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Britain's Best Selling Amateur Radio Magazine

The Elecraft Experience

Comparing the new ready-built K3 plus a pan adapter with a K2 transceiver

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National Hamfest 2012

Friday 28th & Saturday 29th

Newark & Notts Showground

The National Hamfest

We will be having our usual large stand with lots of great equipment and bargains. As always it will be good to meet old and new friends. If there is a particular item that you wish us to bring, then please give us a call. In particular, this applies to antennas. We have a huge selection of antennas, far more than we could bring to the show. But we are happy to put any particular antenna you may need, on the van.

We will also be bringing the new range of Elicraft products and these will all be on demonstration. As we carry out the final assembly in the UK, it will be very easy for us to build exactlt what you need and bring it to the Show. The Elecraft Demo 500W station and product range will only be at The National Hamfest run by the Lincoln Club. Elecraft will not be at The RSGB Convention.

We hope to have a small quantity of KX3 finished radios with us. This very much depends on the supply from the USA. So if you are after a KX3 at the Show it would be sensible to call us and get the latest delivery information and reserve one..

ICOM THE NEW IC-7100 IS ANNOUNCED!

This Rig Adds 70MHz!
Get Your Order in NOW!

50W on 70MHz!

The most exciting news from Icom is the new IC-7100 transceiver that offers 100W from 1.8 -50MHz, 50W on 4m and 2m and 35W on 70cms. There is an SD memory card slot and USB audio output - for IQ SDR we guess. A big leap forward is the introduction of a colour touch screen and a convenient built-in speaker in the remote head unit. Note that the sloping front panel can no longer be connected to the main body like the IC-7000. Now is your time to ask to go on our news list and get your name down for one of these fine radios.

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 £3519.95 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-588 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

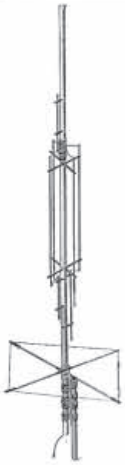
Tigertronics SignaLink USB Soundcard Interfaces

The SignaLink USB combines the excellent performance of the SL-1+ with a built-in low-noise USB sound card. It delivers optimum performance whilst eliminating the need to use your computer's sound card. The SignaLink USB will work with all radios (just select appropriate SignaLink model) and it can then be attached to the Mic. jack, Data port or Accessory port. **£99.95 C Each**

SL-USB-4R SignaLink USB Sound Card Radio Interface+ CD-ROM with 4 pin round mic cable
SL-USB-8R SignaLink USB Sound Card Radio Interface+ CD-ROM with 8 pin round mic cable
SL-USB-RJ-11 SignaLink USB Sound Card Radio Interface+ CD-ROM with RJ-11 mic cable
SL-USB-RJ-45 SignaLink USB Sound Card Radio Interface+ CD-ROM with RJ-45 mic cable
SL-USB-5PD SignaLink USB Sound Card Radio Interface+ CD-ROM with 5 pin din cable
SL-USB-8PD SignaLink USB Sound Card Radio Interface+ CD-ROM with 8 pin din cable
SL-USB-13PDI SignaLink USB Sound Card Radio Interface+ CD-ROM with 13 pin din for Icom
SL-USB-13PDK SignaLink USB Sound Card Radio Interface+ CD-ROM with 13 pin din for Kenwood
SL-USB-6PMD SignaLink USB Sound Card Radio Interface+ CD-ROM with 6 pin mini din
SL-USB-NC SignaLink USB Sound Card Radio Interface+ CD-ROM with unterminated radio cable

GAP ANTENNA PRODUCTS

Gap make some great vertical antennas that fit in small spaces and have excellent bandwidths.



TITAN-DX £379 D

10m - 80m
Full band 10 - 40m
100kHz on 80m
Height: 25 ft
Weight: 25 lbs
4 rigid 80' radials
Mount 1ft or more

GAP antennas do not rely on traps or inductive loading. They use a patented feed method that results in most of the antenna being active with minimum loss, excellent efficiency & low angle radiation. A great solution for the small garden.

CHALLENGER-DX £329 D

Bands: 80m 40m 20m 15m 12m 10m 6m 2m
Bandwidth: Under 2:1
Entire band on 40m 20m 15m 12m 10m 6m 2m 80m over 130 KHz; 10m over 1MHz
Thousands of Challengers are now in use throughout the world. Challenger is the first and only antenna capable of operating on eight separate bands from 3.5 MHz to 144 MHz.

EAGLE-DX £359 D

Bands: 40m 20m 17m 15m 12m 10m - with supplied extender, this can be customized to your favorite part of the band
Bandwidth:Under 2:1
The Eagle is the smallest antenna in the GAP product line. The Eagle DX-VI weighs just 11 pounds and can be installed almost anywhere - at ground level, on a pole, on your roof or atop a tower.

VOYAGER-DX £429 D

Bands: 160m 80m 40m 20m
Bandwidth: Under 2:1
Entire band on 80m 40m 20m; 160m over 90 KHz
Offers low band operation from the typical backyard without a huge investment in time, money and space. The GAP Voyager DX-IV incorporates the identical unique technology as in the Challenger DX-VIII to "open up" the low bands.

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

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£109.95 C

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HM-12
The HM-12 features the new HC6 insert that works with all modern rigs. It will give your signal that "magic" lift that will add dBs to your signal's voice power. As Bob says in his live workshop, a linear costs a whole lot more! Check out our great price of **just £69.95 C**
Interchangeable Adaptor lead for your radio is extra. Phone for price of the adaptor you need to exactly match your radio. Get one for each radio.

Pro-Set-6
The new Pro-Set-6 headset offers a complete new way of operation with its comfortable headset and adjustable boom mic. giving hands-free operation.

Pro-Set-6 £149.95 C
AD-1 Rig adaptor leads £22.95 C

Pro-Set-Elite-6
Modelled on the ProSet-6 but adds phase reversal switch which offers a spatial awareness that moves signals around in your head to give perceived placem ent of signals between the two acoustic headphone chambers.
Pro-Set-Elite-6 £179.95 C
Pro-Set-Elite-IC £189.95 C
AD-1 Rig adaptor leads £22.95 C

YouKits QRP 80-40-30-20m CW Transceiver

HB-1B QRP Transceiver
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**

New Kenwood TS-990S

The New FlagShip Radio From Kenwood

The new radio from Kenwood covers 160hm to 6m and has an output of 5-200W. The AC supply is included and the rig even features PSK-31. It's a big desktop design and the US$ price is expected to be $5K - $8K. So it is at the top end of the price range. There are no firm delivery dates yet, but it is hoped to have one working at Newark in October. PX welcome!

VHF UHF Mobiles

NEW **TM-281E** 2m FM 65/25W Mobile **£169.95 D**
On or off the road, Kenwood's TM-281E is a mobile you can count on. This MIL-STD compliant transceiver delivers powerful performance, excellent audio clarity, and a host of advanced features.

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

FT-7900E 2m/70cms mobile 50/40W CTCSS, DTMF, "WIRES" internet, wide Rx
£239.95 D

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

FT-8900R Quad band 10/6/2m/70cm FM 50W (70cm 35W)
£389.95 D

FTM-10E 2m/70cms Blue Tooth & built-in mic.
£324.95 D

FTM-350E 2m/70cm Mobile Bluetooth GPS APRS
£479.95 D

ID-E880 50 Watt Dual band 2m/70cm with D-Star and airband receive. **£439.95 D**

TM-D710E 50 Watts 2m/70cms with APRS
£445.95 D

TM-V71E 2m/70cm Mobile with Echo Link
£299.95 D

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Radio has never been cheaper in real terms but that does not helpi if you are short of cash. So why not turn out all that old gear and part exchange it for what you really want. EVEN DEAD equipment may have value! Just call us on 01702 203353 or e-mail us your list of gear together with what you want to buy, at: sales@wsplc.com. We will give you an immediate quotation. That new radio is waiting.

Handheld Transceivers

ID-31E NEW
70cms D-Star handheld with built-in GPS, IPX7 submersible & D-Star DV mode, SD card slot, 1252 memories & 5W output.
£349.95 D

TH-K20E & TH-K40E NEW
Two new handies from Kenwood. "K20E" offers 5.5W output and rx from 136-174MHz. "K40" offers 5W out and rx from 400 - 470MHz. **£119.95 D each**

VX-3E
2m / 70cm Handheld Wideband receive
£169.95 D

VX-6E
2m/70cms handy, 5W Wideband Receive
£214.95 C

FT-60E
2m/70cms, 5W handy Wideband Receive
£129.95 C

VX-8GE
Dualband 2m/70cm 5W + GPS Antenna
£349.95 D

VX-7R
Waterproof triple band handy (silver/black)
£299.95 C

VX-8DE
Triple Band 6/2m/70cm Upgraded APRS
£369.95 D

IC-E80D
Dual band 2m/70cm D-Star CTCSS & DTCS GPS Compat.
£329.95 D

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

TH-D72E
Dual band 2m/70cm with GPS & TNC + SiRF
£426.95 D

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

KG-UV6D
Dual band 2m/ 70cm 5W/4W SMA
£94.95 D

HF - UHF in One Box!

YAESU **FT-897D** base or portable, this 1.8 - 440MHz transceiver is great value. 1.8 - 50MHz 100W 2m 50W 70cm 20W.
IN STOCK **£819.95 D**

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

KENWOOD
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 & 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 HF transceiver giving 100 Watts from 160 - 6m and includes auto ATU.
IN STOCK **£779.95 D**

TEN-TEC

Jupiter-538CE 160m - 10m 100 Watts SSB CW AM FM with on-screen CW reader and socket for PC keyboard.
IN STOCK **£1649.95 D**

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

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K3 A Serious Transceiver for 160-6m

The K3 uses on-board SDR Technology

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THE EXPERTS VIEW

Sherwood Engineering report (www.sherweng.com)
Better dynamic range than any other base transceiver

RadCom Review
Lowest transmit phase noise ever measured!

K3/100-F 100W Built £1999.95 D
K3/100-K 100W Built £1899.95 D
K3/10-F 10W Built £1599.95 D
K3/10-K 10W Built £1499.95 D

Operating the K3 brings a breath of fresh air to ham radio. A hand assembled top performer and all the controls are logically arranged. Owning a K3 is a complete experience. The compact size and light weight enables it to fit into a small operating position and makes it the ideal transceiver for portable and DXpeditions. But whilst it is lighter and smaller than many transceivers it is certainly a heavy weight in the performance stakes.

Sherwood Engineering put the receiver section right at the top of their list and rightly so. The receiver has an amazing dynamic range with a quiet front end and contiuously variable selectivity. In fact the selectivity is very dependent upon the SDR (Software defined Radio) architecture within the K3. And Elecraft make sure that your raddo is kept up to date by regularly releasing firmware updates. A simple RS232 or USB connection from your PC.

The K3 has all the normal features you would expect from a top radio, but goes a lot further than most. QRP operators like the ability to turn power down accurately to milliwatts and when the power goes below 10W the main PA is switched off to save current and users the lower level 10W driver. There is an 8-band graphic equaliser for both transmit and receive and a true RF compressor can give real punch. CW operators love the keying and QSK which is totally transparent. There is also a very nice auto CW net control which puts you dead on the other station's frequency at your chosen sidetone frequency.

Data enthusiasts will be delighted to know that not only can you decode CW on the screen, you can also decode PSK31 and RTTY. But the K3 is unique in that you can also send PSK31 and RTTY without the need for a PC. How's that for a neat trick! There is so much logical thinking in the design!

For noisy band conditions the noise blanker is one of the best and the DSP noise reduction has an excellent number of options with its built in algorithm. AGC is another area where extensive user programming is possible. All these user settings can be downloaded and saved on a PC (Windows or Mac).

Then there are all the options, including roofing filters down to 200Hz and an optional I/O board for use with transverter at milliwatt level and IF out for the P3 panadaptor. The K3 is the only radio to offer a true independent second receiver option that matches the main receiver performance. And if 2m is a band you use, there is an optional 2m transverter that can be built in.

To lean more, why not download the full manual from www.elecraft.com

P3 Panoramic 2.5 - 200kHz Bandwidth

It feels like a real PC screen, and is the perfect partner for the K3.The new Elecraft P3 PanAdapter display adds a visual dimension to signal hunting with fast real time spectrum and waterfall displays of band activity. The P3 offers superior sensitivity and DSP processing, giving you the ability to see signals down to the K3's noise floor. The P3 can also be used with any other radio that provides an IF output of 455 kHz to 21.7 MHz looking for band openings.

