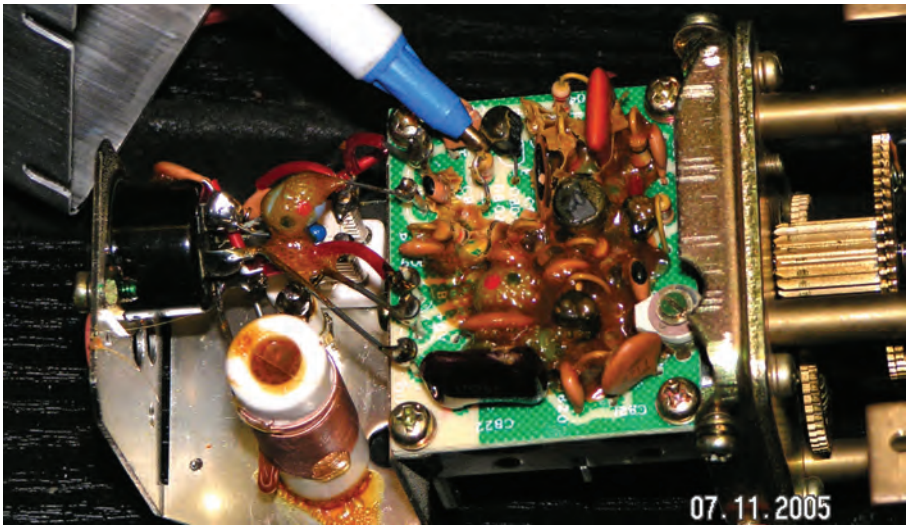


Fig. 2: Carefully picking the glue off from around the oscillator transistor, often results in problems being solved.

Faulty Glue?

I had a query from George who had a Yaesu FT-101ZD that was jumping in frequency. He seemed to know what he was doing and had tried the usual suggestions. These included cleaning the clarifier and v.f.o. push buttons, poking around to see if anything was loose, had checked that the voltages were stable and so on but all to no avail. He stated that it was difficult to check most of the v.f.o. components as they seemed to be encapsulated and asked if I had any suggestions?

To help George, I told him that a number of pieces of equipment, such as the Yaesu v.f.o.s and FDK's phase locked loop stages are covered with a rubbery glue like substance. This appears to be used to stop engine vibration modulating the frequency when they are used in mobile operation. (Yes, believe it or not the FT-101 series were designed as mobile rigs!).

The adhesive covers many components, and is extremely difficult to remove when trying to service equipment. There are various ways of tackling it and I normally try alternatively heating it with a hair dryer, then freezing it whilst attempting to pick it off with long nosed pliers. (If any readers have a better method I would like to hear from them!).

The strange thing about this glue-like substance is that once I've removed it, I have often found that the fault that I've been trying to locate has disappeared. The faults have varied from p.l.l. oscillators that would not lock, FT-290 a.g.c. systems that turned the gain down until the rig had been on for half an hour, and v.f.o.s that have drifted and jumped around in frequency.

In some cases, I might (possibly) have cured an intermittent connection in my efforts to remove the messy substance but it has happened too often for this to be always the answer. I can only presume that over many years something happens to the 'glue' to make it become conductive, or attack components but I've never been able to measure any such leak.

I suggested to George that while there was absolutely no guarantee of success, that he should carefully try to pick the glue off in the vicinity of the oscillator transistor, (as shown in **Fig. 2**). Later (Lo and Behold) he E-mailed me back and reported that a cure had been achieved and that his rig was more stable than it had been for years.

What Do I Think About the FT-102?

Bert E-mailed me to say that he had the opportunity to pick-up a Yaesu FT-102 'that needed slight attention' for only £100. What did I think? I told him that if he was capable of sorting out his own problems, then a nice clean FT-102 with a few repairable faults

could be a bargain. If, however, he would have to pay someone else to repair it my opinion was that he would be better off with an FT-101Z or ZD.

An FT-102 in good working order is superb and when they first arrived in the country I was most impressed but after years of experience with them I have had to revise my thinking. Nowadays, when I see an FT-102 I think of the little girl referred to in the poem by **H.W. Longfellow** "*When she was good she was very very good, but when she was bad she was horrid.*" This fits the FT-102 (and to be politically correct, little boys like my four year old grandson) perfectly. There are quite a few potential problem areas with the FT-102, in that the relays, the band change switch, and the p.a. stage are the most troublesome. This time, I will concentrate on the relays.

On the FT-102's r.f. board are five small relays. Of course, all rigs have relays although most other h.f. rigs, however, have no more than one on the r.f. board. Relays tend to be unreliable devices and if you fit five times as many you tend to get five times as much trouble! Add to this the fact that many of the contacts on the FT-102 relays switch only very small signal voltages (which unlike steady d.c. voltages, are not strong enough to breakdown even the slightest layer of dirt or oxide) you have a recipe for trouble.

The relays are also small and cannot be cleaned easily, which makes things even more difficult. I find that if the user does not smoke, a new set of relays in the FT-102 tends to last about three or four years. However, if the owner is a heavy smoker, the relays can start to become intermittent within a year. With the FT-102 therefore you either give up smoking, or it gives up.

Some users claim to have improved the reliability of the relays by introducing what is known as 'd.c. wetting'. This involves passing a d.c. current from a source of a few volts through the contacts. The idea is that the voltage will breakdown any thin layer of dirt or oxide that forms and make the relays last longer. This idea sounds good but without extensive trials its effectiveness is hard to prove. Perhaps any reader who has more details and full instructions would like to drop me a line?

Replacing The Relays

Of course, before you start work, completely disconnect the rig from the mains. You should note that the FT-102 has a 900V h.t. line. This appears on un-insulated terminals near to the r.f. board underneath the rig and is **extremely dangerous**. The 900V supply can hold its charge even when the rig has been switched off for days (I found out the hard way!). So, make sure that you discharge this before poking your fingers in. Removing the r.f. board to replace the relays is rather too much like hard work and can easily result in a damaged band change switch, fortunately this is not necessary and I find it best to proceed as follows.

Remove the covers from the rig and then undo the screws from the audio panel underneath. Fold the audio panel back, fasten it out of the way with a rubber band and then remove the metal 'window' in the chassis, which you will find underneath it. It's now possible to get at the underside of the r.f. board, without removing it.

Before unsoldering the relays, make a drawing of any connections or modifications that are 'tacked on', as quite a few alterations were made to the printed circuit board (p.c.b.) during the production run and the circuit may be different from that in your manual. If you forget where an undocumented capacitor goes, you will be in deep trouble when you try and fit the new relays. Note that the relay at the front underneath the spindle (RL1005) is a very tight fit, it is, however, just possible to remove it if you break-off the cover and cut the pins short before unsoldering them.

Fitting the four relays towards the back of the r.f. board is no problem, as long as you have noted which are 24V, and which are 12. But RL1005 at the front is a challenge! First, temporarily insert this relay on the wrong side of the board to check that all the pins line-up and that the holes are free, drill out the holes very slightly if necessary, so as to ensure an easy fit. When you have done this remove the relay, cut away the pin that goes to an unconnected tab on the p.c.b. and then trim the rest of the pins as short as you dare. With the aid of a little sticky tape and loads of patience it's then just possible to guide it into place under the spindle and then to solder it. Please note that as I'm no longer in the trade I cannot supply these relays. Has anyone a suggestion for a UK supplier?

Now't Funnier Than Folk!

You don't find an Amateur Radio shop on every street corner and to the local population around Johnston Street Blackburn, what we did in our shop was somewhat of a mystery. When we originally moved in we tried to increase our takings by serving the local population. We soon found that the time taken trying to explain as to why we did not repair £5 radios or giving advice about televisions, hi-fi and electronics in general, was totally unproductive.

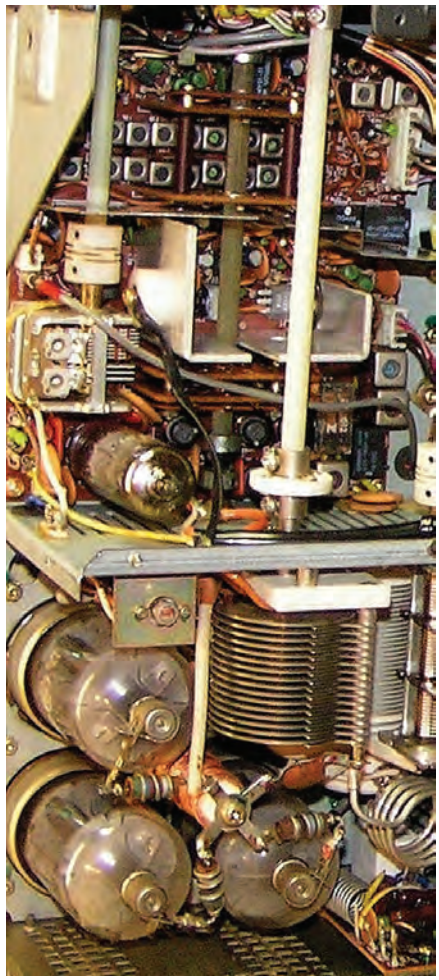


Fig. 3: The r.f. board from a Yaesu FT-102.

A real classic of a request was the customer who came in and explained that he had just moved into the area. He said that he would like to borrow an ampmeter. When I queried why, he explained that the house he had moved into had a large assortment of two and three pin mains sockets. "I am not sure whether they are 2, 3, 5, 13 or 15A sockets", he said "I would like to borrow an ampmeter so that I can check their ratings." How do you explain that one? **PW**

Harry's waiting to hear from You!

