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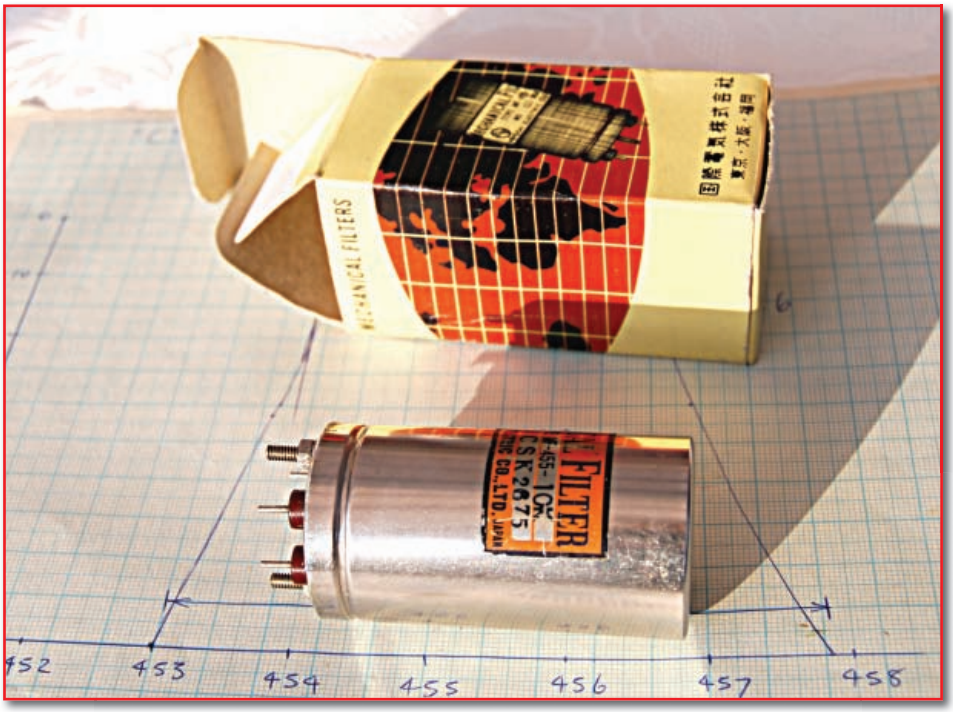

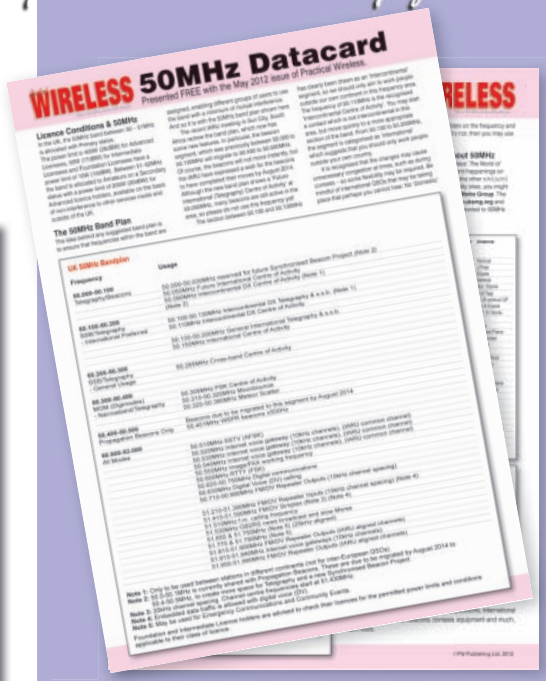

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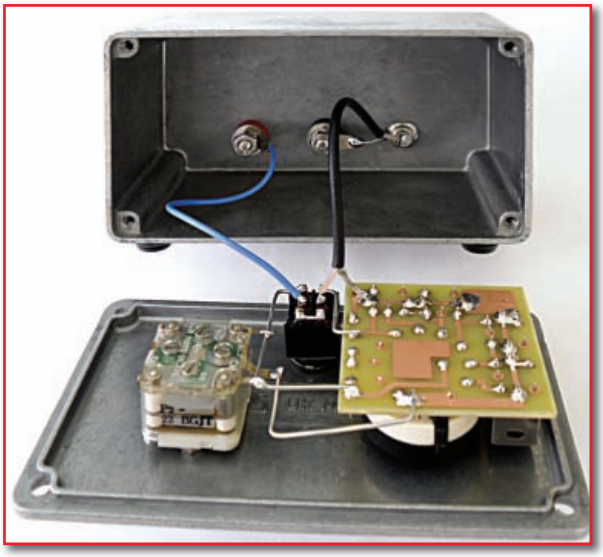
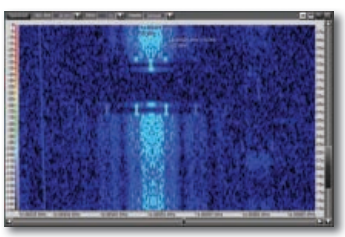


Tony Nailer G4CFY helps *PW*'s listening fraternity



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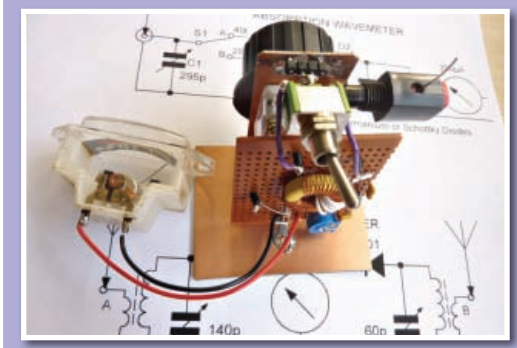
How to make the most of your SDR software

Practical Way

Field strength meters and wavemeters



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HF - UHF in One Box!

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FT-897D base or portable, this 1.8 - 440MHz transceiver is great value. 1.8 - 50MHz 100W 2m 50W 70cm 20W.
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FT-857D The great value mobile or base 1.8 - 440MHz. HF-6m 100W, 2m 50W 70cm 20W. **IN STOCK £714.95 D**

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The **TS-2000E** is a firm favourite for those wanting ultimate all-mode performamnce on all bands. 1.8-144MHz 100W 70cm 50W. It has the highest power on 2m & 70cms and the TS-2000X version adds 23 cms! Includes auto ATU, DX cluster facility and digital IF for superb weak signal performance. **IN STOCK £1549.95 D**

ICOM **IC-7000**

The most compact, high spec. HF-UHF transceiver available. With its lovely display and digital IF filters, it can handle all your needs - SSB CW and data. HF-6m 100W, 2m 50W and 70cms 35W. All in one lovely box. **IN STOCK £1189.95 D**

HF on a BUDGET!

YAESU

FT-450D transceiver comes with the extra IF filter & an Auto ATU built in. 100W 160m - 6m with 3 IF filters 300Hz, 500Hz & 2.4kHz.
IN STOCK £839.95 D

ICOM

IC-718 SSB CW up to 100W from 160m-10m. You won't find a more cost effective HF radio!
IN STOCK £594.95 D

IC-7200 this 100 Watt radio covers 160m-6m and includes digital IF filters. **IN STOCK £839.95 D**

KENWOOD

TS-480SAT A very compact HF transceiver that delivers 100 Watts from 160 - 6m and includes auto ATU.
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TEN-TEC

Jupiter-538CE 160m - 10m 100 Watts SSB CW AM FM with on-screen CW reader and socket for PC keyboard.
IN STOCK £1599.95 D

HF High Performance Transceivers

YAESU **FT-950** HF & 6m Transceiver

Step up to the FT-950 and you enter the world of advanced £1000+ class design. You get 30kHz - 56MHz Rx, Auto ATU, triple conversion Rx with 3 roofing filters, 32 bit floating point DSP, Superb dynamic range, Tx variable bandwidth and Mic EQ adjust, plus CW zero/spot feature, CW message storage etc. **IN STOCK £1264.95 D**

FT-2000 160 - 6m Transceiver

This radio is a DXers favourite and widely used for DXpeditions and contests. Covering 160m to 6m. It has all the digital features and auto ATU. Available as 100 Watt or 200 Watt version.
IN STOCK 100W £2259 D 200W £2899 D

FT-DX5000 160 - 6m Transceiver

The current Yaesu "flagship" radio, covering 160m to 6m delivering 200 Watts. ALL **IN STOCK**

FT-DX5000 Standard radio	**£4635.95 D**
FT-DX5000D + SM-5000 monitor	**£4939.95 D**
FT-DX5000MP + monitor & filters	**£5369.95 D**

KENWOOD **TS-590S** 160m - 6m with superb receiver inc. dual roofing filters, Auto ATU, 32 bit f/p DSP & USB PC connection.

This radio has won the admiration of the radio press and hams all over the world. The best dynamic range in its class, digital IF, narrow roofing filters and auto ATU. Also FREE PC control program that can be downloaded. Exceptional value. **IN STOCK £1329.95 D**

ICOM **IC-7410** HF-6m Transceiver

This lovely new HF-6m all-mode 100W transceiver offers superb front end dynamic range, and has a 15kHz roofing filter. It also features a 36kHz DSP razor sharp filter, internal auto ATU, PC control via a USB port and speech synthesizer. **IN STOCK £1695.95 D**

IC-7600 HF Transceiver

The IC-7600 HF/50MHz transceiver is enhanced with some of the main features tried tested on the flagship IC-7700/7800 models. It is highly regarded by Amateur operators world-wide. Features inc a double conversion superheterodyne system, dual DSP units & 3kHz IF (roofing) filter. **IN STOCK £3299.95 D**

IC-7700 HF Transceiver

The IC-7700 HF/50MHz 200W transceiver shares many features with its "big brother", the world famous IC-7800. With two independent DSP units, a +40dBm 3rd order intercept point and ultra wide dynamic range to name but a few of the features.
IN STOCK £6364.95 D

TEN-TEC **OMNI-VII** HF Transceiver

Fire it up and you immediately know you are driving something different. The receiver is a delight and the transmitted audio is superb. This 100 Watt transceiver that covers 160m - 6m. Ethernet remote control ready.
IN STOCK £2699.95 D

Sofware Defined Transceivers

FLEX-1500 HF Transceiver

HF - 6m All Modes All Bands

This most amazing transceiver mates up with your laptop to bring you an advanced 5W transceiver that no other manufacturer can match at the price. Filters down to 50Hz, Tx audio equalizer, Incredible DSP noise reduction, ultra sensitive receiver, Live Panoramic display and just one USB cable! Plug, Play, Enjoy! **IN STOCK £589.95 D**

FLEX-3000 HF Transceiver

100 Watt HF - 6 with Auto ATU!

It's all you need, apart from a PC. The firewire connection makes setting up easy. Experience performance & features, no hardware design can match even at twice the price! You get the ultimate in flexibility, selectivity and usability. Uses Yaesu mic wiring and requires 12v at approx. 20 Amps peak. Call for more info.
IN STOCK £1399.95 D

Carriage Charges: A=£4, B=£5, C=£8.50, D=£11

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HF Linear Amplifiers

Alpin-100mkII 160m - 6m 1.3kW

The Alpin 100 desktop linear will deliver up to 1.3kW output from this desktop design. It covers 160m - 6m and has full tune up protection. The panel control display tells you exactly what is happening and makes operation simple. If you are looking for something rugged with full safety features at a sensible price - this is it!

£2499.95 D

AMERITRON AL-811XCE 160m - 10m 600W

This Ameritron design gives a sensible power gain for a very reasonable price. It has a hunky built-in power supply with full monitoring of operation conditions. It uses three low cost 811A tubes to achieve the power output running from a 1500volt HT line. This desktop design can easily be accommodated. 350 x 210mm Weight: 14.51k8

£899.95 D

QRP HF Transceivers

YAESU

FT-817ND

A take anywhere all mode transceiver. 2.5 Watts from 1.8 - 70cms from internal batt. Or 5W from external 12v DC. This radio has stood the test of time and comes with its own battery cell pack and AC charger, plus mic. and telescopic whip. A complete all-mode all-band station.

IN STOCK £539.95 D

HB-1B HF

This little CW 80, 40, 30, 20m transceiver runs 6 Watts from ext. 12v or 4W from optional internal lithium cells. Has tunable filter 400Hz-3kHz, electronic keyer, programmable auto CQ, 30 memories, switched tuning speeds. Also receives SSB from 3.4 - 16MHz.

IN STOCK £249.95 D

High Performance Receivers

AOR *We are UK Distributors*

AR-MINI

This amazing little radio covers 100kHz - 1.3GHz AM FM & WFM. 1000 memories, over 30 programmable features inc. CTCSS & DCS. Alphanumeric memories give meaningful channels and there is a built-in bar antenna covering 100kHz - 5MHz. Inc. NiMH pack & charger. FREE software database for PC loading via h.

£169.95 D

AR-8200-MKIII

The famous scanner with the quality performance. 530kHz - 3GHz AM FM FMW & SSB. Inc batts, charger + cigar lead. If you are looking for a truly wide-band great performer this is the best in its class!

£499.95 D

AR-8600MKII Base or Portable

The AR-8600MKII is a base or portable station receiver covering 530kHz - 3GHz. All modes AM FM FMW & SSB with standard rotary tuning. Requires external 12V or optional internal batt pack. A great station accessory for general listening or extra receiver.

£699.95 D

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FT-2900E 75 Watt 2m 3W Audio, CTCSS, DTMF mic & "WIRES" internet.
£142.95 D

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FT-8800E Dualband Mobile 50W / 30W Great Value
£343.95 D

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IC-E92D Dual band 2m/70cm waterproof fitted D-Star. Rugged radio.
£387.95 D

TH-F7E Dual band 2m/70cm + wideband receive inc. SSB
£236.95 D

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£426.95 D

TG-UV2 Dual band 2m/70cm with CTCSS DCS & LED torch!
£84.95 D

NEW from Kenwood!

NEW TM-281E

2m FM 65/25W Mobile Transceiver

On or off the road, Kenwood's TM-281E is a mobile radio you can always count on. As tough as nails, this MIL-STD-compliant transceiver delivers powerful performance, excellent audio clarity, and a host of advanced features.

£169.95 D

NEW TH-K20E

** TX 144-146MHz * RX 136-174MHz * 5.5W Max Output * 200 Memory channels*

£119.95 D

NEW TH-K40E

** TX 430-440MHz * RX 400-470MHz * 5W Max Output * 200 Memory channels*

£119.95 D

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InnovAntennas Get Ready for 50MHz Season! With this Ultra Compact Yagi

This year 50MHz should really come alive with DX. The new LFA-2 element Yagi has a boom of jut 2ft 5" and turning radius of 6ft 6". You get almost 7dB gain and 14dB F/B.

Just £89.95 C

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15EL-432-LFA-SQ	15 element 432MHz yagi 3.173m long 3kw	£129.95 C
16EL-432-LFA-SQ	16 element 432MHz yagi 3.468m long 3kw	£139.95 C

Carriage Charges: A=£4, B=£5, C=£8.50, D=£11

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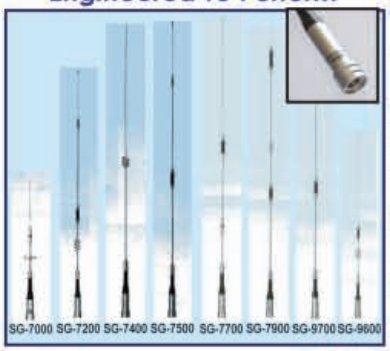

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K-300 Black gutter mount adjust. tilt **£TBA**
TRA-II Trunk lip adjust. + 4m cable **£TBA**
K-600M Trunk lip adjust + cable **£66.95 C**

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K-400 Heavy Duty Hatch mount **£39.95 A**
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K-512 Roof bar mount **£44.95 C**
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DP-7RH Compact 40/30m Dipole

This is a rigid, telesopic dipole, which has an overall length of approx. 3.5m. It collapses down to pocket size. It can be hung from a tree or clamped to a mast. SO-239 feed.
£134.95 C

HF Verticals

CP-6 80-6m 200W with 1.8m rigid radials. Mast mounted. 4.6m long **£359.95 D**

CP-8040 80-40m with 1.8m rigid radials. 6.5m long. **£399.95 D**

KV-5 80-40m ground mounted vertical approx 6.5m long. **£339.95 D**

SD330
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This "screwdriver" design covers all the DX bands (inc WARC0. Continuously tuned with supplied remote control, it will handle 200W and is just 1.85m long. Fitted 3/8" stud mount, it will easily fit onto a 3-way magnetic roof mount. **£439.95 D**

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SX-1100 1.8 - 160MHz. / 430-1300MHz 5/20/200W FSD. 1W/4W sensitivity for FSD. Dual sensors. 0.15dB insertion loss. PEP/RMS **£239.95 C**

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30 Amps continuous 1 - 15vDC variable 250 x 150 x 2400 mm inc. DC cooling fan, weight 9kg **£194.95 C**

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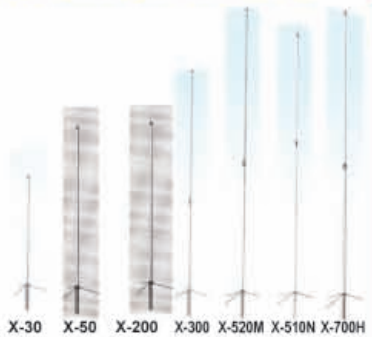

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X-200N 2/70cm 6/8dB 2.5m 200W **£94.95 D**
X-300 2/70cm 6.5/9dB 3.1m 200W **£104.95 D**
X-520M 2/70cm 8.3/11.7dB 2.5m **£TBA**
X-510N 2/70cm 8.3/11.7dB 5.2m 200W **£159.95 D**
X-700H 2/70cm 9.3/13dB 7.2m 200W **£279.95 D**

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LJ-103BA 10m beam 1.5kW 3 el **£169.95 D**
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LJ-204BA 20-17m beam 1.5kW 4 el **£579.95 D**
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Practical Wireless May 2012

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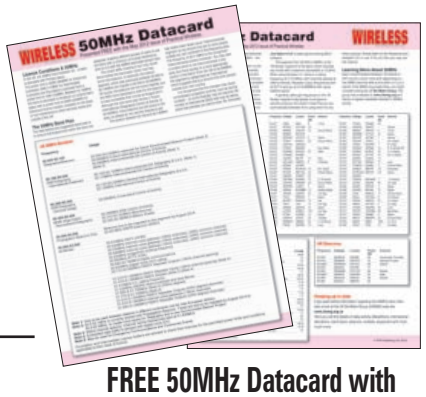

Front cover design by **Steve Hunt.**

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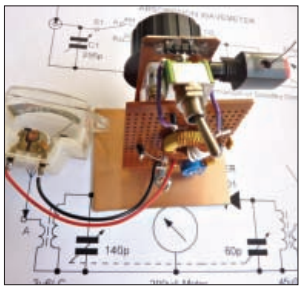

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Rob Mannion G3XFD/EI5IW's

Keylines

The Editor discusses computers and their problems and a particular difficulty he's come across after a working file became corrupted. Because of this Rob needs to hear from authors who are waiting to have work published.

Computers, as most of us know, are fine until they go wrong! And unfortunately even our reliable Apple Macintosh computers can develop problems. Recently **Tex Swann G1TEX** and I found that our Article Reference File had become corrupted and we had lost large sections of it. We now need – with the help of the authors concerned – to re-build the file.

To help us, we need to hear from any author who has either a Provisional (**P**) File Reference number (the 'P' refers to the fact that an article has been commissioned but we have not received the final work in the office) or a **PW** File Reference Number. The PW File Reference Number is immediately issued when we've received the author's final file.

With the help of our authors we can rebuild the file and get it back to its normally efficient state. So, if you are an 'Author in waiting' please contact me as soon as possible.

Writing For *PW*

While on the subject of writing for *PW* a recent (very disturbing) E-mail to me provided a reminder that it's time to encourage more of our reader to consider becoming authors themselves. The contents of the actual E-mail were so disturbing (and completely unfounded – indeed almost paranoid) – I don't want to share them with readers. But what I can say is that **anyone** is welcome to write for *PW*.

Neither **Tex Swann G1TEX** or myself need to know you beforehand. Neither do you need to be a friend of existing authors! However, almost invariably – because you'll become a part of our team – you'll also become a friend. Such is the relationship that forms between the *PW* Editorial team and its authors.

What you do require, to become a *PW* author though, is to be keen and active in the hobby. It doesn't matter if you've not written an article before – we can help you. Indeed, you'll supply the idea and article and we'll work with you. Tex G1TEX and I will do our best to present the article in the best 'light' way possible. Finally, Art Editor **Steve Hunt** will use his excellent design skills to produce the superb page lay-outs that have become standard for *PW*.

We particularly need practical projects for our readers. And importantly – if you can help source essential components, part kits or full kits to help our readers – we'll be pleased to publicise this service. By doing so we'll be helping to offset the development costs of preparing a constructional article and helping readers who may not have a bottomless 'junk box' for those special components.

Your first step will be to request a *PW Author's Guide*. We look forward to hearing from you soon!

A Fascinating Propagation Reminder!

I recently had an amusing reminder of how propagation can work for us – or against us! – while riding on a train. I've no doubt some readers will remember my brief mention in *PW* that on February 25th – I was due to travel on the UK Railtours *Cumbrian Coast Explorer*. I joined the train at Watford Junction early on the Saturday and we travelled up the West Coast Main Line to Preston.

From Preston we reversed direction to travel via Accrington to Hellifield Junction and up the famous Settle & Carlisle line. The train then by-passed Carlisle itself and headed down the Cumbrian coastline.

As we approached Workington I sent a text message to Tex G1TEX, as we were near his home town of Cockermouth. The train then travelled along the dramatic coastline railway.

However, just as we passed by the Sellafield nuclear establishment my mobile 'phone bleeped to announce an incoming text. It wasn't Tex – instead it was a 'Welcome to The Isle of Man' message! It also gave me the costs of calling the UK and the rest of Europe from the Island (then about 30 miles away). Roaming calls are very expensive as we all know! So, I quickly warned everyone in my carriage not to use their 'phones for a while. It was an amusing but effective reminder that clearly demonstrated how that v.h.f./u.h.f. and s.h.f. propagation over the sea can work for or against us!

Rob Mannion G3XFD/EI5IW

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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.

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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. See the Book Store page for details.

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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.

Readers' Letters

Send your letters to:

Rob Mannion, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-mail: rob@pwpublishing.ltd.uk

The Star Letter will receive a voucher worth £20 to spend on items from our Book Store or other services offered by *Practical Wireless*.

A Response To The *PW* Annual Leg Pulling Session

Dear Editor,
After reading your News item concerning the need to obtain a Licence to use the Olympic five rings symbol on QSL cards etc, I have tried in vain to contact Mr Lipra as per the E-mail address given in *PW*. Regrettably the address and web site details in *PW* do not appear to be correct. Can I conclude that there has been a typing error?

I would be grateful if you might check your contact details for Mr Lipra and forward me the correct E-mail address in order that I can pay to use the Olympic five rings symbol on the QSL cards I have ordered to be used in conjunction with the special event station I will be running later this year.

Having an interest in older radio equipment and steam traction, I will be using a 20 horse power stationary steam engine to provide the motive power for the generator from which to power my spark transmitter for the special event station. My home brewed Tesla coils might provide an article for *PW* should you be interested? I intend to photograph the event for my records. I can make the pictures available, however I am concerned about placing eight inch glass photographic plates into the care of the Royal Mail, therefore I would require you to collect them personally.

Living in the hill-top hamlet of Wye on Earth, I have acquired sufficient cable from a very nice scrap merchant to make a quarter mile long wire aerial which I will be stringing up on redundant BT telegraph poles. I know the poles are redundant, because I saw men dressed in balaclavas and in a plain white van remove the wires a few weeks ago. Strangely, the cable I purchased has a resemblance to the cable previously attached to the telegraph poles – a coincidence I'm sure.

Nearer the time I shall contact your office and advised you of my intended transmission times and the approximate portion of the spectrum you should be able to hear me on. You may wish to exchange Olympic greetings and QSL cards. A recent low power test transmission of the spark transmitter using a wire aerial of some twenty feet in length resulted in reception reports from the Coastguard Agency, Civil Aviation Authority and a military radar installation in the Outer Hebrides, so I am very confident that once the

£20 Star Letter

Antennas I Have Used At G3XOI

Dear Rob,
When I lived in Benfleet, Essex at 170m a.s.l. – I was given a 13m flagpole. I was asked to help an Amateur to lower it as he was moving and, when we got it down, he told me that I could keep it. It was duly bolted to the back of my house alongside the shack which was a back bedroom.

Next problem was to erect another pole to support the outer end of the to-come -antenna. A 13m long garden does not allow much space for guys to support a 13m mast so I drew on my sailing experience and used diamond shrouds. The mast was made from two of the old standard 20ft aluminium scaffold poles with a smaller-o/d joining tube with four cross-trees.

So, four shrouds from top of mast, over the cross-trees and in to the bottom of the mast, or approximately one metre from the bottom. Because sea air could cause havoc with metal turnbuckles I used lacing from the end of the shroud to the eyes on the mast. The mast was mounted in a mast tabernacle such as is used when you need to lower the mast on a yacht (if you have ever sailed on the Norfolk Broads you will have met this technique All I then needed was side shrouds to steady the mast, and no guys blocking the garden.

The antenna was half of a trap dipole – a section cut for 7MHz, a 7MHz trap and an extension, cut to make the whole system resonant on 80m. Everything was home-brewed, with the coil wound on a tube from a stationer's store and all potted and painted with Epoxy Resin. It came out of the shack window at 4.8m (16ft), up to the top of the 12.2m (40ft) flagpole and then horizontal to the 13m mast at the bottom of the garden. The equipment at the shack end was a Sommerkamp transmitter and separate receiver, plus a Codar AT5 for 1.8MHz 'Top Band'. Everything was matched with a unit of my own devising – the G3XOI one which **Pat Hawker G3VA** publicised in *Technical Topics* in *Radio Communications*. This set-up seemed to put out a pretty good signal, I managed to work VK on 'phone as well as c.w. And it also worked on Top Band – if you use a heavy gauge, thick wire it doesn't know it cannot radiate, so it does!

My signal wasn't, of course as good as **Ken Woodman G3EBU** who had a 15m mast and a grid of old tramlines under his lawn as an earth mat (Ken was the Radio Officer on the tug *Turmoil* during the *Flying Enterprise* incident in 1951 with **Captain Kurt Carlsen**). I doubt if you will want to print this, but feel free to take any snippets which look useful for inclusion in the magazine. 73, and may your pen never run out of ink!

Alan Gordon G3XOI
Shoreham-by-Sea
West Sussex

Editor's reply: *I've contacted Alan to ask him if he could prepare an article for the* PW Antenna Workshop *based on his experiences. I remember reading about how successful his antenna was – particularly from Top Band enthusiasts who couldn't otherwise get on to 1.8MHz. Alan is an experienced technical writer and I'm sure we'll get a very interesting article. He's also very close to his 80th birthday – so our congratulations go to you Alan!*

transmitter is on full power and with the planned aerial, our signal should be heard over quite some distance. Or better still, with your c.w. operating skills, perhaps you may wish to come and operate the station yourself; if this is the case, please remember to bring insulated rubber gloves and thick rubber soled boots.

Again, please when you have time, forward Mr Lipra's correct E-mail address as I don't particularly want that little sporting Gentleman **Seb Coe** knocking on my door looking for retrospective royalties. Seb Coe in case you don't know is the enthusiastic person who keeps popping up on my neighbour's television with the phrase; "On time and on budget". Thankfully for some strange reason I haven't seen him on my TV, but there again I've not seen anything on my Baird set for several long years now in spite of the Nipkov disk appearing to work correctly. If you happen to come across a service manual for a Baird receiver, please can you send me a copy, I am willing to pay any costs involved if you can inform me as to the present conversion rate for Bawbees to Sterling. Thanks.

William Puller
Dun Roaming
Wye on Earth

Editor's comment: *Thanks 'Mr Puller' – I quickly guessed your real identity as 'Mr Magic' – keen Conjurer* ***Colin Topping GM6HGW*** *from Fife in Scotland. There's an informal competition between many of our readers to spot the annual April spoof and Colin was first this year. Well done Colin!*

Ian Dilworth G3WRT's Gin Pole Article

Dear Rob,
After reading **Ian Dilworth G3WRT**'s interesting article *Antenna Workshop* article I have a minor correction and a suggestion to help. On to page 22, third para "The location of the guying peg..." is hypotenuse times cos(60°) away from the mast, the hypotenuse having been determined as 14m in the preceding paragraph. Therefore the text should read "...will be 14 cos(60°)..." which now correctly gives the measurement of 7m, since cos(60°) = 0.5.

I've prepared a simple triangle calculator to help work out the calculations and it's available to readers. They can get it from me via E-mail or by sending me a blank floppy disk or recordable CD or DVD plus return pre-paid self-addressed mailing envelope. Feel free to print this in the letters section. Copy both files into any convenient directory (both into the same directory) and double-click on the HTML file.

73.

Godfrey Manning G4GLM
63 The Drive
Edgware
Middlesex HA8 8PS
Tel: (**020**) **8958 5113**
E-mail: **cgmm2@btinternet.com**

Editor's comment: *Thank you Godfrey – I'm sure readers will find your practical and simple-to-use tool very useful. I remember a similar calculator being produced commercially at one time. Readers who contact Godfrey via E-mail should be aware that he only accesses his E-mail system once a week – usually a Friday, so there will be a delay using this mode of communication.*

Ross G4DTD's Diplomatic Wireless Service Article

Dear Rob,
I must say that I really enjoyed **Ross Bradshaw G4DTD**'s insight into the Diplomatic Wireless Service in the April issue of *PW* and look forward to the second part. In 1970 early, while I was seeking a suitable job after leaving school, I replied to an advert in a national newspaper by the Diplomatic Service for Radio Technicians.

The application form duly arrived complete with a security vetting form and this form was immediately taken away by my father with him telling me that he would complete it. I knew that my father, who was at that time a primary school teacher, was a former Royal Navy Wireless Telegraphist before and during the early part of the Second World War. I also knew that for most of the war he worked for Special Y Group (SYG) but he said nothing about that type of work during his lifetime.

The completed application and vetting form (that I was not allowed to see) were posted back and some weeks later I was invited to have an interview with the DWS at Bletchley Park. The interviews were held in the mansion a Bletchley Park and lasted most of the day. We were told that we would be trained to HNC level and postings would alternate between pleasant and not-so-pleasant overseas locations. Due to the interviews over running there was a chance I would miss my flight back to Belfast from Heathrow and on mentioning this – the DWS checked me for my flight by telephone.

Several weeks later I received an offer of employment from DWS – but just two days previously I had accepted a post with National Air Traffic Services. I wrote back to DWS thanking them for the offer and explained that I had just accepted this other job.

About a week later another letter from DWS arrived for me asking me to re-consider but my mind was made up and again declined their offer. Over the years I thought no more about that job offer from DWS but did often wonder why they had taken the unusual step of asking me to re-consider accepting their offer.

However, about eight years ago I began to research the secret work my father had done with SYG and discovered that it was not only intercepting enemy coded signals and transcribing them for Bletchley Park to decode – but that SYG, later to be called War Office Y Group (WOYG) was actually controlled by the Diplomatic Service. By then the penny had dropped as to why my father had filled in that vetting form so many years ago without me seeing it and also why DWS were so keen to have me join them! 73.

Robert Connolly GI7IVX
(Author of *Maritime Matters* and *NDB Dxing* Columns, *RadioUser magazine).*
Kilkeel
County Down
Northern Ireland

Editor's comment: *Thanks for your feed-back Robert – it make absolutely fascinating reading! We have been pleasantly surprised at the level of interest shown by* PW *readers in the DWS article. However, I have yet to have confirmation from other Amateurs something that I remember seeing myself – that the DWS actually had recruiting stands at Amateur Radio shows. I'm certain I didn't imagine seeing the DWS stand at shows in the London area in the 1960s.*

News & Products

Send your info to:

Newsdesk, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-mail: newsdesk@pwpublishing.ltd.uk

Martin Lynch Introduces The Superb Antenna MP-1 Chapstick

Chertsey based **Martin Lynch & Sons Ltd**. have announced a new antenna. **Martin G4HKS** *called Newsdesk*, "I'm pleased to announce the latest version of the Chapstick Antenna is back in production. Engineered to an even higher grade, the new Superb Antenna MP-1 Chapstick is offered as a fully tunable 7 to 50MHz (40m-6m) vertical and comes complete with a tripod. As an introductory offer (offer finished at the end of April) the ML&S are offering a free 3.5MHz (80m) coil worth £32.95 allowing you all bands from 80m-2m".