Using the P3 is rather like operating a PC. The front panel makes it very easy to change the vertical response to suit band conditions and noise levels. The horizontal scan width can likewise be adjusted from 200kHz down to 2kHz. The P3 is great for monitoring the beacon area of the 6m band. Integration is total with the K3 and using the control nob it is very easy to click on a signal for automatic QSY via the K3.

The P3 is probably the best panadaptor ever produced for working with its associated transceiver. And as the RSGB review says, the P3 is up to lab standard. It is a very functional and accurate companion to your transceiver and can even be changed to read S units on the vertical scale.

Built £759 D Kit £709 D

KPA-500 Linear 500W 160-6m - 4 inches high

A 500-watt solid-state amp that's so well integrated, you'll think its reading your mind. The KPA-500 features 160-6m coverage, instant RF based band switching with any radio, alphanumeric status display, bright LED bar graphs, and a rugged, built-in linear supply. The amp's manual band switches can also be used to change bands on the K3. Also the K3 can even select per-band amplifier drive levels automatically when the amp is placed into operate mode, so you'll rarely need to adjust power output. But the KPA-500 is not just limited to use with the K3 – It is fully compatible with most radios. The KPA comes with a 230V AC built-n PSU. Time for a change!

Built £2199 D Kit £1999 D

KX3 Transceiver 160 - 6m 10W All Modes + PSK31

KX3 NEWS FLASH
Best receive dynamic range *of ANY TESTED RADIO* says Sherwood Engineering web site!

Should be ex stock by the time you read this!

The revolutionary Elecraft KX3 puts the world in the palm of your hand! Despite its small size, it covers all amateur bands from 160-6 meters, operates in all modes, and has DSP-based features usually found only on larger radios. The KX3's unique form-factor allows you to operate from anywhere. Fold out the rear tilt-feet for use on a desktop or picnic table, or add our rugged mobile mount bracket for vehicle use. For extreme portability, you can add the internal wide-range ATU, 8-AA cell battery pack with NiMH charger, and adjustable KXPD3 keyer paddle. With a whip antenna, you can even operate hand-held. In receive mode, current drain can be as low as 150 mA - about one-half to one-third that of competing all-band portables. Transmit efficiency is also excellent, further improving battery life. This item is currently subject to a back order list and customer should check estimated delivery when ordering.

Built £959 D Kit £899 D

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

Practical Wireless October 2012

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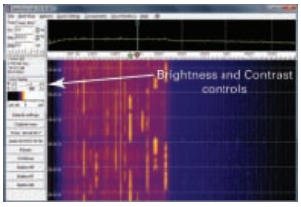

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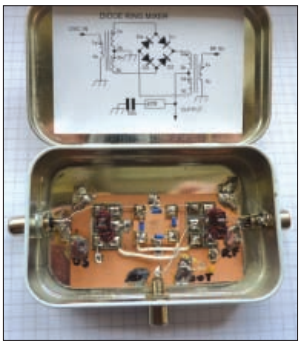
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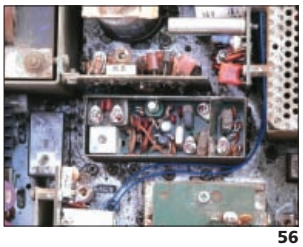
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Front cover design by **Steve Hunt.**

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Rob Mannion G3XFD/EI5IW's

Keylines

Rob G3XFD looks back at a delightful day out that he and friends enjoyed at the QRP in the Country event held in Somerset in July. And it seems that memories of his first mobile rigs were stirred!

We were extremely fortunate with the weather on Sunday July 15th – the rain held off during the whole day at **Tim Walford G3PCJ**'s QRP in the Country (QRPitC) event, held at his farm in Long Sutton, Somerset between Yeovil and Taunton. The 'We' in this case were *PW* friend and colleague **Tex Swann G1TEX**, together with *PW* authors **Phil Ciotti G3XBZ** and **Colin Redwood G6MXL**.

Our trip was affected by the bad weather though – due to some roads being flooded we had to travel to G3PCJ's QTH via Blandford and Sherborne – joining what seemed to be a convoy of classic cars on their way to a rally! It was a case of 'I Spy' Humbers, Hillmans and one exotic American classic car gulping along at about 15 miles to the gallon!

Due to the threatening overcast weather (despite this the sun did appear for extended periods) the event was held under cover in one of Tim's barns. Both he and his wife **Janet** and family looked after us very well and I enjoyed a wonderful bacon butty made with local bacon. Delicious! Our friend **Robert van der Zaal PA9RZ**, Secretary of the **Benelux QRP Club** presented us with his regular gift of some very tasty Dutch Gouda cheese.

Busy Chatting To Readers

I was kept very busy chatting to *PW* readers and other friends during what was a great day and – naturally as we had all arrived by car – mobile operating equipment was one of the main topics.

One of my visitors showed me a photo of his old 1.8MHz 'Top Band' set-up from the early 1970s and this had been based around the Codar AT-5 transmitter with the same *PW* published 1.8MHz to medium wave car radio converter design I'd also used.

I actually saw a complete Codar AT-5 transmitter and receiver combination (complete with the Codar switching controls and inverter power supply) for sale at the event but it disappeared very quickly. If you bought it – I would like to hear from you!

Early Mobile Operations For G3XFD

My own memories go back to the days of 1.8MHz mobile operation using a home-brew transmitter and my early days on 144MHz with a Pye *Reporter* running a 6J6 in the power amplifier (p.a.) that provided about 250mW into the antenna! That rig came via my friend **Alan Partner G3HKT** and provided many years fun on 2m with a simple halo antenna.

My first 1.8MHz a.m. transmitter was a simple 6V6 crystal oscillator p.a., screen modulated by another 6V6. I used a carbon insert hand microphone (from an 18 Set) and the pressel-switch providing the operating current from the microphone also operated a relay. This started the rotary converter and changed over the antenna from receive to transmit and removed the h.t. from the transmitter. Crude yes – but it worked well and the transmitter (and the rotary converter) stayed in the boot of my *Morris Minor*! Only the microphone was required at the driver's position!

The Yaesu FT-75

My good friend **Ivor Richardson G3XLP** (West Cowes, Isle of Wight) made me an inverter power supply for my KW-2000A for mobile use and this gave me the taste of h.f. single side-band. I was then attracted to the amazing little (for those days) Yaesu FT-75 mobile valved-transistor hybrid transceiver.

Owning an FT-75 (I think my original rig cost me £120 new from **South Midland Communications** then based in Totton near Southampton) opened up new horizons and great DX! Indeed, operating as **EI2VJT/M** from our motor caravan while we were on the Dingle Peninsula in County Kerry, Ireland in 1976, I worked many South American stations with the rig's 30W s.s.b. and a 14MHz G Whip antenna! My wife **Carol** had a job to get me off the rig at times!

I would be most interested to hear from any reader who still owns a working FT-75. **Lord Brian Rix G2DQU** owned one and because the FT-75 only had three VXO crystal oscillator channels on each band (3.5 to 28MHz) – all 75 owners soon got to know of each other! Personally, I think the FT-75 is a forgotten pioneer that deserves to be remembered for helping many of us work DX from wonderful locations!

Rob Mannion G3XFD/EI5IW

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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:

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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*.

£20 Star Letter

Valved & Vintage Mobile Operation

Dear Rob,
Reading **Phil Cadman G4JCP**'s *Valve & Vintage* in the July edition of *Practical Wireless* about mobile operation set me off on a nostalgia trip. In 1961/62 I was secretary of the now long-gone **Rotherham Radio Club** when the on-going club project was building a Heathkit DX 40 transmitter for the Club - remember those?

My receiver at the time was an Eddystone 358X with band-change via plug-in coil packs – very inconvenient! This receiver replaced an R1155B from which I had removed the DF circuits and used the space left to build an internal power supply (metal rectifier) and an output stage (6V6GT)!

I replaced the Eddystone with a CR100 which of course had switchable band-change - much more convenient. For two metres I was using a P104. A friend of mine, **Phil Gale G3OJG** had just become licenced and we used to go out in my van with radio gear on-board to operate /P. Sometimes en-route to a radio rally to contact the talk-in station, and sometimes using a QRP rig to see what contacts we could make using an ex-Navy box-kite to support the antenna.

On one day while we were operating the kite came down in a field of cows. Cows are very curious animals and they started to make their way towards the kite so I climbed over the gate into the field to get the kite airborne again before they could cause any damage to it. When I left the field I climbed on top of the gate and then jumped off (Oh for the chance to be able to do that now!), as I landed I heard a crack and felt a sharp pain in my ankle.

Next day I rang work and told them that I had hurt my ankle and had to go to hospital but would be in later. After seeing the Doctor, the X-ray the diagnosis was a broken ankle which resulted in a plaster being fitted to immobilise it (and me!). After a trip home in an ambulance I rang work and told them what had happened and that I would be off work for the duration. (I was in a supervisory capacity at the time).

Next morning at 9.30am there was a knock at my door which my mother answered. My boss was stood on the doorstep – my mother invited him in thinking that he had just come visiting. "Oh No"! He said that he had come to take me in to work and would continue to do so until I could drive again, making the comment that I could do my job from my desk and if anyone wanted me they would have to come to me rather than the other way round. So although I had a broken ankle I only managed a total of three days off work!

Another trip out was to a Radio Rally at Cleethorpes (This is the memory which sparked off this letter). There was the usual talk-in station on 'Top-Band' accompanied by two competitions, one for the furthest travelled mobile to attend the rally and one for the smallest mobile to attend the rally. The contest for the smallest mobile was easily won by a 16 year-old lad on roller-skates using a 25mW transistor outfit with a base loaded whip mounted on a rucksack! Such ingenuity.

Enough of my ramblings! And I hope you enjoyed reading this, 73s, keep up the good work.

Malcolm Parkin M3OAM
East Dene
Rotherham,
South Yorkshire

Editor's thanks: *Wonderful memories – thank you for sharing them Malcolm! Your letter set me off down Memory Lane too! In fact, I've devoted most of this month's* Keylines *to the topic and have asked if any readers who still own the remarkable little (little for those days anyway!) VXO controlled Yaesu FT-75 h.f. mobile transceiver. I also mentioned the 'QRP In The Country' 'traditional' type radio rally that I attended with Tex Swann G1TEX and other friends at Tim Walford G3PCJ's farm in Somerset. It was there I saw a complete Codar AT5 a.m. mobile set-up for sale complete with the matching T28 receiver and inverter with switching control. It was fascinating to see how well the Codar combination had fared over the years. And, although we didn't have room for* ***Phil Cadman G4JCP's*** Valve & Vintage *this month – we did manage to find space for* ***Ian Liston Smith G4JQT****'s article on the AT5. I hope you enjoy reading it!*

Hearing Aids & Amateur Radio

Dear Rob,
a few years ago I was given a high frequency analogue hearing aid to try and combat bad tinnitus which I believe came about working near high speed barrel printers in the computer industry. Eventually, this aid needed replacing and I was given two digital units which were set up tailored for each ear. These were supplied with open ear fittings instead of the usual moulded insert and this meant I could wear normal in heaphones for radio operating.

However, these open units tend to feedback and whistle if turned up too loud but they also react to loud noise and go into self oscillation. I sing in our Church choir and often a high note on the organ was enough to set my ears ringing! At that time, our church audio loop was out of order and no-one else noticed this except me. After much persuasion, it was fixed and now I can turn to the T position and get loud and clear reception throughout the service. On a normal position in a noisy room I could often hear better without the units in as the digital devices tend to amplify high frequencies more in a bid to combat the tinnitus so a babble of

voices made it difficult for me to hear the person next to me!.

I have also purchased a Sarabec Crescendo C50 which is a portable T loop system and this works by connecting it to the audio output of any device to give clear reception using a loop around the neck. This should work well with any radio set-up and you can turn up your own volume without everyone else having to listen. It certainly works well with my Icom IC-706 MkIIG. I got my unit from the **Royal National Institute for the Deaf** (RNID) website, it's well recommended. The only time I can hear my car computer is if I forget to take them off the T position as they then pick up all the control signals in the car, some very strange noises. No problems on any normal position. I hope this might be of use. 73.