As I am now retired, I like to hear about problems with older equipment, particularly pre-1990 Yaesu rigs. If you want a direct reply send remember to send me your E-mail address or enclose a stamped addressed envelope. Send your letters to: **Harry Leeming G3LLL, 'The Cedars' 3A Wilson Grove, Heysham, Morecambe LA3 2PQ. Tel: (07901) 932763 E-mail: harryleeming@tiscali.co.uk**

Remember the mains supply is potentially lethal. Unless you really know what you are doing, always pull the mains plug out, **do not just switch off at the wall socket**, when working on equipment.

When I Was A Lad On 80 Metres

John Worthington G3COI, turns his - somewhat jaundiced - gaze towards the tattered log books covering the history of G3COI just after the Second World War.

In those days my receiver calibration was very coarse and the entire 3.5MHz band occupied a mere 30mm of the dial.

After the Second World War, a typical Amateur Radio shack often contained fairly large amounts of cheap but not worthless equipment. There would be at least one home-built transmitter, a few other home-built items such as antenna tuning units and absorption wavemeters.

There would also be a few books and QSL cards and perhaps a commercial receiver. The commercial receiver could be either one made before the war or one that was sold by the Government cheaply, as surplus, after hostilities had ceased.

Typical Saturday Morning

I'll assume that for the purposes of this article, that I'm recalling my method of operation on a typical Saturday morning in the 1940s. The first thing I'd do on entering the shack would be to switch on the receiver, by operating the switch on the separate mains power pack specially built for it.

I would have perhaps fancied a contact on 3.5MHz and decided to tune over the band to look for someone calling "CQ". But, unfortunately, on the morning in question there didn't appear to be any "CQs" about – everybody was happily working somebody else, mostly in nets. (Yes, it was like that on 80 metres even in those days).

So, I then decided to find a clear spot and put out my own "CQ". First, I would have looked at my stock of crystals (I had five covering the 'phone section of 3.5MHz).

Calibration Coarse

Unfortunately, in those days my receiver calibration was very coarse and the entire 3.5MHz band occupied a mere 30mm of the dial. I wasn't too sure of the band edge and at that time didn't have a frequency marker.

Readers may wonder how accurate my estimation of a clear frequency was! Of course, I could switch on my own transmitter and tune into zero beat with the receiver. But for a reason I couldn't fathom, the radio frequency (r.f.) gain control wouldn't attenuate sufficiently and my own signal therefore blocked the receiver.

Simple Affair

Anyway, on this particular Saturday I then decided to go ahead on 3.615MHz and switched on the power pack. The transmitter was quite a simple affair consisting of a crystal oscillator, driving a tetrode power amplifier, in class C, to about 40W .

The valve was amplitude modulated (a.m.) by a home-made amplifier and a modulation transformer of unknown characteristics. The transmitter was built on to five different chassis, placed on the shelves of an old office cabinet 1.5m (5ft) high.

At this stage only the filaments were on and I had to throw the double-pole knife switch on the table. This connected the output from the a.t.u. from the receiver to the link on the 150 x 75mm (6in x 3in) tank coil on the transmitter.

Next, I would have turned the r.f. gain down on the receiver and switched on transmitter high tension (h.t.) supply, quickly grabbing the knob on the power amplifier (p.a.) variable capacitor to tune to resonance. I would then have glanced across at my home made field strength meter.

Field Strength Meter

The field strength meter was an invaluable item and had it indicated that I wasn't radiating as well as usual, I would've quickly adjusted the setting on the a.t.u. for maximum 'smoke' before re-adjusting the p.a. tuning.

Switching on the audio I would have picked-up the microphone and started whistling and 'helloing' accompanied by feedback howl, which stopped when I found my headphones and plugged them in.

Next, with the headphones on, I would have picked up the microphone again, talking to myself and to someone called "Test". A few minutes later I would - having been satisfied with the sound of my own voice - have launched into a longish "CQ".

Finally, after the long CQ call, I would usually pronounce the magic words, "Now standing by for any possible call" (hopefully). Then, with dexterity acquired from many hours of practice, I would have cut the power to the r.f. chassis, then to the audio, knocked over the knife switch and turned up the r.f. gain on the receiver waiting for the hoped-for call.

Could Be Tedious

As readers will be now aware, with such an outfit as I had then, operating could become tedious. However, there were a few advanced Amateurs at the time who went to the trouble and expense of wiring in relays to do all the switching.

But most of my friends clung to the '3COI method almost until they acquired their first commercial transceiver – a matter of 20 or so years later! Thinking back, as one of the 'backward' Amateurs, I feel that we probably considered the additional wiring required would be something needing careful fitting and not be to easily modified!

However, in spite of the complicated operating practices of those early days I still made contacts. This was in spite of frequent equipment breakdowns and occasional bouts of deafness caused by the audio feedback!

PW

KENWOOD

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Carrying On The Practical Way

The Rev. George Dobbs G3RJV welcomes readers to his annual 'Christmas Special' edition of the COTPW column. As usual, he's got an unusual and interesting idea for you to share with other members of the family!

"Computers are like Old Testament gods; lots of rules and no mercy. "
Joseph Campbell

Welcome to this special edition of COTPW! It has become something of a *PW* tradition that I devote the December edition of this column to a project that can be built with, or for, a child or young person. This is a good excuse for leaving cold turkey and old films so we can spend a little time in the workshop. This year, in theory, you can say to your young family member, "Come with me and we will make a computer!"

I well remember once showing my two sons the 'battery-less' calculator I used at the beginning of the 1960s. It's an Otis King Model K pocket calculator; a cylindrical slide rule with three spiral scales 66 inches (152mm) long!

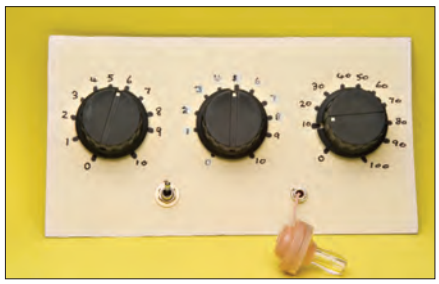
In the age when slide rules were the main calculating instruments, the Otis King was at the top of the product range. I still have it in the top drawer of my desk. My boys were not impressed by the calculator as they had only known pocket digital calculators! So, I gave them a short lesson in digital and analogue approaches to calculation, pointing out that both were simple computers: the Otis King calculator was analogue and the pocket calculator was digital. They were not impressed by that either!

Analogue Computer

I can still remember when I saw my first computer, it was in the research laboratories of a company that manufactured paint base on the banks of the river Humber in North Lincolnshire. It was an analogue computer, acquired to simulate industrial chemical processes. The exciting front panel was full of multi-turn potentiometers with detailed scales, lots of patch leads and sockets and several analogue meters.

I felt at the time, that it was what a piece of technical equipment should look like, with plenty of controls, leads, dials and indicators. But, with a few exceptions, the day of the analogue computer has gone. The old tasks they performed best have been replaced by simulation software on digital computers.

It's a pity the analogue computers have gone because I thought they looked good. However, to bring back the memories for our Christmas project, we're going to join the Flat Earth Society and build a simple analogue computer!



Remembering the days of battery-less calculators (slide rules) the Rev. George Dobbs G3RJV, decided to make an unusual analogue computer for your Christmas delight!

Wheatstone Bridge

We're also going to return to one of the classics of electrical theory, the Wheatstone Bridge, much beloved by old style physics teachers. The diagram, **Fig. 1**, shows the basic circuit arrangement for the Wheatstone Bridge.

The circuit idea is usually credited to **Sir Charles Wheatstone** but it was first described by **Samuel Hunter Christie** in 1833. Wheatstone read of the idea in the 1840s and adapted it for several practical ideas and hence it became credited to his name.

The fundamental idea of the bridge is two voltage dividers fed from the same input voltage, shown in Fig. 1, coming from the left. The bridge output is taken from both voltage dividers and in this case is a meter.

In my school days a galvanometer (a sensitive d.c. current meter) was connected to the output. The purpose of the meter is to measure the balance between the two voltage dividers.

WM3126

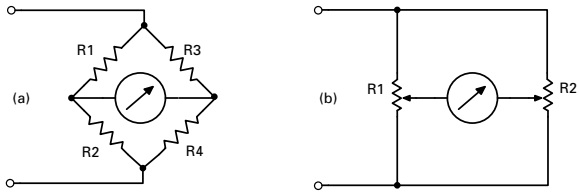


Fig. 1: Circuit of the classic Wheatstone bridge, which forms the basis of this month's project (see text).

Fig. 2: Simulating a bridge circuit using two potentiometers.

WM3127

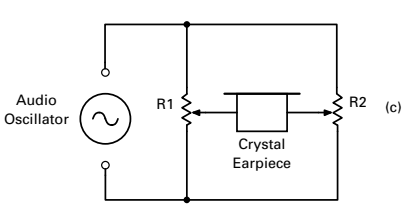


Fig. 3: Moving coil meter movements are expensive nowadays and G3RJV suggests this circuit to provide audio indication of the bridge 'null'.

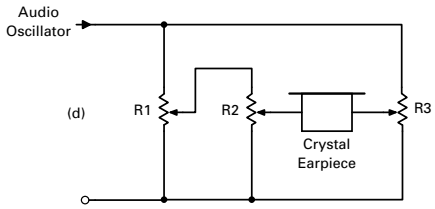


Fig. 4: Using two separate potentiometers provides betters results.

When the two voltage dividers have exactly the same ratio, that is when R1/R2 = R3/R4, the bridge is balanced and no current flows through the meter. If the resistance of R1, R2, R3 or R4 changes, even by a small amount, the bridge goes out of balance and current is detectable in the meter. In essence the meter is a 'null' indicator to show the balance condition.

Two Potentiometers

The diagram, **Fig. 2**, shows how the bridge can be simulated with two potentiometers (R1 and R2). If a voltage is applied across R1 and R2, as shown, the potentiometer wipers can be rotated to the centre of their tracks to produce no reading on the meter.