Martin's press release states, "Ideal for use with any h.f. to 6m transceiver, this simple-to-erect vertical is perfect for portable or home use and can be packed into a back-pack as it's less than 12in long for portability. Price also includes tripod for easy placement on the ground, roof, etc. This antenna is suited to compact h.f. rigs (FT-817/IC-703), because of the high power handling this antenna system can also be used with 100W h.f. transceivers like FT-857/FT-897/IC-7000/IC-7200 and the TS-480. The introductory price is only £139.95 complete with 80m coil and tripod."

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Practical Wireless Club Visits To Caithness & Aberdeen

Rather unusually, there are now two long distance *PW* Editorial club visits to Scotland planned for May and June. **Rob G3XFD** the Editor reports; "It's not often that two invitations for *PW* Editorial visits to Scotland arrive so close together! So, I was delighted to accept an invitation from the **Caithness Amateur Radio Society** (CARS), based in Wick late last year and I'm booked on the Caledonian Sleeper to Inverness, arriving on **Wednesday May 2nd**. From Inverness I'll be travelling on the Far North line to Wick. The CARS members meet at the **Nethercliffe Hotel in Wick** at 7.30pm and I look forward to meeting you that evening! The CARS website is **www.radioclubs.net/c.a.r.s./**

The **Aberdeen Amateur Radio Society** (AARS) have invited me to present a *PW* Club Visit at **7.30pm** on **Thursday June 7th** at their headquarters at **25th Scout Group**, **Oakhill Crescent**, **Aberdeen**, **Scotland AB15 5HY**. Website **www.btinternet.com/~gm0vgi/club/**

Again I'll be travelling up on the Caledonian Sleeper and I'm really looking forward to meeting the Aberdeen members and enjoying the train ride rather than a long distance driving session! My thanks go to both clubs for their invitations. **G3XFD**.

New Dual-Band VHF/UHF Midland Transceiver From Nevada

Mike Devereux G3SED from **Nevada Radio** in Portsmouth, Hampshire called *Newsdesk* with some hot news: "Nevada are pleased to introduce the first in a new line of Midland branded radios to the UK market. The CT-790 is a 5W Dual Band v.h.f./u.h.f. hand-held radio with a great list of features, which even includes a Band II f.m. radio, chronometer and flashlight!

"It is packed with all the usual functions, scan, CTCSS, VOX, repeater shift, tones and more. Supplied with a Li-Ion battery pack and desktop charger it is ready to go out of the box. The CT-790 will sell for £129.95 plus p&p. Incidentally, Nevada recently took over the UK office and distribution of Alan–Midland products and we welcome dealer enquiries. Regards" Mike G3SED.

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Hampshire PO6 1TT
Tel: (**023**) **92 313090**
E-mail: **sales@nevada.co.uk**
Website: **www.nevadaradio.co.uk**

News up-date: The CT-790 will be reviewed by **Tim Kirby G4VXE** in the June 2012 issue.

The 4th Aegean RTTY Contest 2012

The Aegean DX Group have announced the dates for their 4th RTTY Contest, which will takes place over the full weekend of May 19th and 20th 2012. The contest bands are 3.5, 7, 14, 21 and 28MHz. All logs are to be received by June 15th 2012. Any type of log will be accepted and can be E-mailed as an attachment. Full rules and further details from the Aegean Group's website **www.aegeandxgroup.gr**
Contest Manager Alexandros Karpathiou SV8CYR
E-mail: **sv8cyr@gmail.com**

Variable Capacitor Problems For G4TPH Magloops

Tom Brockman G4TPH the creator of the **G4TPH Portable Magloop Antenna** has informed *Newsdesk* that the Jackson Brothers (the company making the special capacitors used in the improved dual-range G4TPH Magloops) is terminating operations as of the first of April. This will affect other companies using the Jackson Brothers capacitors. Tom is researching the market to find alternative capacitors – but at the moment his production will stop once the current stock is sold. Further details from Tom at;
1 Dalby Crescent
Newbury
Berkshire RG14 7JR
E-mail: **tom@g4tph.com**
Website **www.g4tph.com**

Tim's QRP In The Country 2012

Tim Walford G3PCJ contacted *Newsdesk* with an invitation for all home-brew and QRP enthusiasts living in the south and south. "I'm pleased to announce that, following the much increased attendance and very successful QRPiC 2011, the 2012 event will be held on **Sunday July 15 2012**. As before, it will be held at my home – **Upton Bridge Farm**, **Long Sutton**, **Somerset**. The theme remains low power radio operation and home construction, in a country setting! If the weather allows, it will be outside; otherwise, it will be in the barns like last year. I'm particularly keen to increase the attendance by south and south-west based and individuals with interesting things to show off. If you wish to reserve an early place or can suggest a novel feature; just drop me a line!

"I also invite entries for an informal construction challenge to be held at QRPiC 2012. Well known radio constructor and tutor **Steve Hartley G0FUW** will assess the entries and decide who gets the prize of some local Somerset produce!

"The task is to build a receiver for any amateur m.f. or h.f. band using no more than 10 discrete components and optionally one integrated circuit (i.c.) and one supply regulator. The choice of all parts is yours! This should allow a reasonable receiver to be built and Steve will no doubt be considering the three 'S' aspects in his decision – stability, sensitivity and selectivity!

"There will be a long wire antenna, signal generator, headphones and power supply available for your demonstration of the working receiver – but use your own if you wish as they don't count in the parts tally. The style of construction isn't important and can be 'informal'! No prior entry is required - just turn up with your receiver on the day.

"I think this is the sort of project that most QRP enthusiasts ought to be able to manage and is a project that Clubs might well consider entering in addition to having some sort of stall or display at the event. **Janet** my wife and I look forward to seeing you on the day!
Further details from;
Tim Walford G3PCJ
Walford Electronics
Upton Bridge Farm
Long Sutton
Langport
Somerset TA10 9NJ
Tel: (**01458**) **241224**
FAX: (**01458**) **241186**
E-mail **walfor@globalnet.co.uk**

George Dobbs G3RJV choosing the winner of the construction competition at last year's QRP in the Country. QRP in the Country.

Tim Walford G3PCJ introduces guest of honour, George Dobbs G3RJV at last year's QRP in the Country.

Photos courtesy of Colin Redwood G6MXL.

***Editorial note: Tex Swann G1TEX** and I are looking forward to meeting readers at QRP in the Country. **Rob G3XFD**.*

Radio Amateurs Can Follow The Olympic Torch

The **Worked All Britain Awards** group will be tracking the progress of the Olympic flame across the British Isles. Individual Worked All Britain members and local Club Stations have been invited to take part.

The Olympic torch begins its journey on 19th May 2012 and finishes at the Olympic Park on 27th July.

Several different forms of the award will be issued, and as a change from what we normally do. The WAB will be issuing the certificate in PDF format as standard, with the option of a printed version for those who would like it. The black version will be the PDF option. There will be one level of award issued only. This will correspond with the number of contacts made over the entire period of the torch's journey.

The callsigns used will be **G4WAB** and **G7WAB** using the special prefixes to reflect the torch's journey (**GC**, **GH**, **GN**, GP, GS, GT, GX, depending on which part of the country the torch is in at the time.

The WAB group decided to issue PDFs as the award may appeal to overseas members as well as those in the UK. The white version will be the printed option. The award is open to all, WAB members and non-members alike. All are invited to participate. There will be a charge of £3, (€4 or $5) for the certificate. For more information, please consult the website **www.worked-all-britain.co.uk or** E-mail **judith.brooks@ntlworld.com**

Poldhu & The RMS *Titanic* Weekend

During the weekend of April 14th and 15th, **Poldhu Amateur Radio Club** in Cornwall will be operating from the **Marconi Centre at Poldhu** using the callsign **G3MPD** rather than our usual **GB2GM** callsign. The 'MPD' was the callsign of the Marconi Poldhu station at the time of the RMS *Titanic* disaster. The club plan to be operational on as many of the h.f. bands as possible.

Keith Matthew G0WYS writes, "Although Poldhu didn't have any direct involvement in the disaster, the *Titanic* sailed past on April 3rd on her way from Belfast to Southampton and it's inconceivable that she didn't work Poldhu. One of her Quartermasters, **Robert Hichens**, who later became famous, or rather infamous, as the person who was at the wheel when she hit the iceberg was a Newlyn man. Local legend has it that he steered the *Titanic* in towards Mount's Bay to show the ship to his mum! If this were true then the Poldhu operators would have had a very good view indeed of the great ship! We will also be operating on International **Marconi Day** with our usual GB2GM callsign". Keith G0WYS. Further information via **keith@vickimatthew.plus.com**

Keith G0WYS operating GB2GM. However, for the RMS Titanic weekend the callsign G3MPD will be used.

Coventry Amateur Radio Society's Rugby Radio Talk

John Beech G8SEQ, the Secretary of the **Coventry Amateur Radio Society** (CARS) E-mailed *Newsdesk* with some interesting details from the club's calendar – including a talk on the historic and now closed Rugby Radio Station – once managed by the late *PW* Author **Stan Brown G4LU**. The talk is to be given by **Malcolm Hancock** on May 4th. Other dates of interest include:

April 27th Project calibration night.
May 4th Reflections on Rugby Radio.
May 11th 1st Round G4ZMC Trophy Venue – Sowe Common.
May 18th Radio Workshop v.h.f/u.h.f.
May 25th.Cheese and wine evening.
Further details from John Beech G8SEQ
Tel: **079 58777363**
E-mail: **CoventryARS@aol.com**
The CARS meet on most Fridays at 2030 hours in **St. Bartholomew's Church Hall, Brinklow Road, Binley, Coventry CV3 2DT**.

Heil Microphone Winner

Roy Lisle G0SLR from Penketh, Warrington in Cheshire, is shown in his shack with the Heil Genesis HM-12 Microphone and lead he won in the *Practical Wireless* free-to-enter competition with the prize donated by **Bob Heil K9EID** and **Waters & Stanton PLC**.

Rallies

Send your rally info to:
PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-mail: newsdesk@pwpublishing.ltd.uk

Radio rallies are held throughout the UK. They're hard work to organise so visit one soon and support your clubs and organisations. PW Publishing Ltd. is attending at rallies marked *. Please check with the organisers that the rally is 'on' before leaving home.

APRIL

April 10th/15th
Titanic Centenary
A Titanic Centenary event will be held by the Wey Valley Amateur Radio Group at a Charterhouse, Godalming. Two stations will be manned continuously for six days using the callsign **GR100MGY**. The public can visit the station on Saturday 14th and Sunday 15th between noon and 4.00pm. Both admission and car parking will be free.
Micheal Shortland G0EFO
E-mail: michaelgs1@talktalk.net
www.gr100mgy.org.uk

April 15th
The Norbreck Rally*
The 50th Northern Amateur Radio Societies Association Exhibition (formerly known as the Blackpool Rally) will be held at the Norbreck Castle Hotel Exhibition Centre, on Queens Promenade, North Shore, Blackpool FY2 9AA. The doors will open at 10.30am (10.15am for the disabled) and admission will cost £5.00 (under 14s are free). There will be talk-in, car parking, trade stands, a Bring & Buy, special interest groups, a licensed bar, catering and facilities for the disabled.
Dave M0OBW
Tel: 01270 761608
E-mail: dwilson@btinternet.com
www.narsa.org.uk

April 15th
The Cambridge Rally
The Cambridgeshire Repeater Group Rally will be held at the Foxton Village Hall, Hardman Road, Foxton, Cambridge CB22 6RN. The doors open at 10.00am (7.00am for traders) and admission will cost £2.00. There will be talk-in on S22, trade stands, a Bring & Buy, catering and facilities for the disabled.
Lawrence M0LCM
Tel: 01223 711840
E-mail: rally2012@cambridgerepeaters.net
www.cambridgerepeaters.net

April 20th
DX University 2012
The DX University 2012 will be held at the Holiday Inn, Visalia, California, USA. The event will include a full programme of presentations on topics ranging from station and antenna considerations, finding DX, logging, ethics, DXpeditions, internet resources, propagation and DX awards. Registration, which includes lunch and breaks, costs $ 65.00.
E-mail: g3sxw@btinternet.com
www.dxuniversity.com

April 22nd
The 8th International DX Convention
The 8th International DX Convention will be held at Paestum, Salerno in Italy. Further information can be found on the convention website.
www.dxitalia.it

April 22nd
The Yeovil QRP Convention
The 28th Yeovil QRP Convention will be held at the Digby Hall, Hound Street, Sherborne, Dorset DT9 3AA (adjoining the central shopping car park). The doors open at 9.30am and there will be talk-in on S22, car parking, trade stands, a Bring & Buy, lectures, catering and facilities for the disabled.
Derek M0WOB
Tel: 01935 414452
E-mail: yarc-contact@tiscali.co.uk

April 22nd
The Kempton Rally*
The West London Radio & Electronics Show will be held at Kempton Park Racecourse, Staines Road East, Sunbury-on-Thames, Middlesex TW16 5AQ. The doors open at 10.00am (9.50am for the disabled) and car parking will be free. There will be talk-in, trade stands, a flea market a Bring & Buy, special interest groups, lectures, a prize draw, catering and facilities for the disabled.
Paul M0CJX
Tel: 08451 650351
E-mail: inforadiofairs.co.uk
www.radiofairs.co.uk

MAY

May 6th
The Dambusters Rally
The Dambusters Radio Rally will be held at the Thorpe Camp Visitor Centre, Tattershal Thorpe, Nr. Coningsby, Lincolnshire LN4 4PE. The doors open at 10.00am and admission will cost £3.00 (under 12s are free). There will be talk-in on S22 (GB3FR), free car parking, trade stands (pitches will be free but their size will be limited if they are not pre-booked), a car boot sale and catering will be available. In addition, there is an RAF Heritage Centre on site.
E-mail: tcrm@hotmail.co.uk
www.qsl.net/gb4tcm/dambusters.html

May 7th
The Dartmoor Rally*
The Dartmoor Radio Club Rally will be held at Tavistock College, Crowndale Road, Tavistock, Devon PL19 8DD. The doors will open at 10.30am (10.15am for the disabled) and admission will cost £2.00. There will be free car parking, trade stands, a Bring & Buy, special interest groups, catering and facilities for the disabled.
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E-mail: vivwatsondrc@aol.com

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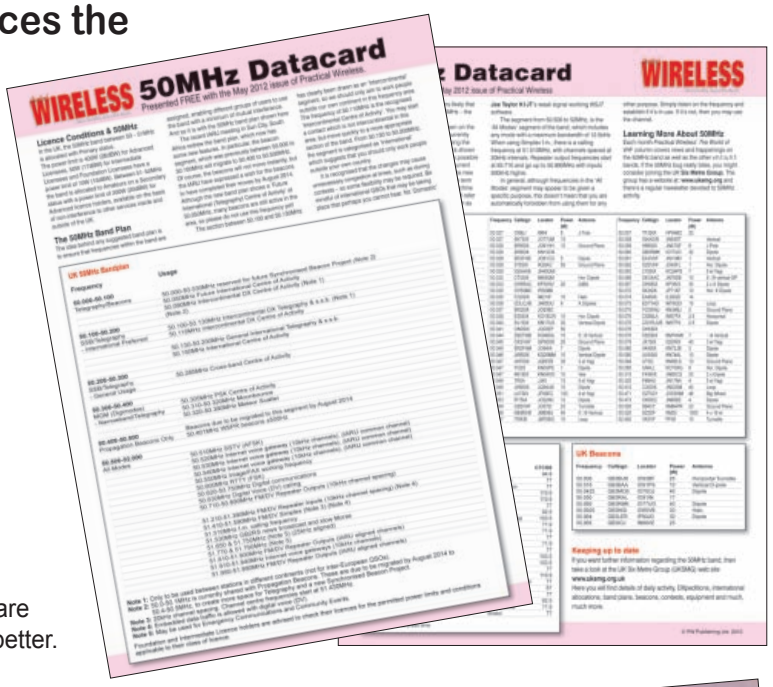
Feature

Tim Kirby G4VXE introduces the 50MHz Datacard.

The PW Companion to 50MHz



Along with the Datacard included with your *Practical Wireless*, this month, this short article aims to tell you what you need to know to get started on 50MHz. Or, if you're already enjoying the band, hopefully to allow you to delve a little deeper into the excitement that it can bring.

The 50MHz band is a particularly fascinating one for people who are interested in propagation. Most of the time the band exhibits v.h.f.-like characteristics but occasionally, around the peak of the sunspot cycle, it can also behave like an h.f. band too.

Getting Going On 50MHz

All UK licencees have access to the band – consult your Licence if you're unsure, about the maximum power you are able to use. Equipment can be as simple or as complicated as you wish. However, to get started and make some satisfying contacts, you will be surprised what you can do with a simple set up.

Many h.f. rigs come with 50MHz included. Generally, performance is good. Having 50 to 100W available to you will make things quite straightforward. However, I have made very many contacts on 50MHz with 10W or less, so don't be discouraged if you have lower power.

The Yaesu FT-450 earned its stripes, as having a really good receiver on the band, during, the FSDXA expedition to Kiritimati, T32C. Many older rigs with the band included will also perform well. If you have a rig that includes the band, but you haven't tried it, this might be the year to give it a go!

Of course you will need an antenna. When signals are strong – all sorts of compromise antennas will do! I've heard many stories of people tuning up their G5RV antennas and long wires on 50MHz and successfully making contacts. For casual contacts, this is fine, but the chances are that you'll want to do better.

Vertical antennas are another option. They are less than ideal for tropospheric or ground-wave propagation where signals are often horizontally polarised – but they are a space-saving way of getting on the band and doing well, particularly during single-hop Sporadic E (Es) openings. Many people – myself included – use a tri-band vertical (50/144/432MHz) successfully for contacts around Europe and occasionally further afield.

If you fancy making a vertical, then I can recommend **Mike Walters G3JVL**'s 5λ/8 vertical design to be found at: **www.uksmg.org/content/vertical.htm** I have used this antenna successfully in a variety of locations over the years and it packs down to almost nothing.

Of course, really, as on any band, there is no substitute for a good Yagi, with as long a boom as possible! To exploit the weak F2 and multi-hop Es openings, a good Yagi antenna is really what you need.

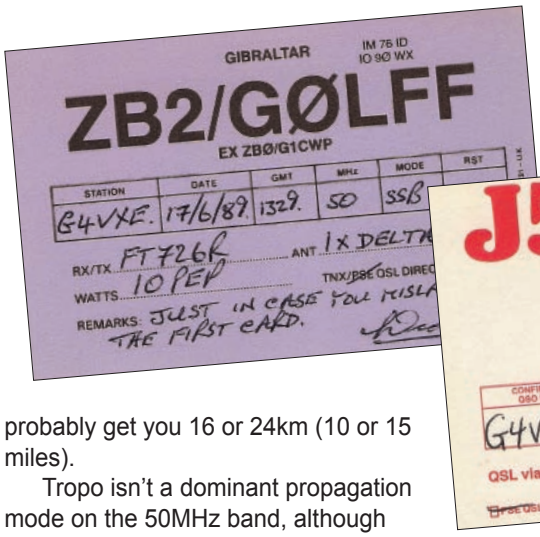
However, don't be put off if you don't have the space to put up a huge array – just put something up!

What Will I Work On 50MHz?

David Dix G8LZE has written a much more detailed article about 50MHz propagation which is included in *PW* this month. However, I thought it might be useful to include some bullet points about what you can expect

Tropo & Groundwave

An average station with a simple beam and 50W or so will easily be able to make tropo/groundwave contacts to 160km or so. Sometimes less, sometimes more. If you have a vertical antenna the distance worked may be less than this and a 'tuned up G5RV' will probably get you 16 or 24km (10 or 15 miles).



Tropo isn't a dominant propagation mode on the 50MHz band, although there can occasionally be some quite interesting scatter modes allowing surprisingly long distances to be worked, especially when there is no other obvious propagation mode. Both c.w. and s.s.b. will be the most useful modes here, although 50MHz f.m. works well for local contacts.

Auroral Propagation

To exploit auroral propagation on the band, you really need a beam antenna. Openings are more frequent during periods of high solar activity and statistically more frequent during the period from September to March – however propagation is not an exact science and I have known the occasional Aurora in July!

In fact, c.w. and s.s.b. are the modes to use for Aurora which is characterised by a rough c.w. rasp and s.s.b. which sounds like a hissy whisper!

Sporadic E (Es)

Let's next look at Sporadic E (Es) and for me here at G4VXE, this is probably the best and the mode giving

most fun on the band. As discussed, when openings are strong, very poor antennas and low power will make surprising contacts.

For more reliable results a little more power and at least a vertical will be useful. And, for multi-hop openings you will do significantly better if you have a good Yagi antennas.

The best months for Es are from May to July, but they can occur at other times. There's a second and lesser peak of Es propagation in December. Again, c.w. and s.s.b. are the dominant modes – but when conditions are particularly good, it's well worth listening on f.m. around 51.510MHz.

East West Extreme Es

East –West Extreme Es (EWEE) is generally a summertime mode that occurs over extremely long paths, such as Western Europe to Japan or West Coast USA to the Mediterranean.

You'll definitely need a beam here as signals are weak – but some amazing DX, comparable to F2 propagation is workable.

Occasionally on a summer's morning, if there's Es around in Europe, you can hear a station in Eastern Europe rattling off a pile-up of Japanese stations – of which here generally there's no sign! These openings occur two or three hours after sunrise at the western end of the path.

Meteor Scatter (MS)

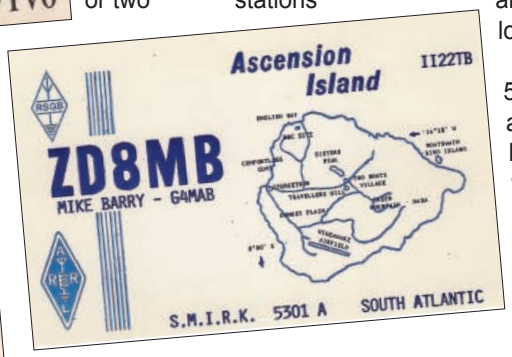
Radio signals can be reflected back to earth from the ionised trails of meteors burning up in the Earth's ionosphere. The technique is referred to as Meteor Scatter. Reflections on 50MHz can be quite long and may, at times, be mistaken for a brief Es opening. However, it's unusual for a single meteor burst to last longer than 30 to 45 seconds – although, of course, there may well be more than one burst.

You can make MS contacts without knowing it on c.w. or s.s.b., or you may choose to use one of the WSJT specialist digital modes such as JT6M or ISCAT. Meteor scatter contacts are possible most days, particularly using digimodes described above, but for c.w. and s.s.b. contacts, the best times will be during the major meteor showers such as the Perseids in August, the Geminids in December and the Quadrantids in January.

Ideally you'll need a beam, but I've made very many MS contacts using dipoles and 25W or so. In fact for 'short' distances, a dipole with a high angle of radiation works well.

The Big Daddy F2

The real 'big daddy' of propagation is F2, when 50MHz changes character from a v.h.f. band into an h.f. band. It occurs around the peaks of the sunspot cycles, so the next year or two should be good ones to be on the band.



As a rule of thumb, look for a solar flux above 200 and a low K-index – but this is not an exact science! Best times of year are the autumn and the spring around the equinoxes. Worldwide propagation is possible. You'll need a beam and your DXing skills – the pile-ups can be intense!

Trans Equatorial (TEP) –

Trans Equatorial Propagation (TEP) is not dissimilar from F2 propagation. This permits lengthy paths across the equator, such as Europe to Southern Africa or South America. Openings are relatively unusual from the UK, although well equipped stations in the south have made some great contacts.

However, look for days when an Es opening occurs from our latitude to say, the Meditteranean and that couples with a TEP opening to Africa or South America. Signals can occasionally be raspy and distorted, not unlike aurora. For the first type of opening, you'll need a good station, for the occasions when Es and TEP are present, you may be lucky with a much smaller station. Prime times of the year are autumn and spring.

Much Closer To Home

Of course, 50MHz is not all about DX and you can have fun much closer to home! It's a good mobile band. With perhaps 50W of f.m. and a reasonable antenna on your car, you will obtain ranges superior to 145MHz!

However, urban noise levels can be high on the band, which may cause disappointing results at times. From my home in Oxfordshire, I can regularly use 50MHz repeaters in Surrey or near Bristol as well as making mobile to mobile contacts over distances of 80 to 160km (50 to 100 miles) when both stations are well located.

In fact, 50MHz makes a great mobile band. Even with low power and a rig like the Yaesu FT-817 and a quarter wave antenna on the car, I have made s.s.b. contacts all around Europe with ease.

Give 50MHz A Go!

Give 50MHz a go! As I've tried to demonstrate in this short article – 50MHz is one of my favourite bands – full of exciting contacts at times and at others, white noise. Certainly, to make a success of 50MHz, you need to be well informed about when openings are most likely and to have a station available to exploit them.

We hope that with the articles and the Data Card included this month in *Practical Wireless* that you will want to try it out and find out for yourself about what many term the 'magic' band. I look forward to getting your reports of DX and other 50MHz activities to use in *The World of VHF* monthly round-up!

Feature

Keen 6m enthusiast David Dix G8LZE explains how to make the most of improving conditions on 50MHz.

Make the Most of Six!

The 50MHz band is often called the 'magic band' for good reason and the unique conditions offered by its propagation can result in very long distance contacts even with low power and a very modest antenna. With the peak of sunspot cycle 24 still to come, I aim to give some basic information to increase both your enjoyment and success on the band.

The 50MHz band is distinctive, in that, for much of the time it behaves like a v.h.f. band, with only relatively short distance contacts possible. But it then can come alive and exhibit the propagation mechanisms of the h.f. bands, allowing contacts over several thousand kilometres. So, how can this happen?

Modes Of Propagation

There are many modes of propagation used on 50MHz such as Auroral, meteor scatter, backscatter, ionoscatter and trans-equatorial propagation (t.e.p.), amongst others, but here we need to understand how 50MHz propagation will be affected during the coming sunspot cycle peak.

Apart from line of sight or groundwave communication, a transmitted radio signal bounces off either an object or atmospheric layer and returns to earth where it is received. The distance between the sending and receiving point is known as the 'hop'. For a given angle of transmitted signal the higher above ground the reflection takes place the longer the hop will be.

If the returning signal is sufficiently strong. it may 'bounce' and be re-transmitted and take a second reflection before being received back on earth, with a double 'hop'. The earth is surrounded by a number of atmospheric layers (see **Fig. 1**).

The troposphere extends from the earth's surface up to a height of around 10km, this is the zone where the weather happens. Within this zone, under certain conditions of temperature, pressure and humidity, v.h.f., u.h.f. and microwave radio signals may be refracted or 'bounced' along an atmospheric duct and communication over far longer than usual distances is possible (hundreds of kilometres up to 2000km).

This enhanced tropospheric propagation (commonly referred to as tropo) can last from an hour up to several days. Look out for tropo when there is high pressure, early mornings in late summer and during foggy conditions.

Gases In The Ionosphere

The gases in the ionosphere, above the troposphere, can be ionised by various mechanisms and by varying degrees. High ionisation tends to reflect radio signals and ionisation at different densities and heights causes different types of propagation. The main influence dictating the degree of ionisation, apart from seasonal variations, is the 11-year solar cycle.

The lowest, D layer, is only present during the day when there is weak ionisation caused (mostly) by the sun. The 50MHz signals pass straight through this weakly ionised layer but h.f. signals, especially below 10MHz, tend to be attenuated restricting long distance h.f. communication.

The E layer is more strongly ionised, again mainly by the sun. Typically it reflects radio waves up to around 20MHz and again, higher frequencies pass through. This is one of the main mechanisms for daytime h.f.

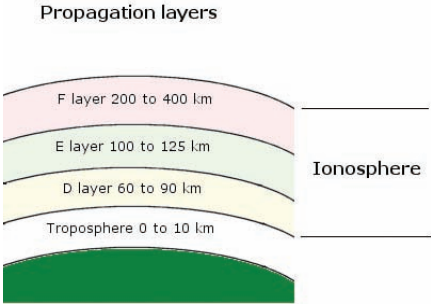


Fig. 1: The various layers within the earth's 'thin' atmosphere.

communication but of no use for 50MHz users. However, there is a special type of E layer propagation called Sporadic E or Es.

Sporadic E propagation occurs when a highly ionised particle cloud forms near the base of the E layer, which if sufficiently ionised, a 50MHz signal will be reflected by the cloud resulting in contacts up to 2200km. But multiple 'hops' are possible leading to contacts over very long distances. Multiple 'hops' to the USA and Caribbean are not uncommon.

As the name implies sporadic E propagation is not accurately predictable but it occurs every year, not just during a sunspot peaks.

The F layer is the most important for h.f. communication reflecting signals at higher frequencies as it becomes more heavily ionised. When solar activity is sufficiently high, the F layer can become ionised enough to reflect even 50MHz signals. Typically the ionisation only becomes sufficiently high during the peaks of the 11-year sunspot cycle. Being higher, the 'hop' from reflecting off the F layer is longer, typically 3200 to 4800km. Again multiple 'hops' are possible.

Sun Spot Cycle

A sun spot is an area of intense magnetic activity on the surface of the sun. The disturbance caused by the sun spot releases energy in many forms, including ultraviolet and X-rays, that hurtle through space and result in the increased ionisation of the ionosphere.

In 1843, after many years of observation, the German astronomer Samuel Schwabe noticed that the average number of sunspots varied each year but appeared to follow an approximate 11-year cycle from peak to peak.

Recent Sunspot Cycles

We are now approaching the peak of the 24th cycle and current predictions are for a maximum of 90 sunspots to occur during May 2013. This is a relatively low number, the highest in the last 100 years was 254, but the effect on 50MHz propagation will still be noticeable.

Cycle 24 Prediction

Now we know how the ionosphere is going to help us making DX contacts on 6 metres during the sunspot peak, let's

look at tools, tips and techniques that will help you make those contacts even if you only have a few watts of power and a simple antenna.

The Band Plan

Whichever mode you operate and whatever the propagation mechanism please adhere to the current band plan, which is provided on the 50MHz Data Card presented in this issue of *PW*.

.

Making The Most Of Sp-E

In the northern hemisphere sporadic E propagation usually occurs, at mid latitudes, during the months of May to September peaking in June and July. Weaker winter Es also often happen in January.

Sporadic E band openings can be very short or last several hours and conditions can change very quickly. Signals can be S9 and then disappear into the noise in a matter of seconds. It's therefore wise, and the custom, to have short exchanges passing the basic QSO information of callsign, report and Maidenhead QRA locator, sometimes also your name.

Remember, it's often quicker to give the information once, slowly than twice quickly. Bear in mind that the operator of the DX station may not be fluent in English and speaking at a reasonable speed will assist them in getting all your information in his log accurately. Their English vocabulary may also be limited and he may only be comfortable with a short "rubber stamp" type of QSO.

When you hear a station you want to contact, call them once, when invited, with your full callsign. If he does not respond straight away, listen. You may not be able to hear any other stations but because of the nature of sporadic E propagation he may have tens of strong stations calling him and it may be very difficult for him to pick out a single call.

Repeated calling while another contact is being made may well result in the DX station deliberately ignoring your future calls. So don't do it! Don't forget that Es propagation moves, so listening for a period may well increase your chances of making a contact.

If you track the locators of the stations that are being successful you may be able to judge when to make your call to best effect. If a station you want to contact suddenly disappears into the noise it's always worth monitoring the frequency for several minutes, you will be surprised how often the station will re-emerge for a second opportunity to make the contact.

Statistically, the times of day Es are more likely to occur are late morning,

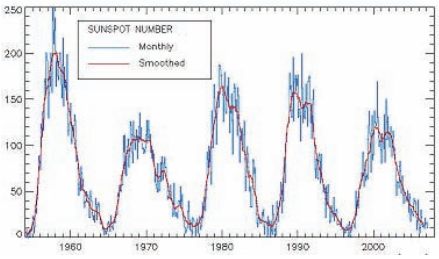


Fig. 2: Sunspot numbers over the last 60+ years, show an 11-year cycle, and seem to show a slower cycle as well.

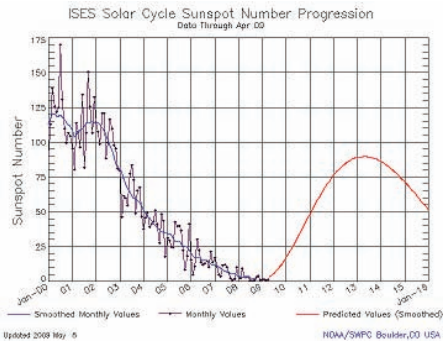


Fig. 3: The predicted smoothed sunspot numbers for the rest of this cycle.

late afternoon and late evening.