Dave Thompson G3OXG
Potton
Bedfordshire

Editor's comment: *Thanks for the information Dave. I since discovered that the RNID now operate under the title* **Action On Hearing Loss**. *Their very helpful website can be found at /* ***www.actiononhearingloss.org.uk***

Promoting Amateur Radio Clubs

Dear Rob,
I read with great interest your comments on Amateur Radio clubs promoting themselves
and the hobby and I thought you might be interested in these articles featuring the Moray Firth ARS: **http://local.stv.tv/lossiemouth/news/features/149539-radio-enthusiasts-aim-to-light-up-a-moray-landmark/** and **http://local.stv.tv/elgin/news/features/107413-raf-lossiemouth-to-take-part-in-world-wide-amateur-radio-event/**

Bill Cecil GM3KHH our club president, approached me some time ago when I turned up at an event in Moray promoting the hobby to a group of Scouts. He was aware of the need to promote Amateur Radio to a new generation of possible operators and asked my advice on how this might be achieved.

I served as an RAF telegraphist in the 1970s but it was only in recent years that I renewed my interest in the hobby and became MM6HFC. After moving to Moray in 2010, I became a full-time local journalist so I guess that put me in the ideal position to give some of the joy I've had from the hobby back again. I cannot agree more with your comments Rob, my feeling is that too many Amateurs are 'set in their ways' and seem set on protecting rather than pro-actively promoting the hobby. Hopefully the small steps being taken here in Moray will make a difference and act as an example to others around the country. Regards

Stuart Crowther MM6HFC
Lossiemouth
Moray
Scotland

Editor's request: *Thanks for your letter Stuart. Your club seems really 'switched on'! Please join me on the* Topical Talk *page for further comment.*

Viewing TV Years Ago

Dear Rob
A recent letter about the early days of television reminded me of my own experiences.
During the Second World War I worked at the GEC Radio Service Depot in Greycoat Street Westminster in London. Some months after war ended, we heard that TV was to restart from Alexandra Palace the day before the 'V' Day celebrations. This would feature parades through London and down the Mall to Buckingham Palace with representatives from the armed services, police, civil defence, voluntary services, nurses, factory workers and all who had played a part in our victory, what is more, the whole event would be televised.

Purchasers of pre-war GEC television sets were offered a fixed-charge servicing check to ensure that their TV would function when broadcasts resumed. The BBC helped by making test transmissions, and I often saw snatches while passing through the workshops.

Eventually came the formal re-opening with a speech from the BBC Director general followed by a newsreel and program of music and dance lasting about 2 hours. It was impossible for the GEC to return all sets before 'V' day, and so several were available in the works canteen for staff to watch the parade, although screen sizes were small by present day standards, with dim black and white pictures best viewed in the dark. We saw the parade televised without a hitch, which was really remarkable considering the limited and fairly primitive equipment available. Afterwards we joined the crowds in the Mall, paying particular interest to the BBC TV Outside broadcast crews who were busy packing up ready for the evening studio broadcasts.

About a year after that event, I was called up for national service in the RAF. One evening, while serving at RAF Farnborough (The Royal Aircraft Establishment), we heard that something interesting was happening at the Electronics Centre. The room was dark and a group of airmen sat before a 6 inch screen watching a TV play. The set had been cobbled up from an old airborne Gee navigation display.

I spent the remainder of my service at the Land's End Gee ground station, where I met my wife-to-be. Shortly after our marriage, we were visiting Lisle Street in London Soho, which many old Amateurs will remember as being line with shops mainly selling ex government radio equipment. One little shop had a stack of Gee sets for sale, as suitable for TV conversion, and as there was very little room, I left my young wife outside while I rummaged through the heap on the floor. Unfortunately, Lisle Street was also notoious for another kind of trade, leading to my wife suddenly running into the shop in alarm, having just been propositioned by a would be customer.
Yours sincerely.

Dennis Easterling M0JXM
Biggleswade
Bedfordshire

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

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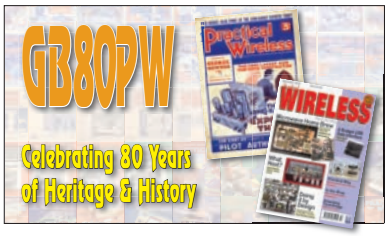
Special Event Station GB80PW Active Thursday September 13th

The Editor writes; "Just a quick reminder to readers that GB80PW will be active on **Thursday September 13th** to celebrate the actual 80th anniversary of the first publication of *PW* in 1932. The station will be active from approximately 1000 hours UK time until 2100 hours from my home in Bournemouth.

We shall be active on 7MHz (40m) single sideband (s.s.b.) until approximately 1500 hours (depending on conditions) before operating on 14MHz (20m) s.s.b. – and other DX bands, again depending on conditions. During the evening we shall be active on 3.5MHz s.s.b. and hopefully on PSK31. The team operating GB80PW will be aiming to work as many stations as we can as the date is so special!



It's a busy few days for the GB80PW operators because we shall also be on air on the saturday following too, with the normal monthly session for GB80PW. Operations on the Saturday will be mostly on 7MHz.

As we approach the last few months of GB80PW operations I'm planning to operate on as many days as possible over the Christmas holiday period. This will be on a 'when I can find spare time' basis but will mainly be during the after lunch period on 7MHz and PSK31 operations on 3.5 and 7MHz whenever I can find the time. Readers are welcome to E-mail me via **rob@pwpublishing.ltd.uk** for the latest schedules for GB80PW. The remaining fixed monthly operating schedules are **Saturday September 15th**, **October 13th**, **November 10th** and **December 15th**. We hope to work you on at least one of the dates! **Rob G3XFD**.

Japanese Visitors To Military Wireless Museum Kidderminster

Recent international visitors to the Military Wireless Museum, the collection of *PW*'s very own *Valve & Vintage* author Ben Nock, G4BXD, were **Mr T. Matsuura JJ6SGL**, and **Mr I. Fujimura JA4VDA**, from Japan. There were of course especially interested in the Japanese war time radios in the collection but found the whole museum most rewarding. Mr Matsuura, who owns the 'Hams Office' Amateur Radio shop in Kumamoto, Japan, was so interested in reading copies of *PW* at the museum that he is now arranging to supply the magazine through his store.

Mr Matsuura (on the left) and Mr Fujimura (centre)

***Editor's apology**. Although I referred to the above news item in* Topical Talk *in the September issue of* PW*, due to an oversight I forgot to include it in the news! Very embarrassing – my apologies to everyone concerned.* ***Rob G3XFD**.*

Stop Press! New Wouxon Mobile from Martin Lynch

Martin Lynch G4HKS contacted *Newsdesk* with the latest news from Wouxon: "Following on from the amazing success that Wouxun themselves have created throughout the world with hand-held transceivers for the Amateur Radio and commercial markets, the new KG-UV920R is their very first mobile transceiver.

"The new transceiver undercuts the competition by £120 and is Wouxun's first entry into the mobile sector. It's a proper dual-band 144/432MHz (2m and 70cm) f.m. transceiver with the ability of receiving on one band while transmitting on the other. The package is bundled with a remote head unit and (for the first 100 units ordered) has a free 5m remote lead included – enabling the main body of the radio to be mounted elsewhere in the vehicle. The Introductory price is only £229.95 including VAT and the first shipments will be in store at ML&S early September 2012". Best wishes, Martin.

For more details see **www.WOUXUN.co.uk** and our website **www.hamradio.co.uk/amateur-radio-main-equipment-mobile-radio-wouxun-mobile-radio/wouxun/wouxun-kg-uv920r-pd-2454.php**

Martin Lynch G4HKS
ML&S Martin Lynch & Sons Ltd., *Outline House*, 73 Guildford Street, Chertsey Surrey KT16 9AS
Tel: (**01932**) **567222** E-mail: **Martin@MLandS.co.uk** Web: **www.MLandS.co.uk**

Doctor Lucie Green Visiting Reading Club – Focus On The Sun

Pete Milton G8FRC, PRO for the **Reading & District Amateur Radio Club** contacted *Newsdesk* to issues a welcome: "**Dr Lucie Green** from the Mullard Space Science Laboratory has kindly agreed to visit the R&DARC to present a lecture entitled '**The Sun'** on Thursday September 27th at 1930 for 200. The event will take place at **Lecture Theatre 109**, **Palmer Building**, **Whitenights Campus**, **Unversity of Reading**. We're expecting a good turn-out for this very special evening, as Dr. Lucie is a renowned speaker and expert on the sun. As seats are limited we recommend that potential visitors register via our website **www.radarc.org** or contact me directly".

"Our Club Calendar for October 2012 also includes: October 6th and 13th Foundation Course, (contact **Eric Curling M0LUV** via E-mail **m0luv@radarc.org** and October 11th 'High Power Transmitters' (Part 2) by **Tony Crake G0OVA.** On October 25th we have our Autumn Junk Sale. Further details from myself". Pete G8FRC. Tel: (**01189**) **695697**
E-mail: **petermail@peterg8frcmilton.plus.com**

Mike Peel

Stop Press!! New Icom Transceiver Covers 70MHz!

Stop press news! From the PW Newsdesk roving correspondent: Two new Icom rigs featured at last weekend's Tokyo Amateur Radio Fair. The IC-7100 multi-mode should prove popular with 70MHz users as it provides 50W on the band. The company also launched a new dual band D-Star hand-held transceiver.

See IC-7100 HF/VHF/UHF Amateur Radio Transceiver **http://www.icomuk.co.uk/News_Article/3508/17675/** and the ID-51A/E dual band D-Star handheld **http://www.icomuk.co.uk/News_Article/3508/17674/**

Triple Special Events Stations Supporting The Paralympic Games

Special Event station **GB2012MV** (with sister stations **GB2012MS** and **GB2012MW**) will be operating until September 9th when the Paralympics ends. **Warrington Amateur Radio Club** with **South Manchester Radio & Computing Club** and **West Manchester Radio Club** are celebrating the 2012 Olympics Manchester Venue with their Special Event call signs and telling amateurs worldwide about the event.

All three clubs are operating with as much equipment as they can muster to stimulate broader interest in a wide range of bands and modes live on air. At the Warrington Club location there is a diverse array of equipment available for members to learn about and operate.

There are three h.f. stations with linear amplifiers, one of which is dedicated to c.w. and digital modes, two v.h.f. stations and one station dedicated to h.f. Eight transceivers are being employed. This allows h.f. transmissions on 1.8, 3.5., 7, 10, 14 and 18MHz (160, 80, 40, 30, 20 and 17m) and 50, 70 and 144MHz (6,4 and 2m). They'll also be active on 70cm and 23cm, plus D Star on both 70cm and 23cm, with 23cm, 13cm analogue and digital ATV.

The operations aren't continuous – but depends on the availability of operators and propagation conditions. Recent investigations of the field strength and coverage map on 23cm have encouraged further experimentation with Amateur Television.

The sustained operation of the station has drawn in members to use frequencies and modes with which they were not previously familiar, and, as is the case with the earlier Olympics event, there is likely to be a positive lasting effect from the experience gained.

This has been a tremendous opportunity to operate many different modes on all bands from 160m up to 13cm, plus offer training to newcomers and promote awareness to the general public. The simultaneous operation on so many bands is not without its difficulties and much time and effort has gone into fitting traps and filters to deal with mutual interference – another steep learning curve for some operators but not apparent to visitors.

Visitors to the station have included the **Mayor of Warrington Councillor Steve Wright**, **RSGB Board Member John Gould G3WKL**, Olympic torch bearer **Angela Davies** and **RSGB President Dave Wilson M0OBW** who took time out from his busy schedule to have a QSO on 7MHz and in the process caused an avalanche of calls in return.

Full information is available on the special event website **www.gb2012mv.com** and amateurs who make contact with any of the stations can confirm the QSO by logging on and clicking "Live Info" then "Online Log" to search for their call sign. Here again valuable experience has been gained in the setting up and operation of a multi venue logging system and a live webcam feed to help publicise the event.

Ron Davies G0WJX
Publicity Officer
Warrington Amateur Radio Club
E-mail: **ronaldadavies@talktalk.net**

South Essex's Olympic Bike Success With GB1HF

Dave Speechley G4UVJ the Secretary of the **South Essex Amateur Radio Society** (SEARS) reports to *Newsdesk*, "When the UK was selected to host the Olympic Games, we decided that SEARS would be doing a Special Event station over the 28 days of the games. However, some of our members attended meetings at Castle Point Council when we were told that we wouldn't get access to, or even near to the site at Hadleigh in Essex, because of a security lock down in that local area, as the site is on the side of Benfleet Downs overlooking the Thames Estuary. So, I decided that somewhere on Canvey Island would be ideal near or on the saltings – opposite the site where the men's and women's Olympic Mountain Bike competitions were being held, at Hadleigh Farm, Essex over the period August 11th and 12th 2012 .