A centre zero meter is really required, as the off-set can be in the positive or negative directions. In practice, this is how a Wheatstone Bridge is commonly used. Although meter readings could be taken to work out an unknown value in the bridge, the arrangement is at its most sensitive when a null reading is used. Good moving coil meters are expensive items, so an alternative method is shown in **Fig. 3**. Here the input voltage is replaced by a signal from an audio oscillator and the meter is replaced by a crystal earpiece.

A crystal earpiece is used because, as a high impedance device, it requires less current drive. High impedance headphones could also be used.

The operation is the same as when a meter is used, as if the audio signal at the output of R1 and R3 is balanced there will be a null and no sound will be heard in the earpiece. This arrangement is usually called an a.c. bridge. This is a good method of detecting a null as the null point with no signal in the earpiece is very distinct.

Everything I've discussed so far, has been leading to the circuit shown in **Fig. 4,** where on the left side of the bridge, two potentiometers replace the single potentiometer. The total audio signal is fed to the top of R1 and the potentiometer wiper picks off a portion of the signal dependant upon its position on the resistive track.

The portion of audio signal is fed to the top of R2, the wiper of which picks-off a smaller portion of the audio signal. This goes to one side of the earpiece. The other side of the earpiece is connected to the wiper of R3, the top of which receives the full audio input signal.

Wipers Centred

Let's now look at what happens if R1 and R2 are set with their wipers in the centre (half way along the track). In this situation half of the signal will appear at the top of R2 and half of that (a quarter) will appear at one side of the crystal earpiece.

Then, R3 will have to be set a quarter along the track to produce the null in the earpiece. In effect, this simple little circuit would actually have performed a calculation, as half-times-a-half equals a quarter.

If all three potentiometers have linear tracks and a pointer knob, we could mark an evenly spaced scale around the knob to represent the resistance change. If R1 and R2 have scales marked '0 to 10' and R3 has a scale marked '0 to 100', when R1 is set on '5' and R2 is set on '5', R3 will be set at '25' to produce a null.

Here's a real calculation; 5 x 5 = 25 (or it could be 25 ÷ 5 = 5). This will work for any other proportionate changes in R1 and R2. This means we have a simple calculator which will work out multiplication, division and proportions. It's an electronic slide rule or an analogue computer!

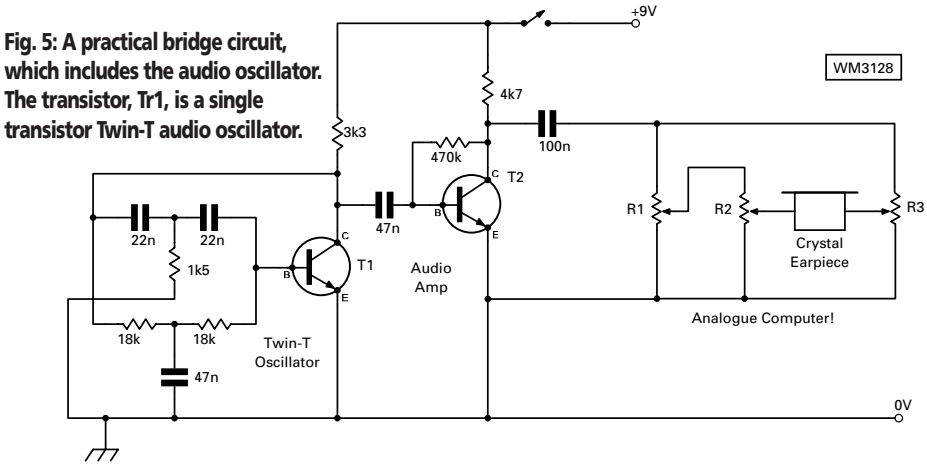


Fig. 5: A practical bridge circuit, which includes the audio oscillator. The transistor, Tr1, is a single transistor Twin-T audio oscillator.

Practical Circuit

The diagram **Fig. 5**, shows a practical circuit that will do the whole job and includes the audio oscillator. The transistor, Tr1, is a single transistor Twin-T audio oscillator.

Please note that the resistive and capacitive feedback networks between the collector and base. The values given will produce a pleasant sounding sine waveform with a frequency around 700Hz.

The transistor, Tr2, acts as a single stage audio amplifier to provide greater audio signals to allow a more definite null. in practice Tr1 and 2 could be almost any common small signal *npn* device. I used the 2N2222A – as I often do. Other devices like the BC107, BC108, BC109 or 2N3904, etc., would all serve the purpose. A capacitor (100nF) feeds the audio signal to the little computer circuit.

The COTPW Computer

Now for the computer! However, before we start, please remember that R1, 2 and 3 must all have linear tracks.

Note: A potentiometer marked with the value followed by B should be a linear tracked component but, sadly, life is not that easy! The B suffix denotes the more recent coding. However, older potentiometers used a code which denoted A for linear, whereas the A suffix is now used for a logarithmic track! I advise that you take care. If you're ever in doubt, try rotating the shaft with an ohm-meter connected between one end and the centre (wiper) contact. The reading should increase gradually for a linear track and the half value of resistance will be in the centre of rotation.

Ideally, physically large potentiometers would be best. The longer the track the better the accuracy, but these days most potentiometers are quite small. However, what is important is to have a large knob for each potentiometer to provide an easier-to-read scale.

A typical potentiometer has about 270° of rotation between each end. It would be possible to calibrate the scales by measuring the angles but I think it's best done using voltage measurement.

I have a stabilised variable power supply, which I use, connecting 10V across each potentiometer in turn and mark out the scale by reading the voltage at each wiper connection. **Note:** R1 and 2 are calibrated 0 to 10 and R3 is calibrated 0 to 100. (Connect all three so that zero volts appears at the left-hand end).

In practice, the values of R1, 2 and 3 may depend upon what is to hand. **Important note:** R1 and 3 should to be the same value and R2 needs to be a substantially greater value. In my prototype R1 and 3 were 10kΩ, while R2 was 100kΩ and these values worked well in the circuit.

If a crystal earpiece or high impedance headphones aren't available a simple audio amplifier could be used as the null detector. In that case the audio amplifier stage provided by Tr2 may not be required.

It's a very unusual Christmas project and with very few parts and a little care, we've built an analogue computer. It may not be very impressive but it can do calculations!

PW

Practical Wireless Index 2006

Volume 82 January to December 2006

Index of Antenna, Features, Practical Projects, Reviews & Theory articles

Features

Doing It by Design by Tony Nailer G4CFY

Reviews

Technical for the Terified by Tony Nailer G4CFY

Theory

Supplements, Free Gifts & Special Offers

Just What Is *Q*?

Martti Nissinen OH4NV, set out to answer the - often ignored - question of a circuit's *Q* figure. He argues that finding *Q* is easier than you might think!

During the wonderful early years of wireless radio technology (around 1910-25), a circuit's quality factor, *Q*-value, remained unknown in the then growing radio literature. The birth of the superheterodyne receiver put more pressure on the topic of selectivity and the quality of the tuned circuits became an important factor. Today, we know that resonant circuit's *Q* is $^{Xs}/_{Rs}$ (series reactance divided by series resistance) or $^{Rp}/_{Xp}$ (parallel resistance divided by parallel reactance) with respect to the circuit in question. But fundamentally, even today, we may still ask "What is *Q*?"

From textbooks we find the exact definition for a resonant circuit's *Q* is given by:

$$Q = \frac{\text{Energy stored in a circuit}}{\text{Energy dissipated in a circuit during one cycle}}$$

The numerator of this ratio includes the instant peak energy that the peak current stores in a circuit's coil (for example). The word 'store', perhaps, is not quite exact, since the storing is for a very brief instant during each cycle. There is no cumulative 'storing' in the terms above the line.

From physics books we get the formula for this energy, W_{coil}, as:

$$W_{coil} = \frac{I_p^2 * L}{2}$$

where I_p is the peak current and L is the coil's inductance. The term below the line, the denominator, is the circuit's losses, such as energy dissipated in loading resistance(s). The average energy is calculated in the normal way:

$$W_r = \left(\frac{I_p^2 * r}{2}\right) t$$

where I_p = peak current, r is the series resistance and t = time.

Original Definition

You may have wondered why, in my original definition, the denominator says: energy dissipated in a circuit during one cycle? The explanation is, that in the denominator, the energy dissipation is cumulative, in that energy lost increases continuously with time.

Checking the energy put in and lost during one cycle makes the energies above and below the line comparable. By dividing the denominator (losses) with the term $2\pi f$ brings the losses to a single cycle state. Sometimes the constant 2π is written at the front of the main definition as the basic multiplier.

Let's now look at how to derive the *Q* of series circuits, **Fig. 1**, is:

$$Q_s = \frac{I_p^2 * L}{\left(I_p^2 * r_s\right)\frac{1}{2*\pi*f}} = \frac{2*\pi*f*L}{r_s} = \frac{x_s}{r_s}$$

And to determine the *Q* of a parallel circuit, **Fig. 2,** *Q* is calculated as:

$$Q_p = \frac{U_p^2 * C}{U_p^2\left(\frac{1}{R_p*2*\pi*f}\right)} = \frac{U_p^2*C*Rp*2*\pi*f}{U_p^2} = \frac{R_p}{x_p}$$

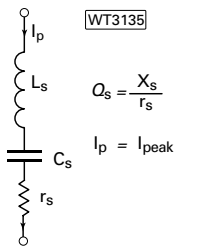
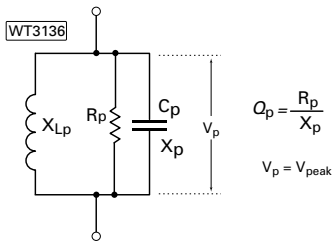


Fig. 1: A series circuit with all the components in series then circuit losses are all due to the current flowing through the circuit elements.