There are a number of things that may give an indication that an Es opening is imminent: Monitor a DX cluster, quite often, increasing 28MHz activity indicates a rise in ionisation and consequently an increase in the maximum usable frequency (MUF). The MUF may not reach 50MHz but it's still a good early warning.

You can monitor for some of the still existing Band I television transmissions in the 48MHz region, if you start hearing the vision carriers then the MUF is rising. Reports on Internet chat sites will indicate when conditions are improving. Monitor in band for signal strengths of beacons and other activity.

Making The Most Of F-layer Propagation

Whereas Sporadic E propagation happens every year, F layer propagation only occurs around the peak in the sun spot cycle. Being at a greater height than the E layer, when the F layer becomes sufficiently ionised to reflect 50MHz signals the 'hop' distance is greater leading to opportunities to contact DX stations not usually reachable during Es propagation.

It would seem logical that the F layer would reach maximum ionisation during the long summer days during the sun spot cycle peak. But there's an anomaly that means that the F layer cannot 'hold' the high ionisation during the summer months and ionisation is actually higher during winter months. So while there may be some F layer propagation during the summer period, the main season is October to June with a fairly flat peak between December and April.

So, around the peak of cycle 24 we can look forward to some truly exciting conditions but there is another characteristic to look out for. While the conditions for F layer propagation in the northern hemisphere will be better in the winter in the southern hemisphere they will be at their worst.

However, during our autumn it will be spring in the southern hemisphere and there will be a propagation overlap making north-south multi-hop contacts possible. The prospect of contacts with Africa and South America is a reality.

The Good News

The good news is that to take advantage of both sporadic-E and F-layer propagation you don't need to live on top of a hill, you don't need a tower, you don't need a linear amplifier and you don't need an enormous antenna!

Most modern transceivers cover 'six metres' as standard, and a lot of operators get their first experience using just a tuned h.f. wire antenna or a simple home-brewed dipole, Moxon or loop antenna. My own introduction to 50MHz was using a 14MHz dipole with just 10W of power and during my first season I managed to work nearly 30 European countries.

Of course, a high gain antenna with a low radiation angle is necessary to absolutely maximise distance. Increased power will also reduce your waiting time in a QSO queue but when conditions are 'right' a very modest station, even with Foundation Licence restrictions, can be almost as effective. Indeed, it's far more a case of being in the right place at the right time!

Most serious 6m operators spend over 95% of their time listening. The first contact on 6m from England to Zambia was near the peak of cycle 22 by a modest station where the operator just decided to have a quick tune around before dashing off to work!

Warning & Encouragement

So, I hope you spend some time exploring 6m but be warned: 50MHz can be highly addictive. If you want to learn more about your addiction and meet others with the affliction I can recommend the **United Kingdom Six Metre Group** (UKSMG) **www.uksmg.org** where there is a wealth of treatment available for us addicts! ●

Rev. George Dobbs G3RJV's Carrying on the Practical Way
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Field Strength Meters and Wavemeters

This month, the Rev. George Dobbs G3RJV takes a look at some really simple – but essential equipment we should all know how to use – after reading the (most appropriate) quotation!

"Although this may seem a paradox, all exact science is dominated by the idea of approximation.
Bertrand Russell (1872 - 1970)

Welcome to *Carrying on the Practical Way* (*CotPW*)! As I sat down to prepare this month's article I remembered that when I was downsizing my Amateur Radio belongings prior to retirement and moving to a much smaller house – I had to 'let go' of most of my cellar items. In those days I had the luxury of multi-location Amateur Radio.

The main location was my shack and workbench. I also had a cellar workshop mainly for metalwork and another room in the cellar for storage. The latter contained many 'radio treasures' accumulated over the years.

Sadly, most of these treasures are now other people's treasures. A picture, I saw in a magazine a couple of weeks ago, reminded me of one such relinquished treasure. It was the Eddystone 696 Absorption Wavemeter. A very simple piece of test equipment it consisted of a variable capacitor, a plug-in coil, a diode and a moving coil meter.

Dating from the early 1950s it has the look of 'classic wireless'. It had a black crackle painted steel case sporting a large tuning knob with chromium plated scale and an old style moving coil meter. What a shame it got away!

Wavemeters Not Featured

Remembering the Eddystone wavemeter reminded me that I'd never discussed the wavemeter in this column. So, it's time to take a look at this useful piece of very basic test equipment.

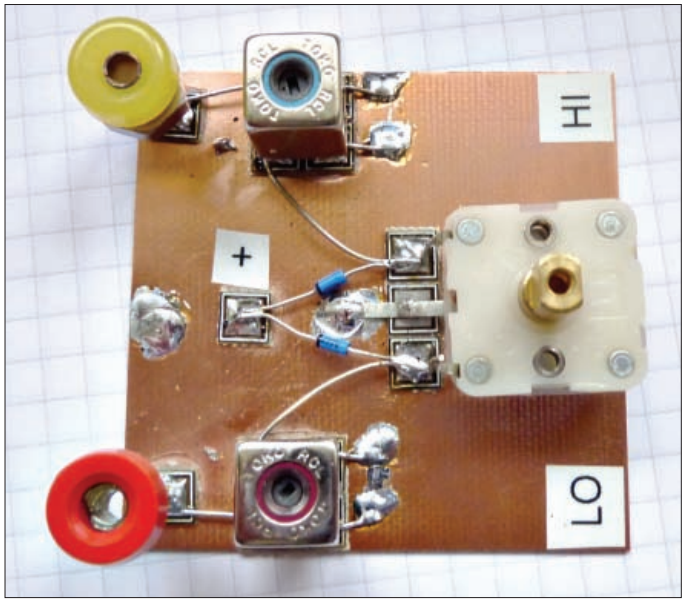
A wavemeter doesn't use any external power; it merely detects and indicates the radio frequency (r.f.) power coming from a transmitter. However, I thought it It would be a good idea to look first at an even simpler test item that relies on the radio frequency signal for power – the field strength meter.

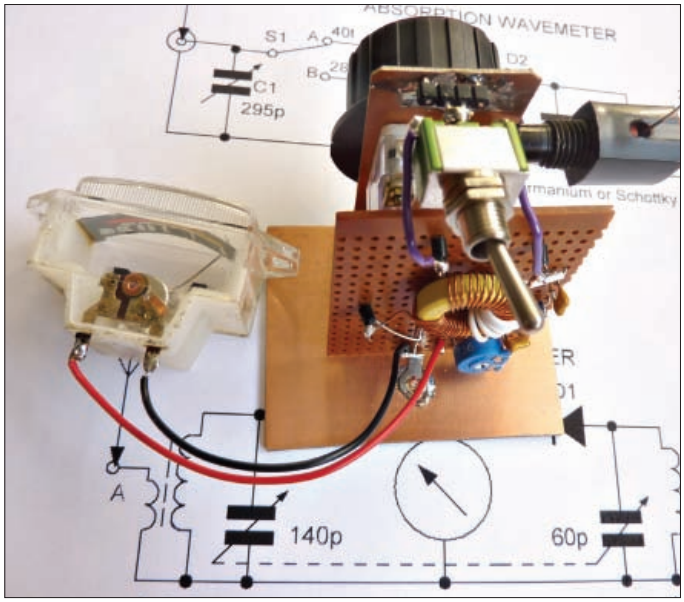
The field strength meter (f.s.m.) is perhaps the simplest piece of r.f. equipment. The sole purpose of an f.s.m. is to detect any local radio signals and give an indication of their strength. An antenna, or r.f. probe, picks up the signal which is converted to a d.c. voltage to be read on a meter.

Although not in the forefront of engineering measurement, an f.s.m. on the operating table with a flicking meter can be reassuring. A signal is being radiated, albeit from just a few feet away.

John Gardner GW4KVJ, suggested, in the G QRP Club journal *Sprat*, that we may already have a possible field strength meter. John found that an analogue multi-meter on a low a.c. voltage range can often do the job. The negative lead is connected to ground, "anything earthy" as he described it, and the positive lead is raised in the air as an antenna. This should indicate the presence of an r.f. signal. The positive lead can then be extended with a short length of wire to increase the sensitivity.

The diagram, **Fig. 1**, shows a more viable field strength meter circuit





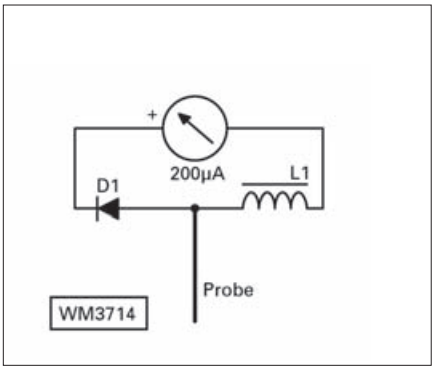


Fig. 1: The late Frank Lee G3YCC came up with a much more viable form of field strength meter.

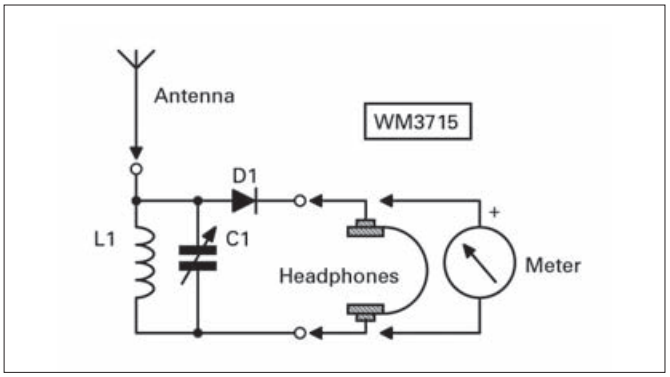


Fig. 2: A crystal radio receiver can be used as a basic wavemeter.

and has become a classic with QRP operators. It comes from the late **Frank Lee G3YCC**, who built up a large following through his QRP website that contained many simple and reliable circuits. Sadly, Frank died of a brain tumour in 2000 – but his website is still available from several sources.

All you have to do is Just Google "G3YCC" to access the archived G3YCC website maintained in memory of Frank. He called the circuit in Fig. 1 his "30 second field strength meter" and using only three parts it could be built in 30 seconds. An r.f. choke provides an r.f. load, a diode converts the r.f. signal into a d.c. voltage and the meter shows the strength of the radio signal.

The probe is an over technical word for a bit of wire acting as an antenna! The length of the probe wire determines the sensitivity and is open to experimentation to suit the individual set-up. The inductor L1 is an off-the-shelf axial moulded inductor. They look rather like a fat resistor!

The meter can be one of the surplus edge-reading meters I mentioned in this column for March 2012. Many of these meters will be VU meters from old tape recorders or S-meters from c.b. transceivers and will probably have a full scale deflection of about 200µA (microamps). The diode D1 and inductor L1 can be directly wired to the terminal on the back of the meter with the wire probe extending from the junction of D1 and L1.

I built the one in the photograph many years ago and yes – it did follow me to the new shack. It's a lovely simple piece of equipment. So, if you have a suitable meter, build one and watch your transmissions for many years to come. If you don't have access to a 1mH (milliHenry) choke try about 22 turns of wire through a BN-43-202 "pig nose" style ferrite core.

For the really frugal constructor, another alternative is to pile wind a lot of turns (at least 50) of thin enamelled wire on a bit of broken ferrite rod. The frugal constructor will have kept the broken ferrite rod!

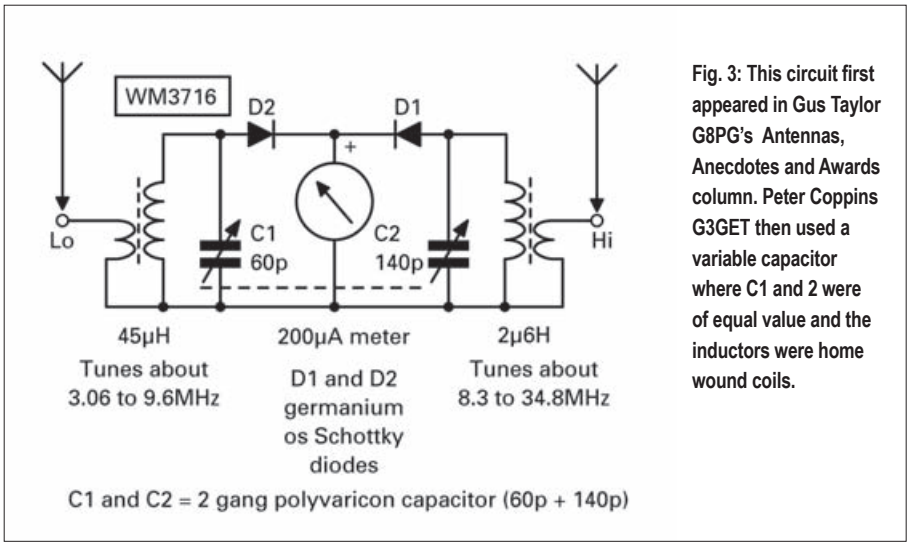


Fig. 3: This circuit first appeared in Gus Taylor G8PG's Antennas, Anecdotes and Awards column. Peter Coppins G3GET then used a variable capacitor where C1 and 2 were of equal value and the inductors were home wound coils.

An Absorbtion Wavemeter

An absorption wavemeter is a step up from a field strength meter in that the detected signal is selected using a tuned circuit. The 'absorption' of absorption wavemeter comes from the fact the wavemeter uses power absorbed from the radio transmission.

The diagram, **Fig. 2**, shows a basic wavemeter. Readers will recognise L1, C1 and D1 as the classic crystal set radio circuit. The inductor L1 and the capacitor C1 tune the desired signal present in the antenna and D1 acts as a detector, converting the r.f. signal to an audio signal which can be heard in the headphones.

Most of us will recall the excitement of building our first crystal radio and hearing radio signals on something we have made for ourselves. The circuit was probably that of Fig. 2. Take away the headphones and substitute a meter and we have a basic r.f. wavemeter.

When I first became G3RJV, it was a legal requirement for every Amateur Radio station to have an absorption wavemeter. I'm not sure if it's a legal requirement these days as I don't have one and haven't read my small print for a while. Having said that, I realise I have just built two of them for this article!

In the days before digital frequency counters, and other fancy test equipment, it was the means by which Amateurs knew we were transmitting within the amateur bands. Perhaps more importantly, it was the wavemeter that showed if we were radiating any spurious, or harmonic, signals outside the legal bands.

The calibration of most wavemeters was such that they could not measure the exact frequency of the signal but at least we knew if our signal was within the legal band. Why build such a simple, and inexact, piece of test equipment these days? The answer is – it's certainly cheaper than any other item of similar purpose.

The wavemeter easy to build and can still tell you if you signal is where it should be and not producing unwanted radiation. There's also a nice 'retro' (and rather satisfying touch in being able to see the needle moving – 'kicking' in response to the transmission.

The diagram, **Fig. 3**, shows quite a clever little interpretation of the wavemeter. It enables the whole of the shortwave spectrum to be covered without the need to switch the tuned circuit ranges. A two gang variable capacitor controls two tuned circuits. One side tunes the lower bands and the other side the higher bands. I first saw this idea in *Sprat* number 100 (Autumn 1999).

The article appeared in the

Antennas, Anecdotes and Awards column written for so many years by the late **Gus Taylor G8PG**. The idea had been sent in by **Peter Coppins G3GET** who used a variable capacitor where C1 and 2 were of equal value and the inductors were home wound coils.

The diagram, Fig. 4, takes the idea a little further. In recent times this column has made good use of the **Spectrum Communications** range of shortwave 10mm 10K coils. These have replaced the Toko coils that were used for many years. The 10K coils are not only ready for use and conveniently small, they also have the advantage of some inductance adjustment using the adjustable screw core.

Covering The Whole Range?

The coils cover the whole range of shortwave amateur bands. It occurred to me that there must be a pair of coils in the range that could cover the span from 3.5 to over 30MHz.

Also in recent times some inexpensive two-gang variable capacitors with nominal capacitance values of 140pF and 60pF have become readily available from several suppliers and the G QRP Club. So, I wondered – What tuning ranges would be possible using the two gang polyvaricon and the 10K coils?

Some 'number crunching' into radio frequency software on my computer showed that there were several possibilities, the best of which provides the values for Fig. 3. Rather oddly, the smaller value gang on the capacitor is used for the lower values of frequency. This may not produce the best ratios for a high *Q* tuned circuit, but it's good enough for this application.

The capacitor C1 was measured to cover about 6.0 to 60pF, which, with a 45µ0L 10K coil (nominal value 45µH) gives a range in the order of 3.06 to 9.6MHz. The capacitor C2 was measured to cover about 8 to 140pF and with the 2µ6L 10K coil (nominal value 2.6µH) gives a coverage of 8.3 to 34.8MHz.

Between them C1 and C2 are able to tune from below the 3.5MHz (80m) band to above the 28MHz (10m) band in two ranges with a nice overlap between the ranges. Naturally the frequency ranges can be tweaked using the cores in the coils.

The coils also have the advantage of a link winding which can be used to couple the antenna to the tuned circuit. The rest of the circuit is simple; in fact it's two of the circuits in Fig. 3 'back to back'. All diodes have some forward voltage loss and to reduce this it is best to use germanium diodes (OA81, OA91 etc.), or the even better choice of Schottky diodes (1N5711, BAT43, BAT85 etc.) for D1 and 2.

One of the surplus meters I've mentioned this month would work well in the circuit. There's no sensitivity control for the meter. The easiest way to increase or decrease the sensitivity of a simple wavemeter is to make the pick-up antenna longer or shorter.

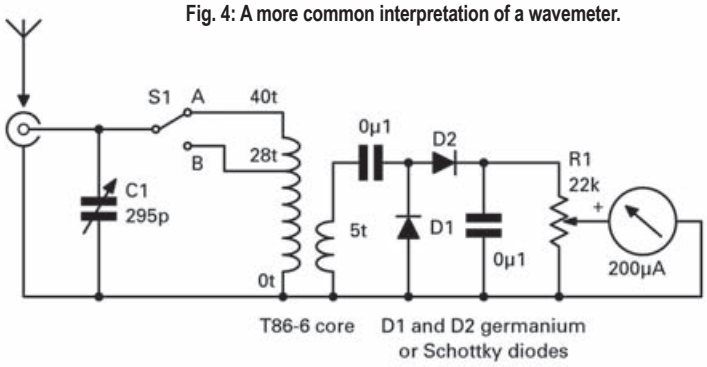
When trying my prototype I found that one of my standard clip leads, about 500mm long, gave a very adequate meter reading. During this test the wavemeter was picking up the signal from a 5W transmitter. Naturally the reading will also depend on the position of the probe antenna and its proximity to the transmitting antenna. Just use a "bit of wire" probe to suit your own situation.

A More Common Interpretation

The diagram, **Fig. 4**, shows a more common interpretation of a wavemeter. Here a tapped inductor is switched to give the full range of shortwave Amateur bands. The switched coil arrangement is not ideal but the switching is required to cover the whole h.f. spectrum. The full winding (40 turns) covers 3.4 to 22.7MHz.

The top end of the range is covered by the 28 turns tap in the coil is gives 4.8 to 32.5MHz. Naturally, these values will vary with individually wound coils but there's enough overlap for that not to be a significant problem. The picture, **Fig. 5** shows the arrangement of the tuning inductor in Fig. 4.

Fig. 4: A more common interpretation of a wavemeter.



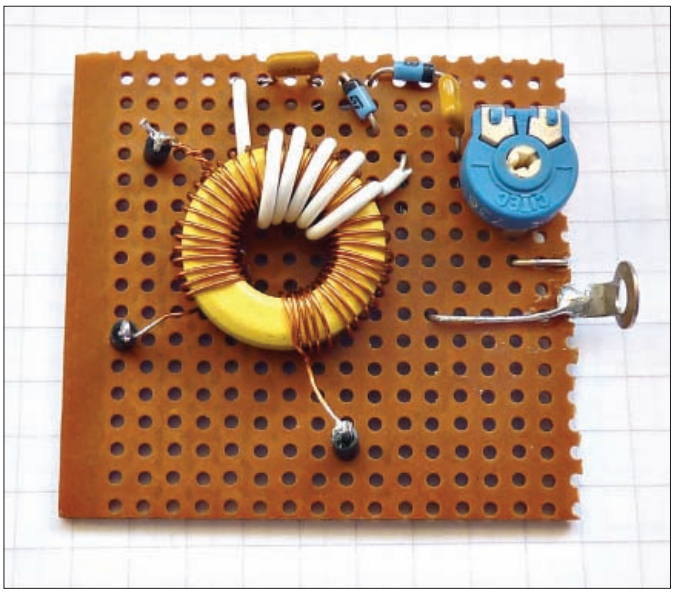


Fig. 5: Showing the arrangement of the tuning inductor in the circuit of Fig. 4.

After winding 28 turns (26 s.w.g. on a T68-6 core) pull out some wire, twist it, scrape it clean to show bright copper and solder the end – then complete the 40 turns. A five-turn link of *pvc* covered wire is wound over the main winding.

The sensing circuit uses two diodes to produce a voltage doubler circuit and R1 provides a sensitivity control. Again D1 and D2 ought to be germanium or Schottky diodes. The tapping arrangement does not give as convenient range switching as Fig. 3. Readers may like to experiment with using the coils in Fig. 3 and making the 10K coil link winding become the 5 turn link to the r.f. sensing section of Fig. 4.

The wavemeter and field strength meter may appear to be Amateur Radio of yesteryear – but they are easy to build and can be quite reassuring as the meter indicates that r.f. signals are leaving the transmitter at the correct frequencies! Their simplicity and low cost make them an attractive addition to the modern radio station. So add some dancing meters to your station!

●

Mike Richards G3WNC's Data Modes
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Data Modes

This month Mike Richards G4WNC, continues his look at SDR radio systems, with some tips on how to make the most of your SDR software.

Welcome to *Data Modes* (*DM*) and – as you'll have seen from earlier articles in this series – there are lots of different software programs for software defined radio (SDR). Additionally, the good news is that the vast majority are free! However, using SDR software to monitor radio signals requires a different approach to a traditional communications receiver.

The first culture shock is the loss of the ubiquitous tuning knob. While most systems provided a simulated tuning knob – it's not usually the best way to get around the bands. If you are desperate for a conventional tuning knob there are a few 'tuning knobs' available that connect, linked to your PC via a USB lead, but you will have to check compatibility with your set-up.

However, it's important to explore the new opportunities presented by the much more flexible interface of SDR software. By far the most common tuning technique is known as 'point and click'. This technique is where you use the mouse pointer with the spectrum display and simply click on the part of the display you want to monitor.

The technique is a particularly quick way to get close to where you want to be and you can usually complete the fine-tuning by 'click-dragging' the tuning point with the mouse or by rolling the mouse wheel. However, there are a few settings that need to be fine-tuned to help you get the best from the interface.

Spectrum Display

There's usually a spectrum display, that dominates most SDR interfaces and usually set shows the entire bandwidth of the IQ signals coming from the SDR hardware. You may well find that in its default set-up the display is very animated and erratic, making it difficult to make sense of what you're seeing.

The solution to this rapidly moving display, is to set the display to show the signals, averaged over time. When averaged, each point on the display will depend on previous readings, which has the effect of smoothing out the movement and making observation very much easier. The critical point is, of course, how much averaging to use – too much and short duration signals will disappear – too little and the display will still flicker.

It's very difficult for me to recommend a specific setting as it depends on the software you're using and the speed of your PC. A good starting point can be found by tuning to the Morse (c.w.) segment of a busy band and experiment with the averaging until you find a setting that keeps c.w. signals visible, but smoothes-out the flicker. I've shown an example of the difference averaging can make in **Fig. 1**.

The screen shots shown in Fig. 1, show the spectrum plots of a WinRadio Excalibur Pro with no averaging and then with 0.4s averaging. As you can see, the averaged plot is very much cleaner and the signal traces are more

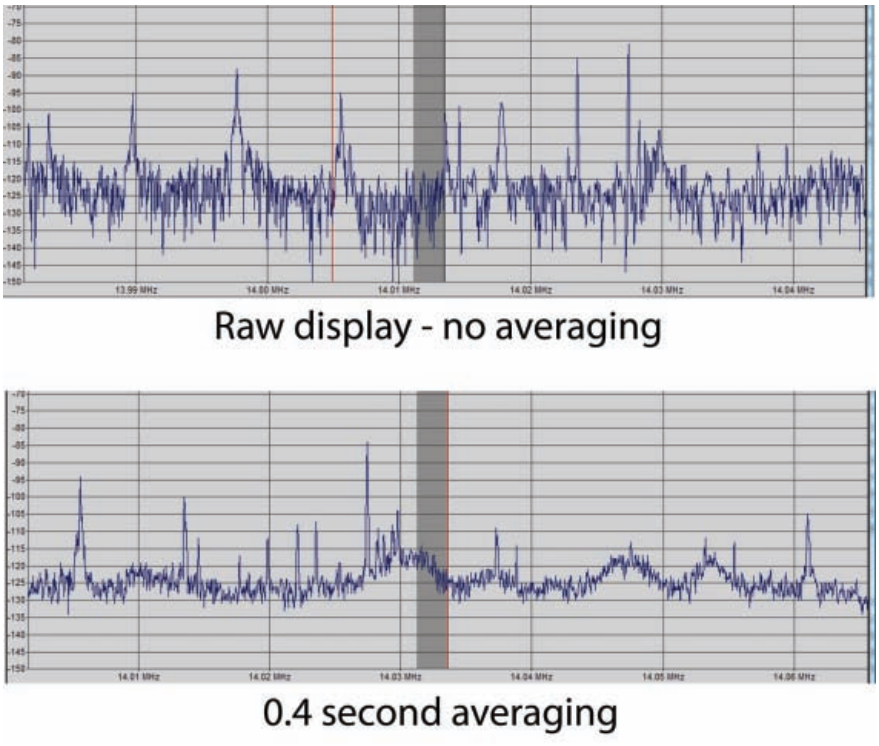

Fig. 1: Averaged and non-averaged spectrum displays, note with the averaged display (bottom display), it's much smoother to read.

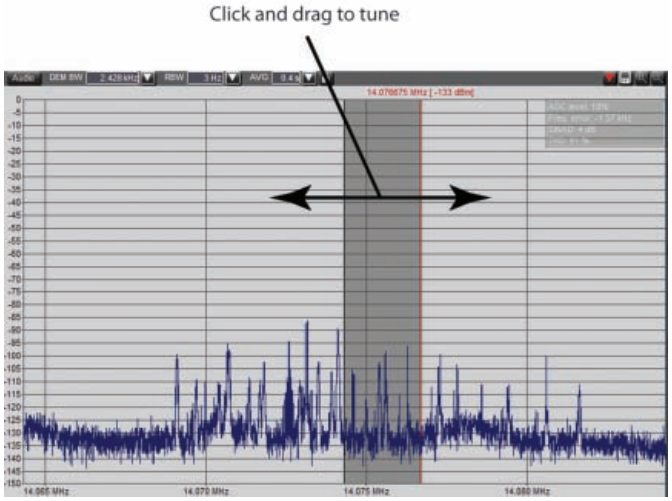

Fig. 2: Fine tuning a spectrum display.

obvious. If your software uses the number of samples to set the averaging to three or four, a good starting point.

Most SDR software will show the demodulator bandwidth as a highlighted, or grey bar, superimposed on the spectrum display. This can be dragged from side to side to complete the fine-tuning, see **Fig. 2**. On most systems you can also use the mouse wheel to scroll around. If you happen to have a graphics tablet handy this can also be used for tuning and I find a tablet quicker and more precise than a mouse.

The receive bandwidth bar is often adjustable simply by clicking and dragging on one edge of the bandwidth display, see **Fig. 3**. On some systems this has to be done in the audio rather than the r.f. spectrum display. This feature is particularly powerful, allowing you to trim the receive bandwidth carefully to minimise interference. But I'll cover filters in more detail in a later article.

Waterfall Display

The waterfall display found on many SDR programs, is one of the most useful features, as it provides a record of a signal's spectrum over time. Instead of showing the spectrum as a varying line graph, the waterfall shows different levels in the spectrum as points of varying brightness – the stronger the signal, the brighter the trace. I've shown an example of a spectrum display and the corresponding waterfall display in **Fig. 4**.

The real power of the waterfall display comes when you allow the display to build up for a few minutes. Any intermittent signals show as dashed lines and you will note that different types of transmissions have their own characteristic patterns. This is another subject I'll be looking at in more detail later.

The waterfall display is also very good for click-tuning as it's much easier to click on a stable trace on a waterfall than a signal that's bobbing about within the spectrum display! This is especially true if the station has just finished a transmission as the trace will still be visible in the waterfall but no longer show in the spectrum display.

Display Resolution

In addition to the controls I've already discussed, there are a couple of other settings associated with Fast Fourier Transform (FFT) displays that often cause confusion. The first setting is the display resolution, which is set by a combination of sample rate and the FFT size. Let's quickly re-cap on the FFT process to see how sample size and FFT size relate.

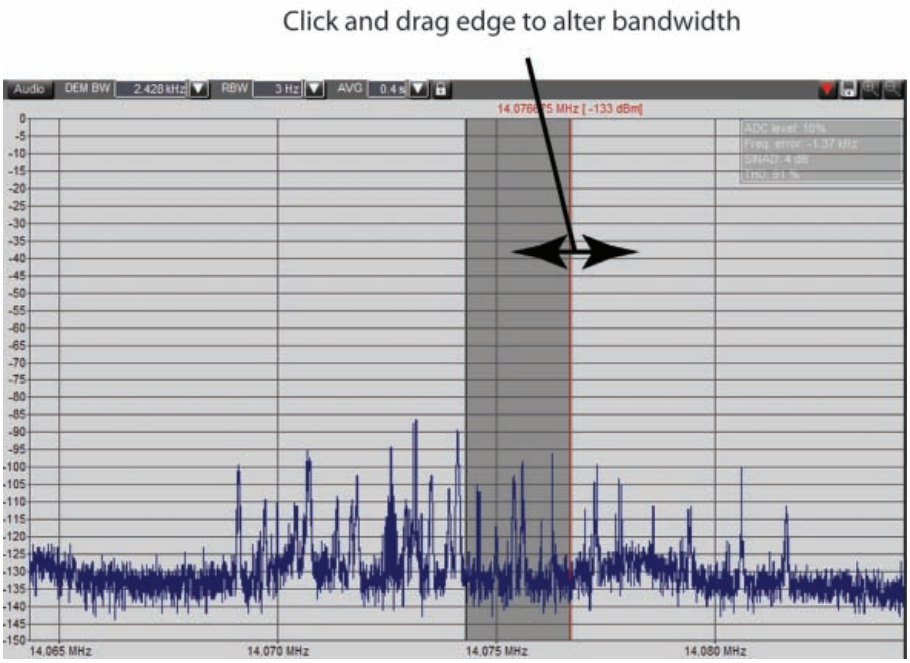

Fig. 3: Adjusting the demodulator bandwidth.

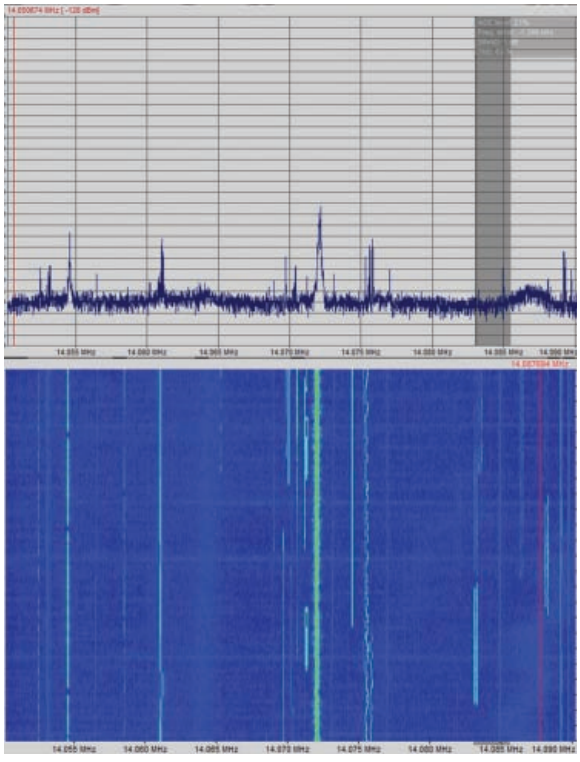

Fig. 4: Spectrum and waterfall displays compared, the spectrum above the waterfall display.