"As I'm a member of a Yacht Club at Canvey Point, the site looked ideal as we would be looking up to Benfleet Downs to the site from the other side of Benfleet Creek. We operate a Station at the Yacht Club for their 'fun day' every year so we know how good the site is on h.f.

Dave Speechley G4UJV's motor caravan came in handy for GB1HF.

Over 20 Activations

"The Special Event Station was in operation at over 20 times during the 28 days on all modes and bands. Most of the club members took part – from older members to newly licenced members, all 'had a go'. Our aim was to give everyone the opportunity to operate at field stations.

"On some occasions we operated from my motor-caravan with a G5RV antenna for h.f. and a 2m collinear at 9m. At other times (when more members were present) we used our pop-up Gazebo. The station was never planned as a big event, running 24hrs a day, as we had to erect and dismantle the antennas every time we operated.

"What did amaze me, was the enthusiasm all over the world to work the station for the Olympic callsign. In all, we worked 1163 stations, with 510 on c.w., 135 on PSK31, 477 on s.s.b. and 41 on 144MHz f.m.

Highlights were China, Japan, Canada, and USA. Members who operated managed all pile-ups that we encountered and the help and support from more experienced Amateurs made sure that everyone was able to hone their operating skills. It was a lot of work organising the station, but it was worth it! In all it was a very enjoyable 20 days we had a very good operate site, where we spent most days looking out watching the warships in the Estuary patrolling the Thames for the Olympics Games and enjoying the view. We thank all Amateurs who worked the station. More information is on our web site **www.southessex-ars.co.uk** with a Video and pictures of the event.

Dave Speechley G4UVJ
E-mail: **g4uvj@btinternet.com**

Joe Taylor K1JT Chooses InnovAntennas

Justin Johnson G0KSC of **InnovAntennas** proudly contacted *Newsdesk* with his latest news: "I'm pleased to say that **Joe Taylor K1JT** has selected British company InnovAntennas to provide the new 432MHz EME array for the Princeton University in the USA. Joe is a Nobel Prize Laureate and the writer of the modern-day weak signal digital packages such as *Whisper*, *JT6M*, *JTM*, *MAP65*.

InnovAntennas
Unit 1
Point Industrial Estate
Point Road
Canvey Island
Essex SS8 7TJ
Tel: (0800) 0124205
E-mail: **justin@innovantennas.com**

The photo includes Justin G0KSC (left), Russ Pillsbury K2TXB (centre) and right is Joe Taylor K1JT. The photo was taken at a recent Cambridge EME conference.

Ripon & District Amateur Radio Society's New Rally!

Rob Hall M0RBY E-mailed *Newsdesk* with information on his club's new rally: "I have pleasure in letting you know about our first radio rally. We have decided that, despite all the doom and gloom in the world at the moment, that some fun does still exist out there in the Amateur Radio community, and a new rally might just gladden the heart!

"I've embedded a map on our website for the event and it is pretty clear from the big button that I've knocked up for the front page where people need to click to get info. If you would be so kind as to put our website in that would be smashing. Our address is **www.ripon.org.uk**

"Our Radio Rally and Surplus Equipment Sale is due to takes place on **Sunday October 21st 2012** at **Hugh Ripley Hall**, **Ripon**, **North Yorkshire HG4 2TP**. Doors open to stallholders 0900 and the doors open to the public at 1030. Entry on the door £2 per head (under 16s free) Tables are provided and are £10 each. Hot and cold food will be available on the day. We look forward to meeting *PW* readers!"

Rob Hall M0RBY
Membership Secretary
Ripon & District Amateur Radio Society
E-mail: rob@waylock.co.uk
E-mail **rally@ripon.org.uk** for more details of the rally

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KG-UV6D 2/70cm (130-174/400-470MHz for export) 5w handie..... **£94.95**

KG-699E/4M 4m (66-88MHz for export) 5w handie **£91.95**

KG-679EU 70cm (400-470MHz for export) 4w handie **£64.95**

KG-679E 2m (136-174MHz for export) 5w handie ... **£59.95**

Now back in stock in limited numbers

KG-UV6D "PRO-PACK"

For a Limited Time Offer Wouxun has bundled together all your favourite accessories and placed them inside one presentation box which includes, the popular KG-UVD6D dual band handie, desk top charger (110-234v & 12V input) & power cord, cigar car charger, headset with PTT & Mic, eliminator, remote mic/speaker, leather case, 1300mA Li-Ion battery, 1700mA heavy duty Li-Ion battery, AA empty cell case, pc programming lead, PC drivers & software, all at only **£159.95** Great deal – Great saving!

KG-UV920R Multi Band came in and ALL SOLD OUT!

New batch arriving any day CALL for more details

The new Multiband mobile with amazing TX/RX capabilities.

Transmit/Receive - UHF: 400-520MHz, VHF: 136-174Mhz, FM (RX Only): 65-220MHz, AM: (1) 500-2000Khz (2) 50-500KHz (3) 2-30MHz. First batch very limited supply – ***Order yours now for only*** **£229.95**

Hand-helds

"NEW" ID-31E D-Star single band 70cm full 5 Watt handie with GPS **£349.95**

IC-E80D D-Star dual band 2/70cm handheld with wideband RX 0.495-999.99MHz **£329.95**

IC-E92D Dual band 2/70cm RX 0.495-999.9MHz with built in DSTAR..... **£389.95**

IC-E90 Tri band 6/2/70cm RX 0.495-999.9MHz..... **£244.95**

IC-T70E dual band 2/70cm handheld with 5W Tx & 700mW loud audio **£159.95**

IC-V80E single band 2m handheld with 5.5W Tx & 750mW loud audio **£99.95**

ICOM

Authorised dealer

Mobiles

IC-7000 All mode HF/VHF/UHF 1.8-50MHz, 100 Watts output..... **£1,189.95**

ID-1 Single band 23cm 1240-1300MHz digital and analogue DSTAR transceiver **£719.95**

IC-E2820 + UT123 Dual band 2/70cm with DSTAR fitted, 50 Watts output **£699.95**

IC-E2820 Dual band 2/70cm DSTAR compatable, 50 Watts output..... **£499.95**

ID-E880 D-Star ready dual band with wide band RX 0.495-999.99MHz..... **£439.95**

IC-2200H Single band 2m 65 watts..... **£229.95**

INTEK

Authorised dealer

KT-900EE 2/70cm (136-174/400-470MHz) 5w handie **£89.95**

KT-930EE 2/70cm (136-174/400-470MHz) 5/4w Handie..... **£79.95**

HR-200S 2m (136-174MHz) 60w mobile **£139.95**

HR-400S 70cm (400-490MHz) 45w mobile **£139.95**

HR-2800 10m (28-29.7MHz) AM/FM 20w mobile... **£99.95**

HR-5500 10m (25.615-30.105MHz export) 40w mobile **£149.95**

AnyTone®

Authorised dealer

AT-588 2m 60W mobile RX 136-174 MHz **£149.95**

AT-5189 4m 25W mobile RX 66-88MHz ... **£149.95**

AT-5555N 10m 12W mobile RX 25-30 MHz..... **£149.95**

AT-5189PC programming software and lead for AT-5189 ..... **£14.95**

AT-5555PC programming software and lead for AT-5555N..... **£14.95**

MOONRAKER

HT-90E 2m single band transceiver with full 5 watts output just..... **£59.95**

The HT-90E is a brilliant compact radio, perfect for beginners to the hobby. Comes complete with battery, belt clip, antenna, and rapid charger all for under £60 quid! Everything you need to get on air is in the box!

YAESU

Authorised dealer

Hand-helds

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VX-8GE Dual band with built-in GPS antenna and wideband 100-999.90MHz Rx..... **£349.95**

VX-7R Tri band 50/144/430MHz RX 0.5-900MHz, 5 Watts outut **£299.95**

VX-6E Dual band 2/70cm RX 1.8-222/420-998MHz, 5 Watts output..... **£249.95**

FT-60E Special offer ~~£179.95~~..... now **£129.95** massive £50.00 saving

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VX-170E Last few at this price..... **£99.95**

FT-270E Single band 2m, 144-146MHz, 137-174MHz Rx..... **£109.95**

Mobiles

FT-857D All mode HF/VHF/UHF 1.8-430MHz, 100 Watts output..... **£714.95**

FTM-350 Dual band with Bluetooth, GPS & APRS..... **£479.95**

FT-8900R Quad band 10/6/2/70cm 28-430MHz, 50 Watts output..... **£389.95**

FT-8800E Dual band 2/70cm RX 10-999MHz, 50 Watts output..... **£339.95**

FTM-10E Dual band 2/70cm, 50 Watts output **£324.95**

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FT-2900E Single band 2m 75 Watt heavy duty transceiver..... **£142.95**

FT-1900E Single band 2m 55 Watt high performance transceiver..... **£129.95**

Portable

FT-897D HF/VHF/UHF Base/Portable transceiver 1.8-430MHz 100 Watts HF+6, 50 Watts 2M, 20 Watts 70cm..... **£819.95**

FT-817ND HF/VHF/UHF Backpack Transceiver RX 100kHz – 56MHz 76-154MHz 420-470MHz 5 Watts **£539.95**

Base

FT-2000D HF/6m All mode 200 Watts transceiver RX: 30kHz – 60MHz..... **£2,899.95**

FT-2000 HF/6m All mode 100 Watts transceiver RX: 30kHz – 60MHz..... **£2,249.95**

FT-950 HF/6m 100 watt transceiver with DSP & ATU RX 30kHz – 56MHz..... **£1,259.95**

FT-450 Compact transceiver with IF DSP, HF+6m 1.8-54MHz, 100 Watts output..... **£649.95**

FT-450D HF/6m LSB, USB, CW, AM, FM 100 Watt transceiver with built in ATU & 300Hz CW filter .... All for just **£839.95**

QUANSHENG

Authorised dealer

TG-UV2 dual band 2/70cm 5 Watts with 200 memories..... **Only £81.95**

TG-UV2-ELEM Battery Eliminator **£9.95**

TG-UV2-SPK Speaker microphone **£9.95**

TG-UV2-CASE Leather case **£9.95**

TG-UV2-PROG Programming cable and software..... **£19.95**

CHAMELEON ANTENNA

New appointed UK dealer! New lower prices on these smash hit antennas from the U.S.

Chameleon V1 HF/VHF/UHF 11 bands 80-70cm multiband base antenna 500W SSB..... **£149.95**

Chameleon V2 HF/VHF/UHF 11 bands 80-70cm multiband mobile antenna 200W SSB..... **£99.95**

Chameleon Zepp HF Multiband is a brilliant base or portable stealth antenna working 10-80m with 600 Watts SSB maximum **£129.95**

Chameleon V3 HF/VHF/UHF 160-70cm ultimate portable antenna 250W SSB..... **£349.95**

Chameleon V4 HF/VHF 20-6m Ultra portable antenna, dipole or end fed 250W SSB **£109.95**

Chameleon Accessories

Chameleon 13ft 4 section heavy duty air cushioned antenna stand **£79.95**

Chameleon heavy duty specially designed carry bag (antenna acc not inc) .. **£79.95**

Chameleon 9:1 Unun 500 Watts completely waterproof housing..... **£29.95**

MOONRAKER Yagi Antennas

All Yagis have high quality gamma match fittings with stainless steel fixings! (excluding YG4-2C)

YG27-4 Dual band 2/70 4 Element (Boom 42") (Gain 6.0dBd) **£59.95**
YG4-2C 2 metre 4 Element (Boom 48") (Gain 7dBd) **£29.95**
YG5-2 2 metre 5 Element (Boom 63") (Gain 10dBd)..... **£59.95**
YG8-2 2 metre 8 Element (Boom 125") (Gain 12dBd)..... **£79.95**
YG11-2 2 metre 11 Element (Boom 185") (Gain 13dBd) **£119.95**
YG3-4 4 metre 3 Element (Boom 45") (Gain 8dBd)..... **£69.95**
YG5-4 4 metre 5 Element (Boom 104") (Gain 10dBd)..... **£79.95**
YG3-6 6 metre 3 Element (Boom 72") (Gain 7.5dBd)..... **£79.95**
YG5-6 6 metre 5 Element (Boom 142") (Gain 9.5dBd)..... **£89.95**
YG13-70 70 cm 13 Element (Boom 76") (Gain 12.5dBd) **£54.95**

MOONRAKER ZL Special Yagi Antennas

The ZL special gives you a massive gain for the smallest boom length ... no wonder they are our best selling yagi's!