Thus we have reached safely the starting claims, i.e. $Q_S = {}^{x_S}/_{r_S}$ and $Q_p = {}^{R_p}/_{X_p}$. We started from the instant energies (per unit time) and arrived at the component ratios. With the L/C circuits the *Q*-calculations are well in control, but with antennas, for example, some problems make exact calculations somewhat difficult. Let's now consider antenna *Q*.

Antenna *Q*

The *Q* of a resonant antenna is calculated basically the same way as the *Q* of a resonant circuit. Antenna *Q* is proportional to the ratio of the energy stored in the antenna's reactance to the sum energy transmitted by radiation and lost in the elements by heat. The idea may be clear, but in practice the resonant antenna's reactance is hard to find or calculate.

Fortunately there's another way to calculate the antenna *Q*. Since half power bandwidth is proportional to the *Q* of an antenna, it's possible to use s.w.r. measurements, and calculate the antenna *Q* from these. Once you have the antenna's *Q*, you can then define the antenna's reactance if that is needed. The relationship between the half power bandwidth (B_{3dB}), the $Q_{antenna}$ and the operating frequency, f_o, is:

$$Q_{antenna} = \frac{f_o}{B_{-3dB}}$$

When considering the *Q* for an antenna, it's interesting to know that, at the -3dB or half-power points, the s.w.r. will have risen to 5.82:1.

Well there you have it! Answering the question of *Q* is easier than you thought!

PW

Fig. 2: In a parallel circuit, the circuit losses are due to the voltage across the circuit elements.

Valve & Vintage

Phil Cadman G4JCP seems to have abandoned his normal brown dust coat this month, instead he's wearing a bright red coat with a sprig of berried holly in his lapel while he discusses valve filaments and the Homodyne and Synchrodyne types of receiver.

Compliments of the Christmas Season to one and all and welcome to a suitably festive Valve & Vintage 'shop' for my final column of 2006! Amongst others things, I've a rather interesting receiver design for you this time. But before moving on to that, there's a couple of other subjects I'd like to mention first.

Last time, I asked if anybody had any thoughts regarding under-running valve heaters/filaments. Over-running valve heaters is certainly detrimental to their longevity and valve manufacturers don't (as a rule) recommend operating valve cathodes below normal operating temperature either.

However, I did wonder if under-running is, in anyway, harmful, providing there is always sufficient electron emission available? I received an interesting reply from **Richard Martin M0LLY**.

In the 1960s, Richard worked for a company, which - at that time - specialised in chemical analysers. He recalled a pH meter the company designed and built, which used valves with under-run heaters. Specifically, the unit's 6.3V-valves were run at 5 to 5.5V.

Richard told me that under-running helped with both stability and reliability. Indeed, the instruments proved extremely reliable, working for many years with very little maintenance. Thank you for your comments Richard!

From Richard's information, it seems that under-running heaters isn't necessarily detrimental and can actually prolong the life of a valve. Of course, it all depends on the cathode material and the valve's function. Under-running the cathodes of power valves is certainly not recommended!

Astatically Wound Coils

A letter from **M. J. Hanslip** of Southampton, in Hampshire, queried the use - years ago - of **astatically-wound** coils. He told me that he'd found a reference to these coils in a book by **Ralph Stranger**. Entitled *The Outline Of Wireless (OOW)*, the book was first published by Newnes in 1931 (the original publishers of *PW*).

As it turns out, I also have a copy but mine is a reprint from 1942. The book is a comprehensive tome of some 800 pages and must have been very popular in its day, as between 1931 and 1942 it was reprinted 12 times!

There's also a description of an astatically-wound coil in my circa-1930 edition of the *Newnes Wireless Constructor's Encyclopaedia*. Edited by *PW*'s first Editor **F. J. Camm**. The book states, "An astatic coil is one wound in two sections, half of the winding being on one coil and half on the other, but wound in the opposite direction."

In his own book, *OOW*, Stranger elaborates, "One half is wound in one direction and the other half is wound in the other direction in order to neutralise the external electric and magnetic fields. Such a coil is desirable for satisfactory working of a screened-grid valve."

An interesting set of quotes! I've come across astatic coils in sensitive galvanometers and the like, where winding the coils as described it helps them reject external magnetic fields. However, I've never seen one used in a radio application. To be honest, I don't see the advantage of such coils over conventional (screened) coils.

Perhaps astatically-wound coils are beneficial when coils are physically large and there's an increased possibility of mutual coupling leading to instability? That would seem to fit in with the point in Stranger's book about the coils as being desirable for use with screened-grid valves.

When introduced, screened-grid valves provided much higher stage gains than was possible with triodes. It was then that problems of instability in sets (with insufficient screening between stages) increased considerably.

I'm left wondering, were astatically-wound coils genuinely used to prevent instability? Or were they simply a bit of a sales gimmick? I'd very much like to hear from anyone who has any knowledge or information about these coils.

Incidentally, while leafing through the *Constructor's Encyclopaedia*, I came across this rather telling entry: "Antennæ - Obsolete term for aerial." (And that was in 1930). So now you know*!

*****That's why PW uses **antenna** (singular) and **antennas** (plural) and not antennae Phil! **Editor**.*

Superhet Versus TRF

A few months ago I received a letter from **John B. Dickinson** of Tamworth. He asserted that a well-designed t.r.f. receiver could out perform a superhet. (I think that's probably true in certain circumstances John).

While commercial radio manufacturers have no choice but to produce superhets, enthusiasts can make t.r.f. sets if they wish. Indeed, for listening to local stations - which is what most people do - a well-designed t.r.f. can give excellent results*.

***** *An interesting observation Phil. Readers who use ZN4124/MK484 t.r.f. one chip receivers consistently claim they provide better audio quality.* ***G3XFD***

Homodyne & Synchrodyne Receivers

I continued to think about what John had said, and eventually I remembered Homodyne and Synchrodyne receivers. These are t.r.f. sets, which can be thought of as direct-conversion receivers for amplitude modulated (a.m.) transmissions.

Instead of using an envelope detector (or any other kind of asynchronous detector), these sets use a synchronous detector to demodulate a.m. signals.

Briefly, after any necessary r.f. amplification, the amplitude-modulated signal (still at the original carrier frequency), is multiplied by the output of a phase-locked local oscillator running on exactly the same frequency as the wanted signal. Incidentally, some of the better a.m. broadcast receivers use a related detection technique **but at the intermediate frequency**. In these circumstances it's often called exalted carrier selectable sideband reception (ECSS) reception

The terms Homodyne and Synchrodyne were - and are - often used interchangeably. This is probably because the Homodyne was enhanced through the years into a receiver comparable to the Synchrodyne (the original Homodyne receiver was a very simple affair).

Having two names for the same receiver was clearly unsatisfactory and so it appears that back in 1954, the author of a paper

published in the *Journal of the British Institution of Radio Engineers* suggested the following distinction. (See **www.thevalvepage.com/radtech/synchro/synchro.htm**)

Separate Local Oscillator

A Synchrodyne receiver is characterised by having a separate local oscillator (l.o.), which is phase-locked to the incoming carrier. In the absence of a received carrier, the oscillator free-runs.

Conversely, a Homodyne receiver does not have a local oscillator. The 'local oscillator' signal is generated by amplifying and limiting the received carrier. Of course, in the absence of a received signal there's no local oscillator injection but that's not really a problem.

The diagram, **Fig. 1**, shows a simplified circuit of a Synchrodyne receiver. It's based on an experimental design by **G. A. French**, which was published in the February 1955 issue of *The Radio Constructor*. According to French, his circuit was based on a design by **'**Cathode Ray**'**, which appeared in the August 1948 issue of *Wireless World*. Both articles are well worth a read.

The operation of the circuit is quite straightforward, the tuned circuit formed by L1 and C1 is adjusted to the frequency of the wanted transmission. The signal appearing across L1/C1 is then fed to two cathode followers - V1 and V2. The l.o. (V3) is also tuned - by means of L3 and C10 - to the frequency of the wanted transmission. The 'sync' (synchronisation) control (R8) is then adjusted so that a sufficient proportion of the wanted signal is fed to the cathode of V3, in order to lock the oscillator frequency to that of the incoming carrier.

The locked l.o. output is inductively coupled - via L4 - to a Cowan modulator (D1 to D4), although in this application the modulator is actually a demodulator. In fact, this is the only part of the circuit that needs further explanation.

When the induced voltage in L4 is such that it provides reverse bias to D1 to D4, all four diodes effectively 'disappear' from the circuit. Hence the signal present at the junction of R5 and R6 is unaffected, and subsequently appears across C4, which forms a low-pass filter with R6.

When the voltage across L4 reverses polarity, all the diodes conduct heavily and any signal present at R5/R6 will be shorted to ground. The polarity of the signal doesn't matter, as the current through the diodes completely swamps the (relatively small) signal current, whatever its direction.

The net result is that alternate half-cycles of the signal are removed, leaving an half-wave rectified signal voltage at the junction of R5/R6. This is then low-pass filtered by R6/C4 and fed to an external audio amplifier.