The FFT technique is a well established and very useful mathematical algorithm that can process a stream of digital data to separate-out the frequency components. In very simple terms, it does this by generating a number of memory stores (known as bins or points) each one of which, represents a narrow band of frequencies. As the data is processed, each bin is allocated a number that corresponds to the energy level of its particular frequency band.

The output of these bins is then used to drive the spectrum and waterfall displays. The bandwidth of each bin is determined by the sample rate of the signal and the number of FFT bins with the simple formula: Bandwidth(in Hz) = sample rate/number of bins (or points).

As always, there are compromises to be considered. The larger FFT sizes take longer to fill, so there's a time lag between the signal being received, and it showing on the display. The optimum setting will be specific to your set-up and preferences –but feel free to experiment!

The method of adjusting the display resolution varies between systems and whilst the *Excalibur Pro* and *HDSDR* show the bandwidth in Hz via a simple drop-down menu, many SDR software packages only offer FFT size selections with typical options being: 512, 1024, 2048, 4096, 8192, etc.

Here's an example to show you how to work out the display resolution. If the incoming sample rate is 96kHz and the FFT point size is 4096 then each of the FFT bins and therefore the display

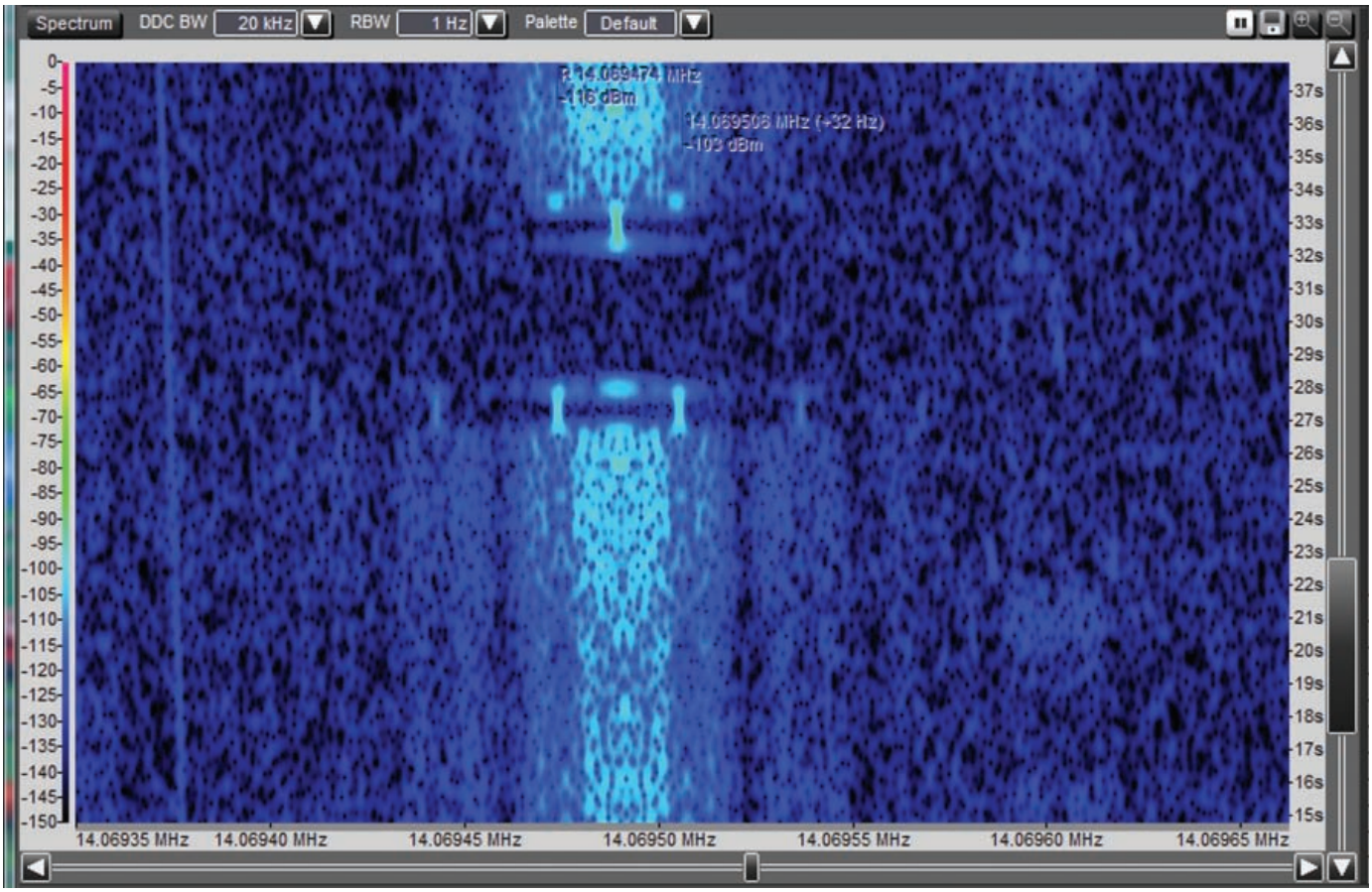

Fig. 5: 1Hz resolution analysis of a PSK31 signal using the Excalibur Pro receiver and its software.

resolution will be 96,000/4096 = 23.4Hz wide. Whilst that resolution would be okay for general use, finer resolution is necessary if you want to take a close look at narrow data signals such as PSK31 that are only 31Hz wide.

In the case of trying to sample a PSK signal, you'd probably need to take the FFT size up to 32,768, as that would provide a more useful resolution of 2.7Hz. I've shown an example of a PSK31 signal analysed with 1Hz bandwidth in **Fig. 5**, where you can see the waterfall display. The display is very revealing and provides a powerful analysis tool that can be used to check the transmission quality and identify the transmission mode but I'll cover this later.

Further Confusion

The further source of confusion concerns FFT windows. Why do we need to worry about these windows? For the FFT to work accurately and drop all the signals neatly into the correct bins each signal in the FFT sample has to be periodic within each data sample. That just means each signal should start and finish at 0. As we're dealing with a wide variety of unknown radio signals, clearly that will not be the case.

If the signals aren't periodic within each measurement sample, then the allocation to bins becomes 'smeared' and a single frequency signal will appear in more than one bin. This effect is known more technically as leakage. If left unchecked, this will spoil the resolution of our display.

The solution is to intervene and force all signals to zero at the beginning and end of each measurement sample. Of course, there are lots of ways in which the signal can be reduced.

Signals could be either abruptly stepped down to zero, or they can be gently reduced over a period of time. As you can probably imagine, there are countless techniques that could be used but a number of standard shapes have been developed over the years and these shapes are known as windows and are generally named after the people that developed them, hence the window types called **Blackman**, **Hanning**, **Hann**, **Nuttall**, etc.

I've shown two common examples for such windows in **Fig. 6**. As always, selecting the window type involves compromises but for general radio use Hanning is probably the best starting point as this provides good resolution with minimal leakage. If you want to achieve accurate measurement of a single tone signal, then a flat-top or rectangular window is likely to give the best result.

That's it for this month, next time I'll be taking a look at SDR filters. Cheerio for now! ●

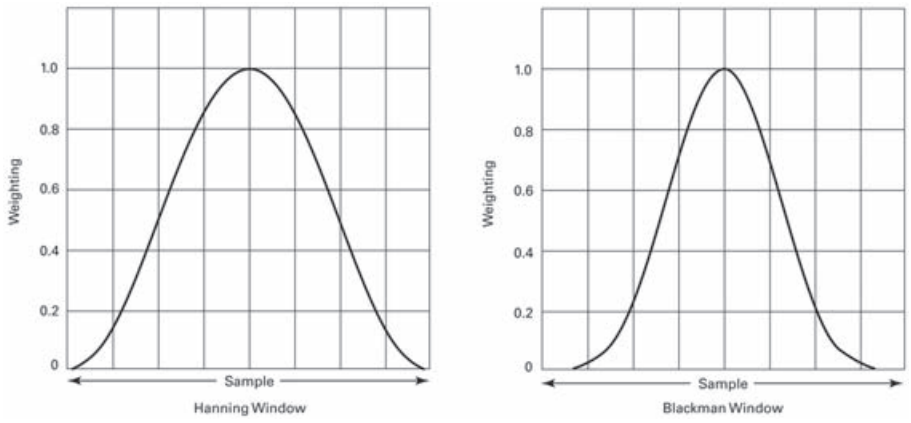

Fig. 6: The Hanning window shape to the left of the Blackman FFT window shape on the right.

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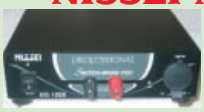
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MFJ-962D 1.5kW (metered) antenna tuner	our price £279.99
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SGC MAC-200	£259.99
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2m + 70cm + wideband Rx. Includes battery/charger. ~~£179.99~~ **£129.99**

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10m + 6m + 2m + 70cm. (up to 50W).
INCLUDES WIDEBAND RECEIVE AS STANDARD (PLUS DUAL RECEIVE)
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Latest YAESU VX-8DE with free extra battery.....£365.00

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50W, 2m, 70cm dual Rx.
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2m, 70cm + APRS/TNC.
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2m/70cm + APRS
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2m + 70cm Handie. Includes nickle metal N.M.H.I and charger.
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2m/70cm handie + desk charger, car charger, headset, case, microphone, speaker. 2 x batteries, AA case, PC lead, etc.
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all include battery, charger and antenna

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USB lead + s/ware	£21.00
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Half size 40-10m.....£32.99
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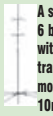
DIAMOND CP-6



A superb (diamond quality) 6 band trap vertical antenna with trap radials – "rotary" trap system allows "flat wall" mounting. 80m/40m/20m/15m/10m/6m. 200W SSB, HT 4.6m (15ft tall).

£339.99 OUR BEST SELLING VERTICAL

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HF-2V (80/40m).....£279.99
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22089 9ele 2m..... £79.99
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DIAMOND YAGIS

No tuning required

2m/5 element — No tuning required — SO-239 feed..... £54.99
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70cms/15 element — No tuning required — SO-239 feed..... £74.99
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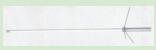
DIAMOND V-2000



6m + 2m + 70cm. 2 section (2.5m long) PL-259 fitting. Superb quality.

Sale price **£119.99**

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Del £10.00

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X-627 GF 50/144/430MHz..... £99.99

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MX-72 144/430MHz..... £39.99
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50/144/430/1200MHz. BNC (plus SMA adapter). 51cm long – amazing!
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RH-770H (BNC)
2m/70cm Tx + wide Rx. High gain up to 5.5dB.
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300Ω Twin Feeder
£1/mtr £70/roll
450Ω Ladder
£1/mtr £70/roll (100m)

ALUMINIUM POLES (2")
20ft (collection only) £49.99
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2.4m.....£29.99
5ft.....£14.99

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A superb quality ferrite ring with incredible properties. Ideal for "R.F.I". Width 12mm/ OD35mm. 6 for £16.99 P&P £4.00
12 for £26.99 P&P £5.00
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Hard drawn (50m roll).....£40.00 P&P £7.50
New: 50m roll, stranded antenna wire.....£16.99 P&P £7.50
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Flexweave (PVC coated 50 mtrs).....£59.99 P&P £7.50
Special 200mtr roll PVC coated flexweave.....£180.00 P&P £10.00
Copper plated earth rod (4ft) + wire clamp.....£16.99 P&P £8.00
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2" mast-floor base plate..... £16.99
6" stand off brackets (no U-bolts)..... £8.99
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12" T & K brackets (pair) £19.99
18" T & K brackets (pair) £24.99
24" T & K brackets (pair) £29.99
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All our brackets are of high quality, British made and galvanised.
U-bolts (1.5" or 2") each..... £2.00
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2" extra long U-bolt/clamp £7.49
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Set of 3 heavy duty fixing spikes (~0.7m long)..... £29.99
30m pack (4.4m) 480kg B/F nylon guy..... £15.00
Roll of self-amalgamating tape 25mm x 10mtr..... £8.99

HEAVY DUTY 30ft SWAGED MAST SET

5 sections, 2 inch x 6 foot long. Very heavy duty.
£89.99 PER SET (delivery £15)
TWO SETS FOR £150.00 while stocks last (delivery £18)

NEW SWAGED MAST SETS

24 foot mast. 1½" – 4 sections (6ft long). **£49.99** OR 2 SETS £84.99
SALE:- 3 SETS £99.99

24 foot mast. 1¼" – 4 sections (6ft long). **£46.99** OR 2 SETS £78.99
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H/DUTY CAR BOOT MAST SET

18 foot (1½" dia).
18 foot – 6 x 3 foot (1½") slot together ally sections.
£49.99 per set.
SALE:- 3 SETS £99.99
TWO FOR £79.99 DEL £13.00

NEW CAR BOOT MAST SET

Superb 18 foot (6 x 3 foot sections) that slot together.
Dia: 1¼" ideal to take anywhere.
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2 for £74.99 3 sets £89.99

HEAVY DUTY 24ft SWAGED MAST SET

New extra heavy duty 2" mast set. 4 sections x 6 foot that slot together. **£79.99 PER SET**
TWO SETS FOR £140.00 SALE: THREE SETS FOR £159.99

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10m MAST, ONLY
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A simple to fit but very handy mast pulley with rope guides to avoid tangling.
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30m pack (4.4mm) nylon guy rope £15.00
132m roll 4.4m nylon guy (480Kg b/f) ..... £45.00 Del £7.50

NEW EASY FIT WALL PULLEY

Pulley will hang freely and take most rope up to 6mm. (Wall bracket not supplied).
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132m (4.4mm) nylon guy (480Kg) £45.00

HANGING PULLEY

Heavy duty die-cast hanging pulley. Hook and go!
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500kg brake winch. BARGAIN PRICE
£94.99 Del £10.00
(Now includes cable grip)
Winch wall bracket..... £22.99

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FG-01
Analyser 1.8-60MHz
£225.00

HB-1B-Mk3
80-40, 30-20m 4-band QRP rig.
£249.99

LOW LOSS PATCH LEADS £4.50 P&P

Connectors	Length	Price
PL-259 - PL-259	0.6m	£11.99
PL-259 - PL-259	1m	£14.99
PL-259 - PL-259	4m	£19.99
PL-259 - PL-259	20m	£49.99
BNC - BNC	1m	£12.99

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Heavy duty universal mount.
Includes 5m cable **£34.99**

MT-6601

Adjustable roof rack/window bar mount
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External analouge meter for Yaesu FT-857/FT-897 (includes connection lead).
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True military spec real UK coax

RG-58 Military spec x 100m.
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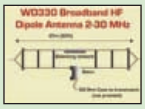
£149.99/100m or 2 for £260.00
WESTFLEX 103 (100m) £159.99

NEW DIAMOND WD-330



Amazing performance. Twin folded dipole. 2-30MHz – and it really works. No ATU required (25mts long). Supplied with 30 mtr PL-259 feeder – ready to go. If you want great transmission, look no where else. Japanees quality made product
WOW **£249.99**

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2-30MHz (250W) 6.4m long. End-fed wire antenna. Icludes matching balun. Sling up & away you go.
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80-10m & only 19.2m long! (Up to 1.2kW) Includes 1:1 Balun. Bargain. Superb Japanese quality antenna system.
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"We've sold 100s all over Europe"

★ 1.8 - 60MHz HF vertical ★ 15 foot high ★ No ATU or ground radials required ★ (200W PEP).
SEND SAE FOR LEAFLET
£219.99
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CW-80	(80-10m) 40m long	£150.99 P&P £10.00
CW-80S	(80-10m) 20m long	£150.99 P&P £10.00
CW-40	(40-10m) 20m long	£139.95 P&P £10.00
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80mtr inductors + wire to convert ½ size G5RV into full size. (Adds 8ft either end).....£34.99 P&P £4.00 (a pair)

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D-308B DELUXE DESK MIC

(with up/down). Many amateurs (over 4000) have been pleased with it's performance. Includes 8-pin round Yaesu mic lead. Icom/Kenwood & other leads available. Phone (£22.99 each). Replacement foam windshield £3.00 + P&P.
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(POST £4.00)

CX-SW4N DC-1.5GHz (5xN).....£59.99
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DC-2 Standard 2-pin/15A fits most VHF/UHF.... £10.00 P&P £3
DC-3 Fits Yaesu FT-7800/8800/8900, etc ..... £17.50 P&P £3

Q-TEK TRI-MAGMOUNT

Very heavy duty. Available:- SO-259 or 3/8 – specify.
£44.99

Feature

Forget James Bond and the 'Secret Squirrels' – This is the real thing!

Editor's introduction: Ross Bradshaw G4DTD's article is something rather unusual for PW *and any branch of the 'Secret Squirrels' are always quite sensitive whenever their work is mentioned – even when it's historic. But I'm sure that our readers will be fascinated and if any reader remembers – and responded to – the DWS Recruitment stands at Radio Shows in the 1960s, I would be pleased to hear from you.* ***G3XFD****.*

Diplomatic Wireless Service Part 2

Ross Bradshaw G4DTD continues his look back of his career with the government's diplomatic communications service and the adventures he experienced.

Welcome to part 2 of my look back at my work in the DWS. When I 'retired' from sea-going radio, and with my security clearance enhanced I was stationed in the ComCen and I began working the overseas stations. As usual I received the minimum of training, I was taught how to 'fill' a station prior to going into cipher then left to it!

A station in plain language (PL) was known as being in 'lowers' or in 'red' while a station that was in cipher was regarded as being in 'uppers' or in 'green'. The lights on a BID 610 were red, green and yellow. The yellow lamp was light when you were 'filling' a station, red was PL and green means you were in cipher.

The first station I was given to work on my own was Belgrade, who (at his end) was closing for lunch. I had to ask him what I was supposed to do! He told me that we both would drop out of cipher, known as 'going low' or to use the term 'glow'.

If there was more than one station in a group, then the station you had been working would not only 'glow' but would also go Group Stand By (GSB). This was executed on his Piccolo panel, where a switch would offset their transmitter by a couple of kiloHertz and not block the transmission from the other station. They would stay listening to Hanslope Park so that when the other station finished and cleared off or went GSB in his turn, the station could then switch back to his transmit frequency and make contact. This saved warm up time and made contacts a lot faster.

Closing For Lunch?

Should the station be closing for lunch, that station would say what frequency his receivers would be left tuned to. This was done so that we could transmit a series of letters that would activate the alarm bell in his building so that he could be recalled to the radio station for contact!

When the station closed at night the operator would leave one receiver tuned to one frequency and the other receiver tuned to another frequency. One of the frequencies would be a 'day' frequency; the other a 'night' frequency so there was a good chance of making contact regardless of the time of day.

The special call letters, or 'bell' letters would activate the alarm in the security officer's office. They would telephone the duty operator to come in and at the same time the security officer would press a button that would activate the transmitter that had been set to an answer-back frequency.

There would be a small length of Baudot tape, fashioned into a loop so it would run in an endless fashion to say that the call had been received and the operator was on their way. The loop was called the QVA4 tape. The Q code QVA4 means (in plain language) that "Your call has been received and is being dealt with".

All the information regarding frequencies, times of next contact, last message number sent and the last message number received, was sent on the closure of the station in the operator's DCR (My accounts are settled by...). This contact usually ended with the words "QRC as per DCR" but whereas DWS used QRC to mean "the next contact is…" I had been taught the Merchant Navy version that read basically "My accounts are settled by…" so on principal I would only ever send "as per DCR".

Torn Tape Relay

We also used what was referred to as the "torn tape relay" method of operating. We would receive a message on a teleprinter (either from a post or from London) and as it printed out a length of five-unit Baudot tape was cut. This tape was then stapled to the page copy and put in the 'Out tray'.

All the messages were periodically collected and taken to what was called an 'Enumerator bay' to be stamped with a serial number and entered in a book. These were then hand delivered to the required bay.

On the bay you detached the tape, fed it into the teleprinter tape head and sent the message, the page copy being 'signed off'. Any messages to more than one station were passed from bay to bay as required. Traffic received in the Comcen for London and onward distribution would be sent over a private wire, suitably online-ciphered on one of two lines, G arm or (when traffic levels were high) F arm would be opened up in tandem.

One Or Two Operators

Small stations usually only had one operator, a DSC8 grade, while a normal station would have a DSC8 in charge

The Central Receiving Station (CRS), or the Big House, as it was known, was a building put up soon after the War as a temporary building but was still being used in the mid 1980s.

with a DSC9 to help. We only had a couple of larger stations where there was a DSC7 in charge and a couple of DSC9 grades doing most of the work – depending on how helpful the DSC7 was!

It seemed that at this time it took about 15-18 years to go from DSC9 to DSC8 grade – promotion was a bit on the slow side! We had about 136 grade DSC9s and about 86 grade DSC8s. Of the 66 radio posts that we had in the DWS, as a DSC9 I could be sent to any of 45 of them – the other 21 were one man (DSC8) posts. Eventually, I was posted to Darwin in Australia.

Darwin Relay Station

Because of the long distance to transmit to and from the Far East stations there was a relay station in Darwin, in the Northern Territory of Australia. Messages would be sent from Hanslope Park over a secure on-line cipher link to the Darwin Station.

Darwin would then transmit, via h.f. radio, to the various outstations. Those stations would transmit back to Darwin on the h.f. link who would receive the traffic and using the torn tape relay system, send the traffic to Hanslope Park over the secure line. Darwin at the time (1980) had the following stations, shown in **Table 1**.

Katmandu Power Problems

The Kathmandu outstation in Nepal often had power problems, their mains supply would drop to as low as 180V instead of being 240V. As a result we often had to wait whilst the operator started up their standby generator to get a reliable voltage supply and so continue passing traffic!

Table 1.

Station	Mode of communication	Cipher gear
Peking	Mark D piccolo	BID 610
Tokyo	Mark D piccolo	BID 610
Rangoon	Mark D piccolo	BID 610
Kathmandu	Mark D piccolo	BID 610
Vientiane	Mark D piccolo	BID 610
Canberra	Private wire	BID 610
Wellington	Private wire	BID 610
Bangkok	Mark D Piccolo	BID 610
Islamabad	Mark D piccolo	BID 610
Dacca (Dhaka)	Mark D piccolo	BID 610
Delhi	Mark D piccolo	BID 610
Hanoi	Mark D piccolo	BID 610
Kabul	Mark D piccolo	BID 610
Seoul	Mark D piccolo	BID 610
Singapore	Mark D piccolo	BID 610
Ulan Bator	Morse code	None

Vientiane (Laos) often missed a radio sked (or was late) and having such a low amount of traffic it wasn't long before the station was closed. That then became one posting that lost to us.

The operator in Rangoon (it was Burma in my time - now it's known as the Republic of the Union of Myanmar) was often doing work in the registry and seemed to be more interested in that, than doing his radio work. So several times he was late for his skeds. A mortal sin!

When radio conditions were poor, Kabul, Islamabad and Delhi would work direct by radio to Hanslope Park rather than to us. We only had one Morse station and that was Ulan Bator who because of the very low volume of traffic, didn't warrant the expense of Piccolo gear but eventually they would be upgraded to fall in line with the other stations.

If we lost the private wire to Hanslope Park we would make contact on h.f. radio but the contact was never very good for long. Also, by the time I had left Darwin in 1982 most of our BID 610 ALVIS cipher gear had been upgraded to BID 770 TOPIC.

The Darwin relay station would soon cease working as a traditional relay. The stations would be received but not worked, instead they would be plugged into the private wire (M1020) and we would work the stations in the normal way. Any transmit or receive frequency changes at Darwin would be asked for

After the old CRS had been flattened, this was the new CRS building, which was opened on July 4th 1986. But only seven years later it had closed.

over the service line where the staff (drastically reduced) would carry out the changes.

Two Passports!

Some time later, after my tour of duty in Darwin, I was posted to our Embassy in Tel Aviv in Israel. To enter the country I had been advised to carry two valid passports in my name. One was for use while in Israel itself and the other was in case I had to cross the Allenby Bridge into Jordan on a casual courier run.

If I was called on to assist with the courier missions I would have to show one passport at the Israeli checkpoint. However, at the other side of the bridge, from a different pocket, I would then have produce my second passport that didn't have any Israeli entry stamps in it! This was because of Arab/Israeli hostility. I never had to do a courier run as things turned out but I had to be prepared just in case!

I was the second operator – as a DS9C grade, while my boss was a DS8C grade. I had asked for a course on the Mark F piccolo, which I had never used having only been trained on the old Mark D. I was told that I didn't need such a course as Tel Aviv was still using a Mark D station.

The Embassy had four floors and a flat roof. The first floor was occupied by the unclassified section and Administrative offices as well as the staff bar. The second floor was for the senior staff such as the Ambassador, the head of Chancery, the Second Secretary and other staff. On the third floor – where I would be working in the 911 room – was the registry and at the far end of the floor were the Defence staff.

On the top floor was the CTSD man (technical security) with his workshop. Also in a room on the top floor we had an emergency generator (for power cuts) and another room for burning the secret waste – a job that I as a junior grade had to do every day!

Four Monopole Antennas

Up on the Embassy's flat roof were our four monopole antennas, one to transmit on, two for the receivers and one spare. The ground plane mat for these antennas was under the roof covering, originally the mat was planned to be of copper but due to the expense of copper (even then!), chicken wire mesh was used instead!

A diesel powered generator was located down in the basement. This would be used for power cuts – but should it be unserviceable then our own small diesel generator was the absolute last resort. Also in the basement – in a secluded room – was a small back-up radio station using the Mark 128 radio.

After a couple of days I was into the routine of typing up the telegrams and receiving what Hanslope had sent to us. We had one outstation to pass traffic to, over a private landline (on-line ciphered with a BID 770/TOPIC) and this was in Jerusalem. The line was used in the simplex mode i.e. if Jerusalem was sending we had to wait until they finished before operating our keyboard.

In Jerusalem the operator was a lady "of mature age" who had the awkward habit of cutting in when we were sending traffic to her. Usually it was in the middle of a long telegram. Because of her trying to "talk" at the same time as we were, the system dropped out of cipher mode. We then had to go through the procedure of getting back into cipher – only for her to tell us to hold on while she put some more paper in her teleprinter. It was very frustrating!

Jerusalem could not hold anything over the classification of Confidential, so anything that was sent 'Secret' was read and destroyed. Or 'eat before reading' as we sarcastically called it!

To be continued

In Part 3 Ross G4DTD rounds off the story of his career with the DWS and laments the closure of h.f. operations – as the introduction of satellite communications made the DWS operators redundant.

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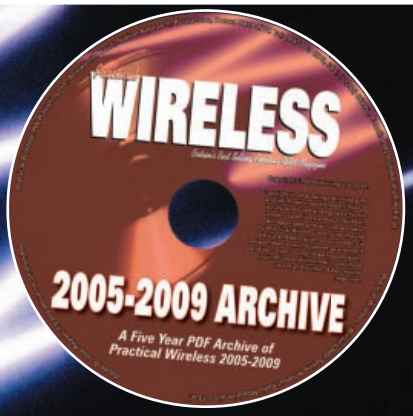

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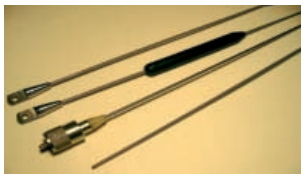

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Tony Nailer G4CFY's Doing it by Design
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Helping *PW's* Listening Fraternity

In this month's *Doing It By Design* column, Tony Nailer G4CFY is aiming to help radio listeners. He thinks that they are a neglected group amongst *PW's* readers!

Mounted in a die-cast box. the a.t.u. is a very useful unit for those with little space for long wire antennas.

Since taking over Garex Electronics I have been selling all types of portable and indoor antennas for use by listeners. Also, I now market the Target HF-3 receiver, which covers 30kHz to 30MHz.

I quickly came to realise that there's a branch of *PW* readers, who could be termed armchair listeners, without a radio shack and possibly, even without a soldering iron. They may even be more likely to be living in a flat.

Such armchair enthusiasts often will not have a 13.5V bench power supply so have nothing to power the Target receiver. One even attempted to plug the red and black leads directly into the mains but fortunately failed to make a connection. After a quick consultation he went to his local Maplin store and bought a power supply unit (p.s.u), which was successfully demonstrated within the store, to power his receiver.

Power Supply Problem

Around the same time I obtained stock of what I thought were reasonably priced 12V 500mA plug-in power supplies. These were offered to customers as optional extras for the receiver.

Then customers started calling me to say they couldn't receive anything but noise and one customer returned his receiver for a full refund. When I tested the receiver with the p.s.u., I could hear a lot of noise and not a lot of signal. Indeed I couldn't even listen to BBC Radio 4.

The noise problem was quickly traced to the p.s.u., which being a switch mode design, was conducting spikes at around 100kHz directly via the d.c. lead to the radio. Putting the receiver onto my 13.5V linear bench supply and the noise dropped dramatically allowing the receiver to spring to life.

Then I had to find a source of suitable linear power supplies. This task turned out to be quite difficult, as nearly all wholesalers have discontinued this type in favour of the cheaper and lighter weight switched mode versions. Stocks of the linear versions were obtained and sent to all customers who had bought the other types.

Even the man who had bought his p.s.u from Maplin's was offered a linear one, for a reasonable price of course. Although the linear ones were more expensive all I asked was for the customers to return the switched mode units so they could be returned to the wholesaler as being in contravention of the EMC regulations.

Listeners' Antennas

The armchair listeners differ from the short wave listeners of former times, in that they'll not have access to a garden and several resonant antennas. Instead many live in apartment blocks or flats or even residential homes and have no opportunity to erect an outdoor antenna of any sort.

Active antennas are really useful where even a relatively short random wire antenna cannot be used. But, active antennas are not as good as a longer random length of wire.

Random Wire Antennas

As most readers will be aware, short antennas with amplifiers have relatively poor signal-to-noise ratios. There really is no substitute for having lots of wire to intercept radio signals. Any sort of random wire of length in excess of 3m (about 10ft) will pick up signals, especially at the 30MHz end of the high frequency band.

At 1MHz the wavelength is 300 metres, and a really efficient antenna would be 75 metres long! What this tells us is that a short length of wire works well at high frequency but becomes progressively poorer as the receiving frequency is reduced. Is there any way to enhance the performance of a short random wire when used at low frequency?

The answer has been known for many years and is incorporated in most older style car radios. Telescopic and rigid whip car antennas are incredibly short for the reception of long and medium wave and present a high impedance at the feed-point. This problem is compounded by the use of coaxial cable, which it is usually 150Ω characteristic impedance feeding the car radio.

At the input of the radio, a series-connected high value choke is used to make up for the missing inductance of the whip and so, presents a much lower impedance to feed the input amplifier. Nevertheless, reception on long wave in particular results in a poor signal-to-noise ratio. On the v.h.f.

f.m. band the whip is about the right length to be a quarter-wave so works really well.

Antenna Works Best

When feeding a receiver, an antenna works best if its impedance, at the receiver end, is low, say 35 to 75Ω. This state occurs naturally when the antenna is a quarter wavelength long. If it's too long, the impedance rises again and has excess inductance that needs to be 'tuned out'. If the antenna is too short it also is high impedance, but this time, it's in the form of excess capacitance.

So, a short antenna can be made to appear electrically as a quarter wavelength long, by the addition of inductance, whilst a long antenna can be electrically reduced to a quarter-wave by tuning out the excess inductance by the addition of capacitance.

Antenna tuning units for transmission need to have a low *Q* to prevent excessive losses due to high circulating currents. When such units are used only for receiving, they give little noticeable improvement in received signal. They also, do little to restrict unwanted out of band signals.

Antenna tuning units for reception will never have high circulating currents, so need to be as high *Q* as possible. This factor also means there will be considerable magnification of the received signal's voltage.

The trick with receiving a.t.u.s is to transform the high voltage at a high impedance point within the tuner, down to the lower impedance required for the receiver's input. Any transformer, or auto-transformer action wins because the voltage transforms by the turns ratio, while the impedance transforms by the square of the turns ratio.

Types Of Tuner

I started looking through literature from the RSGB and ARRL *Handbooks*, *HF Antennas For All Locations* by the RSGB, *A Digest of Horizontal Wire Aerials* published by the Spalding & District Amateur Radio Society, and several years of *Antennas To Go* by *Practical Wireless*.

Many of the designs that I found, fell into the trap of being low *Q* also being suitable for QRP transmissions. One of the most useful articles was *HF Antennas for Difficult Locations* by the late **Fred Judd G2BCX** in *Antennas To Go*, June 2005. Fred showed a parallel tuned circuit and how it could be coupled to a high impedance antenna and low impedance receiver. A copy of the basic tuning unit is shown in **Fig. 1**.

Tuner Design

A simple tuner based on the parallel tuned circuit concept and using two switches is shown in **Fig. 2**. The two switches allow the antenna and variable capacitor connections to be independently switched. I found a suitable polyvaricon, which on measurement, varied from 20-240pF using both gangs in parallel.