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ZL7-2 2 Metre 7 Ele, Boom 150cm, Gain 11.5dBd **£69.95**
ZL12-2 2 Metre 12 Ele, Boom 315cm, Gain 14dBd **£99.95**
ZL7-70 70cm 7 Ele, Boom 70cm, Gain 11.5dBd **£39.95**
ZL12-70 70cm 12 Ele, Boom 120cm, Gain 14dBd **£49.95**

MOONRAKER HB9CV

Brilliant 2 element beams ... ideal for portable use

HB9-70 70cm (Boom 12")..... **£24.95**
HB9-2 2 metre (Boom 20")..... **£29.95**
HB9-4 4 metre (Boom 23")..... **£39.95**
HB9-6 6 metre (Boom 33")..... **£49.95**
HB9-627 6/2/70 Triband (Boom 45")..... **£69.95**

MOONRAKER Halo Loops

Our most popular compact antennas, great base, mobile, portable, or wherever!

HLP-2 2 metre (size approx 300mm square)..... **£24.95**
HLP-4 4 metre (size approx 600mm square)..... **£34.95**
HLP-6 6 metre (size approx 800mm square)..... **£39.95**

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The most popular wire antenna available in different grades to suit every amateur .... All from just £24.95!

G5RV-HSS Standard Half Size Enamelled Version, 51ft Long, 10-40 Metres **£24.95**
G5RV-FSS Standard Full Size Enamelled Version, 102ft Long, 10-80 Metres **£29.95**
G5RV-DSS Standard Double Size Enamelled Version, 204ft Long, 10-160 Metres..... **£54.95**
G5RV-HSH Half Size Hard Drawn Version, pre-stretched, 51ft Long, 10-40 Metres **£29.95**
G5RV-FSH Full Size Hard Drawn Version, pre-stretched, 102ft Long, 10-80 Metres **£34.95**
G5RV-HSF Half Size Original High Quality Flexweave Version, 51ft Long, 10-40 Metres **£34.95**
G5RV-FSF Full Size Original High Quality Flexweave Version, 102ft Long, 10-80 Metres..... **£39.95**
G5RV-HSP Half Size Original PVC Coated Flexweave Version, 51ft Long, 10-40 Metres..... **£39.95**
G5RV-FSP Full Size Original PVC Coated Flexweave Version, 102ft Long, 10-80 Metres..... **£44.95**
G5RV-HSX Half Size Deluxe Version with 450 Ohm ladder, 51ft Long, 10-40 Metres..... **£49.95**
G5RV-FSX Full Size Deluxe Version with 450 Ohm ladder, 102ft Long, 10-80 Metres..... **£54.95**

Accessories

G5RV-IND Convert any half size G5RV to full with these great inductors, adds 8ft on each leg **£24.95**
MB-9 Choke Balun for G5RV to reduce RF Feedback..... **£39.95**
TSS-1 Pair of stainless steel springs to take the tension out of a G5RV or similar **£19.95**

MOONRAKER Multiband Mobile

Why buy loads of different antennas when Moonraker has one to cover all! SPX series has a unique fly lead and socket for quick band changing

SPX-100 9 Band plug n' go portable, 6/10/12/15/17/20/30/40/80m, Length 165cm retracted just 0.5m, Power 50W complete with 38th PL259 or BNC fitting to suit all applications, mobile portable or base ... brilliant! **£44.95**
SPX-200 6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, 3/8th fitting **£39.95**
SPX-200S 6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, PL259 fitting..... **£44.95**
SPX-300 9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W, 3/8th fitting **£54.95**
SPX-300S 9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W,PL259 fitting **£59.95**
AMPRO-MB6 6 Band mobile 6/10/15/20/40/80m, length 220cm, 200W, 3/8th fitting, (great for static use or even home base – can tune on four bands at once)..... **£74.95**

DIAMOND ANTENNA Yagi Antennas

"NEW" lower prices!

Diamond performance from the superb Diamond factory

A502HB 6m 2 Elements, Power 400W, Gain 6.3dBi, Radial Length 3m..... **£99.95**
A144S10R 2m 10 Elements, Power 50W, Gain 11.6dBi, Boom Length 2.13m..... **£86.95**
A144S5R 2m 5 Elements, Power 50W, Gain 9.1dBi, Boom Length 95cm **£47.95**
A430S15R 70cm 15 Elements, Power 50W, Gain 14.8dBi, Boom Length 224cm **£69.95**
A430S10R 70cm 10 Elements, Power 50W, Gain 13.1dBi, Boom length 119cm. **£52.95**

MOONRAKER HF Mobiles

Get great results with the Moonraker range of HF mobiles ! ... from as little as £19.95!

AMPRO-10 28MHz, Length 220cm, 38th fitting (slimline design)..... **£19.95**
AMPRO-12 24MHz, Length 220cm, 38th fitting (slimline design)..... **£19.95**
AMPRO-15 21MHz, Length 220cm, 38th fitting (slimline design)..... **£19.95**
AMPRO-17 18MHz, Length 220cm, 38th fitting (slimline design)..... **£19.95**
AMPRO-20 14MHz, Length 220cm, 38th fitting (slimline design)..... **£19.95**
AMPRO-30 10MHz, Length 220cm, 38th fitting (slimline design)..... **£19.95**
AMPRO-40 7.0MHz, Length 220cm, 38th fitting (slimline design)..... **£19.95**
AMPRO-80 3.5MHz, Length 220cm, 38th fitting (slimline design)..... **£24.95**
AMPRO-160 1.8MHz, Length 220cm, 38th fitting (heavy duty design)..... **£59.95**
ATOM-20S 14MHz, Length 130cm, PL259 fitting (compact design) **£24.95**
ATOM-40S 7.0MHz, Length 165cm, PL259 fitting (compact design) **£26.95**
ATOM-80S 14MHz, Length 165cm, PL259 fitting (compact design) **£29.95**

MOONRAKER VHF/UHF Mobiles

GF151 Glass Mount 2/70cm, Gain 2.9/4.3dBd, Length 78cm complete with 4m cable and PL259 ..... **£29.95**
MRM-100 MICRO MAG 2/70cm, Gain 0.5/3.0dBd, Length 55cm, 1" magnetic base with 4m coax and BNC **£19.95**
MR700 2/70cm, Gain 0/3.0dBd, Length 50cm, 3/8 fitting **£9.95**
MR777 2/70cm, Gain 2.8/4.8dBd, Length 150cm, 3/8 fitting **£19.95**
MRQ525 2/70cm, Gain 0.5/3.2dBd, Length 43cm, PL259 fitting (high quality)..... **£19.95**
MRQ500 2/70cm, Gain 3.2/5.8dBd, Length 95cm, PL259 fitting (high quality)..... **£26.95**
MRQ750 2/70cm, Gain 5.5/8.0dBd, Length 150cm, PL259 fitting (high quality)..... **£36.95**
MR2 POWER ROD 2/70cm, Gain 3.5/6.5dBd, Length 50cm, PL259 fitting (fibreglass colinear) **£26.95**
MR3 POWER ROD 2/70cm, Gain 2.0/3.5dBd, Length 50cm, PL259 fitting (fibreglass colinear) **£32.95**
MRQ800 6/2/70cm Gain 3.0dBi/5.0/7.5dBdBd, Length 150cm, PL259 fitting (high quality)..... **£39.95**
MRQ273 2/70/23cm Gain 3.5/5.5/7.5dBdBd, Length 85cm, PL259 fitting (high quality)..... **£49.95**

MOONRAKER GP2500 All Band HF Vertical

This is the perfect answer for anyone with limited space and requires no radials. Covering 80 through to 6M with a VSWR below 1.5:1!

Frequency 3.5-57MHz without tuner, Power 250 Watts, Length 7.13M

All at an amazing £229.95!

GP2500F
fibreglass version of above.... **£279.95**

MFJ Magnetic Loop

MFJ-1788X
..... **£479.95**
Frequency 7 - 22MHz (40 - 15m) ● Size: <1m (36in) loop ● Feeder: 50 Ohms ● Power: 150W ● Remote control included ● Auto band selection ● Dual Fast/Slow tune buttons ● Built-in cross-needle VSWR/Wattmeter

MFJ-1786X..... **£439.95**
Frequency 10 - 30MHz * Size: <1m (36in) loop ● Feeder: 50 Ohms ● Power: 150W ● Remote control & PSU included * Auto band selection ● Dual Fast/Slow tune buttons ● Built-in cross-needle VSWR/Wattmeter

MFJ-1782X..... **£384.95**
Frequency 10 - 30MHz ● Size: <1m (36in) loop ● Feeder: 50 Ohms ● Power: 150W ● Control box does not have SWR/PWR metering ● No automatic band selection

MOONRAKER Dual and Triband Colinear Verticals

Diamond quality – Moonraker prices ! These high gain antennas have been pre-tuned for your convenience, easy to use, easy to install, and a choice of connection ... look no further

SQBM100P 2/70cm 3.00/6.00dBd, RX 25-2000MHz, Length 100cm SO239..... **£49.95**
SQBM100N 2/70cm 3.00/6.00dBd, RX 25-2000MHz, Length 100cm N-Type **£54.95**
SQBM200P 2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, SO239 ..... **£54.95**
SQBM200N 2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, N-Type..... **£59.95**
SQBM500P 2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, SO239 ..... **£74.95**
SQBM500N 2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, N-Type..... **£79.95**
SQBM800N 2/70cm, Gain 8.5/12.5dBd, RX 25-2000MHz, Length 520cm, N-Type..... **£139.95**
SQBM1000P 6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, SO239..... **£84.95**
SQBM1000N 6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, N-Type **£89.95**
SQBM223N 2/70/23cm, Gain 4.5/7.5/12.5dBd, RX 25-2000MHz, Length 155cm, N-Type..... **£74.95**

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Cable

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RG58-DRUM-100 Standard, 5mm, 50 ohm, 100m reel **£24.95**
RG58M Mil spec, 5mm, 50 ohm, per metre (best seller) **£0.60**
RG58M-DRUM-50 new 50m reel of mil spec RG58 in a great handy size .only **£24.95**
RG58M-DRUM-100 Mil spec, 5mm, 50 ohm, 100m reel **£44.95**
RGMINI8 Mil spec, 7mm, 50 ohm, in grey per metre (amateur favourite) **£0.75**
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WESTFLEX-DRUM-50 Mil spec, 10mm, 50 ohm, 50m reel..... **£79.95**
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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**
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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**
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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

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Get rigged up, for full list of all options visit our website!
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GUYKIT-HD10 Complete heavy duty adjustable guying kit to suit upto 40ft masts .. **£54.95**
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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**
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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**
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DOGBONE-C Small ceramic wire insulator **£1.00**
EARTHROD-C 4ft copper earth rod and clamp **£24.95**
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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**
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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**
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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**

"NEW" SWR-270 Dual Band VSWR & Power Meter

● Frequency: 120-500MHz ● Impedance: 52 Ohms
● Power: 0-100W ● Measures forward/reflected power + VSWR ● Sockets: SO239
Brilliant small and compact VSWR meter, at an amazing price and this month only **£27.95** with free postage

Telescopic Masts

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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**
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The Elecraft Experience

Phil Ciotti G3XBZ has enjoyed building and using Elecraft equipment – and recently had the opportunity to compare the new ready-built K3 plus a pan adapter with his cherished K2 transceiver.

Throughout the years I have been interested in Amateur Radio I've been much involved with the construction of equipment. In the early days the majority of receivers and transmitters were built using thermionic valves.

After discussions with more experienced local Amateurs a design would be chosen, and the collection of all the components then began. To help with this task many items were donated by others, to encourage the completion of the chosen project. If this avenue failed to produce the full compliment of parts, the remainder had to be purchased from the component suppliers, usually at a high premium.

As a tribute, the first on the air contacts were made with those people involved in the project. This usually led to the inevitable question of "What are you going to build next?" I did try to build a multi-band unit, but it was not a world shattering success and consequently I consigned it to the junk box!