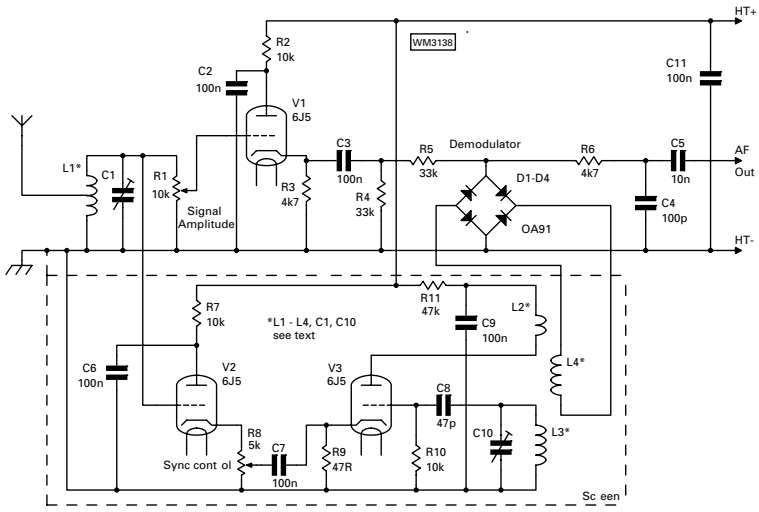


Fig. 1: A simplified circuit of a Synchrodyne receiver. The design was by G. A. French and was published in the February 1955 issue of *The Radio Constructor*.

Detector Difference

What makes the synchronous detector different to the envelope detector (found in conventional radios), is what happens to unwanted signals adjacent to the wanted signal. An envelope detector simply responds to the relative amplitudes of all the radio frequency signals presented to it, and produces an average of all of them.

The synchronous demodulator, on the other hand, produces difference frequencies. These are equal to the frequency separation of the wanted and unwanted signals.

Long and medium wave stations, with international agreement, operate 9kHz apart. Because of this an unwanted signal on an adjacent channel will produce a continuous audio tone of 9kHz.

There will also be other components if the unwanted signal is modulated. An unwanted signal two channels away will produce an output of 18kHz and so on. These unwanted audio components can be removed very effectively by a low-pass filter which has a rapid roll-off.

In short, whereas a conventional t.r.f. receiver achieves its selectivity through filtering (and possibly regeneration) at the signal frequency (a superhet receiver achieves the same through i.f. filtering), a Synchrodyne/Homodyne receiver achieves all its close-in selectivity through audio filtering. And of course, sharp audio filters can be constructed far more easily than comparable radio-frequency filters.

The Disadvantages

There are disadvantages, particularly with the simple circuit shown in Fig. 1. Most important is the lack of sensitivity so, a good antenna is essential.

In addition, tuning the receiver is not straightforward! Both C1 and C10 have to be tuned to the frequency of the desired signal. This has to be done with the sync' control at minimum setting, if attempted otherwise there will be an undesirable interaction between each adjustment. The sync' control is then adjusted to lock the l.o. while the signal amplitude control is adjusted to give the best audio.

In fact, the simple set, shown in Fig. 1, is best used as a single-station receiver. Although it could be used to receive two or three stations by using switched trimmers at C1 and C10.

Classic Pre-amplifiers

Thinking about sharp audio filters reminded me of some of the classic pre-amplifiers from the 1950s and 1960s. They were often fitted with either resonant LC or active RC audio filters, which had a beautifully flat response in the pass-band, and then dropped-off like a stone. The Quad 22 and 33 Control Units, and the Leak Vari-Slope series of pre-amplifiers immediately spring to mind.

Although such filters were designed to remove high-frequency noise from gramophone records, they would also make ideal filters for Homodyne/Synchrodyne receivers. Particularly as they usually have a notch at some frequency in the stop-band. Tuning the notch to 9kHz would effectively remove unwanted heterodynes produced by adjacent stations.

Ah, the end of the page beckons, so I'd better remove myself too. I sincerely hope you all have a good Christmas and New Year, and I'll hopefully be back in the V&V 'shop' next year. Until then, please send your comments and letters to me, either via E-mail to: **phil@g4jcp.freeserve.co.uk**, or by mail to: **21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX**. Happy Christmas everyone! **PW**

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VHF DXer

REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

DAVID G4ASR CONTINUES TO TAKE A LOOK AT THE SUMMER SPORADIC-E OPENINGS ON THE 144MHZ BAND

Only one 144MHz Sporadic-E (Sp-E) opening was reported in August, bringing to a close what must be one of the best seasons on record for this type of propagation. The opening, on Sunday August 13, was really excellent and as it coincided with the Perseids meteor shower it meant that many v.h.f. DXers were already active on the144MHz band.

The opening, as shown in the diagram, **Fig. 1**, consisted of three separate events. The first was between 0950-1030UTC to Albania (ZA), Bosnia-Hercegovina (T9), Macedonia (Z3), Montenegro (YU6, 4O) and Greece (SV). The second event occurred between 1055-1148UTC to a similar area with 144MHz contacts being made into SV, T9, ZA, Z3, 4O, Bulgaria (LZ), Croatia (9A), Poland (SP) and Serbia (YU). The final opening of the day, (and of the summer season) was a brief event between 1215-1230UTC to OM5LD (Slovakia) and at 1230UTC a solitary reception report of UA6MA (KN97) who was heard calling "CQ" on 144.300MHz over a two-hop path of 2846km.

Paul Pasquet G4RRA (Devon IO80) uses an Icom IC-275H transceiver driving a pair of GU74B tetrodes and a pair of 10-element Yagis, reports that he was very happy to work two new locator squares and 4O3T (Montenegro) for a new country. His contacts made between 1111-1148UTC included the s.s.b. stations of T98GTH, YT1VP, YU1AIF, YU1EV, YU1JB, YU1TT, YZ1RA and 403T on c.w. All of his contacts were made over path lengths ranging from 1700 to 1950km. Paul also made some excellent contacts over 2000km with the s.s.b. stations of YU1DGH (2077km), LZ1QB (2257km), LZ1ZP (2370km), LZ2FO (2136km) and LZ9X (2425km).

Dave Edwards G7RAU (Isle of Wight IO90) comments that he easily 'smelt' the opening coming as the Perseids meteor shower often triggers a Sp-E event nearly every year. There's nothing like a few tons of metallic material dumped in the Ionosphere to help things along! Running a Yaesu FT-757 transceiver driving a Mutek transverter into a 400W amplifier and a pair of 17-element Yagis, he made some excellent s.s.b. contacts on August 13 between 0950-1020UTC. His QSOs included the stations of SV2JL (KN10), SV2KGA (KN10), YU6AO (JN92), Z35Z (KN11) and J48XG (KN20).

The stations of J48XG and J48YA were operated by HA4XG and HA1YA during their expedition to Thassos (EU174), a Greek island in the Aegean Sea. The group was running an Icom IC-746 transceiver, a GS35B amplifier and a 10-element DK7ZB Yagi. In the second opening of the day between 1107-1145UTC, the 144MHz station of G7RAU contacted 7 x LZ (Bulgaria), 15 x YU (Serbia), 6 x 9A (Croatia), T98GTH (Bosnia-Hercegovina) and YO3FFF/P (Romania). A few minutes after that opening had finished David heard the station of EV3M (Belarus) in a local QSO but unfortunately, couldn't attract his attention.

Mike Jupp G1HWY (West Sussex IO90) reports that the opening was very patchy at his QTH, although signals were very strong at times. This often happens with Sp-E propagation and stations only a few kilometers apart may receive all or none of the DX signals. Using an Icom IC-706 MkII2G transceiver running 50W output, he contacted the s.s.b. stations of T98GTH, YT1VP, YU1DGH, YU1EV and YU1TT.

Colin Roberts G4ZFJ (Essex JO01) mentions that he was pleased to work two new countries, Macedonia (Z35Z) and Montenegro (YU6AO) and three new locator squares. Using an Icom IC-275H transceiver running 100W output into a 9-element Yagi, he also contacted SV2JL (KM10), LZ2FO (KN13), YT1VP (JN94), YU1AIF (KN03), YU1EV (KN04), 9A4NF (JN73) and 9A6R (JN83).

Steve Eldridge G8IZY (West Sussex IO91) reckons that the 2006 Sp-E season has been one of the best ever. The month of June was fantastic with 15 DXCC countries (CT, EA, HA, I, LZ, OK, OM, RX, SP, SV, UT, YO, YU, Z3 and 9A) being worked. Steve then went on to work EA on July 7, LZ and YU on July 6, IT9 on July 9, CT, EA and EA9 on July 16 and EA, EA8 and IS0 on July 26.

The station at G8IZY consists of a Kenwood TS-700G transceiver with a home-brew front-end consisting of a MGF1302 and SRA1-H mixer, a 4CX250B amplifier and a 9-element M2 Yagi on the house chimney at 13m above ground level. In the opening on August 13, Steve made s.s.b. QSOs with the stations of SV2JL, YT1VP, YU1AIF, YU1DGH, YU1EV, YU1TT, YU6AO and Z35Z. This year, his new countries worked on the 144MHz band have been Z3 (DXCC 48), EA8 (49) and YU6 for the half-century.

The highlight of the season for Steve was a contact with EA8BPX (Canary Islands IL18) over a path length of 2875km. He never imagined that EA8 would be possible from his QTH, especially as he has a poor take-off in that direction. As I've mentioned many times before, it's just a matter of being in the right place at the right time. And the only way you can achieve that is to be regularly active on the v.h.f. bands!

Gianluigi Sartori T98GTH (Bosnia JN84) mentions that this was the best Sp-E opening that he has ever experienced. At his QTH, the 144MHz band was open simultaneously in two directions, to Russia and to the UK. Gianluigi (also known as IV3GTH) uses a Yaesu FT-897 with a 150W amplifier and a 16-element F9FT Yagi. Between 0930-1000UTC he made contacts in an easterly direction with RA3WDK, RK3WWF, RW3XR, RX3QFM, UA3ARC, UA3WM and UY0UP. Swinging the beam, he then started making contacts with UK stations that included G0KPW, G1HWY, G3BNE, G3WZT, G4DBL, G4IGO, G4LOH, G4RGK, G4RRA, G7RAU, GW8ASA and M5BXB.