If it's assumed that with stray capacitance, the capacitance variation covers a range of 10:1, then the frequency swing with be the square root of this. This is because $F = 1/(2*\pi*\sqrt{(L*C)})$. The square root of 10 is 3.16. This means that we need three coils to cover three decades from 1–30MHz. The ideal ranges being 1–3.16, 3.16–10, and 10–31.6MHz.

With a tuning capacitance at maximum of 240pF, the inductance will be L = 1/(39.5xF*F*C). So, $L = 1/(39.5*1*10^{6}*1*10^{6}*240*10^{-12})$. Fortunately the power of 10 all cancel out leaving L = 1/(39.5*240) = 0.000105H, or 105µH.

Suitable coils from the Spectrum Communications range of 10mm types were selected, with L1 = 110µH, L2 = 11µH, and L3 = 1.2µH. The 1.2µH also had a very low impedance secondary of just one turn giving a good match to 50Ω at 30MHz.

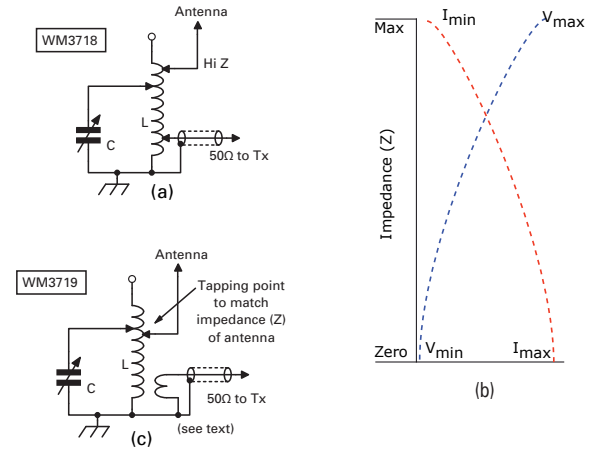

Fig. 1: A basic antenna tuning unit circuit (a) with its high impedance (voltage) feed. How impedance creases from zero to maximum across a tuned circuit (b) and an antenna tapping point adjusted to meet feed impedance needs (c).

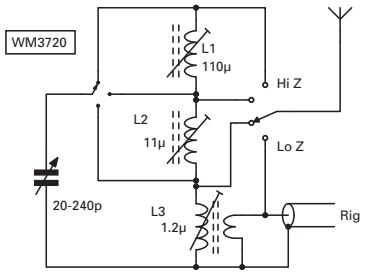

Fig. 2: A simple tuner based on the parallel tuned circuit concept and using two switches is shown here.

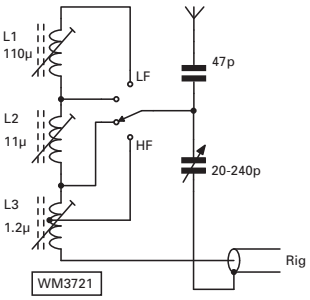

Fig. 3: The circuit of Tony's first experimental receiving antenna tuner.

Experimental Tuner

The experimental version of the tuner was built in lash-up form and put through its paces in conjunction with a 5m length of throw-out wire and a Target HF-3 receiver. It worked quite well at mid-range frequencies around 14MHz but not very well either at low frequencies or above 21MHz.

Obviously, some further thought was needed, so I put the unit to one side until I next walked my dogs! During the next dog-walking session, I reasoned that the low impedance secondary on the small coil was too much of a step down when much higher inductance was, in effect, added to the main winding of the 1.2µH coil.

To avoid the step down I ignored the secondary and instead, I wired the coaxial output point in series with the coil chain. A tap on the primary of the smallest coil was also brought to the switch for very low inductance.

Again, I experimented with the tuner and found it was dramatically improved, especially at the low frequency end of the range. I also found that the optimum position for antenna connection was also the same position as the variable capacitor.

Signal improvement and tuning became fairly flat at the high frequency end as the antenna passed the point where it was over a quarter wavelength long. I added a 47pF capacitor

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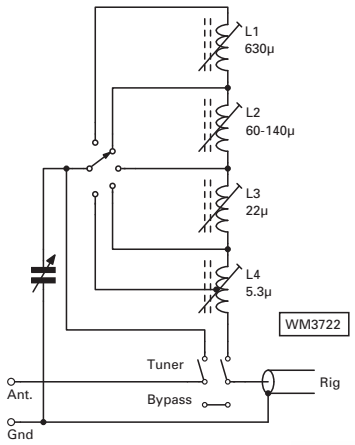


Fig. 4: Circuit modifications, with new coil values and the extra coil are added to the circuit of Fig. 3.

Fig: 5: The modified circuit is acting as an L-match circuit.

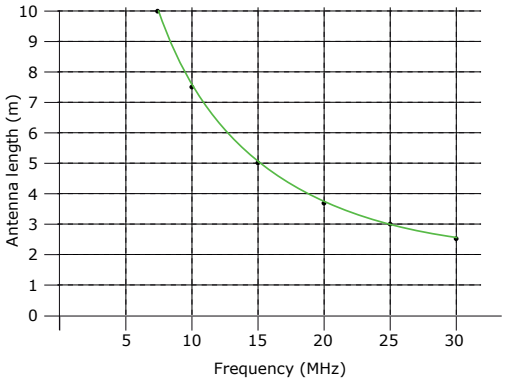


Fig. 6: A graph, to help determine at what point a random wire is quarter-wave resonant.

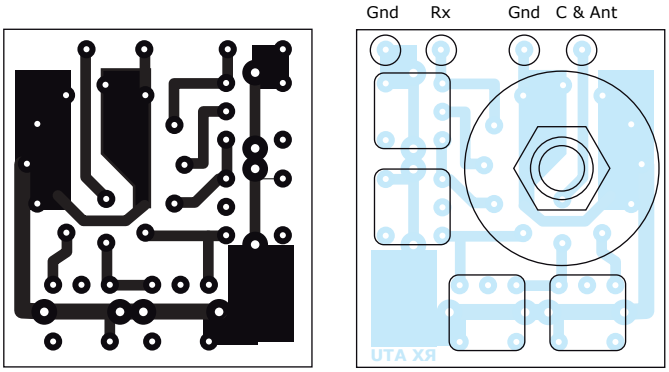


Fig. 7: A suitable printed circuit board layout.

in series with the antenna to reduce the excess inductance for the high frequency end, which seemed to offer an improvement. The new circuit is shown in **Fig. 3**.

Further Experiments

Several different values of inductance were tried and a fourth coil was added to make the tuner function down to the long wave band. I then laid out a p.c.b. and a board was produced. When built, although it wasn't not boxed-up, it performed much the same as the prototype but was easier to manipulate.

A double-pole switch was incorporated to allow the tuned cicuit to be by-passed. This is really handy, as it allows you to compare the benefit of the tuner in circuit. It's also of benefit at frequencies higher than those of quarter-wave resonance of the random wire. Beyond this frequency point, the tuner offers no signal increase. The further modified circuit with new coil values and the extra coil is shown in **Fig. 4**.

I found a suitable box in my store, and the unit was properly assembled. It's a delight to use and enhances the wanted signal whilst rejecting out of band signals. On 3.5MHz in particular, it can change a barely perceptible signal into one fully readable and yet still showing only one bar on the signal display.

Another polyvaricon was substituted for the fixed 47pF and it was found on all frequencies that there was better reception with the polyvaricon at maximum. There was even better reception with the antenna connected directly to the main tuning capacitor. On some frequencies the improvement was as much as four bars on the receiver signal display.

Further Thoughts

Whilst considering the circuit function I finally realised that the modified circuit was simply an L-network as shown in **Fig. 5**. It can only match dissimilar impedances and they must be higher at the capacitor end than the inductor end. For equal input and output impedances would require two equal value capacitors, which then makes the circuit into a Pi-network.

Following this reasoning I reversed the input and output connections to see if an improvement in signal above 21MHz could be achieved, but unfortunately there was no improvement over the antenna connected directly to the receiver. So, that defines the limitation of this design. To solve the problem for frequencies from 21MHz to 30MHz may require a completely different network.

I also tried a polyvaricon on its own in series with the random wire to see if tuning out the excess inductance had any benefit but none was discernible.

To assist listeners in determining at what point their random wire is quarter-wave resonant a graph is included in **Fig. 6**. As an example, if the wire length is 3.5m, then where that projected value across hits the curve corresponds to 21.5MHz on the frequency scale. Below that frequency the tuner would give increasing benefit.

If the antenna wire length is 6.5 metres this corresponds to 11.5MHz. The tuner will be of benefit below that frequency but not above it. You will also notice from the graph that a wire less than 2.5 metres long is resonant above 30MHz.

Although the tuner will help improve the performance of most random wire lengths, it must be pointed out that antenna gain falls off proportional to the square of the length reduction. Despite the belief to the contrary, antennas and a.t.u.s aren't 'black magic', although sometimes they are difficult to understand. I hope this article and the project will be of benefit to everyone who listens! ●

Parts availability

The **RX Random Wire Tuner** printed circuit board, coils, polyvaricon, switches, terminals and coaxial socket and drilled box are available as a kit for £32.00. Also available ready built for £42.00,both prices including P&P.

There was a repeated problem in the circuits of Fig. 1 and Fig. 2 of the *Mixing One To One* article on page 32 onwards of the March 2012 issue of *PW*. In each case, the lower diode of each illustration has been reversed and should have its cathode terminal to the left, rather than to the right as shown, the text is, however, correct. My apologies for the mistake!

Tim Kirby G4VXE's World of VHF incorporating VHF DXer
Willowside, Bow Bank, Longworth, Oxfordshire OX13 5ER
E-mail: tim@g4vxe.com Twitter: g4vxe

Wainwrights on the Air

Tim Kirby G4VXE welcomes you to the world of Amateur Radio above 30MHz and a new enterprise – Wainrights on the Air – aimed at increasing outdoor activity on the v.h.f. bands.

Welcome to the *World of VHF* (*WoVHF*) and – with the better weather hopefully on the way, it's always good to think about portable activity. On this theme it was great to hear from Liz Waller M6EPW of the Wainwrights on the Air Management Team about how the programme is developing.

Liz says, "As of the 1st January 2012, the Wainwrights on the Air scheme (WOTA) has been extended, with the addition of the 116 Outlying Fells, which are described in a separate Wainwright guidebook. This will add new challenges and make it easier for everyone of all ages, levels of radio operation and abilities to get involved."

"Tongue in cheek, Wainwright dedicated the *Outlying Fells of Lakeland* guide to 'old age pensioners and others who can no longer climb the high fells'. In fact the routes described range from quite easy strolls that can be enjoyed by every member of the family as a fun day out, to hikes which are harder than ascending some of the original 214 summits.

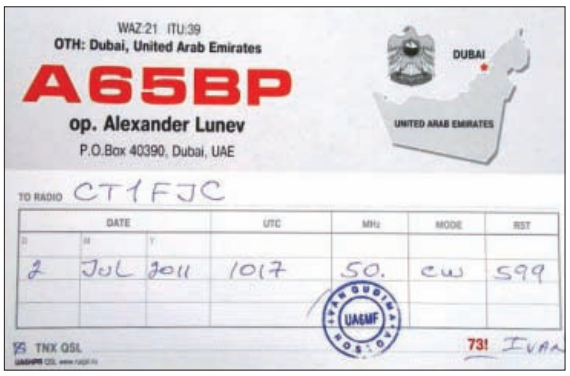
"Nevertheless, the inclusion of these fells under the WOTA umbrella provides greater opportunities for amateurs to get involved with operating portable. Many of the Wainwright tops count for the **Summits on the Air** (SOTA) scheme and Summits base scheme and are good locations for v.h.f. DXing and contesting, so they represent good 'multi-tasking' opportunities.

"Get your walking boots and radio ready! With an extra 116 fells to explore, let's make 2012 a fantastic year for WOTA"!

Thanks for that Liz! If you want to learn more about WOTA, see their website at **http://www.wota.org.uk**

High Altitude Balloon flights

Jon Joyce GM4JTJ sent another fascinating report on his experiments tracking a balloon flight on February 12th. Jon writes, "Xaben was launched from a site in Suffolk, not far from Ipswich at about 11.20am. I had spent a while that morning changing over the antennas on my portable mast and settled down with the chat node and keeping an eye on the website: **http://spacenear.us** to track the progress of the balloon. This site gives the position of the balloon superimposed upon a map and also gives details of its rate of ascent and which stations have decoded its information."



"The map also has the position of the receiving stations superimposed upon it. Early on the map was dominated by approximately 15 stations in the Home Counties with myself near Dundee and a station in Northern Ireland. Another function that this website calculates and displays, is a circle around the balloon which represents its 'Radio Horizon'."

"The balloon, which was a floater, ascended very slowly at around one metre per second and the course of the balloon tracked to the south west and latterly to the south. It was transmitting on 434.650MHz sending a 425/50, 7-bit RTTY signal which had details of its GPS co-ordinates, balloon pressure and temperature"

"I knew it was going to be quite a while before I was within the radio horizon, maybe several hours.

"Tantalisingly this horizon never made it much further north than Sunderland for as fast as the balloon ascended, thus increasing its horizon, it was also tracking south and moving away from me.

"I eventually realised at around 3.30pm that I was not going to hear this balloon which was now somewhere at around 30,000m above Amien in France and so I stopped monitoring.

There were about a dozen UK stations tracking and also by this time a few Dutch and French Amateurs along with an Swiss station who I think did decode some telemetry. Even so, this was an enjoyable day of anticipation and hoping that maybe I might receive something. It would appear that the balloon made it to some point between Stuttgart and Nuremburg in Germany. That's quite an achievement!"

"I have a home brewed station and use a 21-element Yagi antenna but many stations monitoring in the Home Counties were using simple commercial equipment and omni-directional antennas. I find it staggering that the received signal strength at 500km+ distant from essentially a car key-fob transmitter of a few milliwatts of r.f. output at 20,000 to 30,000m can be so strong. When in the past I have tracked balloons in the skies above Cambridge I was receiving a consistent S7 signal – but sadly not this weekend!"

Jon finishes, "So not much to report this time – but that's often the way of it with this hobby, hours spent waiting and hoping."

Thanks Jon! How true, but sometimes the experiments when you don't hear something are just as interesting and informative as when you do!

Spacecraft reflections

Martin Rigby G4FUI (Penrith, Cumbria) always sends an interesting E-mail. When he'd last written he had been using the *R_Meteor* program, but he

had since found that he's had better results using the *SpectrumLab* program from DL4YHF (*www.qsl.net/dl4yhf/spectra1.html*) especially once he had tweaked the settings a bit.

Martin had been monitoring the GRAVES radar on 143.049MHz and has had some excellent results, including on one occasion recording a reflection from the International Space Station – which as you would expect, travelling at 17,500m.p.h., exhibited considerable Doppler shift!

Well done Martin and thank you for the tip on using the Spectrum Lab software. Sadly, I've not yet been able to get a reflection from the ISS (although at one stage, I mistakenly thought I had – but I'd managed to read the trace wrongly!).

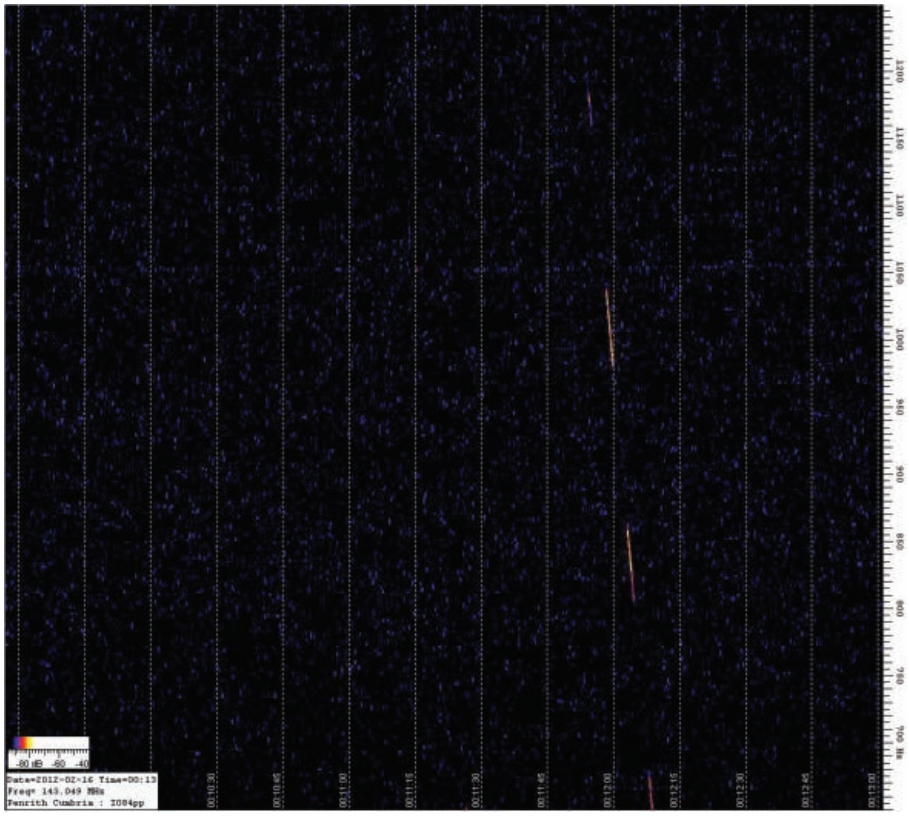


Fig. 1: The GRAVES radar signal on 143.049MHz reflected off the ISS, as recorded by Martin Rigby G4FUI.

Anyone Know The RA30H1317M?

Bernard Gilbert G8EWF (Mablethorpe, Lincolnshire) wrote with a question I couldn't answer! He has a Mitsubishi v.h.f. semiconductor package an RA30H1317M but doesn't have a 145MHz p.a. circuit to use it in.

Bernard wondered if I knew, but despite considering myself good with search engines, I couldn't come up with anything to help. Can you? If you can, please drop me an E-mail and I will be pleased to put you in touch with Bernard.

The 50MHz Band

Just too late for the last column, but **Jim Rabbetts GM8LFB** (Wick, Caithness, Scotland) sent a report on the excellent contacts that he made during the aurora on January 22nd. Jim was active between 1800 and 2200z and worked the following OZ8ABA (JO55), LB9JE (JP50), SM4JFG (JO79), ES2QN (KO29), UT1FG/MM (JO43), SM6UQL (JO57), SB6A (JO57), G3USL (IO92), GW8ASD (IO93), MM0LUP (IO67), GM8IEM (IO78), EI4EY (IO52) and M0KWP (IO93). Jim was running 100W to a 3-element Yagi antenna, all on s.s.b.

It was good to hear from **Mark Marment CT1FJC** who has been away from home in Portugal for a few weeks, holidaying in Barbados. Mark says that he saw a nice 50MHz Yagi while he was there, but the house was guarded by dogs, so he wisely decided not to investigate further! Back at home, Mark has been finding some Trans Equatorial openings to the south, working TR8CA on JT65 on March 1st and then on March 3rd he worked 6V7SIX on s.s.b.

I asked Mark about the possibility of trying a JT6M QSO with him. We concluded that for meteor scatter, it would help if I put a beam up – using a vertical, it might make life quite hard at the receiving end! However, it would be more feasible to try JT6M in weak Es type conditions, so I shall look forward to trying that.

The JT6M mode, of course, is one of the modes produced by K1JT's *WSJT* program and was designed to be specific to the needs of 50MHz. However, in the latest version of the program, *WSJT 9.0*, JT6M is dropped and replaced by a mode called ISCAT. I asked Mark if JT6M had been replaced by ISCAT.

Mark replied "Correct, ISCAT is the replacement for JT6M, and is a mode in *WSJT 9. WSJT 9* does not have JT6M included which is a shame. However, JT6M (in *WSJT 7*) is still very much alive, and used by more stations than ISCAT I find. You get used to the jingle of JT6M, so much so that you know what is being sent before it decodes. e.g. RRR, 73, etc., but not callsigns.

The A65BP QSL recently received by Mark Marment CT1FJC for their 50MHz QSO.

"That said, ISCAT is capable of decoding weaker signals under some circumstances. But it is difficult to hear anything before decoding. The JT6M mode has a sort of 'love affair' following with most digital operators!

Have a look at **www.JT6M.org** and look at 'all time tables' for 50 and 70MHz to get a feel for stations active on JT6M. No doubt in time ISCAT may well come to the fore, and JT6M will be lost to the history books"

Useful Advices For Digimodes

Mark also had useful advice for people setting up digimodes interfaces to allow operating on modes such as JT6M. "It's very important that the audio paths are transformer isolated from the computer, with no earth hum loops. Also, ensure that the p.t.t. trigger line is opto-isolated, and that computer tones are disabled, also the microphone. There's nothing worse than hearing computer pip tones, etc., coming over on digital signals!"

The discussion and advice came about because I'd finally got a digital

modes interface sorted out for my FT-847 which I use on most of the v.h.f. and u.h.f. bands here at **G4VXE**. I was recommended to use a ZLP interface and discovered that they offered good value compared to many other interfaces.

However, I was a little concerned whether it would work with the FT-847 having been thwarted by the rig in the past, but received a helpful and informative reply from **Neil Crook G4ZLP** recommending the interface I should use.

Setting it up proved to be very straightforward and within minutes, I was on the ON4KST chat for 50 and 70MHz to see if anyone was around to try JT6M. Although we didn't complete a QSO, I was able to exchange signals with **Pat Whitty EI8IQ** (IO62) on JT6M, proving that it was all working well. I was surprised and pleased, given that I was only using the vertical antenna.

Pat and I concluded that we just needed slightly better conditions to complete a QSO. Otherwise, it was just tropo QSOs on 50MHz for me during the month, including a few during the RSGB's UK Activity Contest on February 28th, with 2E0NEY (IO81) being my best DX at around 60km – not bad for a noisy band and the vertical antenna!

Phil Oakley G0BVD (Great Torrington, Devon) was pleased to work G4TSW (IO80) during the RSGB UK Activity contest on February 28th – but didn't hear any other stations.

Ronald Pincho ZB2D (Gibraltar) caught a few weak openings on the band as well as a Trans Equatorial opening to South American on February 29th. He didn't work any stations, but heard a number of Argentinian stations calling for Europe.

Hopefully by the time you read this the Es season will be getting started and we shall all be making a few more QSOs on 50MHz.

The 70MHz Band

Here at **G4VXE** the only 70MHz activity to report was working a new local station on f.m.; **David Glover 2E0LIO** (Abingdon). David reported that he regularly joins an Oxford based net on 70.450MHz on a Monday evening.

Via Twitter, **Colin Thomson G6AVK** (Rayleigh, Essex) reported that he had copied the OPERA signals from PA0OCD (JO22) on 70MHz. OPERA is a QRSS mode. The software may be downloaded from **http://rosmodem.wordpress.com** The software has recently added modes specifically aimed at aircraft scatter or meteor scatter.

Fig. 2: Some of the G0KSC antenna designs as produced by EA7JX, photographed by Ron ZB2D.

The 144MHz Band

Here at **G4VXE**, I have enjoyed the ability to try out the WSJT digimodes, using my new interface. In particular, I have had some success monitoring the 144.370MHz FSK441 frequency. This mode is used for meteor scatter contacts. Although I have not made a two-way QSO, just leaving the rig monitoring has revealed some interesting reflections from distant stations such as IK3DGH, IW4ARD, YU1IO and OK1UGA.

The nice thing is that all these stations were heard on 'sporadic meteors', in other words, not a specific meteor shower. On JT65A, I worked F1MPQ (JN08) on February 23rd by tropo. During the RSGB's 144/432MHz contest I worked ON4WY (JO11), DF0MU (JO32) and ON6ZT (JO10) as well as a number of UK stations. On f.m. there has been occasional tropo with GB3HH (Buxton) and GB3BC (South Wales) repeaters heard on February 26th.

During the RSGB's 144MHz Activity contest, **Phil Oakley G0BVD** (Great Torrington) was delighted to work G4DEZ (JO03) which is a good distance from West Devon.

Panos Dadis SV1GRN (Athens, Greece) reported another successful QSO, between the ISS using the callsign NA1SS and the 5th High School of Katerini, was made on March 2nd. Interestingly, as NA1SS passed towards my south eastern horizon, I heard them calling SX1912K with good signals from the space station.

With an eye towards the Es season, Ronald Pincho ZB2D has been upgrading his 144MHz antenna. He has purchased a 144LFA7, which is a 7-element yagi from Eantennas run by Rod, EA7JX near Seville. The designs **(Fig. 2)** are based on **Justin Johnson G0KSC**'s work. Ronald says that the antenna looks strong and well designed and he is looking forward to trying it out. Justin reminds me to say that his early antenna design work is available for free for people to build themselves at **www.g0ksc.co.uk**

The 432MHz Band

The best contact here at **G4VXE,** during the RSGB's 144/432MHz contest on March 3rd/4th, was PA6NL (JO21) with not much other DX heard, although a good number of UK stations were worked. Closer to home, I have also been enjoying using one of the little Baofeng UV-3R micro transceivers when I have been out on walks around the Oxfordshire countryside. I worked **Rob Loss G4XUT** (Swindon) over a path of around 25km on 433.500MHz simplex, although unfortunately, I was unable to contact **Jon Wheeler G0IUE** (Melksham).

However, G0IUE has made some nice simplex QSOs on 433.500MHz including **G0OID** (Lyneham, Wiltshire), **G0RBD** (Chippenham, Wiltshire) as well as rather unusual QSO with M0RLK who was operating mobile from his tractor! As Jon says, great to know that 70cm simplex is alive and well in Wiltshire!

That's it for this month! Thanks for all your E-mails and news, I really appreciate it. Until next month!

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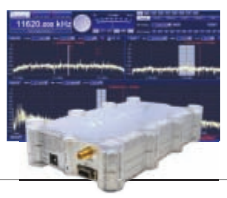

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Feature

Martin Emmerson G3OQD explains how new life can be given to those fascinating Kokusai mechanical filters that were so popular years ago. If you've got a sick mechanical-filter fitted rig – Martin's article could help!

Repairing Kokusai Mechnical Filters

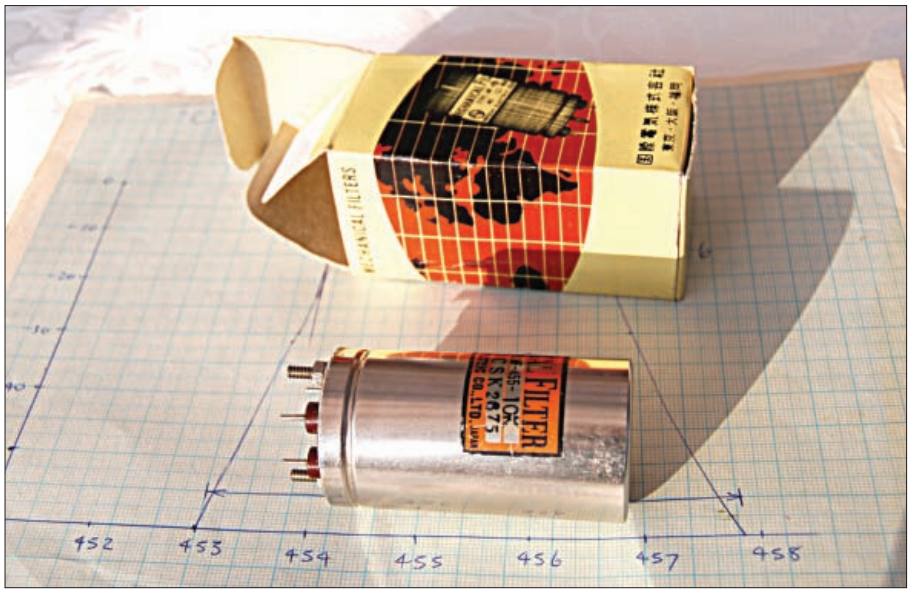

Fig. 1: This is a new Kokusai filter with its box and plotted response sheet.

The Japanese-made Kokusai mechanical filters, used for single sideband operation were very popular in the 1960s. They were used in many home-constructed s.s.b. rigs as well as a large number of commercial Amateur Radio equipment. The filters I'm considering here in this article are the MF455-10K – but the information should also be applicable to the wider bandwidth MF455-15K [‡1], Fig. 1.

The passage of time hasn't been kind to these filters – now, the performance is likely to have considerably degraded from when they were new – see before and after restoration – **Fig. 2** and **3** or they may have failed completely.

The problem first became evident when I was modifying the The *G3OQD Transistorised SSB Transceiver* [‡2] to use the valved power amplifier (p.a.) to provide a quick source of output power for a current software defined radio (SDR) project.

The modification involved a lot of reworking various sections of the transceiver. During this procedure the transceiver transformed from an s.s.b. one to an amplitude modulation (a.m.) type of response.

After a moment of reflection I considered that the problem had been caused by vibration to the mechanical s.s.b. filter, which had resulted in its failure. So, it was time for me to become a detective – and an investigation was started.

The purpose of my article is to describe the procedure used to repair the filter and restore it to its original performance. I'm presenting it in the hope that this may help others to do the same and prevent restorable vintage equipment ending up in a landfill.

Since the first repair, I've successfully saved two more filters using the same procedure – one is now used in a similar home-brewed transceiver and the other just kept in its box as a spare. All had degraded in a similar way, which suggests that time rather than usage caused the problem.

The Repair Procedure

The first requirement for repairing the mechanical filters is plenty of time and patience! However, the results are worth it – these filters are no longer available and any second-hand ones are likely to be in the same sorry state.

To start, first carefully remove the filter from the equipment by unsoldering the four wires connected to the terminal pins, noting which wire is connected to which pin. The pins are labelled P (input), B (input ground), G (output) and E (output ground) **Fig. 4**. A close up photo with a digital camera is a handy way to record the procedure at each key stage.

Next, remove the two fixing nuts and the small screening plate and keep these in a safe place. The nuts are a peculiar size, so they aren't easy to replace. There are two nuts, two spring washers, and two flat washers, in that order.

The filter may then be carefully lifted out of the equipment. However,If when turning the filter over in the hand, the filter element inside can be felt flopping around, this is a clear sign that all is not well.

It's the movement of the filter element inside the screening can that causes the connecting wires to become detached. If a ground connection breaks – the filter, bandwidth will become wide – as in the case being investigated. But if a signal lead becomes detached, the filter will have very high attenuation.

Even if all the connections are still intact the filter response will be degraded and shifted slightly lower in frequency, with the attenuation increasing by 6 to 10dB: **Figs. 5** and **6**.

If you find this is the case, it's still worth handling the filter with care while opening it. This will help to avoid any wires becoming detached since reconnecting them is the most critical part of the repair.

The safest way to remove the screening can to gain access to the filter assembly is to carefully scrape away the solder from the joint at the base of

the can using a sharp knife. Patience is a virtue in this operation. Once the edge of the can becomes exposed then a thin knife blade can be carefully inserted between the can and the base.

Then the knife should be moved around the circumference – releasing the can from the base so the two parts can be carefully separated by hand. If it won't come apart – then a little more work with the knife is required rather than applying excessive force.

Case Removed

Once the case is removed it will probably resemble **Fig. 7.** The incredibly sticky stuff that looks a bit like syrup pudding needs to be completely removed. To do this it's necessary to remove the filter element from the screening channel. Before this can be done, the four multi-strand (Litz) wires must be disconnected from the filter chassis end rather than the filter assembly end.

Again, note exactly where these connections go and the orientation of the filter unit before removing the wires. There are two connections at the base end – one to ground, and the other, sleeved lead, to the signal terminal. These connections are wrapped around the terminals so use a soldering iron and tweezers to carefully unwrap these connections.

Note: Don't just cut the connections, otherwise they will not be long enough to reconnect them. The connections at the top end go into a small printed circuit board (p.c.b.), so they are easier to remove – but the holes must be cleared with either a solder sucker or solder braid to allow the wires to be reconnected later.

Making sure that all four connections are free, carefully remove the filter resonator assembly. The piezoelectric transducers at each end are delicate – so handle it by the centre filter resonator disks, taking care to avoid the thin connections breaking off.

Next, put the filter element aside in a safe place so that first the denatured plastic foam can be removed from the screening channel. Following this sequence will give you some experience of the nature of this stuff before removing it from the delicate filter assembly.

Isopropyl alcohol (PROPAN-2OL) [‡3] and a small clean unused paintbrush can be used to remove the deposits from the brass filter housing channel. A small flat-bladed screwdriver can be used to aid the process to get it absolutely clean. It will probably be necessary to wash your hands several times during the cleaning procedure since it can become difficult to work with sticky fingers!