Reading the Amateur Radio magazines of the time, revealed an advertisement for the Heathkit range of products. Having heard these transceivers on the air, together with the favourable comments being given by their constructors, I was definitely interested.

Here was the rig that I was looking for! A multi-band high frequency (h.f.) transceiver, with all the components from a single source. All I had to do was assemble it correctly following the comprehensive instruction manual.

The model chosen was the HW101, affectionately known, at the time, as the 'Hot Water 101.' By modern standards, this was a very basic transceiver, but it provided me with many worldwide contacts. I used the rig on many occasions, at Special Event stations, such as Jamboree On The Air and school fetes, and proved to be very reliable. I eventually sold the transceiver to a local Amateur, who I believe still has it, although it has not been used for a number of years.

Also popular at the time were the Heathkit HW7, 8 and 9 c.w. only QRP (low power) transceivers. These were available as complete kits for home construction. Although Heathkit are no longer trading in the Amateur Radio market they will be remembered for the standard set in assembly manuals.

The Elecraft K2

Later, I became interested in low-power solid-state equipment, of which most were single-band transceivers. However, the desire for a multi-band radio was still high on my agenda, which led to my introduction to the Elecraft K2. At the time this rig was gaining a high reputation for it's radio frequency (r.f.) performance, and was suitable for the more experienced constructor.

In its simplest form the K2 was an h.f. 3.5 to 28MHz (80 to 10m) c.w. transceiver. A range of internal options were available for extending its capabilities. A big bonus point was its low power consumption, as it required less than 300mA during receive periods from a 12V d.c. source. This feature made it very attractive for anyone interested in going portable.

Having decided to purchase the kit I also ordered a single sideband (s.s.b.) adapter, a noise blanker and the 1.8MHz (160m) option at the same time, to save money on the delivery charges. Two weeks later, the postman delivered a medium sized box containing the eagerly awaited K2 kit!

Assembly proceeded well, helped

The new Elecraft K3 transceiver.

Phil G3XBZ's original kit-built Elecraft K2 transceiver alongside the new K3.

Phil G3XBZ was sceptical at first regarding the P3 panadaptor – but ended up being most impressed!

enormously by the excellent owner's manual. After seven weeks of spare evening construction I had a fully working c.w./s.s.b. transceiver with up to 12W output.

During the 12 years since I built the K2, it has proved to be a rugged, reliable transceiver, also surviving a number of portable operations. However, in the world of technology nothing stands still for long and 'whispers' of a new Elecraft transceiver were circulating.

Enter The K3

The 'whispers' turned into reality and Elecraft announced the arrival of the new K3 transceiver. The frequency range was extended to cover from 1.8 to 50MHz (6m), including the 5MHz (60m) allocation. Transmitter power options are either QRP with up to 10W, or the high power 100W version. Both power levels are adjustable from minimum to maximum from a front panel control knob.

A choice of either a self-assembly kit or a completed transceiver is available. The K3 soon established a strong foot-hold in the Amateur Radio market. In a similar style to that of its older relation the K2, it can be purchased as a basic transceiver, with other modules being added as required.

Until very recently the only way to purchase any of the Elecraft range was direct from the factory in California. After some serious negotiations by Essex-based Waters & Stanton PLC (W&S), this situation has now changed. They have been appointed sole distributors. So, when an assembled K3 became available for review I needed little persuasion to try it!

Opening The Box

When the new K3 arrived the transportation carton was soon opened – revealing the transceiver, the manual and a d.c. input lead. Two small packets contained an Allen key and a cable for use when required. The overall size of the case is approximately 275 x 260 x105mm.

The d.c. cable is 1.5m in length and terminated in an 'Anderson Power Pole' connector rated at 30 Amps. I noticed that this cable didn't include an in-line fuse for protecting the transceiver. A 13.8V d.c. power supply rated at 25A is required to run the transceiver at the highest power setting.

The Manual

The manual is presented in the Elecraft style, with easy-to-read print and is spirally-bound rather than in standard book form. I particularly liked this, as it meant I could open the pages and lay them flat on the desk, without the manual automatically closing again.

Topics covered in the manual, are from basic set-up through to the more advanced technical features. The last few pages are devoted to an alphabetical index to guide the operator to the required topic of interest.

The first surprise came when I switched the K3 on. I expected the usual mechanical on/off switch, but the transceiver has a soft-touch device and a light press is all that is required! The majority of the front panel light emitting diodes (l.e.d.s) light briefly followed by numerous relay clicks and finally the display reveals itself.

At this point I should point out that my evaluation isn't intended to be a full technical review. There have been many in-depth reviews of the performance of the K3 published over the years. I have always taken the hands-on approach, `put it on the desk and find out what it can do,' and so I'll endeavour to share my thought about the K3 with you here.

Array Of Controls

Looking at the K3's front panel, as with any modern transceiver, reveals an array of rotary knobs and push buttons. The K3 is no exception – but I quickly began to find my way around the different functions offered. The 'quick-start' section of the manual was very useful during the first few hours of operation.

All the controls had a positive feel to them, and both the variable frequency oscillator (v.f.o.) knobs could be adjusted for friction. The majority of buttons have two functions. The first function is accessed by a tap or short press. Holding the button for longer than half a second, activates the second function. This 'tap-and-hold' system is used on the K2, and I was pleased to see it had been carried forward to the K3.

The display has an orange background with bold, easy to read text. A wide range of information can be viewed, and this changes as various adjustments are made. I liked the receiver bandwidth information. When the bandwidth is adjusted a numerical value is shown along with a graphical representation. Similarly if the shift, low or high cut is used this graph also moves to indicate the new settings.

To set the transceiver to the operator's requirements two sets of menus are available. These are the **Main** or **Config**, and are accessed via the **Tap** or **Hold** functions of the menu button. These adjustments are simple to execute and there is an extensive range to choose from.

While listening to the received audio I became aware that I wan't getting as tired after lengthy periods of use. There was a lot less white noise coming from either the loudspeaker or headphones when compared with my other h.f. receivers.

All Amateur Bands

I tried all the amateur bands from 1.8 to 50MHz (160 to 6m) and really enjoyed using the receiver. The flexibility in the receiver filtering really helped when operating close to other stations.

One of the advertised features of the K3 is its ability to decode Morse and data signals and display the results on the screen. As an aid to operating c.w. I felt it did quite well, although fine adjustments are required to get reasonable results. The quality of the incoming c.w. signals had to be good for the decoding software to work effectively. Similar results were obtained when decoding PSK31 signals, where even finer adjustments were needed.

Moving on to the transmitting side, I had a number of contacts on various bands using s.s.b. Reports on the transmissions were always favourable, without any sign of splatter, even when driven hard. The r.f. output power is adjustable, from zero to maximum, using a front panel control. Interestingly when using 10W or less the power amplifier (p.a.) is by-passed, thereby reducing current consumption.

The numerous settings can be altered,

via the menu system, and include an eight-band equaliser, which ensures there is much debate on audio quality! One menu setting even displays the temperature of the p.a. stage!

Two fans are fitted on the rear panel to assist in p.a. cooling for the high power version.These change speed automatically according to the temperature of the p.a. The QRP version (10W) has a blank panel without fans in this position.

Amongst the contacts using s.s.b. were **Oliver** operating **EI80IRTS (The Irish Radio Transmitting Society's** 80th anniversary Special Event station callsign**), Yannick (Yan) Matthey HB9TWY in** La Sarraz Switzerland and **Nobby Styles G0VJG/P** (on holiday from Kent) on the Scilly Isles. Several contest were active during the review period and many contacts were made, although not much information, regarding equipment used, was gathered.

As I'm not much of a c.w. operator I invited a good friend – **Colin Davis G0JII** – to operate on the key. He made contacts around Europe including **Frank SP8SMK**, **Vitas Krasnickas LA/LY5G** from Klaipeda in Lithuania, and **Oszi HA9RP** in Miskolc, Hungary. Colin also commented on the receiver filtering, saying it was better than his own transceiver.

Another local Amateur, **Alan Walker G4UWS** has recently purchased the K3 in kit form and we spent a pleasant hour on 3.5MHz, discussing our experiences. Judging by his comments, he was very pleased with his transceiver – wishing he had purchased it earlier.

The Elecraft P3 Panadaptor

In addition to the K3 itself, the Elecraft P3 panadaptor was supplied by W&S. This unit was designed to match the K3, although it can be used with other receivers fitted with an intermediate frequency (i.f.) output. **Note:** The full functionality is only available when used with the K3.

The P3 unit came with the required interconnecting cables, ready for use. A d.c. voltage of between 10 and 15V at up to 500mA is needed to power the unit. When using it with a K3 this voltage is supplied from a connector on the rear panel.

The full colour display is bordered on two sides by push-button switches and a rotary control. These buttons use the same tap or hold system as the transceiver.

A range of menu parameters can be altered to suit the operator's personal preference. The display can be 'halved' horizontally, this produces the normal frequency spectrum in the top section, and a waterfall in the lower. The horizontal span can be varied between 2kHz and 200kHz.

To be honest I was, at first, a bit sceptical about the P3 as an operating aid. However, experience was to lay any doubts to rest! and I came to rely on its facilities, especially when looking for that elusive clear frequency. Using a marker (A or B) the K3's v.f.o. can be changed without touching the transceiver itself.

The screen has excellent clarity and my eyes weren't tired after looking at it for lengthy periods. Great for extended operating times!

Really Enjoyed!

During the review period I really enjoyed using the K3 and it is easy to see why it has gained its popularity rating. The front panel layout gives enough space between controls whilst keeping it's physical size small enough for carrying around.

To extend the capabilities of the K3, additional modules can be installed when required. Any updates to the firmware can be downloaded to the transceiver from the Elecraft website.

The P3 Panadaptor is an extremely useful accessory and compliments the transceiver in appearance. Similarly, updates can be downloaded in the same manner as for the K3.

I have only one minor point of concern and that is the Powerpole connector. There is no provision for locking this in place and if the D.C. cable is pulled, the connectors part company. Operating at home this should not be a problem, but under field conditions, where there are more pairs of feet around, care needs to be taken.

Elecraft have produced another superb transceiver complimenting the K2. I found it to be the best rig I have used in my shack! Many thanks to Waters & Stanton PLC for the loan of the K3 and P3. ●

Conclusion

Pros: An excellent all round transceiver.

Cons: Non locking d.c. connector.

Jeff Stanton G6XYU Comments

Thank you for sending me a copy of Phil G3XBZ's review. 1: The 100W version as tested sells for £1999.95 including VAT. (That's model K3/100-F). 2: The Model KXV/3A interface was supplied (This is an option at £129.95 to interface the panoramic display). The panoramic display is model P3-F priced at £759.95. The UK mainland delivery is £11 for 1 or 2 if bought separately. But only a total of £11 if bought together. Similarly £6.50 for 2 if bought separately. But within the £11 if it's purchased with one of above! Hope that's clear? Regarding the comment about the non-locking d.c. lead between the radio and panadaptor. At least the radio wouldn't be dragged to the floor if a foot was caught up in the lead! Regards. Jeff.

The rear panel view of the K3. The twin cooling fans vary their speed according to the temperature required for cooling.

The Elecraft K3 and the P3 Panadaptor provide a powerful and comprehensive station.

Mike Richards G3WNC's Data Modes
PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-Mail: mike@pwpublishing.ltd.uk

Digital Spectrum Analysis

Turning away from SDR receivers this month, Mike Richards G4WNC looks at spectrum analysis using a typical computer sound-card.

Welcome to *Data Modes* (*DM*) where I'm aware that I've spent a lot of time recently showing SDR users how to get the best from their new found display systems but users of traditional gear may be feeling a bit neglected. So, this month I shall put that straight by dealing with analysis systems that can be used regardless of your receiving equipment.

While wide-band spectrum and water fall displays are great for spotting signals, when it comes to analysing and identifying data modes we only really need to examine the recovered audio bandwidth and that is available from all receive systems.

Spectrum Analyser

To be able to recreate some of the analysis displays I've shown over recent months, you need to use a 'spectrum analyser' to examine the audio signal. However, although spectrum analysers used to be little more than a dream for the majority of Radio Amateurs, modern signal processing techniques have made these easy to achieve using the most basic of computer sound-cards.

The first step in any digital signal-analysis system, is to convert the analogue audio signal into a digital format that the computer can work with. This is a job for your computer sound-card, inside which, you will find a sophisticated dual-channel Analogue to Digital Converter (ADC).