A number of Bulgarian (LZ) stations were also active during the openings on August 13 and appeared to be just in the right place at the right time. **George Nestorov LZ1ZP** (KN22) had a fantastic time during the opening by working 6 DL (Germany), 5 ES (Estonia), 2 x EW (Belarus), 15 F (France), 9 HB9 (Switzerland), LY2BAW (Lithuania), OE5MPL (Austria), OH4LA (Finland), 2 OK (Czech Republic), 8 ON (Belgium) and 29 PA (Netherlands) stations. Running a 4X150A tetrode amplifier and a 10-element DJ9BV Yagi, George also contacted the UK stations of G3LTF (2221km), G3WZT (2134km), G4AEP/P (2181km), G4BWG (2144km), G4IGO (2306km), G4RRA (2370km best DX of the opening) and G7RAU (2193km). An amazing 86 s.s.b. QSOs!

The 144MHz station of **LZ2FO** (KN13) running a Kenwood TS-770E transceiver, a 500W power amplifier and a 15-element Yagi made 83 s.s.b. contacts, which included the UK stations of G1SDX, G3LQR, G3LTF, G4AEP/P, G4CQM, G4FUF, G4LOH, G4RRA and G4ZFJ. He also worked J48XG (Greece), OK1DTC, 23 DL, 25 F, 6 HB9, 2ON and 16 PA stations.

Rady Nikolov LZ2ZY (KN13), using a

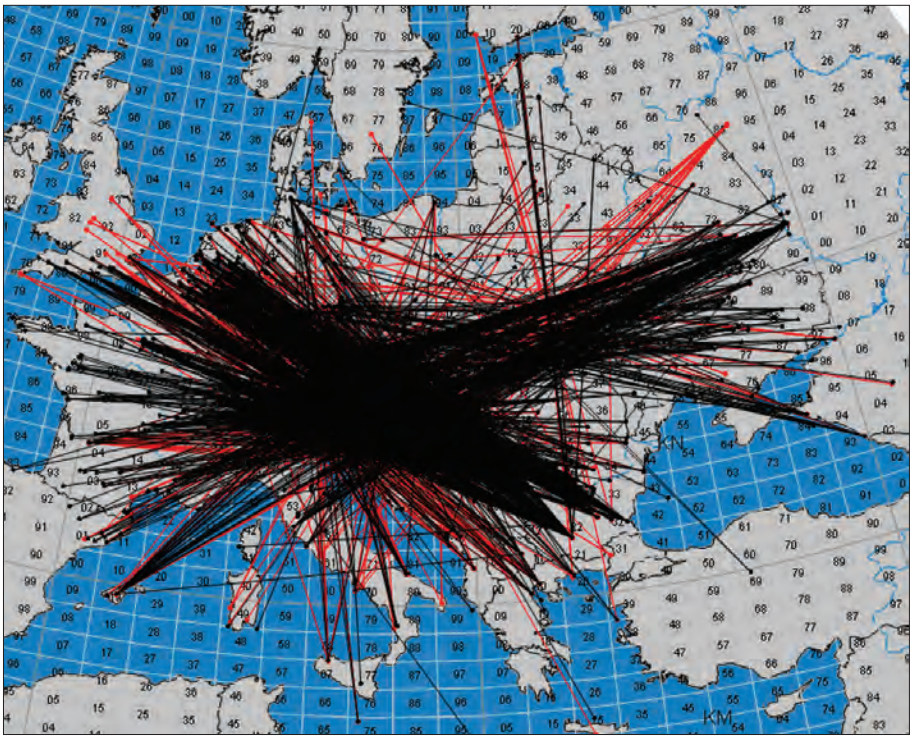


Fig. 1: The Sp-E opening on 13 August 2006.

Fig. 2: Four 10-element DK72B Yagis at the QTH of OK1KUK.

Kenwood TS-780 transceiver, a 250W amplifier and a pair of 9-element Yagis contacted 20 x DL, 22 x F, 9 x HB9, 12 x ON and 12 x PA stations as well as G4CQM (IO70) for best DX of the event at 2212km, G4IGO (IO80), G7RAU (IO90) and GW8ASA (IO81). A total of 79 QSOs!

Running 150W into a 7-element DK7ZB Yagi the Macedonian station of **Dime Jakovlev Z35Z** (KN11) contacted EA6VQ, OK1KT, 33 x DL, 5 x F, 16 x ON, 12 x PA stations and UK stations G3LTF (2085km), G3WZT (2023km), G4BWG (2001km), G4CBW (2277km), G4FUF (1970km), G4IGO (2165km), G4KWQ (2178km), G4RGK (2054km), G4ZFJ (1955km), G6HIE (2023km), G7RAU (2053km), G0KPW (1958km), G0ORG (1905km) and M5BXB (2015km). An excellent 81 QSOs completed, although Dime mentions that he would have liked to work more UK stations but there was a very loud wall of DL, ON and PA operators calling at the same time.

Emilio Cutolo ZA/IK0OKY (JN61) reports that this was his best 144MHz Sp-E opening since being in Albania for the last three years. He is using a Yaesu FT-100D transceiver running 50W into a 5-element DJ9BV Yagi and made 43 s.s.b. contacts into DL, ON, OZ, PA, SM, SP and with the stations of G4RGK (IO91) and G0KPW (JO02).

SPORAIDIC-E SUMMARY FOR 2006

In my opinion, this year's Sp-E season on the 144MHz band must go down as one of the best ever. It started in May with two days of openings on May 12 and 17. Conditions on the 144MHz band in June were fantastic, with 20 days of long-distance openings being reported by UK stations. Indeed, during the first two weeks of June it seemed as if there were Sp-E openings every single day. However, on 11 of these days there was more than one opening throughout daylight hours and I've calculated that at least 36 discrete Sp-E events occurred in June. For the record they were reported on every day between June 3-14, 18-22, 24-25 and 27. That's truly amazing!

Around 35 countries at Sp-E distance (not less than 1000km) were worked from the UK in June but not all of these were in the 'traditional' south-easterly direction. During June, there were a number of 144MHz Sp-E openings to northeast Europe with contacts being made into northern Scandinavia, the Baltic area and Russia. This is most unusual!

The great thing about Sp-E propagation is that it enables low power stations with a small antenna to make some remarkable contacts. **Roger Adkins M3AOM** (West Midlands IO92) reports that on June 12 at 1704UTC he made his best contact so far on the 144MHz band when he worked LZ2ZY (KN13). This contact, over a 2088km path. proves that you don't need a mega set-up to work DX on 144MHz, as Roger only uses a Yaesu FT-480R transceiver running 10W into a 9-element F9FT Yagi.

In a similar vein **Mark Dean MW3HQT** (Carmarthenshire IO81) mentions that on June 18 at 1130UTC he contacted EA3DXU (JN11) with 59 reports both ways. His set-up is a Kenwood TR-9130 transceiver running 10W into an 8-element Yagi. Mark says that as he lives in a valley with mountains all around, the s.s.b. contact really made his day.

There were slightly less Sp-E events in July but nevertheless a total of 13 days of openings on the 144MHz band is still very good. On a number of days, though, there was more than one opening and my records show that at least 25 separate Sp-E events were observed from the UK during the month. The openings were reported on July 1, 5, 6, 7, 9, 12, 13, 14, 16, 17, 20, 23 and 26.

Unlike June, all of the Sp-E paths from the UK in July were in the more normal southerly direction to southeast Europe, the Mediterranean area, northern Africa (CN, EA9) and Atlantic islands (EA8, CU). And, as I've just reported, there was one Sp-E opening in the following month on August 13. Even so it was an excellent event with three separate phases.

To sum up, there were 36 days between May 12 to August 13 when Sp-E openings occurred on the 144MHz band and during this period there were a minimum of 64 discrete events. For the record, the 40 DXCC countries worked on s.s.b. from the UK this summer season were Albania, Algeria, Austria, Azores, Balearic Islands, Belarus, Bosnia-Hercegovina, Bulgaria, Canary Islands, Ceuta, Corsica, Croatia, Czech Republic, Estonia, Finland, France, Greece, Hungary, Italy, Latvia, Liechtenstein, Lithuania, Macedonia, Malta, Moldova, Montenegro, Morocco, Poland, Portugal, Romania, Russia, Sardinia, Serbia, Sicily, Slovakia, Slovenia, Spain, Sweden, Switzerland and Ukraine. Never let it be said that there is no DX activity on the 144MHz band!

DEADLINES

Well I've managed to get up-to-date with all the Sp-E openings on the 144MHz band but I still haven't found space yet to report about all the fantastic DX that was worked on the 50 and 70MHz bands! Maybe next month.

In the meantime, if you want to report any DX worked on the v.h.f., u.h.f. or microwave bands then please send me an E-mail before the last weekend of the month.

73 David G4ASR

DAVID BUTLER G4ASR
YEW TREE COTTAGE
LOWER MAESCOED
HEREFORDSHIRE HR2 0HP
TEL: (01873) 860679
E-MAIL: g4asr@btinternet.com

HF Highlights

AS USUAL, INFORMATION, REPORTS AND PHOTOGRAPHS TO ME PLEASE BY THE 15TH OF EACH MONTH.

CARL GW0VSW ROUNDS-UP THE LATEST NEWS FROM THE HF BANDS

New International Reply Coupons (IRCs) are now available again as the Universal Postal Union (UPU), which was established in 1874, has redesigned them again. The new design, known as 'Beijing Model No. 2' was submitted by **Volodymyr Taran**, a graphic artist from Ukraine. Taran's design was inspired by Michelangelo's painting on the ceiling of the Sistine Chapel in Rome depicting two fingers about to touch and this has been framed in a postage stamp to represent the concept of communication and exchange.

The newly designed IRC will be valid until 31 December 2009 while the current IRC is valid until 31 December this year. The IRC will celebrate its centenary in 2007, as it was on 1 October 1907 that the International Bureau issued the first 'International' Reply Coupon.