Next comes the tricky bit – removing the deposits from the filter resonators and the delicate piezoelectric transducers at each end. Before starting, note that the transducers resonator plates are attached at just one critical point to one of the coupling rods, so avoid applying too much pressure here.

Only hold the module by the centre resonating discs and never by the piezoelectric transducers. Just let the solvent and the soft paint brush dissolve the deposits until the filter module is completely clean.

Also avoid any movement of the connecting wires as far as possible since this could cause them to break off – they are difficult to reconnect.

The small blobs on some of the resonators have been added during manufacture to fine-tune the elements, so avoid removing any of these. There's also some red dye – some of this will inevitably get removed – but it doesn't seem to cause any ill effects, whatever its original purpose was!

New Foam

When the filter assembly is completely clean **Fig. 8** and the screening channel too, then the filter may be reassembled using new foam to replace the original denatured stuff just removed. Since the type of foam used originally is unknown, judging by the remains it was probably the common yellow plastic stuff, some suitable replacement needs to be found.

Although there are many options here, the pink antistatic foam often found in the packing of sample integrated circuits (i.c.s) was chosen since it was readily to hand in my workshop. It seems to be made of a material that looks like it will last longer and be more stable than the original. But only time will tell, of course!

The main purpose of the foam is to provide adequate support for the delicate filter resonators. It's also stop them flopping around while taking care not to apply any undue pressure or friction to the resonator plates which could dampen their resonant Q factor.

The foam I chose was of the closed cell type, which should present less friction to the resonators than the conventional type. Also I added small blocks of foam at each end, **Fig. 9**, carefully avoiding any strain to the

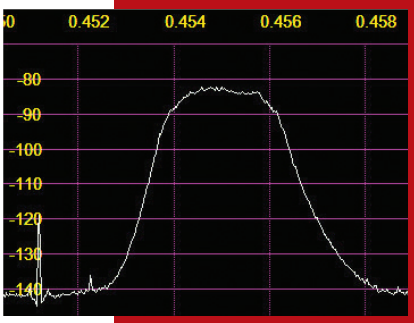

Fig. 2: The response plot of a suspect filter.

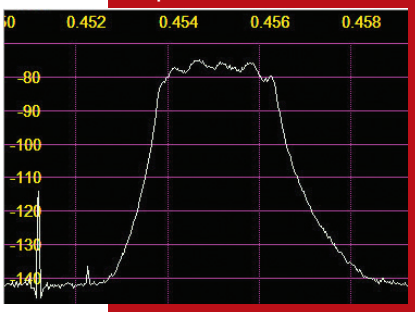

Fig. 3: This is what the response plot should be like.

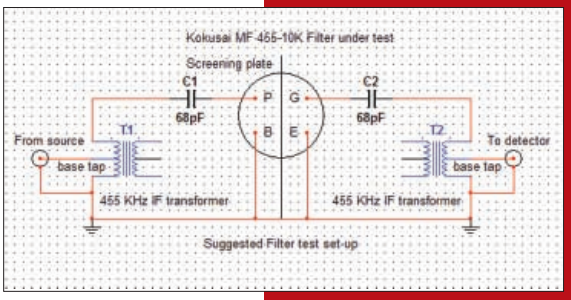

Fig. 4: This is how the filter is 'plumbed' into the circuit and how the test jig is made up to check its response.

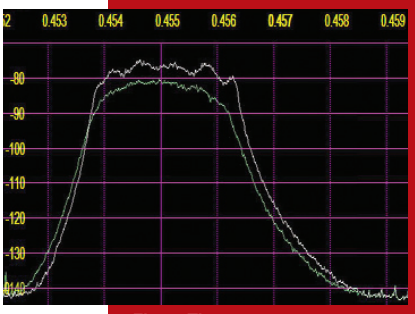

Fig. 5: The two responses compared. The rounded and slightly lower response is of a suspect filter.

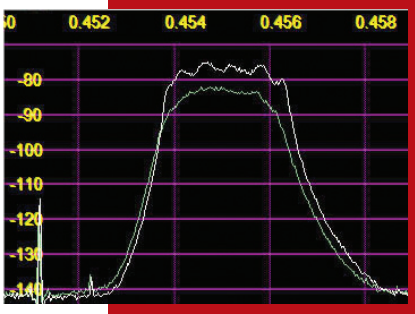

Fig. 6: Two other filter responses compared.

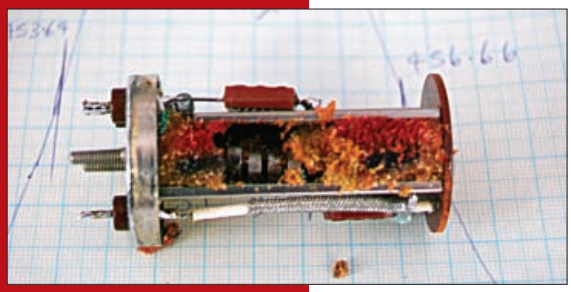

Fig. 7: This is the mess that was found on removing the screening can.

Fig. 8: The filter itself, after cleaning, ready for remounting.

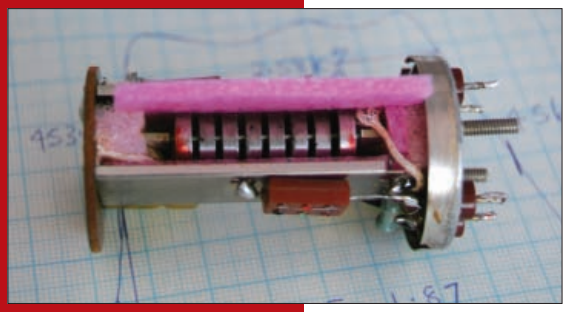

Fig. 9: The new foam insert ready to fold over to completely enclose the unit.

Fig. 10: Ready to have the screening can replaced.

delicate transducers and connecting wires – to stop the relatively heavy resonator assembly from flopping about in the screening channel.

It's important to restrain any filter movement – this could, in time, result in the connecting wires fracturing – without applying too much pressure to the elements. This is a compromise – but if the filter is going to be subjected to vibration, perhaps in a mobile situation, then more tightly packed foam will be better.

Safely Re-Positioned

Once the filter is safely positioned in the brass channel you can reconnect the floating wires back to the filter chassis. The connections and filter orientation must be the same as originally – but, as a double check, the live signal connections go to the small separated lands on the piezoelectric transducers and have insulating woven sleeving.

The picture of **Fig. 9**, shows the cleaned filter assembly reconnected with foam installed and **Fig. 10** shows the foam tucked in ready for re-assembly into the screening can.

Before final assembly and re-soldering the screening can it might be worth checking that the filter is working. If there have been no problems then this check is probably unnecessary. A fairly high power soldering iron, for example 45W Weller, will be required to solder the screening can back on using a minimum of solder required to make a seal – just in case it has to come off again.

Problem Wires

Another, and the most likely problem, is that one or more of the connecting wires has become detached from the piezoelectric transducer. In this case it's necessary to re-solder the connection. First, make sure the end of the wire is properly tinned. Only a very short length needs to be tinned (as short as 1mm).

Next, using a very fine tip soldering iron just dab the connection onto the centre of the existing solder blob for just long enough to melt the surface of the solder and not melt the thin silvered surface on the piezoelectric slab. When making the joint it's more important to avoid melting the silver plating than getting a classic well-wetted joint – just as long as it is attached and does not look like it could easily fall off again.

A more serious problem that was encountered with one of the repaired filters was one of the piezoelectric slabs became loose on its connection to the coupling rod, with the danger of it falling off. Rather than risk trying to solder it back, a small quantity of conductive silver paint [‡4] was carefully painted around the affected area – once fully dry the transducer seemed stable. This sort of paint can also be used for replacing any melted silver plating that may have been accidentally removed when soldering back connecting wires.

As the response of the filter is determined by the metal resonator disks, any degradation to the coupling transducers should only cause a slight increase in insertion loss. This can probably be compensated for and is likely to be less than that caused by the denatured foam, which has just been removed.

Testing & Measurement

If the repair has gone to plan, then there may be no need to test the filter before restoring it to its original equipment. However, the first filter I repaired, didn't perform correctly when put back in my G3OQD transceiver, so a test jig was devised, **Fig. 11**.

My test rig consisted of two 455kHz intermediate frequency (i.f.) matching transformers with small coupling capacitors to the filter under test. The transformers I used were of the same type as used in the G3OQD transceiver – but any similar transformers – let's say from a scrap transistor radio – can be used.

The important point is that the Kokusai filters are high impedance devices so they need to be matched down to 50Ω. Screening between filter input and output is very important to see the full rejection offered by these filters, which should be at least 60dB. If not, there's leakage around the test jig – or the filter repair itself may be faulty.

Make sure the screening plate is in position and the nuts tightened. **Note:** small ripples across the passband are due to the individual resonances of each filter disk and are normal for this type of filter.

I used a wide band noise generator as the source with an amplifier, together with a switchable attenuator to set the

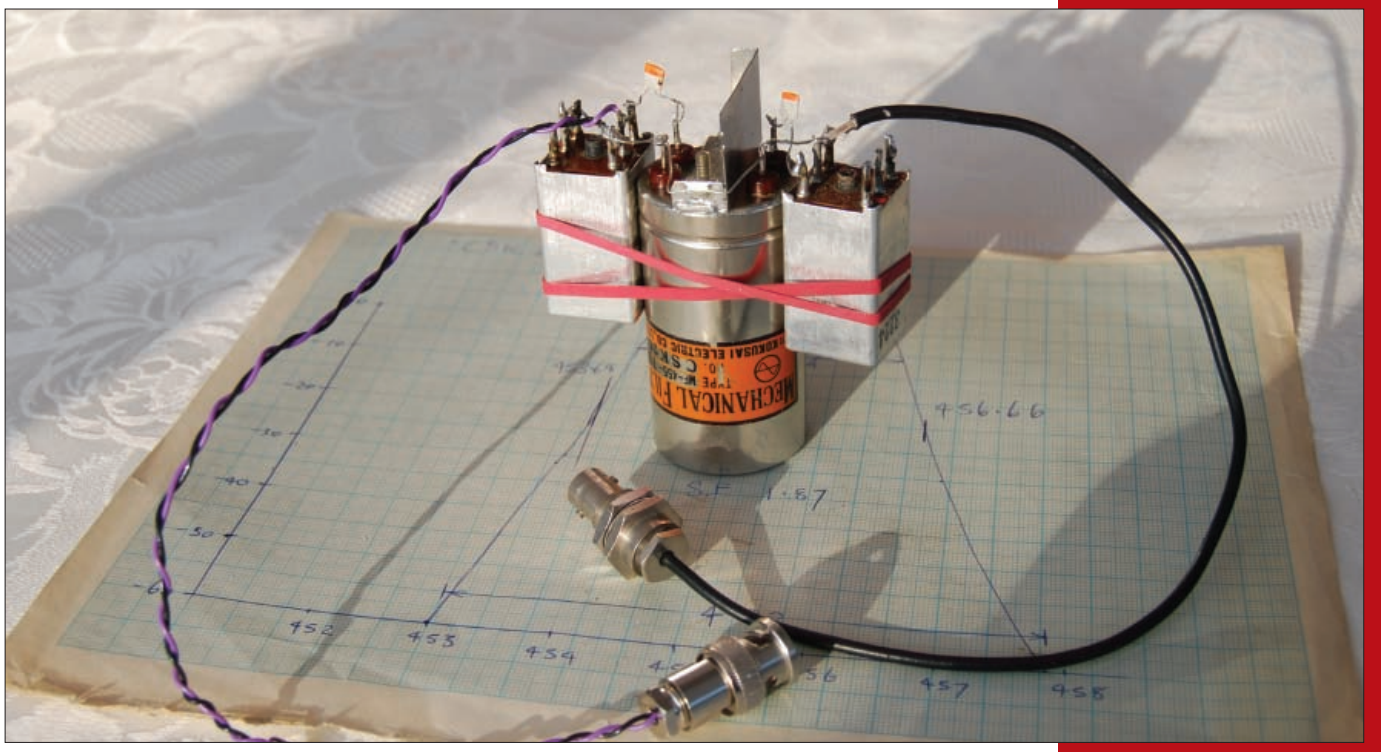

Fig. 11: The test jig, set up to check out the filter. It follows the circuit of Fig. 4.

level into a home-brewed SDR being used as a detector. To get a smooth noise-free plot I set the SDR to an averaging spectrum display with the time constant set to the maximum of 1 second.

The resulting response is shown in **Fig, 12**, which can be compared to the original data sheet supplied with the filter **Fig. 13** and a plot of this in photo **Fig. 14**.

It turned out that the first repaired filter was fine, but in reinstalling it the grounding and screening had been disturbed causing leakage around the filter – the performance was therefore compromised. After I corrected this the transceiver returned to like-new performance.

So, if you have a sick Kokusai filter in a receiver or transceiver, you could try my repair method. Good luck! ●

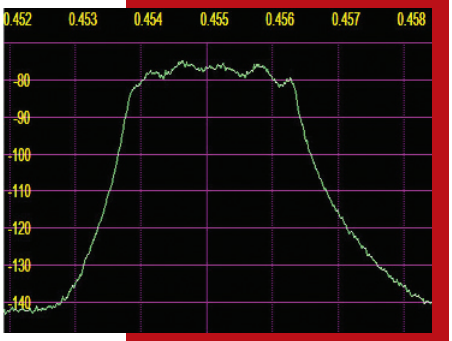

Fig. 12: The new response plot may be compared to the original, if you still have it.

[‡1] The Kokusai Mechanical Filter pages 10.17 to 10.20, *RSGB Radio Communications Handbook* Fourth Edition Sept. 1968.

[‡2] *The G3OQD Transistorised SSB Transceiver*, pages 10.89 to 10.104, *RSGB Radio Communications Handbook* Fourth Edition Sept. 1968.

[‡3] Available on eBay etc.

[‡4] Available from Maplins, or other suppliers, etc.

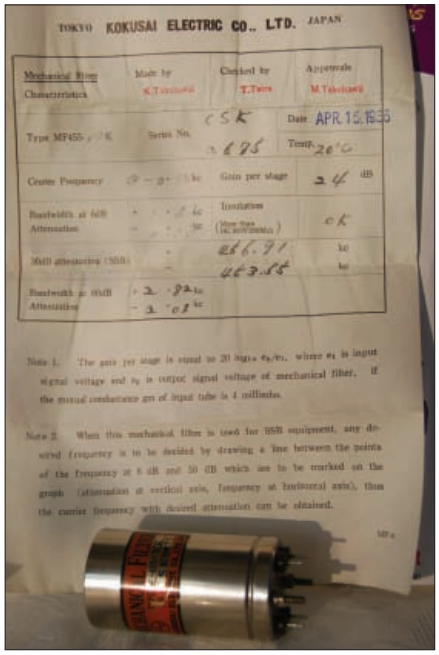

Fig. 13: The specification chart supplied with the filter as originally supplied.

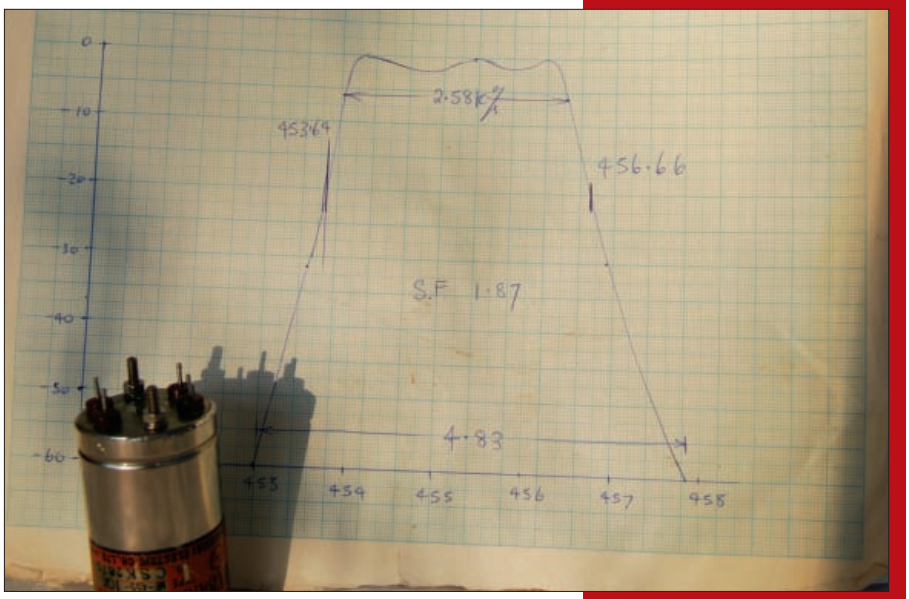

Fig. 14: Plotting the response allows its 'shape factor' to be calculated.

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Specification
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- Loss per 100m: 6.28dB @ 100MHz, 4.52dB @ 50MHz

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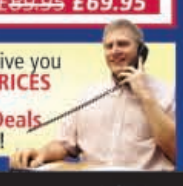

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Colin Redwood G6MXL's What Next?
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Looking at EchoLink

This month Colin Redwood G6MXL takes a detailed look at Echolink. It's a somewhat controversial system – but for some Amateurs, it may be the only option to no Amateur activity at all.

Welcome to this month's *What Next?* In the September 2011 *WN?* column – when I discussed repeaters – I promised to look at EchoLink in a future *WN?* I must thank Mike Robertson G3USX, for reminding me of this, as although I had started to prepare the article many months ago, it had slipped to the back of the pile on my 'desk'.

What's EchoLink?

EchoLink enables Radio Amateurs to contact other Amateurs using either transceivers or computers or a mixture of them. For the computer-to-computer aspects, it can be thought of as being similar to Skype. The big difference is that at the ends of the links, it's possible to replace the computers with Amateur Radio stations.

In the latter arrangement it can be thought of as inter-linked repeaters, where the linking is done over the Internet. The system can enable a low-power portable hand-held station to talk to a similar station on the other side of the world, **Fig. 1**.

As I've already indicated, EchoLink can be used in several different ways. However, I'm going to concentrate on the two approaches that I believe most Radio Amateurs will want to use. This includes using it from a transceiver without using a computer, and using it from a computer in a manner similar to Skype or other Voice Over IP (VOIP) technologies.

Getting Started?

So how do you get started? If you already have a computer connected to the internet and already use Skype or a similar VOIP system, then I would suggest starting by downloading and installing the *EchoLink* software. I make this suggestion as the validation steps can take a few days, and the quicker you start, the quicker you will be over this hurdle.

Even if you don't intend to use a computer for your EchoLink activities, I think it's still a good idea to install the basic software on your computer. This is because using it in the early days can help with any difficulties you might encounter along the radio frequency (r.f.) journey.

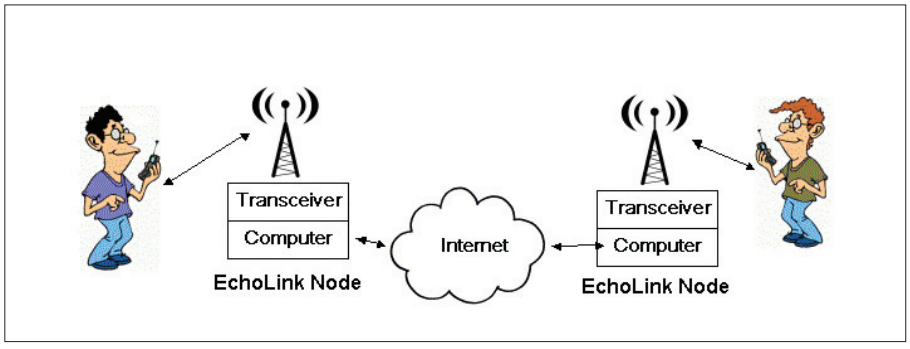

Fig. 1: A simple 'Internet assisted' radio to radio contact with local nodes connected by Echolink using the Internet.

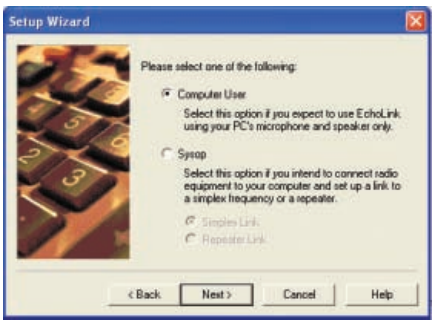

Fig. 2: Installation is quite easy – when prompted for Computer User or Sysop, select Computer User.

Dowloading & Installing Software

Visit **www.Echolink.org** and you'll see a link on the home page, labelled 'Download'. Clicking on this link will then take you through the process of downloading the software. When prompted to choose the option of 'Computer User' or 'Sysop', **Fig. 2**, I selected Computer User.

I was asked about my internet connection. If you are using a dial-up link, then select this option, otherwise select the option for DSL, cable, IDSN or other above 56k option. I found installation to be very straight forward. I chose to store the program in a different folder to the default, and this was certainly easy enough to do by following the clear installation instructions provided on the screen.

Registration Is Easy Enough

Registration is easy enough. Just a minimal amount of information is requested namely; Callsign, a Password, your First Name, Location and E-mail address. The installation then asks for your region. It correctly set my region to Europe.

As EchoLink allows computer users to talk to Radio Amateurs over the air, to comply with licence conditions it's essential to verify that everyone using EchoLink is in fact a licenced Radio Amateur. For UK Amateurs, this can be simply done by following the instructions and sending an image file of the front page of your Licence.

For those keen to get started, I would suggest (at least) getting to this stage, as it may take a few hours for validation to be approved – mine took just under one hour. For Amateurs in other countries, EchoLink requirements for validation vary – but clear requirements are provided for most countries.

A week later I received an E-mail advising me of my node number. Incidentally, I'm not sure whether this time is typical or not, as the period

straddled the Christmas holiday.

After receiving my node number, I was able to connect to other nodes using my computer without making any changes to my firewall or router settings. I think it therefore makes sense to wait for this E-mail before making any firewall or router changes.

Firewall & Router

If you still cannot connect, then you may need to look at your 'firewall' or router settings. These days, most computers connected to the internet have some form of firewall installed. This might, for example, be the software firewall that comes with most recent versions of MS *Windows*, or as part of the security software from the main anti-virus companies, or physically as part of a broadband router .

The *EchoLink* software on your computer needs to be able to 'talk' to the Internet through specific 'ports'. In order to do this without compromising your computer security, it is important to be quite specific in allowing only traffic to and from EchoLink via UDP ports 5198 and 5199 to pass. Everything else that your firewall currently prevents from passing should continue to be prevented.

Please don't be tempted to turn off your firewall, otherwise you will open up your computer to every piece of malware you'll see on the internet! Malware, meaning malicious software, is software designed to disrupt computer operation, gather sensitive information, or gain unauthorised access to computer – **http://en.wikipedia.org/wiki/Malware**

There's specific guidance for many popular routers and firewalls at **www.portforward.com** You may want to skip the advertisement that initially appears. I found the information I would need for popular domestic routers that I use.

Information Needed By Sysops

A lot of the documentation that can be found about EchoLink, concentrates on information that Sysops (the people who look after nodes) need when linking their station to their computer to make a local node. While Sysops are vital to the functioning of EchoLink, I don't believe that all users of EchoLink will want to become Sysops, and in fact I think it wouldn't be a good idea for too many to do so!

In the UK, Sysops have to obtain a letter of variation to their Licence, as in effect they are setting up a special type of repeater. (I'm not going to cover this relatively specialist subject in this issue).

Fig. 3: A Dual-Tone Multi-Frequency (DTMF) signalling microphone.

Initial Checks

I found it very helpful to make my initial checks using a combination of computer and radio. I tuned my 145MHz receiver to my local Echolink node and then used my computer to connect to the node. This allowed me to hear a message over the air that I had connected to the node. It also demonstrated that my computer set-up was working, and furthermore that my receiver was hearing the local Echolink node over the air.

Over The Air

To use EchoLink over the air, you'll need to be within range of a Sysop with a station connected to the Internet. In the UK, there are a number of these stations mainly in the 144/145MHz and 433MHz bands, with callsigns in the MB7+ 3 letters sequence.

On 2m many stations are to be found on frequencies designated 'Internet Simplex Voice Gateways' in the band plans such as 145.2125, 145.2375, 145.2875, 145.3375MHz. On listings these will often have a **–L** after their call sign.

Some repeaters – mainly on 430MHz (70cm) – with callsigns in the GB3+2 letters sequence are also EchoLink nodes, which enables them to be linked by EchoLink. These employ the usual repeater shifts according to the band. On listings these will often have a **–R** after their call sign.

You will also need a 144/145MHz and/or 433MHz f.m. transceiver with a Continuous Tone Coded Squelch System (CTCSS) capability. If you're not sure of the correct CTCSS frequency for your area, I suggest that you refer to the *WN?* in the September 2011 issue of *PW*. (I found it helpful to store this tone in my transceiver's memory).

The other thing you'll need Dual-Tone Multi-Frequency (DTMF) signalling microphone, **Fig. 3**, which has a numeric key-pad on it that looks like the numeric keypad on a telephone. These microphones can be quite expensive. So, it may be worth shopping around for one that's suitable for your transceiver – I found some on eBay at a substantial reduction on normal UK prices.

Some transceivers come complete with a DTMF microphone, including for example Kenwood's TM-V71E, **Fig. 4**, which was reviewed in the August 2007 issue of *PW*. This transceiver

Fig. 4: Kenwood's TM-V71E was reviewed in the August 2007 issue of *PW* and is designed for EchoLink operation.

can also be used as an EchoLink node itself. All the main manufacturers offer some hand-held transceivers that have numeric DTMF key-pads.

Useful Tip: If you don't have a DTMF microphone, a useful tip is to hold a mobile phone near a normal microphone and press the relevant keys on the mobile phone so that the microphone picks up the audible DTMF tones from the phone!

Connecting Over The Air

When I tried to connect over the air to my nearest EchoLink node, initially I didn't succeed. Fortunately my local Sysop was on-hand to help diagnose matters. I was trying to connect by just sending the DTMF tones **08** to check the status of my local node. My local Sysop advised that his particular node didn't support this command, and suggested connecting via his node to a remote node. I tried this, again without success.

Following some further investigations, I found that I needed to use narrow deviation suitable for 12.5kHz channels and not the wider 25kHz that I used. Excessive deviation was causing a problem with decoding my DTMF tones.

Changing to 12.5kHz deviation meant that at least I was getting responses, even if they weren't always the ones I was hoping for! Don't forget that although you need a CTCSS tone, you don't need a repeater shift, unless you are using your radio and the interlinking facilities provided on some repeaters.

Connecting to my local node by computer enabled me to hear my radio signals and vice versa. This is a particularly useful technique if you encounter difficulties, as it makes diagnoses of problems much easier.

Operating With A Computer

As I have already explained, it's possible to operate using just a computer at one end, **Fig. 5**, or both ends of the contact, **Fig. 6**. I discovered that I needed to configure the EchoLink software to recognise my Skype headphone and microphone.

You may also need to adjust your Windows soundcard settings. This is very easy to do with the assistance of the EchoLink test server. I found that hearing the test server instructions, then successfully sending a voice message to it and hearing it played back was a very useful confirmation that I had many aspects of my set up working.

I needed to adjust the audio level so that the audio level just causes the level indicator to move into the yellow area on voice peaks. If you use Skype, then you will already be familiar with a similar test facility.

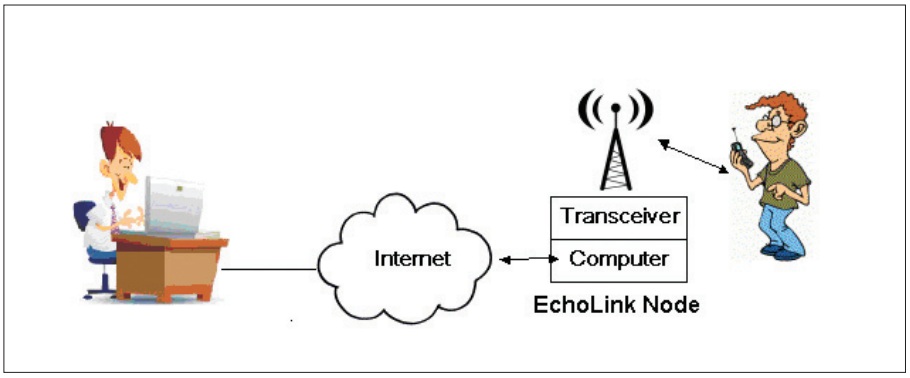

Fig. 5: Echolink can be used with a Radio Amateur at a computer at one end and a Radio Amateur on the radio link at the other end.

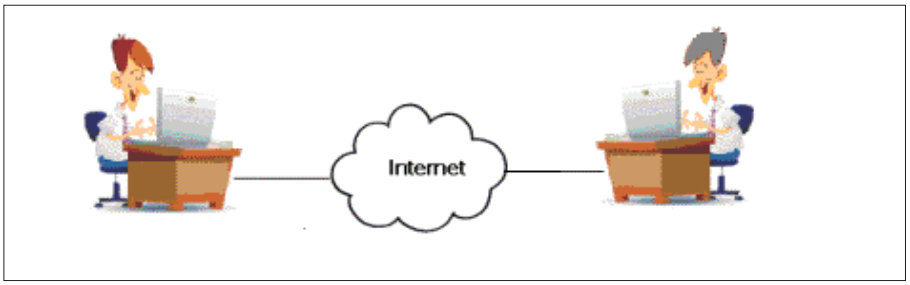

Fig. 6: Echolink can be used with Radio Amateurs at computers at both ends of the contact.

I experimented with a couple of different microphones: one that is part of a headphone that I use for Skype, and another that is part of webcam that I use with Skype. For receive I also tried a couple of headphones: one I use for Skype and some hi-fi ones that I use for listening to music.

In all cases I found that the audio that I received on playback from the test server was a little muffled and distorted in comparison with Skype, but still quite intelligible. It was fun to make contacts with stations in far-flung places, using low power 2m or 70cm f.m.

Golden Rules

It's important to consider others when using EchoLink. Please don't use EchoLink frequencies for local QSOs. You are tying up the frequency and could also be linked to and heard over other nodes if you do this. Likewise, don't hog the nodes, and leave gaps between overs for others.

Keeping 'overs' short will also help to avoid time-outs. Since EchoLink allows access to local nodes and repeaters all round the world, it's important that we are all sensitive to local customs, practices and languages.

Additional Information

There are several sources of additional information on EchoLink. There's a useful EchoLink Guide that can be downloaded from the EchoLink website at **www.EchoLink.org**

In common with some other sources of information, I found the guide concentrates on setting up a permanent link between a transceiver and computer. Nevertheless, it is a free download and I would certainly suggest reading the few pages that are relevant to a basic set up.

The book *Computers in Amateur Radio* by **Steve White G3ZVW**, barely touches on EchoLink, so whilst I can't recommend this otherwise excellent book for anyone wanting help getting started with EchoLink. In my opinion, Steve's book is a much better read for those interested in the digital modes, which **Mike Richards G4WNC** writes about in his (excellent) *Data Modes* column in *PW*.

The ARRL VOIP Internet Linking for Radio Amateurs by **Jonathan Taylor K1RD**, the creator of EchoLink, unsurprisingly has a good chapter on EchoLink, which concentrates more on the technology aspects of EchoLink from a Sysop's point of view. This might be a good choice for someone wishing to compare EchoLink with other similar technology such as ILRP.

I was beginning to wonder whether there was a good book on EchoLink that I could recommend to readers. However, I'm pleased to report that in my opinion, *The Nifty E-Z Guide to EchoLink Operation* by **Bernie Lafreniere N6FN, Fig. 7**, really fits the bill. While the book aimed at an American reader – it's a very practical book, with numerous diagrams and screen shots that talk the reader

through every stage of setting up EchoLink on a computer.

The book is available via the **www.niftyaccessories.com** website. It costs US$13.95 plus postage of US$10.89 to the UK. Nifty also produce an operating aid-memoir in the form of a credit-card sized, fold-out card which includes the all important DTMF codes.

Pure Amateur Radio?

For EchoLink operation over the internet, some in the hobby might reasonably question whether this is 'pure' Amateur Radio – although you will be talking to other Radio Amateurs, but not necessarily using Amateur Radio bands. However, what's clear is that Amateur Radio awards and contests **will certainly not recognise** a contact made with EchoLink to be a valid contact for the award or contest.

In my view, although EchoLink isn't always 'pure' Amateur Radio, it certainly can be considered a useful tool to Radio Amateurs. Imagine you set up a regular sked on an h.f. band with a DX station during periods of sunspot maxima.