The process of converting a signal from analogue to digital is achieved by taking voltage measurements at regular intervals with the resulting string of digits forming the digital output that the computer can handle (see **Fig.1**). I dealt with digitisation back in January this year's issue of *PW*.

To create a realistic digital likeness of our analogue signal, lots of measurements (samples) are needed and, as mentioned in the earlier article, Nyquist comes into play here. Back in 1924, Harry Nyquist published a paper, showing that the minimum sample rate has to be at least twice the highest frequency in the signal.

As most sound-cards were originally intended for use with Hi-Fi music signals, the highest frequency was considered to be 20kHz, so a sample rate of 40kHz or more is necessary and 44.1kHz quickly became the industry standard. However, if you look at the settings for current sound-cards you will often see sample rates ranging from 11kHz to 192kHz.

The resolution of this digital representation of the analogue levels can be as low as eight-bit (256 distinct levels), but is now more generally 16-bit (65,536 levels). Many modern sound-cards now support 24-bit conversion, with its well over 16 million level accuracy.

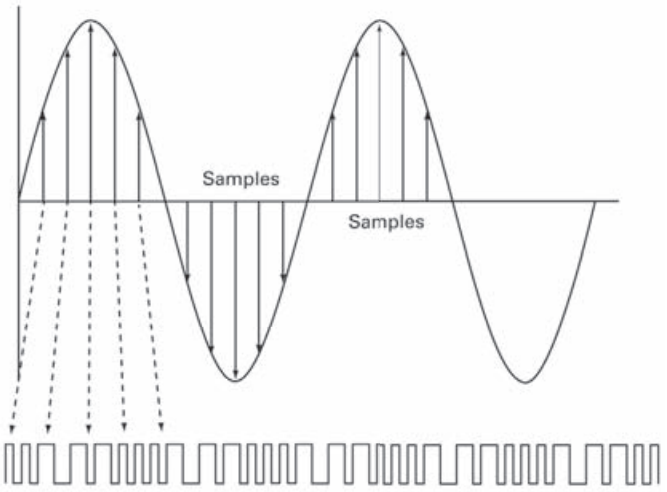


Fig. 1: Example of digital sampling, typical sampling rates are 11, 22, 44.1, 48, 96 and 192 kilosamples per second. The number of discrete steps can be represented in eight, 16 or 24bits at each sample.

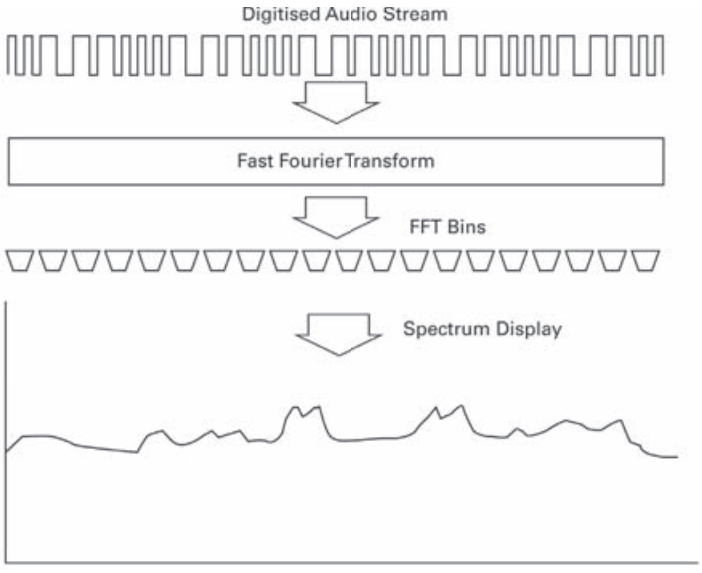
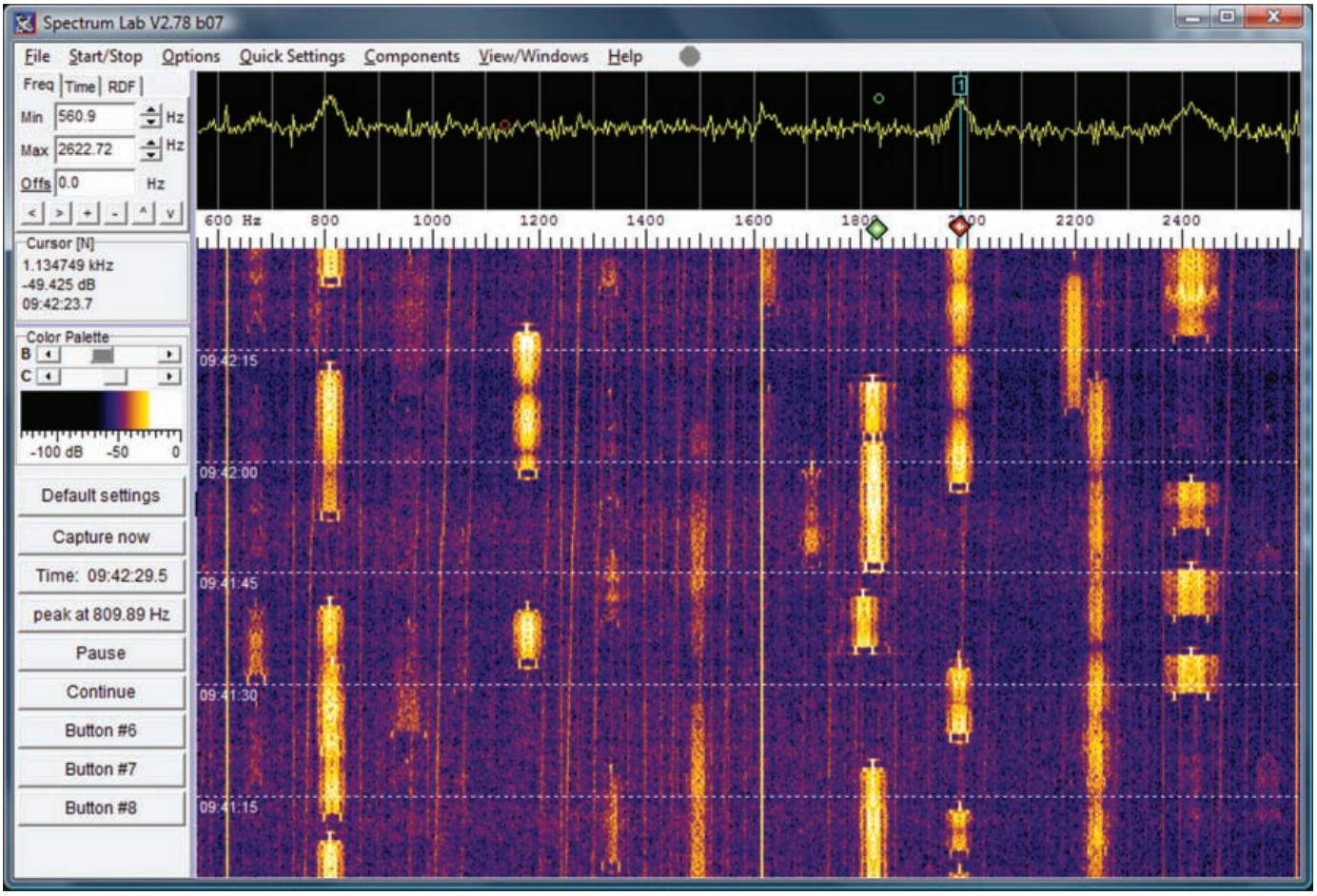


Fig. 2: Using Fast Fourier Transform processing to create a spectrum display.

Digital Likeness

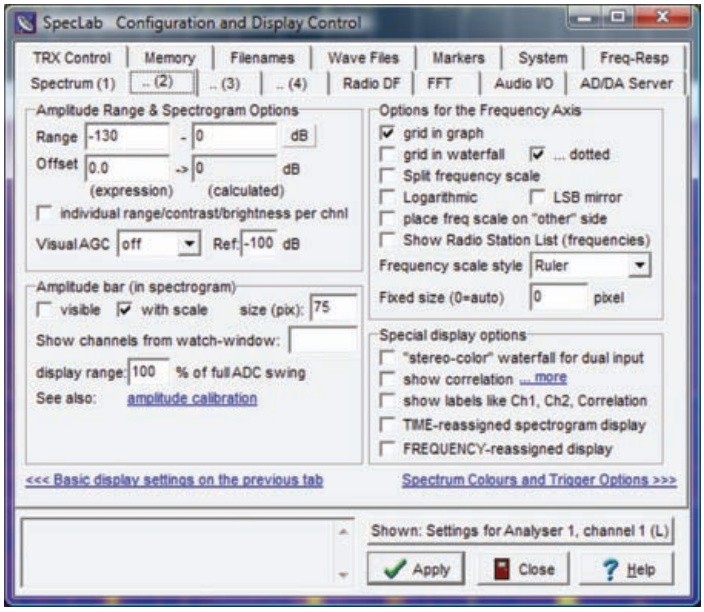
Having created a digital likeness of our audio signal, the next stage is to analyse and display the results. The technique that's pretty much universally employed is Fast Fourier Transforms (FFT) and we've covered these previously when discussing Software Defined Radio (SDR) techniques. However, for the sake of completeness in this article, I'll quickly run through the key points again with particular reference to the impact on spectrum analysis.



Using *Spectrum Lab* to display the PSK segment of the 14MHz band.

Let's start with a look at the output from the sound-card, which I shall assume has a 16-bit accuracy! The digital output comprises a stream of 16-bit numbers representing the instantaneous signal level at each sample point. The stream of data comes pretty fast, as even in a 'mono system' the sound-card is sending 44,100 samples of 16-bit data every second.

The mono 16-bit, 44.1k samples per second translates to just over 700,000 bits per second – a lot of data to process! To perform a spectrum analysis we need to be able to determine the signal level in a number of narrow frequency bands across the spectrum of interest. Sounds a tricky task but this is where FFTs save the day.



***Spectrum Lab* has a comprehensive settings panel.**

Frequency Band Buckets

Fast Fourier Transforms create what's known as a 'bucket' or 'bin' for each of the separate bands of frequency to be analysed. It then examines the incoming data stream of data and will extracts values appropriate to each bin. At the end of each measurement cycle the data value contained in each bin will be proportional to the amount of signal energy that was detected for that frequency, which is exactly what we want for spectrum analysis (see **Fig. 2**).

The number of available bins is determined by the number of samples, or points included in each measurement cycle. The frequency resolution is directly related to the frequency range covered and the number of bins. At this point it's probably as well to illustrate this with a few worked examples.

Let's start with a 44,100Hz sample rate and an audio signal ranging 0Hz to 20kHz using 1024 points (or samples) in our FFT setting. The number of bins can be calculated by dividing the FFT size by 2 thus giving 1024/2 = 512 bins. To work out the frequency resolution or bandwidth of each bin, just divide the frequency range by the number of bins thus: 20,000Hz/512 bins = 39Hz for each bin.

The other factor to consider is how long each measurement takes as we can only update the display when we have gathered all 1024 samples. The answer is the number of FFT points divided by the Sample Rate which in this example is 1024/44100 = 0.02 seconds. An alternative way to calculate the refresh time is 1/frequency resolution thus 1/39Hz = 0.02 second.

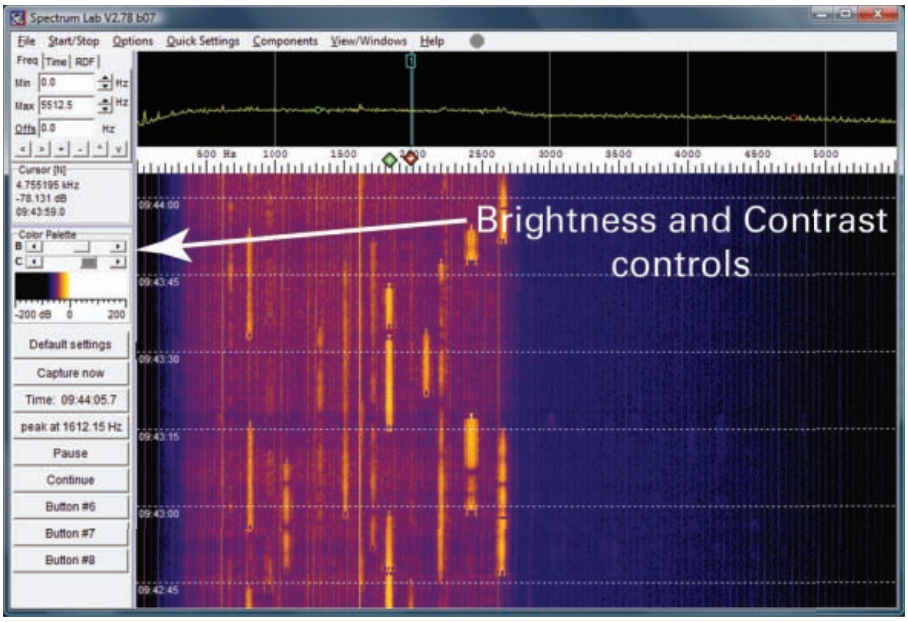


Fig. 3: The main screen of *Spectrum Lab* and the important brightness and contrast controls.