To mark the event, countries can ask the International Bureau to include a special overprint that reads '1907-2007: 100 years of IRCs' so collectors, philatelists and future buyers should appreciate this added feature. The new coupon will be on sale commercially in over 70 countries world-wide and is certain to be a popular collector's item at next year. If you would like to discover more about the IRC try **www.upu.int/irc/en/index.shtml**

DX NEWS

After some years of silence, an international team of operators lead by **Andy Lueer DJ7IK** will operate from Libya between the 14 and 28th November using the callsign **5A7A**. Activity is expected to be on all bands using c.w and s.s.b. with the addition for the first time ever, of digital modes including RTTY, SSTV and PSK mode plus another first, f.m.

The goals of the DXpedition are to support the development of Amateur radio in Libya and activate a rare country on all bands modes (including digital modes) and f.m. The team aims to provide more than 50,000 QSOs activating a new prefix **5A7** and to take part in CQWW DX CW Contest as a Multi/Multi entry and also provide the opportunity for some low band contacts. Current suggested frequncies (at the time I was putting the column together) were: on c.w: 18.27, 3.507, 7.017, 10.107, 14.007, 18.077, 21.027, 24.893 and 28.027MHz, on s.s.b: 18.47, 3.777, 7.087, 14.197, 18.147, 21.277, 24.977 and 28.477MHz and on RTTY: 14.087, 18.107, 24.928 and 28.087MHz.

A group of operators from the Radio Club, ACRA will be active on most h.f. bands as **TO8RR** from Guadeloupe NA-102 until the 12 November for the eigth Route du Rhum, which is a 4800km (3000 mile), single-handed transatlantic yacht race between St. Malo in France and Pointe-a-Pitre in Guadeloupe. Further information can be found at **www.routedurhum.org**

Members of a Slovak Contest Team will be active as **3B8/OM0C** from Mauritius during the CQWW DX CW Contest, which runs over the weekend of 25 and 26th November as a Multi-Single entry. You can QSL via **Branislav Daráö, OM2FY, PO Box 6, SK-820 08 Bratislava 28, Slovak Republic** and operators will be active before and after the contest between the 17 and 30th November. Try looking for activity on the low bands, especially on 1.8MHz and on RTTY.

In early December, keep a look out for special event stations **LR50U** and **LR5U** to be active from Argentina. This activity is to commemorate the 50th anniversary of the first operation from South Sandwich Islands by an Argentine Amateur, LU3ZY, and the activity will be mainly c.w. and s.s.b.

Members of the **Radio Club Pampeano** in the city of General Pico LU1DZ, La Pampa Province, will celebrate this event during various days throughout December. Three operators from GACW will join the locals during this event between the 7 and 12th December. The QSL route for these calls will be direct only to EA5NI and further information can be found at the GACW website at **http://gacw.no-ip.org/**

If you need Chad in your log then listen out for **Philippe Koch F4EGS**, who will be active once again as **TT8PK** until the 20 November. Activity is planned for all bands from between 7-28MHz using s.s.b. and digital modes. All QSLs will be according to Phil's instructions and skeds are possible via E-mail to **cocheese.cocheese@laposte.net**

In Antarctica, **Alex LIanjoura R1ANC/UA1ZCK** is active from the RussianVostok Antartic Base looking for Europe every day between 0600 and 1000UTC on 14.146 or 14.152MHz beaming over the North Pole. You can QSL via **Valentin Mykitenko RU1ZC, PGCH 2-1, St. Loparskaya, 184340, Russia**.

QSO PARTY

Those readers interested in PSK may want to participate in the **EPC PSK63 QSO Party**, which is sponsored by the **European PSK Club** and will be held on 19 November for 24 hours. The objective of the competition is to establish as many contacts as possible between Radio Amateurs around the world by using the BPSK63 mode. Everybody can work everybody for both QSO and multiplier credits. Full information can be found at **www.eu.srars.org**

The European PSK Club, or EPC for short, is an informal club of Amateur Radio operators dedicated to maintaining high levels of amateur radio communications using PSK modes on all Amateur bands. Membership is free for any licensed Radio Amateur, Short Wave Listener (s.w.l.) or club. A high quality and colourful membership certificate in PDF format is sent via E-mail to new members when membership is granted and each new member is assigned a unique 'EPC Number', which is retained for life and is never re-issued. All EPC members are eligible to participate in various activities and award programmes run by the club.

NEW QSL MANAGER

Adam Forman KA1ZFE, has announced that he is now the new QSL Manager for **YI9DXX** in Iraq, which is an Internet remote h.f. base station run by W7DXX. Cards should be sent to KA1ZFE either direct to **7321 Pinecastle Road, Falls Church, VA 22043, USA** with a Self Addressed SASE in order to receive a QSL card or via the Bureau. You can find information about this station at **www.w7dxx.com/** or **www.ka1zfe.com/portal**

YOUR REPORTS

On to your reports now and I must apologise if you sent in a log, which does no appear this month. Unfortunately, the computer gremlins have been at work, forcing me to reformat my PC yet again. During the process I lost several E-mails and addresses despite my efforts to print or save them!

The 7MHz log of **Martin Addison 2E0MCA** in East Finchley, North London starts us off this month and judging by his large log he had a busy few days on the radio! Monitoring the h.f.

The RV3AMV QSL card received by Martin Addison 2E0MCA.

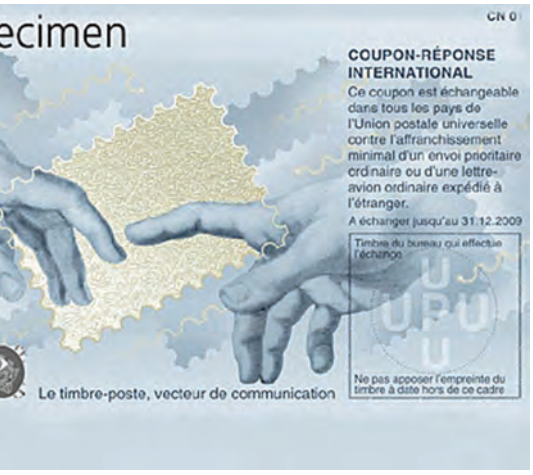
EU-104 at 1206 and 3V8SM (Tunisia) at 1951UTC.

THE 18 & 21MHz BANDS

One log arrived by mail signed only with the initial G. It lists contacts on several bands including 18MHz where SM6CAW (Sweden) 1740, UY5QZ (Ukraine) 2053, PY1OW (Brazil) 2054, LA5DF (Norway) 2108, IK2RMZ (Italy) 2112, N3WT (USA) John in Jefferson, Maryland at 2136, JL1MWI (Japan) 2138, 5B4AGC (Cyprus) AS-004 at 2153 and DL1RTL (Germany) 2211 were all worked using c.w. at 100W. If this is your log please let me know!*

Also, on 18MHz was Martin 2E0MCA who worked DG0OBU (Germany) Andreas in Weissenborn using s.s.b. at 1746 while moving up to 21MHz there was one s.s.b. contact for Owen G0PHY with TX5NK (Mayotte) AF-027 at 1138UTC.

**** Editorial note:*** *Please co-operate with Carl. Although we encourage reports, we do not normally accept anonymous material.* ***G3XFD***



Example of the new International Reply Coupon.

The FG5HR QSL card. An example received by GW0VSW from Guadeloupe for a s.s.b. QSO in 1995.

bands Martin has begun to hear stations as far away as New Zealand and South America with good signal strengths consistently during the day. Maybe it's a sign that the poor conditions experienced by us all over the past year or so are about to improve at last!

Using s.s.b. from a Yaesu FT-840 and powers up to 50W into a folded half-size G5RV, Martin logged LA/DJ5ZWS/LH (Norway) on Hellisoy EU-055 at 0730 and LA9K on Oksoy Island EU-061 at 0825, 7S6LAN (Sweden) 0750, LX/DH2WQ (Luxemburg) 0851, GM3OFT/P (Scotland) on Westray EU-009 at 0911, TM8CDX (France) 1336, ON4USA (Belgium) at Henri-Chapelle Cemetery in memory of all those killed liberating the area during the Second World War at 1354. Then PA6URK/LH (Netherlands) made the log at 1358, while special event station DL0LH/P (Germany) was worked at 1408 celebrating the 50th anniversary of Lufthansa and ES15L (Estonia) followed at 2006 to mark the 15th anniversary of Estonian Independence.

THE 14MHz BAND

On 14MHz, **David Bambrook 2E0DAB** in Little Milton near Oxford had voice contacts with LA9SN/P (Norway) 1211, OK1AQW (Czech Republic) 1235, IK2RWV (Italy) 1305, HB9RDE (Switzerland) 1513, RK6ASO and UA3DDA (European Russia) at 1951 followed by LZ19OOK (Bulgaria) at 1958UTC using a Yaesu FT-747GX and 40W to a home made a.t.u. and dipole installed in his loft!

The log of **Owen Williams G0PHY** In Biggleswade, Bedfordshire lists s.s.b. calls EX0M (Kyrgyzstan) 1530, A25VB (Botswana) 1836, YI9KT (Iraq) 1846 and PJ2F (Netherlands Antilles) SA-006 at 1947UTC with his Yaesu FT-757 and 100W into his dipole.

Also on the band was **Martyn Medcalf M3VAM**, Chelmsford, Essex who used s.s.b. once again, logging RU3SD (European Russia) 1847, CS7T (Portugal) 1900, TM7C (France) 1905, 9A1V (Croatia) 1911, DK8MZ (Germany), SP4XQN (Poland) 2140 and CU8T (Azores) EU-003 at 2150UTC using an Icom IC-746 and a half-size G5RV antenna with SGC-237 auto tuner.