When the sunspots disappear during following minima, EchoLink could prove a very useful way of staying in contact. It could be particularly useful as a means of talk back during antenna tests, or during periods of marginal propagation, or arranging a radio 'sked' with a Radio Amateur in a DX country.

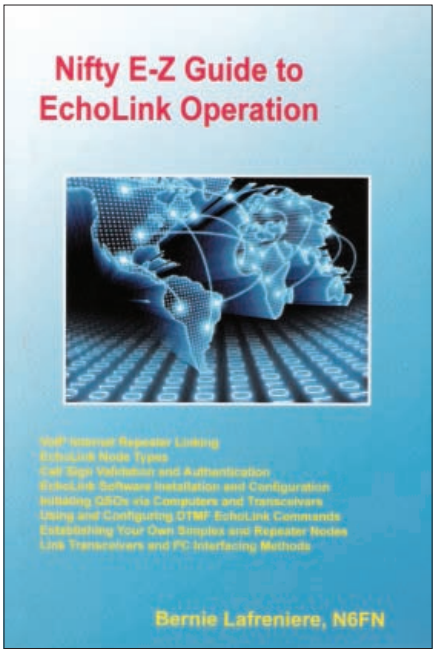

Fig. 7: Colin G6MXL found *The Nifty E-Z Guide to EchoLink Operation* is the most useful book on *Echolink* for beginners.

Initially, I questioned whether EchoLink really has any benefits over commercial Internet-based telephony offerings such as Skype. I think the benefits lie in the fact that everyone using EchoLink is a Radio Amateur, and as such is likely to welcome a contact from a fellow Amateur. I doubt if your average Skype user would welcome contacts from complete strangers – I know I wouldn't!

Like Marmite!

I have a feeling that EchoLink is a bit like Marmite – you'll either love it or hate it! I must admit that in preparing this article, I have come to appreciate Echolink's value for Radio Amateurs far more than I was expecting to!

I think Echolink's real potential is to enable Radio Amateurs keep in touch when – for whatever reason – radio links aren't possible. This includes periods of poor propagation or from places where there's an Internet set-up but Amateur Radio operation may not be permitted – such as a retirement home.

Conversely, Echolink is also a way of keeping in touch using a small v.h.f. or u.h.f. transceiver in areas where mobile phone coverage and repeater coverage is poor or non-existent but where there may be Internet connection. At the end of the day, I think it's up to each reader to decide whether or not to use it. ●

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Remembering Portishead Marine Radio Station

This month Carl Mason GW0VSW looks back at an extremely important marine radio station before presenting the DX news and his round-up of your h.f. activities. All reports to Carl by the 15th of each month please!

Welcome to *HF Highlights* (*HFH*)! and I'm sure many of you will have heard of or even worked the world famous Maritime Radio Station at Portishead callsign GKA that operated from 1928 until 2000. The station provided worldwide maritime and long-range aeronautical communications and was the world's largest and busiest radiotelephony station.

Fig. 1: The QSL card sent from DL0SLITISA after working George G3ICO on 3.5MHz c.w.

A video has now been produced that shows a history of the station in photographs set to **Mike Batts** *Portishead radio Song* and I think it's well worth a look **www.youtube.com/watch?gl=GB&hl=en-GB&v=owTO7RAuPmE**

It was a very sad day for many operators around the world when the station's final transmission was made on April 30th 2000 by Radio Officer **Mike Pearson**. It read "CQ CQ CQ de GKB2/4/5/6 = This is the last broadcast from Portishead Radio. For 81 years we have served the maritime community. We say thank you to all those who have supported and used our station. We pay tribute to Marconi who made it all possible. His first transmissions across water were made from nearby here and so started the radio era. We are proud to have been part of that era. As this historic time in the commercial messaging world comes to a close the Manager and Radio Officers wish you farewell from Portishead Radio/GKB + SK" More information, photographs and stories on GKA can be found at **www.portisheadradio.co.uk/**

The DX News

On to some DX News now and first we head to Honduras, a republic in

Fig. 2: George G3ICO's 'tidy' shack mentioned in his report.

Central America sometimes referred to as Spanish Honduras, where **Gerard Jacot F2JD** is active again as **HR5/F2JD.** He will be in Copan which is an archaeological site of the Maya civilisation located in western part of the country and not far from the border with Guatemala. Gerard will operate until the May 6th on all the h.f. bands and using all modes and a QSL is good via F6AJA. A log search is available at **http://lesnouvellesdx.fr/voirlogs.php**

In the Democratic Republic of the Congo, a country located in Central Africa, is **Sergiy Shpak UV5EVJ** who is stationed in the province of Katanga working with the United Nations Stabilisation Mission until May 9th. He plans to be QRV on all h.f. bands using c.w. and s.s.b. in his spare time. Although he has not been issued his own call as yet – Sergiy has been worked as **9Q0HQ/7** from the club station ARAC or Amateur Radio Association of DR of Congo.

In Australia, **Craig Edwards VK8PDX** will be operating from Bremer Island OC-185 or Dhambaliya in the local language, an island in the Arafura Sea just off the northeast corner of Arnhem Land (Cape Wirawawoi), Northern Territory between April 18th to 23rd as **VK8PDX/P**. The antenna will be a Spiderbeam 14/21/28MHz tri-bander on a 10m Spiderbeam mast. In January Craig passed his Advanced Licence exam and is now **VK8AS** and all QSLs should go via the new call.

Fig. 3: The QSL card sent by 9A203SM following a QSO with G3ICO.

Fig. 4: The VP8CMH/MM card sent to Geoffrey M1EDF following a 10MHz c.w. QSO using a new MFJ key.

modes in his spare time but be aware he is liable to close down at very short notice because of work. (His licence expires on the June 13th).

Your Reports

On to this month's reports and it's good to see that our reporters have managed to work something on nearly all the h.f. bands. I begin with the log of **Eric Masters G0KRT** in Worcester Park, Surrey who used his Kenwood TS-570 and modified W3EDP antenna tuned with an SG-230 smart tuner on the 3.5MHz band working c.w. stations LY2XW (Lithuania) at 1926 with 100W and PA3GRR (Netherlands) at 2035 with 5 watts QRP.

In Yeovil (Somerset) **George Davis G3ICO** used his Elecraft K2 at 5W to a doublet antenna to work DL0SLITSA (Germany) **Fig. 1,** at 1901 with a special call to mark the 1200th anniversary of the city of Schlitz. On 7MHz Eric worked OK7O (Czech Republic) at 1910 a school Radio club in Pilsen, R3ZZ (European Russia) 1913 and HA6OA (Hungary) at 1917UTC.

I had asked George for a photo of his shack **Fig. 2**, and a short while later he E-mailed me a photograph saying "I admit to some artistic licence here as it was not as tidy as this a few hours ago! No doubt it will return back to normal in a few days time". I think a lot of our shacks are like that George!

The 10MHz band was not in great shape but George managed a few contacts here including TK7C (Corsica) EU-014 1529 QSL via F9IE, LX75RL (Luxemburg) 1611 and a special call to mark the 75th anniversary of Radio Amateurs of Luxemburg (QSL via LX2A) and 9A203SM (Croatia) at 1504UTC with a call to mark 20 years of the 9A prefix (QSL via 9A3SM).

The 10MHz band was where **Geoffrey Powel M1EDF** in Tamworth, Staffordshire tried out a new key the MFJ550, **Fig. 3** which he finds nice and light to use. Using an ICOM IC-718 and 60W c.w. one of Geoff's first contacts was with **Mike Gloistein GM0HCQ** the radio officer on the **British Antarctic Survey Vessel** (BASV) ***James Clark Ross***. Mike was operating as **VP8CMH/MM, Fig. 4,** in the South Sandwich Islands and was worked at 2204UTC.

The 14 & 18MHz Bands

In Portadown, County Armagh **Tom Ruddell 2I0TJR** has been enjoying 14MHz again after moving house and being QRT for almost a year. Tom said "I switched the radio on at 0745 to see if there was anything interesting around and heard a number of stations from New Zealand calling but with very low strength and obviously unworkable.

"I then heard ZL1KY who was about 5/6 with me and just signing off with another station so with nothing to lose I called him. Much to my astonishment and delight Rob in the Bay Of Plenty, North

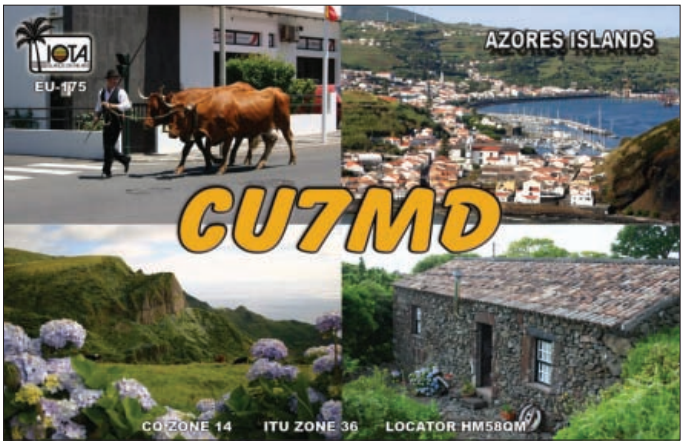

Fig. 5: The QSL card from CU7MD following a QSO with Tom 2I0TJR on 14MHz s.s.b.

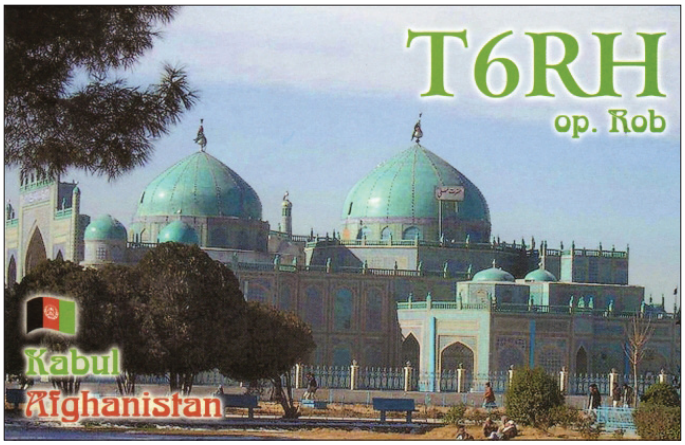

Fig.6: The QSL card sent by T6RH following a QSO with Steve M0SAS on 18MHz PSK31.

There's still time to work **Jose Matos CT1FKN** who is working in Afghanistan with the International Security Assistance Force and has been active as **T6JM**. His station includes an Icom IC-706MkIIG, a homebrew (2xGI7BT) amplifier and a horizontal 39m loop, tuned with an Icom AH-4, and a Windom antenna. Noise levels are high at his QTH so reception can be difficult. Jose can be found on 14 and 21MHz using s.s.b. and digital

Island NZ came straight back and we enjoyed a nice chat!

"This was at 0757 and was my first contact with New Zealand after almost 10 years of being licenced. Afterwards I was more like an excited schoolboy than a reserved 42 year-old family man especially as I didn't think it would have been possible to work ZL with my station. After taking a short break I turned the Kenwood back on again at around 0900 to check for any propagation and heard VK4YB calling "CQ".

"Again I called and Roger in Brisbane came right back and we enjoyed a 15 minute QSO. Needless to say that I was feeling rather pleased to have worked a nice double of 'Down Under' countries and they were a very welcomed addition to the 2I0TJR log. What a great hobby this is".

Other stations to make Tom's s.s.b. log included JY5HX (Jordan) 0912, K8LEE (USA) Lawrenceburg, Indiana at 1403, 7X2ARA (Algeria) 1434, CN3A (Morocco) 1812 (QSL via IV3ZXQ)and 5C2P (7) at 1840 on Herne Island AF-068 QSL via IK2PZC, ZS5MWS (South Africa) 1841, PV8AA (Brazil) 2004 and CU7MD (Azores Island), **Fig. 5,** on Faial Island EU-175 at 2023UTC using a Kenwood TS570DGE and 50W into a home-brewed vertical antenna.

On the 18MHz band was **Steve Wellon G0SAS** who has been using digital modes again working T6RH (Afghanistan), **Fig 6,** 1457 QSL via NI5DX using an Icom 756ProIII and PSK31 at 20 watts to a Cushcraft MA5B mini beam.

Also on the band was **Panos Dadis SV1GRN** in Athens, Greece, who has been trying out a new MV10 vertical antenna from Sandpiper and so far is very pleased with it. His logbook shows s.s.b. QSOs with 4U1WRC (ITU Geneva), **Fig. 7,** 1019, EA6AIP (Balearic Islands) EU-004 at 1137, K1GUN (USA) in Woolwich, Maine at 1142, RA6LIO (European Russia) 1309. Then came MI6DXT Tommy Brown in County Derry, Northern Ireland at 1315, ON7MV (Belgium) 1329, EA3DTD (Spain) 1343, TM9AAW (France) 1430 a call for the 9th Antarctic Activity Week (QSL via F8DVD). Then came IZ2KSF (Italy) 1540, DF8WZ (Germany) 1542, PA2P (Netherlands) 1542 and LX1HD (Luxembourg) at 1532UTC – all using an Icom IC-756ProIII at 100W.

The 21 & 24MHz Bands

Moving up to 21MHz Panos found conditions good, logging VU2XO (India) 1256, PA0M (Netherlands) 1308, ON4LT (Belgium) 1402 and ZS1TMJ (South Africa) at 1529UTC.

George G3ICO tried the 24MHz band and found it to be in fair shape as his QRP worked EY8MM (Tajikistan) 1214 (QSL via K1B). Then came CO8LY (Cuba) NA-015 at 1403, A45XR (Oman) 1440 and 3B8GY (Mauritius) AF-049 at 1507. Eric G0KRT also found time to operate 21MHz using s.s.b. and logged YV1FPT (Venezuela) 1436 QSL via EA5GL, SV2HTI (Greece) 1437 and EA8UP (Canary Islands) AF-004 at 1506. Meanwhile – with c.w. at 5W – Eric found K2VV (USA) in Moscow Mills, Missouri at 1454UTC.

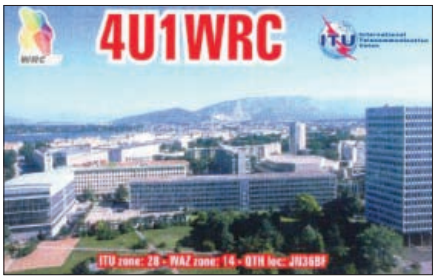

Fig. 7: The QSL card sent by 4U1WRC after an 18MHz s.s.b. QSO with Panos SV1GRN.

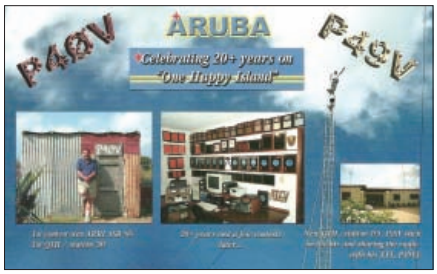

Fig. 9: The QSL card sent by P49V following a QSO on 28MHz with G3ICO.

The 28MHz Band

Having moved from Southampton (Hampshire) to a new QTH in Reading (Berkshire) that had a very small garden **Charlie Ivermee M0WYM** needed a simple h.f. antenna that would be effective on all bands from 7-50MHz. He also wanted it to work on the 3.5MHz band if possible.

Charlie E-mailed me to report that, "After some research I decided that an inverted 'L' antenna running East/West would do the job. The vertical section is approximately 16 feet and raised 3 feet off the ground and the antenna is fed from the base where quarter wave counterpoises for each band run to and along the bottom of my garden fence. The horizontal section attaches to the house and the overall length is 51ft. The automatic matching unit in my Kenwood TS-480 brings down the s.w.r. to 1:1 on all bands from 14MHz and up. I'm sure this simple arrangement could be easily scaled to suit most operators and details can be found on my website at **www.radiowymsey.org**

It is certainly effective for me with 100W s.s.b. contacts into the Far East, Africa and the Americas. Using a homebrew a.t.u. on the 3.5MHz band the antenna system may not be very efficient – but I managed to work all over the England and Wales in the recent AFS SSB contest with my best contact being GD0EMG on the Isle of Man".

Fig. 8: Charlie M0WYM received this QSL from TJ3AY after a 28MHz s.s.b. QSO.

Fig.10: The MFJ 5501 Morse key used by Geoffrey M1EDF.

Thanks for that Charlie! Incidentally, his 28MHz log included 5B4AIF (Cyprus) AS-004 at 1014, TA3TTT (Turkey) 1154 and TJ3AY (Cameroon), **Fig. 8,** at 1513UTC QSL via F5LGE.

Finally, Eric G0KRT used 100W s.s.b. to work 5B4AIF (Cyprus) 1215, YO3CZW (Romania) 1219, SV5BYR (Greece) 1434, VE3LOE (Canada) 1554 and WX3B (USA) in Tanytown, Maryland at 1557. Meanwhile George G3ICO used c.w. again at 5W logging T6MO (Afghanistan) 1204 QSL via K9GY, P49V (Aruba), **Fig. 9,** SA-036 at 1425 QSL via AI6V, YN7SU (Nicaragua) 1542 and CX7CO (Uruguay) at 1547UTC (QSL via WB3CDX).

Signing Off

Well, that is it for another month but before I sign off I would just like to say thank you to **Stephen Slater G0PQB**, **Eric Pickering G3LPS**, **Eric Walton G4FSN**, **Brian Poole G4UJL**, **Alan Lovegreen GM4FLX** and **Wyn Mainwaring GW8AWT** for their valuable help and advice regarding Morse keys. They had suggested possible replacements for the old Army Mk8 key I had used until it let me down, mentioned in March *HFH*. It is not until you have a good look around that you realise just how many different straight keys there are around. A few have caught my eye so stay 'tuned' for an update in a future column.

As usual my thanks go to **Maurio Pregliasco I1JQJ/KB2TJM** editor of the ***425 DX Newsletter*** for all the DX information and to all our reporters for their logs. Until next month I wish you all good DX. 73, Carl GW0VSW. ●

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Practical Advice on Valved Driver and p.a. Stages

This time Harry Leeming G3LLL continues looking at valved drive and power amplifier stages – and also passes on a helpful tip from a reader.

Welcome to *In The Shop* (*ITS*) where I look back to when I was busy servicing equipment brought to us in our shop in the north west of England. This time I start off with an E-mail from Dave Williams. He sent me the following tip regarding equipment which is held together with self-tapping screws, as frequent removal of these tends to wear out the mounting holes.

Dave wrote, "*When re-assembling self tapping screws in plastic housings, etc., after locating the screw into its fixing hole, press with a slight downward pressure on the screwdriver, and rotate the screw* ***anticlockwise*** *for up to one complete turn.*

"At some position the screw will be felt to drop slightly, and at this point ***stop****.*

"What has been found is the start of the thread that the screw had originally formed, and if the screw is now turned clockwise the original thread will be used, instead of making a new one and damaging the hole."

Thanks for the tip Dave!

Driver & PA Stage Faults

Last month I was looking at valved driver and power amplifier (p.a.) stages. This time I shall continue to refer to the Yaesu FT-101E/B circuit, **Fig. 1**, as this is similar to that of many more high frequency (h.f.) rigs.

The capacitor, C11, is part of the 'bottom end coupling circuit' of the p.a. stage neutralising, and is of the type shown in **Fig. 2**. Whilst some of these capacitors have Yaesu's name stamped on them, other makers use them, and I doubt if Yaesu had anything to do with their manufacture. Certainly they could not be expected to know that after 20 years or more the capacitors would become unreliable. This type of capacitor does cause quite a bit of trouble, and in the circuit shown in Fig. 1, crops up as C11, C125, and the infamous C13.

Quite apart from causing interference on receive as mentioned last month, C11 can go short, and burn out R40 starving the 12BY7A of its high tension (h.t.) supply. Alternatively it can go resistive and reduce the drive to the p.a. valves, or alter in value and upset the

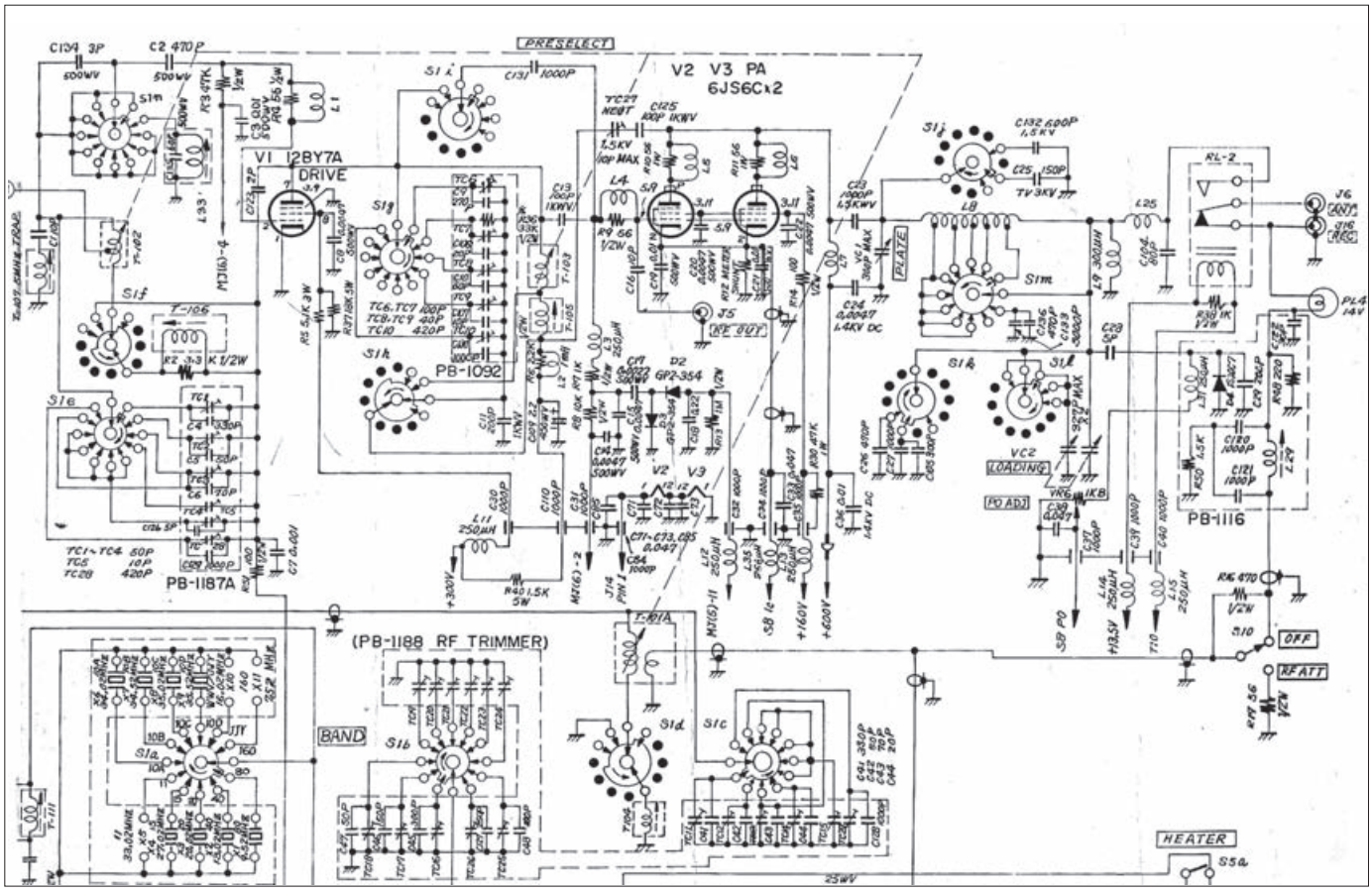

Fig. 1: The Yaesu FT-101E/B circuit.

p.a. stage neutralisation. And to make things worse – it may decide to do all three intermittently!

The capacitor, C125, is in series with the neutralising capacitor, and has a habit of intermittently breaking down as the power is increased, upsetting the neutralisation. When servicing a Yaesu rig that uses these capacitors, you should certainly, as standard, replace C13 (or the capacitor which looks like the one shown in Fig. 2 and is used in the same position in the FT-200, FL-101, FL-100 FT-401 FT-500, etc., and a couple of Trio rigs) with something rated at 1,500V or more, and preferably also swap C131 which comes in on 1.8MHz (160m) or, if you don't use 'Top Band' – simply remove it.

If any of the capacitors mentioned above go short, 300V positive from the anode of the driver valve is applied to the p.a. valves. This causes them to glow red hot, and burn out within seconds. However, C131 doesn't often fail, but I have come across cases where the users after replacing blown p.a. valves, has used the rig for a few weeks on the DX bands, only to have them melt. And, as new valves take more current than old ones, L7 can burn out along with the mains transformer, when they decided to do a spot of local listening on Top Band!

Plenty of Drive?

There could be a situation where you have plenty of drive on all bands, so that you set the p.a. current meter to almost full scale. But, at the same time you're not getting a good 'dip' or much output when you try and adjust the 'plate and load' contyrols. If this happens you have to be very careful not to damage the p.a. valves.

The p.a. valves in a typical h.f. rig are rated at about 30W each, 60W for the pair. If you tune up at full power they will have to withstand an input power of around 200W for a few seconds, an overload of over 300%.

Once the rig is tuned up properly and is producing 100W output, only around half of the input power will be heating up the valves, and provided that full power key down is not maintained for more than a few seconds, they will not come to any harm. If however, full input power is maintained with little or no output during a fruitless attempt to tune, the p.a. valves will be destroyed.

Quite a number of Amateurs, who have always previously operated transistorised equipment, are discovering the joys of operating some of the older 'classic' equipment, and as a result I get many requests for advice on tuning up. I usually E-mail the text from a leaflet that I produced many years ago, in an attempt to stop to stop my customers wrecking the rigs that they had purchased from me. It has been published previously, but as it fits in nicely with the subject under discussion, I am including it above.

Fig. 2: The suspect capacitor with Yaesu markings.

Tuning A Typical 100W Valved PA Stage

When operating a transceiver with valved power amplifier (p.a.) stages – following the maker's instructions to the letter, is often far from a good idea! When valved p.a. equipped rigs – such as the FT-101 – were designed, valves were cheap, and of rather better quality than those available now.

Some valve types are now difficult to obtain at any price, and rarity has sent prices skywards. Under present day circumstances the 'tune up at full power for 10 seconds for maximum smoke' approach, is just foolhardy. So let's have a look where people often go wrong.

Most valved p.a. transceivers are fitted with a 3-way front panel meter switch to monitor the p.a. cathode current labelled '**IC**'; the p.a. automatic level control feedback labelled '**ALC**'; and the relative radio frequency (r.f.) power output labelled '**PO**'. The last position 'PO' is a 'no go area' – only use it if you want your rig and it's valves to be burnt out during tune up! Why manufacturers ever fitted this position to the switch evades me; its use only serves to line the pockets of service engineers and valve suppliers. (Why should I complain?).

When tuning up a typical 100W rig keep the switch in the 'IC' position, carefully monitor the current and don't allow it to exceed 100mA (0.1A) for more than about three seconds. Follow the maker's instructions as far as possible, but **do not** monitor the r.f. output by switching to 'PO'**,** and **do not** manually switch to transmit on the rig**.** Use a push-to-talk (p.t.t.) equipped microphone or a Morse key for switching, so that you can instantly return to receive if anything goes wrong. You should also monitor your r.f. output by using a separate s.w.r./power meter, or the meter in your antenna tuning unit.

As the rig is peaked up, keep backing off the drive/carrier control to keep the current below the 100mA mark. When you have correctly set the **Pre-selector/ drive tune**; **p.a. tune**; **load**; and **a.t.u.** controls for a maximum output of somewhere around 5-15W with low s.w.r. and with the IC reading below 100mA, it's time to have a quick burst at full power.

Set the drive or carrier control at maximum, and give a quick burst of one or two seconds in a full power mode such as c.w. You should get around 100W on your power output meter depending on the rig. If it's much less than this, retune the p.a. and load controls – while transmitting in quick bursts of two seconds on, and two off – until full power is obtained.

Finally, temporally switch the meter to read ALC, and speak into the microphone in the s.s.b. mode. Adjust the pre-selector/drive tune for maximum ALC, and then set the microphone gain so that the meter is just moving nicely. Switch back to 'IC'.

While you are operating keep the meter switch in the 'IC' position and keep your eye on it at all times! On some rigs – such as the FT-102 the p.a. current can go into thermal run away, and you'll have to switch off quickly to avoid damage if the current starts creeping up.

High Voltage

The first thing to remember when trying to trace any fault in the p.a. stage, that it contains high voltages that don't necessarily disappear once the rig is switched off. There are bleed resistors, which are intended to discharge the high voltages once the set is

disconnected from the mains – but with many older rigs these have gone high in value and (as I've found out the hard way), hundreds of volts can still remain days later. To be on the safe side disconnect the rig from the mains, wait five minutes, and then short the top caps of the p.a. valves to chassis with the blade of an insulated screwdriver – keeping your fingers well away from where the blade enters the handle.

Probably around 50% of faults in the output circuit of the p.a. stage can be spotted visually; if you can't get more than about 10W of r.f. output on one or more bands with the p.a. current meter '**IC'** at not much more than 100ma – it's time to have a careful look at the coil, the switch, the loading and tuning capacitor, the wiring insulation, and the other components in the output circuit.

Look out for burnt switch contacts and wiring, a blob of solder on the p.a. coil, or a p.a. switch coupler that has slipped, leaving the p.a. circuit on the wrong band. These are all quite common causes of trouble.

Some Bands Work?

Sometimes a rig will tune up reasonably on say 21 and 28MHz (10 and 15m), but refuse to load or produce much output at the l.f. end of the range on say 1.8 and 3.5MHz (160 and 80m). Alternatively, you may find it's okay on the lower frequencies – but is unresponsive at the higher frequencies.

Strangely, the apparently opposite faults can be caused by short circuited turns on the p.a. anode choke L7. And unless you happen to have access to an inductance meter, the best way to prove this is to replace the choke with something similar.

In common with other valved h.f. rigs whilst the loading capacitor VC2 on the FT-101 has more than one section, only one part is used at the higher frequencies.

The FT-101ZD uses a similar circuit to Fig. 1 but has a three section loading capacitor, all sections are used on the lowest frequencies, and only one on the highest. The plate spacing on this capacitor on the '101ZD seems to be rather marginal, and the combination of this, plus the fact that quite a few rigs, (particularly the version that was re-badged as a Sommerkamp FT-277ZD) arrived in the UK set on 220V, resulted in the insulation flashing over and breaking down.

The heat causes the blades to bend leaving them touching over all or part of the capacitor's range. If it's only the section used on the lower frequencies is faulty, the p.a. will load perfectly on the higher frequency bands, but take full current and produce little output on the lower bands. A check with an ohmmeter, as the loading capacitor is swung from one end to the other, will soon show this fault.

If only one section, let's say the 21 and 28MHz, is faulty it's possible to disconnect this, and then wire one of the others in its place, or to connect all the good sections in parallel. The rig will then probably load with the loading capacitor at one end of its travel on 1.8MHz, and at the other end on 28MHz – but at least it will work. Fixed capacitors can then be experimentally be added so that they are switched in on the lower frequencies, if necessary via a toggle switch mounted at the rear of the rig. (More about the p.a. stage next month).

Fig. 3: Harry G3LL came across an Accountant who has a sense of humour – who turned out to be an old customer!

It Pays To Use Your Eyes!

'**Jim**' phoned me to ask if I would look at his FT-102, but as I was busy with other things, I told him to try again in about a month. A few weeks later he 'phoned me again and reported that when he removed the covers from the rig, he found that a spider had crawled inside. Possibly it liked being somewhere warm, but unfortunately for the spider, it had proved a little too warm, and once Jim removed its fried remains the equipment worked perfectly. You can save money by using your eyes!

Accountant With A Sense Of Humour

I can't help wondering how much perfectly good electronic equipment is needlessly written off, when in practice it only needs re-setting to the maker's defaults or, as is the case with many faults on computers, simply requires rebooting. I've frequently mentioned this, but recently my eye caught something in the window of **Parkinson Accountancy Services** at Morecambe, that made me realise that I'm not the only person giving this advice.

I just couldn't resist including it, and so went into the office to obtain permission to take the photo shown in **Fig 3**. I was greeted by a very affable **Dave Parkinson**, who turned out to be a former customer who had purchased Sugden and Quad Hi-Fi equipment from our shop at Blackburn, 30 odd years previously. It's a small world eh? See you next month! ●

Problems

I like to hear about problems with older equipment, particularly pre-1990 Yaesu rigs. Please email me, (add some radio related term in the subject heading, to differentiate against spam), or write and enclose a stamped addressed envelope. Remember that electricity is dangerous, if you are not familiar with safety precautions you must never work on your equipment whilst it is plugged into the mains. (Switching off at the wall socket does not necessarily make equipment safe.