Martin 2E0MCA used s.s.b. again, finding EC5KB (Spain) 0651, UT5UDX (Ukraine) 0730, IO1FO (Italy) 0836, DL3SEZ/P (Germany) 0917, special call ER15MD (Moldovia) celebrating the 15th anniversary of Moldovian Independence at 1042, 9A5AN/P (Croatia) on Palagruza Island EU-090 at 1117, SP5PB/2 (Poland) 1131, TK/IK5PWQ (Corsica)

SIGNING OFF

Well, that's your lot for this month and thanks to all our reporters for their logs. If you wish to send in a log remember to include your name, your callsign and location together with the band, time, mode used and station worked together with the equipment you used and any other information you feel would be of interest via post or E-mail.

Let us hope that the bands over the winter period will be in better shape than they were last year and there will be plenty of DX to work. Thanks to **Tedd Mirgliotta KB8NW** editor of the *OPDX Bulletin* and **Mauro Pregliasco I1JQJ/KB2TJM** editor of the *425 DX Newsletter* for the DX information. Until next time, have a good DX filled month.

73, Carl GW0VSW

CARL MASON GW0VSW
12 LLWYN-Y-BRYN
CRYMLYN PARC
SKEWEN, WEST GLAMORGAN SA10 6DZ
Tel: (01792) 817321
E-MAIL: carl@gw0vsw.freeserve.co.uk

In Vision

GRAHAM G8EMX ROUNDS-UP THE LATEST NEWS AND VIEWS FROM THE RECENT BATC GENERAL MEETING

Enough visitors came along to the **British Amateur Television Club** (BATC) General Meeting, held in the Village Hall at Stow-cum-Que on 24 September, to pack the room set aside for the lecture stream throughout the day. The larger room meanwhile, was used for trading and demonstration tables, which included two very fine ex-broadcast cameras. One of these had been in service with a television company until quite recently. Only removed from use because it was 4:3 format - the proud new owner (a BATC member) had been given it for free!

I was travelling down from Birmingham during the first lecture by **Ian Waters G3KKD**, entitled 'The early days of ATV'. I arrived in time, however, for 'The New Amateur Radio Licence and ATV repeaters' by BATC's RSGB Liaison Officer, **Graham Shirville G3VZV**. Relaxation, clarification and even the removal of a few requirements (and for example, the keeping of a logbook) was the general ethos of the new Amateur conditions.

Graham gave the latest figures for licenced ATV repeaters on the 24, 13 and 3cm bands (1.3, 2.4 and 10GHz). Civil aviation radar could still be an issue on 24cm but the CAA system software has been upgraded and 24cm repeaters continued to be licenceable, depending on the location and height of any 24cm proposal (as always). The final lecture looked at digital television, encoding principles and why digital technology was a necessary way forward for ATV.

GENERAL MEETING

Due to space considerations, it was decided that the General Meeting would take place in the main hall, which was cleared of traders. The BATC chairman, **Trevor Brown G8CJS** then laid out a row of chairs and beckoned all existing committee members to sit facing the assembled members. Compared to previous years there was quite a gathering!

Moments after Trevor had started his opening statement a member from Holland called a "Point of Order", asking why there was no 'AnyOther Business' on the agenda and if there would be an opportunity for questions. Trevor assured him that there would be - as members could put questions at any time during the meeting.

After completing his opening comments the chairman and other committee found themselves 'fielding' questions for about an hour; including requests for more information and circuits needed for newcomers, costings of the magazine, future and protection of the ATV bands. Almost no aspect of ATV or the BATC escaped comment from the floor. The rest of the General Meeting was relatively routine. The accounts were accepted and a new face joined the committee, **Dave Crump G8GKQ**, as Contests Manager. A new President was elected - **Peter Blakeborough MPhil. C Eng. MIET, G3PYB** and presentations were made to outgoing president **Mike Cox** and retiring - after ten years - **Ian Pawson** as editor of *CQ-TV*.

After the 'dust had settled' from the BGM, Trevor called a very swift first committee meeting to decide some of the vital jobs. **Brian Kelly** had been trying out the *CQ-TV* editing software but stated that his computer was too slow, so Trevor asked if Brian would be editor if the BATC obtained a faster computer. Brian Kelly was willing to do this, at least for the next issue.

Paul Marshall emphasised he was no longer BATC secretary, another post that Trevor was anxious fill on the day. I stated that if it would help the BATC to continue, I would volunteer to take the job. Paul cautioned that I might start receiving 'phone calls from overseas members at unsocial hours - we shall see!

Personally, I shall encourage E-mail to be sent to me (who makes 'phone calls these days?) Paul retains BATC Publications, which includes the supplies of *CQ-TV* back issues.

The committee did, however, say goodbye to one very long-standing officer, **Peter Delaney**, who for many years had looked after the Members' Services component stock. Sales of these, which still included vidicon camera tubes, had been slow for some time and the incoming committee has decided to 'write-off' the remaining stock and discontinue this service.

With a few changes, the BATC lives on. Whether our next BGM (2008?) is held in a 'phone box or the National Exhibition Centre depends on many things including: the continuation of Amateur Radio as a significant, important technical hobby of appeal to all ages and abilities. It also depends on an increaced an increased perception of and active interest in the television medium as a technical accomplishment to be understood by those who wish to and appreciated by all who watch, be they lay viewers or vision professionals.

The BATC chairman Trevor Brown G8CJS answers members' questions at the General Meeting.

WISH LIST

What would be on my personal 'Wish List' between now and 2008? First, that more ATV repeaters are licenced and on-air; a basic ATV transmitter and receiver designed for the newcomer and published in *CQ-TV*; more information for beginners in the BATC magazine; all ATV repeater groups to send their repeater information to the magazine; more members to join the BATC, both from the Amateur Radio hobby and from the world of professional broadcasting; all ATV operators to be more creative with their pictures and for repeaters to have regular activity times.

I would also like to see Digital ATV to become much less costly to the individual Amateur and therefore revive 70cm as a useable ATV band. Finally, the BATC to produce a DVD to show the fascinating world of amateur and professional television! Now, let's jump into a time-machine, fast forward to 2008 and see how much of the wish list has happened.

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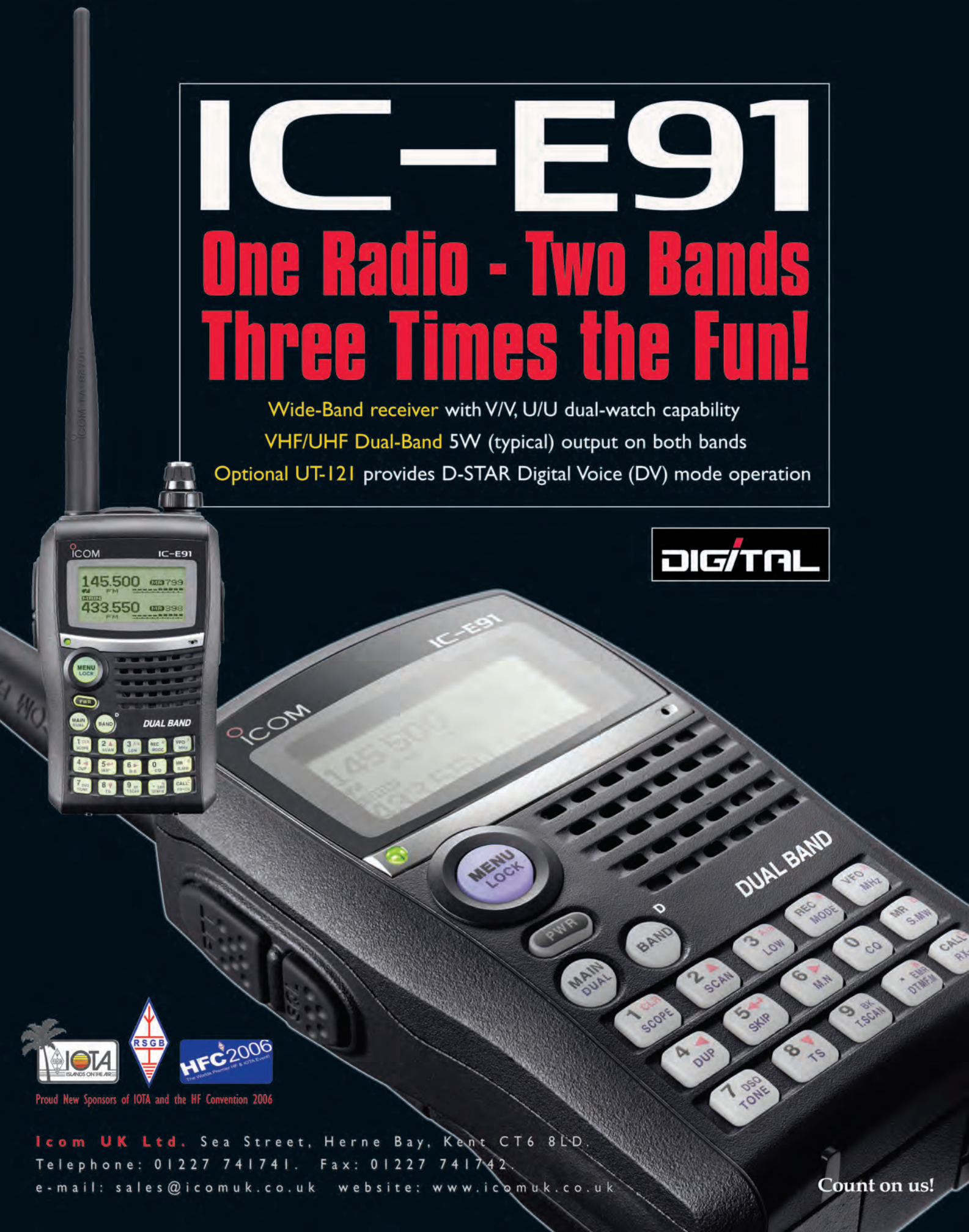

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