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ATV Websites via Google

Graham Hankins G8EMX suggests that you make changes to improve your website's 'Google' rating, and tells of the projected new Dublin ATV repeater.

Welcome to *In Vision* (*IV*) where we explore the world of Amateur TV. The Internet search 'engine' Google is, so I'm told, a 'hungry beast'. It likes to be 'fed' with new data frequently. Meaning, apparently, that it 'crawls' the world's websites looking for changes. The more changes it finds, the more 'active' it regards the website and moves it further up its 'ranking'. So to stand any chance of getting your website at the top of the first page, keep your site bang 'up to date', making changes frequently.

However, I think this is really most unfair to those sites which give long-term information – facts which will remain current and unchanged for the foreseeable future. Will these fall off Google's 'page one' onto lower pages, if they find their way onto Google at all? Because it is said that, for most web 'surfers', if they don't find a site on the first screen, they don't look any deeper. So, after typing "amateur tv" (ATV) into Google recently, I took a look at the rest of the pages in its index – but only managed to find three related to UK ATV operation.

Grimsby ATV Repeater

The website for Grimsby's ATV repeater GB3GG, managed page three. Not up-dated since June 2008, it includes links to nine other repeater groups. The Solent Club for Amateur Radio and Television, SCART, was eventually found on Google page 16. Its date was correct, maybe automatically changed, but the Events Section was only updated in May last year.

Perhaps that's why GB3GG is so low down in Google's 'rankings'. And, friends, I suggest that you please check your spellings and punctuation! Also found (at the time of writing) on page 16 – G0KRD's personal ATV site. Lots of ATV info and links here, on a page last up-dated in December. But, unsurprisingly and thankfully too, the British Amateur Television Club (BATC) was at the top of page one! Perhaps Google counts the 'hits' as well as changes?

When you 'Hit' the BATC site, you'll find the club announcing its Convention and Biennial General Meeting. Although this isn't until October, these things need to be published well ahead of time. Past meetings have mostly been in the Midlands, but the club is travelling south again, this time to Basingstoke, described on the site as "right in the centre of the current hot spot of UK DATV (Digital ATV) activity".

The BATC convention will be in the new Everest Community Academy and the lecture stream will include the Digilite project (a cheaper way to transmit DATV), operating digital on 70cm (to bring back ATV to that Band) plus all the usual traders. At the moment the club is planning up to seven talks over the two days, October 6th and 7th.

Range Expansion

The BATC's range of new modules continues to expand. Don't just look at the 'Kits and Bits' page, as I did! Click on the 'batc shop' link, which takes you to the ordering page for the Digilite project and there are now two additional modules; one carries a pre-programmed PIC, the other a Balun.

There is a pre-programmed USB module and two phase-locked voltage controlled oscillators (VCOs) giving 1249MHz and 437MHz. Oh yes, and a newly designed BATC enamel clip badge. Looks like the side view of a modern studio camera on its pedestal. My very strong advice is to buy these modules 'while stocks last' or before some vital component becomes obsolete – although the badges will probably be around for some time.

The BATC is also adjusting its membership subscriptions. Personally, I find it's rather surprising amazing that printing and posting the club's excellent magazine *CQ-TV* absorbs £13.49 of a member's £15 annual subscription. By contrast its 'cyber' members (a very sci-fi sounding title for simply getting the magazine as an E-mail!) pay just £4 a year and all of that goes to running the club.

Some Win – Some Lose!

So the BATC is reducing the 'cyber' subscription to just £2 while increasing the paper copy version cost to £16. It's also discontinuing, payment by credit card and discounts on 'forward' payments (paying for two or more years in advance). It's a case of some win – some lose!

Personally, I don't really care how low the 'cyber' subscription becomes! I still like, and indeed want a paper magazine thumping through my door every quarter!

Contributor **Bill Shepherd EI4KB, PA3FDK, G0KPR** sends a welcome report of a new ATV project in Dublin. Bill writes: "South Dublin Radio Club is an active club holding talks on diverse topics and is actively involved in other projects. It is now pioneering a project for ATV. It has set up an ATV repeater high above the city at Three Rock Mountain (1457 feet a.s.l. IO63VF).

New Repeater

The new repeater will cover the city with a good signal on 2.390GHz output and it will receive input on 1.249GHz. Uniquely, the club is simultaneously offering a receiver kit to generate a high level of awareness and usage. The club has made a bulk deal for the equipment.

The package includes a panel or dish antenna, a 2.4GHz receiver and a set of leads and adaptors. Thus it is hoped the repeater will be used soon after coming on air. Expressions of interests have been received praising the ease of set up and the non intrusive appearance of the dishes. Coverage maps and more information can be gained from:

www.iatc.ie and
www.southrdublinradioclub.ie

Finally for this time I have received information regarding my quest to preserve some analogue broadcast television equipment. I'm informed that museums rely on equipment being offered for donation, so maybe if Arqiva, the company that runs the transmitter sites, reads this page (I hope it does!) it will 'take the hint'!

Radio Spectrum under threat!

As users of the Spectrum, the issue is simple: PLA devices are causing interference and if we don't do something now we might not have a hobby take part in – it's that serious. We have created a Spectrum Defence Fund – not just to fight the PLT issue but other threats as and when they come up.

The Spectrum Defence fund is made up from donations from individuals and organisations with an interest in protecting the Radio Spectrum from noise, interference, and other issues that may affect licensed Amateur Radio Operation and Short Wave Listening. It is used to cover the cost of challenging the regulators of the spectrum (Ofcom, EU etc) over threats to spectrum noise level.

We are looking to our administration (Ofcom) to protect our interests, which it is their statutory duty. There are other challenges ahead and the fund will be used only to protect the Spectrum when and where we need to do so. This is a long term project and all monies donated will be 'ring fenced' for these actions alone.

If every amateur in the UK pledged £10 to the Spectrum Defence Fund we'd probably have enough to fight the cause and so we need your donations (no matter how small) to help us meet the threat.

Please help amateur radio and the radio spectrum by donating to the fund today!

RSGB

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Spectrum Defence Fund

Advertising space kindly donated to the Spectrum Defence Fund by PW Publishing

Ben Nock G4BXD's Valve & Vintage
62 Cobden Street Kidderminster Worcestershire DY11 6RP
E-mail: military1944@aol.com

Valve & Vintage

This month Ben Nock G4BXD is wearing his smart new Curator's suit as he's officially re-launched the 'Kidderminster Kollection' as The Kidderminster Military Wireless Museum.

A very big welcome to the Valve & Vintage 'shop', brought to you this time from the 'Kidderminster Kollection', which is also now known as **The Kidderminster Military Wireless Museum**! This is because I have finally got things into some sort of order and I'm in a position to welcome visitors. I have spent the past few months sorting out the collection, getting rid of some of the numerous duplicates I've acquired over the years and have even started to gain new items for the display. Indeed – I'll start off this month with news of just such a new set.

The French Connection

The French military set recently found its way into the stores here in Kidderminster. Sold as a 'radio militaire TRPP24 SOCRAT' the set has a plate on it stating the model number as ER-247A. The radio, **Fig. 1**, is an ultra high frequency (u.h.f.) military airband transceiver covering 200 to 399.975MHz in 25kHz steps. One of its uses would have been to provide air cover for ground troops. The operator could, for example, call up an air strike to deal with any 'problem' areas near the troops.

The set was advertised as working and indeed it does work. I have been listening to the military airband, London Military control for instance on 280.350MHz with good reception. The set came with an odd looking antenna. I was expecting a whip of some sort but what came with the set was a tube, 30mm or so in diameter and about 150mm long. The base of the tube has a coil spring and an N type plug to match the sets N type antenna connector.

I had expected the tube to contain a coil or helical type antenna but I was surprised to find when (as I always do) I took it apart there was just a metal disk. The thin disk, **Fig. 2**, is attached to a long threaded bolt and fixed with a nut. I'm guessing it's some sort of resonant cavity type antenna, moving the disk up or down the thread will obviously tune the antenna to frequency.

Oddly though – it might seem to work but I've noticed that tipping the set horizontally improves the received

Fig. 1: The u.h.f. airband transceiver (note the odd antenna on the right).

signal received! I'm assuming the actual signals are vertically polarised, which makes the poor reception with this antenna, when held vertical, a bit odd. No doubt someone out there in *PW* land will put my mind at ease?

The set came with two battery packs and the carrying case and straps. One of the battery packs takes a charge but as the other wouldn't – I decided to open it up. After a bit of messing about I removed the 20 D cells, **Fig. 3**, and the box was cleaned up.

I've connected a lead to the battery case for the time being, so I can run the set off an external 24V supply. But I might built a small 24V mains power pack into the battery box suitable for receiving only as, of course, I shall never be using the transmit side of the set.

Éncore! – As The French Say

Oddly, only a few days after the arrival of the ER-247A another French-made set arrived at the 'Kollection'. This set was again of the v.h.f. type, produced for the military and was a man-pack design – but was far more useful in the Amateur Radio role than the 247 above.

The TRC-552 is a 26 to 76MHz frequency modulated (f.m.) manpack which means it's actually usable on the 28, 50 and 70MHz (10, 6 and 4m) Amateur bands without any modifications. Made by the French Thomson-CSF company the radio, **Fig. 4**, was designed as a portable platoon or company level unit. It seems many of these sets saw use in the Iraqi army, many are also apparently painted in the colour patterns of the desert and labelled with Arabic lettering.

The radios were apparently also produced under the designation TRPP-28A, ULT299 and TRP-553 (this later version though has increased output power to 5W). The actual specifications are: Frequency range: 26 to 75.975MHz, number of channels: 2000 (using 25kHz spacing). Number of memory channels: 9 – with a clever feature that the first 4 are also available for selection with a switch on the telephone style handset.

Squelch: This appears to be the standard NATO CTCSS of 150Hz, On/Off selectable. The intermediate frequencies (i.f.s) in the receive section are 21.4MHz and 455kHz. Transmit power: not less than 2W; power supply: from 12 to 30V d.c. battery power and an operating temperature range: -40 to +70°C.

Current consumption: while listening 60mA at 15V supply voltage, 120mA during reception and 800mA during

Fig. 2: The airband antenna internally – it seems to be just a disc. If you can help Ben with information on this antenna he would like to hear from you.

Fig. 3: The contents of the battery box.

Fig. 4: The French TRC-552 v.h.f. transceiver.

transmission. When switched off there's still a drain of 2mA or so to keep the memory channel data stored.

The mechanical strength is obviously very high as the equipment was intended for delivery by parachute! Dimensions of the transceiver unit: 252 (width) x 71 (thickness) x 233mm (height) without batteries, with battery, ALI 110B, 309 mm). Weight: 5.752 kg (transmitter and receiver unit with battery ALI 110, less accessories). The optional kit includes: handset, the blade antenna short, 'goose neck' to attach the antenna band, long 2m whip for the lower frequencies, Plecako-frame with the bearing strips, case for spare battery, equipment bag, copy of the manual in French; and Ni-Cad battery 14.4V ALI-110 (uncharged).

The radio has a digital display, **Fig. 5**, with a numeric keypad that lets you enter the frequency into each memory. Unfortunately, it does not seem possible to 'tune' around. For example I entered a starting frequency of 51.000MHz then step up or down in 25kHz steps. The procedure is to enter the memory channel required, 01 say, then enter the frequency, let's 51.125MHz say, which is then stored into that memory channel, the channel then needs to be selected using the channel knob.

In addition to the volume, squelch on/off and channel selection knobs there seems to be a stepped attenuator button – at least I think that's what it does! As its pressed the gain of the receiver seems to reduce in steps and then jumps back to full gain on a further press. My main 'French' agent who assists with all things French is in the process of moving house as I write this so I can't call on his services but I'll do so as soon as he's settled in.

Fig. 5: The digital display of the 247 set.

Fig. 6: The R-159 frequency control dials.

Military Sets On 4 & 6M

With the thought of using the TRC-552 on the 4 and 6m amateur bands and having not played on 70MHz since the late 1970s – I checked the band plans for the two sections. I was pleased to find the 70.450MHz calling frequency along with 25kHz steps above and below but the additional use of the older and well used 70.260MHz still there. Obviously the 25kHz steps of the TRC-552 would put my signal 10kHz away and of no use on that channel.

I also noticed that on 6m the calling frequency on f.m. was given as 51.510MHz*, again a channel I could not reach on the French set. Also, a local repeater uses 50.830 and 51.330MHz as its channels, again outside the range of the 552.

Many of the ex-military v.h.f. sets use 25kHz steps and even 50kHz steps – so this was going to be a problem. By chance though, I was contacted recently by E-mail about a Russian set I already had in the collection, the R-159, which I have not covered before in *V&V*. When I checked on the set, **Fig. 6**, I realised it tunes 30 to 80MHz in 1kHz steps, so it's capable of tuning on these odd channels.

Another memory cell fired and I recalled I also have the R-107M which I mentioned back in February 2007 which also tunes in 1kHz steps. I'm just about to put a 4m dipole on the mast here – so I'll be experimenting with these two sets and will let you know how they perform in Amateur use later on.

***** *There have been significant band-plan changes on 50MHz. These changes are published on the free 50MHz data card published in this issue of* PW. ***Editor****.*

Nice To Hear From You!

It's always nice to hear from readers and I would like to thank **Bryan Harris G3GTF**, for his recent E-mail in which he says he enjoys the column and the website pictures, and also **Graham Jones G4DPH**, who's about to start a Paraset build project. Good luck with that Graham!

Well readers, that's about it for this stint at the *V&V* shop. I hope you have enjoyed the selection I have bought you and there are more pictures at **www.militarywirelessmuseum.co.uk** and more pictures of the progress in the museum layout in the 'Museum status' page. As always I can be contacted, now at my new E-mail address; **ben@radiomuseum.plus.com** Cheerio for now. ●

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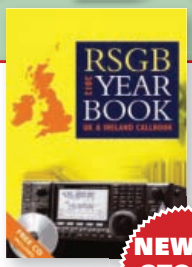

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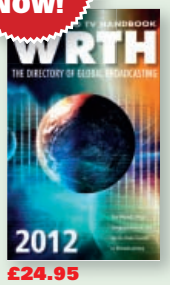

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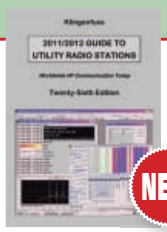

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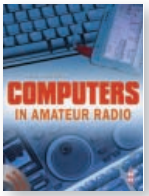

Radio amateurs have always been quick to embrace changes to their hobby to make operating easier or provide something extra. Computers are no exception and they have become essential tools to get the job done quicker and easier than ever before. But there is much that can be done with a computer and many are simply not aware of the huge potential they offer. Computers in Amateur Radio sets out to provide an insight into the wide range of amateur radio uses for the humble home computer.

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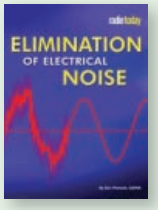

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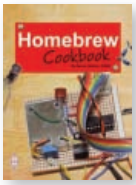

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If you are interested in home construction, Eamon Skelton, EI9GQ is the acknowledged expert in this field. The RadCom columnist on the subject, Eamon brings his enthusiasm, common sense and easy to understand approach to the Homebrew Cookbook, such that readers will be reaching for their soldering iron with inspiration.

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AIR TRAFFIC CONTROL HANDBOOK

The complete guide for all aviation and air band enthusiasts. This is a reincarnation of the Air Band Radio Handbook, an essential reference book first published over 20 years ago and a strong seller throughout its eight editions. The new title reflects not just the extent of overhaul and updating that has occurred for this new version, but also the fact that a larger proportion of the audience these days comprises air traffic controllers themselves (both trainees and fully qualified) as well as the traditional air band listening enthusiast. The expert author's accessible and comprehensive text explains the intricacies of air traffic control and its jargon, enabling the reader to locate and interpret what is actually going on in the airways overhead.

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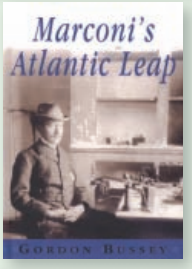

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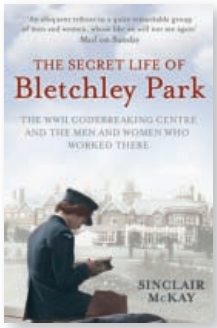

THE SECRET LIFE OF BLETCHLEY PARK

A truly fascinating account of the people who worked at Bletchley Park – their work and recreation. This book is about people working in a very special environment.
Despite the long hours – night shifts were where some of the most amazing breakthroughs were made – there was a social life complete with excellent amateur dramatics and many other activities. Winston Churchill even made sure the staff could have a tennis court! And, despite everything, romance often blossomed between staff!

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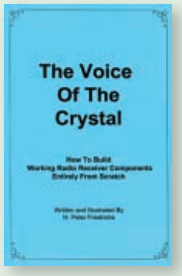

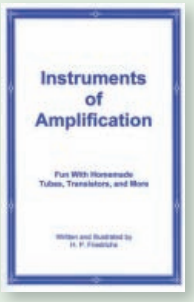

INSTRUMENTS OF AMPLIFICATION

Rob Mannion G3XFD writes: Peter Friedrichs has written a truly superb book but has chosen a title that really hides its 'light' under the proverbial bushel! Armed with the book an interested constructor can literally build a radio from scratch anywhere! Perhaps a better title could have been Desert Island Radio for the Shipwrecked because everything from simple earphones, detectors and mechanical amplifier to home made valves (tubes) and transistors. If you enjoy Rough Science on BBC2 you'll love this book! **Very highly recommended**.

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Rob Mannion G3XFD/EI5IW's

Topical Talk

The Editor discusses topics raised in this month's Letters section and provides some suggestion and ideas.

Tex Swann G1TEX and I are still pleased with the level of feedback we're receiving from readers regarding the antenna systems they've used in the past and are using nowadays. However, I'm rather disappointed that much of the feedback is arriving marked 'not for publication'.

Perhaps – with a little more encouragement I can persuade more readers let us publish their experiences. After all, I don't think the Amateur Radio hobby has that many 'shy people'. If we did, the bands would be much quieter! Or perhaps the privacy that's provided by a radio transmission – with just the voice being heard – does provide some shelter for the more sensitive amongst us?

Joke over – and time to be serious again! We really would like to have more readers sharing their antenna success – and perhaps that antenna success has followed a disaster? Most active Radio Amateurs have had antenna failures – it's all part of the learning process – a vital part of our hobby.

In *Letters* this month I was delighted to exchange the result of an interesting series of E-mails with **Alan Gordon G3XOI**. This sprightly Amateur – in his 80th year – was responsible for several antenna ideas that I learned of via the precursor of Wikipedia on the Internet – the 3.5MHz (80m) 'chat groups'.

Fortunately, Alan agreed to get busy and has provided me with some very interesting article snippets which, together I'm sure we'll prepare a very interesting *Antenna Workshop* for our readers' interest. Thank you Alan! Tex G1TEX and I look forward to preparing your article for publication.

All we need now is a few more readers to contact me to request our *Authors Guide*. If you are tempted – to write on a topic for *PW* – I invite you to see the information I have provided on the *Keylines* Editorial page. In fact, I have devoted much of that page to encourage more of you to share your practical projects with us. So, everything you need to know is on the *Keylines* page.

However, if you wouild like to chat things over with either myself or Tex G1TEX, please E-mail us. If your query centres around possible projects, subjects and ideas for articles for possible publication you are invited to E-mail me via **rob@pwpublishing.ltd.uk** and, of course, Tex and I always discuss article ideas before we take a final decision.

If your query involves circuit diagrams, printed circuit board (p.c.b.) diagrams, wiring lay-outs, photographs and anything of a technical nature – please E-mail our Technical Editor via **tex@pwpublishing.ltd.uk**

The Diplomatic Wireless Service Article

We have been delighted at the interest shown by our readers after we managed to find space to start publishing **Ross Bradshaw G4DTD**'s much longer than usual article. Both Tex and I realised it would be of great interest to many of our readers because the nature of the technology we enjoy as our hobby has also led to many of us being communications, 'Radio', 'TV' and electronics professionals at one time or another. I also know many others who served in various specialised military jobs involving communications.

Although I appreciate that many of us have signed the Official Secrets Act documents on numerous occasion (you can never 'unsign' it!) – I'm sure there are many other interesting stories to be told. An ideal example of this was clearly demonstrated by the fascinating letter from **Robert Connolly GI7IVX** who writes for our sister magazine ***Radio User***, sharing the story of his 'near miss' employment with the DWS.

I've never met or had reason to communicate with Robert GI7IVX before so I was delighted to receive his letter. What a story he had to tell and I wonder what direction his career would have taken if he'd also worked for the DWS?

If you have a story to share about your career in radio communications, broadcasting or electronics, etc., please consider sharing it with *PW* readers. The basic rule is – the shorter the article the quicker we can find space for it. But don't be put off by the writing requirements – the *PW* team will gladly work with you to get the best results. We look forward to hearing from you soon!

Rob Mannion G3XFD/EI5IW

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IN THE UK'S BEST AND ONLY INDEPENDENT AMATEUR RADIO MAGAZINE

Reviewed – The Midland CT-790 v.h.f/u.h.f. hand-held
Our v.h.f. specialist author **Tim Kirby G4VXE** takes a look at the latest offering from the Midland stable, imported by Nevada in Portsmouth. Midland are an extremely well known name in the world of CB radio – but what does Tim think of the performance of this mid-priced hand-held? Read the review to find out!

It's 144MHz QRP Contest Time!
Yes, it's that time of year again and Contest Adjudicator **Colin Redwood G6MXL** introduces our ever-popular QRP Contest – it's a grand day out! – and presents the rules. Make sure you see the rules and pencil in Sunday June 10th and that you've got a suitable site planned.

Antenna Workshop
Now the weather is better we should perhaps turn our attention to antenna maintenance and experimentation. The *Antenna Workshop* series features guest authors who share their extensive experience that had brought good results for them on the bands. Don't miss the June article!

Buying Second-hand
Chris Lorek G4HCL passes on helpful hints and tips for buying second-hand Amateur Radio equipment and what to look out for. And, as the rally season starts in earnest – Chris says there are plenty of bargains about!

Technical For The Terrified
Something different this month! **Tony Nailer G4CFY** sets out to dispel the myths and fears regarding p.c.b. lay–out and design. A number of readers have told Tony they're "scared stiff" about making p.c.b.s for themselves – so he's determined to take the fear out of those p.c.b. projects!

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RG213-DRUM-50 Mil spec, 9mm, 50 ohm, 50m reel..... **£59.95**
RG213-DRUM-100 Mil spec, 9mm, 50 ohm, 100m reel **£109.95**
WESTFLEX103 Mil spec, 10mm, 50 ohm, per metre **£1.75**
WESTFLEX-DRUM-50 Mil spec, 10mm, 50 ohm, 50m reel..... **£79.95**
WESTFLEX103-DRUM-100 Mil spec, 10mm, 50 ohm, 100m reel..... **£149.95**
300-20M Ladder Ribbon, best USA quality, 300 ohm, 20m pack..... **£17.95**
300-DRUM Ladder Ribbon, best USA quality, 300 ohm, 100m reel **£69.95**
450-20M Ladder Ribbon, best USA quality, 450 ohm, 20m pack..... **£19.95**
450-DRUM Ladder Ribbon, best USA quality, 450 ohm, 100m reel **£79.95**

Antenna Wire

Perfect for making your own antennas, traps, long wire aerials etc.
SEW-50 Multi stranded PVC covered wire, 1.2mm **£19.95**
SCW-50 Enamelled copper wire, 1.5mm..... **£24.95**
HCW-50 Hard Drawn bare copper wire, 1.5mm..... **£29.95**
CCS-50 Genuine Copperweld copper clad steel, 1.6mm..... **£29.95**
FW-50 Original Flexweave bare copper wire, 2mm **£34.95**
FWPVC-50 Original clear PVC covered copper wire, 4mm **£44.95**
FW-100 Original high quality flexweave antenna wire, 100m reel **£59.95**
FWPVC-100 Original PVC coated flexweave antenna wire, 4mm, 100m reel **£79.95**

PAM-KIT

A great portable freestanding tripod which can be extended to 4m.
Perfect for field days at a perfect price
.....just **£59.95** complete

Rigging Accessories

Get rigged up, for full list of all options visit our website!
PULLEY-2 Adjustable pulley wheel for wire antennas, suits all types of rope **£24.95**
GUYKIT-HD10 Complete heavy duty adjustable guying kit to suit upto 40ft masts .. **£54.95**
GUYKIT-P10 Complete light duty/portable guying kit to suit upto 40ft masts **£39.95**
SPIDER-3 Fixed 3 point mast collar for guy ropes..... **£5.95**
SPIDER-4 Fixed 4 point mast collar for guy ropes..... **£6.95**
PTP-20 Pole to pole clamp to clamp up to 2" to 2"..... **£5.95**
DPC-W Wire dipole centre to suit either 300 or 450ohm ladder line **£5.95**
DPC-S Wire dipole centre with SO239 to suit cable feed connections **£6.95**
DPC-A Dipole centre to suit ½ inch aluminium tube with terminal connections ... **£7.95**
DPC-38 Dipole centre with SO239 socket with two 3/8th sockets to make mobile dipole **£6.95**
DOGBONE-S Small ribbed wire insulator..... **£1.00**
DOGBONE-L Large ribbed wire insulator **£1.50**
DOGBONE-C Small ceramic wire insulator **£1.00**
EARTHROD-C 4ft copper earth rod and clamp **£24.95**
EARTHROD-CP 4ft copper plated earth rod and clamp **£16.95**
G5RV-ES In-line SO239 replacement socket for 300 or 450 ohm ladder line..... **£6.95**
AMA-10 Self amalgamating tape for connection joints, 10m length..... **£7.50**

Mounting Hardware & Clamps

We have all the mounting brackets you could possible want – for all options see our website
TRIPOD-HDA Free standing, heavy duty, fold away tripod, which adjusts from 50-65mm **£149.95**
TRIPOD-25L Free standing heavy duty tripod to suit masts 65mm or less..... **£79.95**
TRIPOD-20L Free standing heavy duty tripod to suit masts 2 inch or less **£74.95**
TRIPOD-15L Free standing heavy duty tripod to suit masts 1.5 inch or less **£69.95**
TK-36 Heavy duty galvanised pair of T & K brackets, 36 inches total length..... **£49.95**
TK-24 Heavy duty galvanised pair of T & K brackets, 24 inches total length..... **£29.95**
TK-18 Heavy duty galvanised pair of T & K brackets, 18 inches total length..... **£24.95**
TK-12 Heavy duty galvanised pair of T & K brackets, 12 inches total length..... **£19.95**
SO-9 Heavy duty galvanised single stand off bracket, 9 inches total length **£9.95**
SO-6 Heavy duty galvanised single stand off bracket, 9 inches total length **£6.95**
CHIM-D Heavy duty galvanised chimney lashing kit with all fixings, suitable for upto 2 inch **£24.95**
CAR-PLATE Drive on bracket with vertical up stand to suit 1.5 or 2" mounting pole .. **£24.95**
CROSS-2 Heavy duty cross over plate to suit 1.5 to 2" vertical to horizontal pole**£14.95**
JOIN-200 Heavy duty 8 nut joining sleeve to connect 2 X 2" poles together..... **£19.95**
PTM-S Pole mounting bracket with SO239 for mobile whips, suits upto 2" pole . **£19.95**

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NES10-2 Mk3 noise eliminating speaker .. **£112.95**
The NES10-2MKII Noise Eliminating Speaker removes unwanted background noise, hiss, hash computer hash, plasma TV interference, white noise etc from speech so that you can hear the speech much more clearly.

DESKTOP "noise away" robust base station speaker..... **£154.95**
The Desk Top "Noise Away" is a stylish robust base station speaker for use in radio communications, especially amateur radio

Telescopic Masts

TMA-1 Aluminium mast ★ 4 sections 170cm each ★ 45mm to 30mm ★ Approx 20ft erect 6ft collapsed..... **£149.95**
TMA-2 Aluminium mast ★ 8 sections 170cm each ★ 65mm to 30mm ★ Approx 40ft erect 6ft collapsed..... **£249.95**
TMF-1 Fibreglass mast ★ 4 sections 160cm each ★ 50mm to 30mm ★ Approx 20ft erect 6ft collapsed **£149.95**
TMF-1.5 Fibreglass mast ★ 5 sections 200cm each ★ 60mm to 30mm ★ Approx 30ft erect 8ft collapsed..... **£199.95**
TMF-2 Fibreglass mast ★ 5 sections 240cm each ★ 60mm to 30mm ★ Approx 40ft erect 9ft collapsed **£249.95**
TMF-3 Fiberglass mast * 6 sections 240cm each * 65-23mm * Approx 50ft erect 8ft collapsed..... **£299.95**

20ft Mast Sets

(5ft Sections)

These heavy duty masts sets have a lovely push fit swaged sections to give a strong mast set. Ideal for portable or permanent installations . . . also available singly
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MSP-150 4 section 1.50inch OD mast set... **£44.95**
MSP-175 4 section 1.75inch OD mast set... **£49.95**
MSP-200 4 section 2.00inch OD mast set... **£59.95**
MSPX-150 4 section 1.50 inch 5mm scaffold gauge (very heavy duty) **£69.95**

Portable Telescopic Masts

LMA-S Length 17.6ft open 4ft closed 2-1" diameter **£79.95**
LMA-M Length 26ft open 5.5ft closed 2-1" diameter **£89.95**
LMA-L Length 33ft open 7.2ft closed 2-1" diameter **£99.95**
CARPLATE-HDT brilliant drive on plate with tilt – ideal to be used in conjunction with the portable telescopic masts and only..... **£44.95**

CARPLATE-HD without tilt
..... **£24.95**

Patch Leads

PL58-0.5 ½m Standard RG58 PL259 to PL259 lead **£3.50**
PL58-10 10m Standard RG58 PL259 to PL259 lead **£8.95**
PL58-30 30m Standard RG58 PL259 to PL259 lead **£16.95**
PL58M-0.5 ½m Mil Spec RG58 PL259 to PL259 lead **£4.50**
PL58M-10 10m Mil Spec RG58 PL259 to PL259 lead **£12.95**
PL58M-30 30m Mil Spec RG58 PL259 to PL259 lead **£27.95**
PL213-10 10m Mil Spec RG213 PL259 to PL259 lead **£18.95**
PL213-30 30m Mil Spec RG213 PL259 to PL259 lead **£39.95**
PL103-10 10m Mil Spec Westflex 103 PL259 to PL259 lead **£29.95**
PL103-30 30m Mil Spec Westflex 103 PL259 to PL259 lead **£69.95**
(All other leads and lengths available, ie. BNC to N-type, etc. Please phone for details)

Connectors

PL259-6mm Standard plug for RG58..... **£0.99p**
PL259-9mm Standard plug for RG213..... **£0.99p**
PL259-7mm Standard plug for Mini8..... **£1.25p**
PL259-6C Compression type for RG58 ..... **£2.50p**
PL259-9C Compression type for RG213..... **£2.50p**
PL259-103C Compression type for Westflex 103..... **£5.50**
NTYPE-6 Compression type plug for RG58..... **£3.95**
NTYPE-9 Compression type plug for RG213..... **£3.95**
NTYPE-103 Compression type plug for westflex 103 .... **£6.00**
BNC-6 Compression type for RG58 ..... **£1.50**
BNC-9 Compression type for RG213..... **£3.50**
SO239-N Adapter to convert PL259 to N-Type male..... **£3.95**
NTYPE-PL Adapter to convert N-Type to PL259..... **£3.95**
BNC-PL Adapter to convert BNC to PL259..... **£2.00**
BNC-N Adapter to convert BNC to N-Type male..... **£3.95**
BNC-SMA Adapter to convert modern SMA radio to suit BNC... **£3.95**
SO239-SMA Adapter to convert modern SMA radio to suit SO239 . **£3.95**
PL259-38 Adapter to convert SO239 fitting to 38th thread..... **£3.95**

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New lower prices!

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MFJ-993B 1.8-30MHz 300W SSB/150W CW ATU..... **£254.95**
MFJ-994B 1.8-30MHz 600W SSB/300W CW ATU..... **£349.95**
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MFJ-934 1.8-30MHz 300W tuner complete with artificial GND **£204.95**
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MFJ-229 UHF Digital Analyser 270-480MHz **£209.95**
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NEW 50m Coax Drums

Perfect size reels of cable at the perfect price – why have they not been available before!
From stock we have the following:-
RG58 Standard **£14.95**
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