Reduced Bandwidth

For data signals we don't really need to work with frequencies up to 20kHz and so we can work with a reduced bandwidth. For most situations considering data signals, 5kHz bandwidth is fine. If we rework the above calculations using a sound-card sample rate of 11kHz and a point size of 1024 we keep the number of bins at 512 (FFT points/2)

The bandwidth of each bin changes from my original example, as the frequency range is now limited to 0 to 5000Hz. So, the resolution becomes 5000/512 = 9.8Hz which is much closer to the resolution we need for data work.

The 'fill time' also changes because of the reduced width of each bin. So, as it is still one divided by resolution, it becomes 1/9.8 = 0.1 seconds, which is still plenty fast enough for a lively display. But what if we now want to get a finer resolution say down to around 1Hz?

For a resolution of around 1Hz, we would have to increase the point size close to 5000. As most FFTs are binary based, and can only change in powers of 2 the nearest rate becomes 4096 points.

With 4096 points in mind, let's rework using this as the point size. Now the bandwidth becomes 5000/4096 = 1.2Hz and the fill time changes to 1/1.2 = 0.8 seconds.

First Compromise

Now we can see the first compromise, as we increase the point size to get a better resolution, the refresh time for the FFT increases so the display will start to flicker and can become uncomfortable to view. One of the common ways to overcome flickering is to use averaging.

Averaging is as you might expect, where the value of each bin is averaged over several measurement cycles. And it's this averaged result that is used to update the display. Setting the best averaging is always a matter of personal preference as it depends on both the FFT settings and the type of signal you are trying to analyse. I find, a value of two to three is usually a good starting point for most data signals.

To create a spectrum analyser display from the FFT output, all we have to do is to link a vertical row of screen pixels with the value in each FFT bin (see **Fig. 2**). For a waterfall type display the FFT bin is used to control the brightness of a screen pixel.

A Complication

You can see from the previous section that FFTs provide most of the hard work necessary for a spectrum analyser but there is a snag. The FFT assumes that all signals start and end at zero during the measurement cycle. If a signal does not comply then you get the equivalent of key clicks on a c.w. signal as the incoming signal is abruptly cut at the beginning or end.

These digital bin 'key clicks', causes smearing between adjacent FFT bins and so spoil the resolution of the display. The solution is to artificially reduce all signals to zero at the beginning and end of each measurement cycle.

The process of artificially, setting the signals to zero, is known as windowing. It's rather like opening a window to let air in and closing it again afterwards. The shape of the window, i.e. how quickly it opens and closes has an effect on the resolution.

Unfortunately, there's no perfect window so, in most software spectrum analysers, you normally find a selection of window types. The most common type is the Hanning window as this represents a good compromise for a general purpose analyser. However, it is worth experimenting with other windows if you are having problems getting the desired clarity for a particular signal.

Practical Analyser

Having briefly run through the theory let's have a look at a practical spectrum analyser program that's freely available for download. There are plenty about but one that has been designed specifically for Amateur Radio use is the excellent *Spectrum Lab* written by **Wolfgang Buescher DL4YHF** and you can download a copy from this site: **www.qsl.net/dl4yhf/spectra1.html**

Not only does *Spectrum Lab* include a spectrum analyser and waterfall display but it also has a very useful digimode terminal so you can send and receive many of the more common modes. In most cases the default settings will give you a perfectly usable display with a combined spectrogram and waterfall display – don't forget to start the analyser via the top menu Start/Stop option!

If you have multiple sound-cards installed, you should use the Options menu and select "Audio settings, I/O device selection" here you should find all your sound devices listed and you can select the appropriate one. Once you get used to the program you will come back to this screen as this gives access to all the FFT settings so you can start customising the analyser. You may also need to adjust the record level on your sound-card to see the trace properly.

Once you have achieved a successful trace, it's worth experimenting with the colour controls to get the best display clarity (see **Fig. 3**). By clicking on the colour palette you can choose from a wide range of preset colour schemes and immediately above that are the brightness (B) and contrast (C) controls that have a dramatic effect on the clarity of the display.

To improve the clarity of the upper spectrum analyser, go to the Options menu and select "FFT Settings part 2". Here you should set the Amplitude range to -130 and 0 respectively and click Apply to see the result. After changing these settings you may have to go back and alter the brightness and contrast.

To look more closely at a group of signals, you can zoom-in simply by drawing a selection box around the area of interest with your mouse. I'll provide some more tips and introduce a different analyser next time. ●

Connecting BNC Plugs

Tony Skaife G4XIV takes a look at something we often take for granted – wiring up the BNC plug correctly. Get it wrong and you can cause yourself many problems!

There will be quite a number of people who have equipment that uses BNC plugs, this will includes surplus PMR (private mobile radio), hand-held radios and test equipment. However, there will be many who don't know how to put a BNC plug on and may be using adaptors of dubious quality adding losses and unreliability to their system.

My aim here is to show that it's not difficult to put the proper plug where it should be. One important thing to do, though, is to always buy good quality branded plugs – and these will always come in sealed plastic envelopes. Then lay out the plug's components in their order of assembly, this will ensure that there's nothing missing (**Fig. 1**).

Fig. 1: The items laid out awaiting assembly.

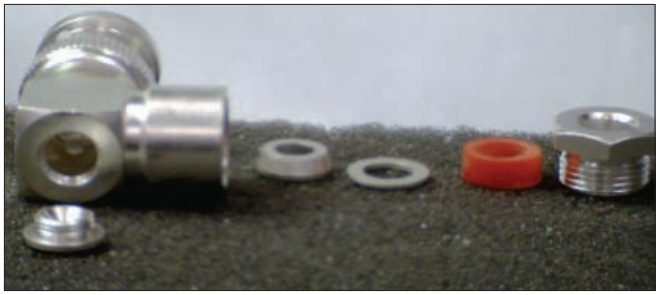


Fig. 2: Right angled BNC plug component parts.

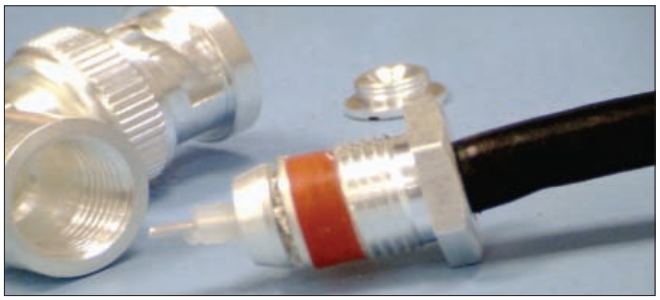


Fig 3: A right angle plug and the coaxial cable with prepared end.

Main Types Of BNC Plugs

The photos show the main types which are straight, Fig.1, and right angle BNC plug, **Fig. 2**, which is my favourite type. Take a look at the straight plug's photo (Fig. 1) and notice the contact pin has ridges around the body. When the two white plastic pieces are slid over the pin they hold the pin firm in its plug.

Beware of any BNC plugs where the contact pin is smooth over its length. This is because after the plug has been assembled the pin could be pushed back with use resulting in a poor or even open circuit contact.

The two plugs mentioned here are for the very thin or thin coaxial cable. The most common is RG223 or RG58 – but the same principles apply whatever type of plug or coaxial cable is used.

For both types of plug, slide on the end screwed nut over the coax then the rubber/metal washer combination. Cut and trim the ends of the coaxial cable, **Fig. 3**. For the straight plug, slide the 'T' shaped piece over the inner's insulation and under the braid thus making a good contact. Slide the smaller of the white insulators over the inner of the coaxial cable and solder the pin to the inner. Slide the larger of the white insulators into position over the pin.

Fig. 4: Right angled BNC plug showing inner soldered.

Matching Indents

The insulators have indents to match up so check they are the right way round. You will now have the pin enclosed in the white insulation material. Excess braid from where the 'T' was fitted may be cut away. Slide everything into the outer shell of the plug and using appropriate spanners the plug can be fully assembled by tightening the end threaded nut.

The right angle plug components should look like **Fig. 4**. Push the assembled cable into the plug and tighten the end nut. As the nut is tightened the inner of the coaxial cable will reach the plug's centre pin, which is slotted. The inner of the coaxial cable when seated in the slot may then be soldered. Finally screw on the top cap, which, as well as making a neat end to the task, it will help to keep out moisture. ●

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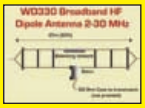

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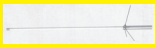

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A Versatile PIC-based Audio Generator

Phil Cadman G4JCP takes a break from his *Valve & Vintage* column to present a neat little audio generator using a Peripheral Interface Controller™. But if you're not familiar with PICs – don't be dismayed – Phil will guide you along the way!

Phil Cadman G4JCP's prototype PIC-based audio signal generator.

As Radio Amateurs and Radio Enthusiasts, we constantly deal with signals at radio frequencies (r.f.), yet in most cases the messages we communicate, begin and end as audio frequency (a.f.) signals. Even the so-called digital modes are very often generated and processed (by computer, of course) at a.f. So, having access to an accurate signal source covering the audio frequency spectrum is a very useful piece of test equipment to have available.

The project I'm presenting this month describes just such an audio signal generator, but with a difference: it's primarily digital in operation. For general purpose use, that gives it several advantages over purely analogue designs.

The Design

The design presented here has three switched overlapping ranges. **Range One** covers 0.625Hz to 640Hz in steps of 0.625Hz, **Range Two** covers 250Hz to 3.315Hz in 2.5Hz/5Hz steps (2.5Hz below 2,300Hz and 5Hz above 2,300Hz), and **Range Three** covers 1,000Hz to 26,150Hz in 10Hz/25Hz/50Hz steps (steps change at 5,000Hz and 15,000Hz). A potentiometer sets the desired frequency, which is accurately indicated on a liquid crystal display.

The output amplitude is adjustable up to approximately 1V r.m.s. into a 10kΩ (or greater) load, and is essentially flat, falling 1dB at 10Hz and 20kHz. The output is 3dB down at 25kHz.

The output can be switched between sine, triangle and sawtooth waveforms, although the triangle and sawtooth outputs are only really useable up to a few kHz. A 5V square wave is also available as a separate output at all settings. While this output is useful in its own right, it's of particular use when used to trigger an oscilloscope via the 'scope's external trigger input. The oscilloscope display will then remain stable even when you're viewing waveforms which have a very low amplitude or contain noise.

There's a sweep function whereby the output will automatically sweep from 10Hz to 26,160Hz. The sweep time is 10.5 seconds in the '**Fixed Sweep**' mode, and adjustable from 2.5 seconds up to about one minute in the '**Variable Sweep**' mode. The sweep is substantially logarithmic.

Two PIC Microcontrollers

Looking at **Fig. 1**, you'll see that the generator uses two PIC16F690 microcontrollers. One PIC is used to generate the wanted frequency with the desired wave shape. The other PIC handles the range and sweep selection switches, the potentiometer that sets the frequency/sweep time, and the liquid crystal display.

The only other active components are a three-terminal regulator, a dual operational amplifier and a liquid crystal display. The generator needs +12V (maximum is +24V: check the dissipation of IC3) and the prototype consumed 45mA, about half of which was due to the display's backlight.

The PIC which actually generates the required frequency – which I shall refer to as the DDS PIC - uses a technique called Direct Digital Synthesis (DDS). I'll explain how this works later.

The output from the resistor network consisting of R1 to 16, is fed to a comparator which is inside the DDS PIC. The output of this comparator (pin 17 on the DDS PIC) is a square wave at the generator frequency. The 330Ω series resistor is there to prevent damage to the PIC should the output be shorted to ground. Switch S1 is monitored by the DDS PIC and the software modifies the output waveform as appropriate.

As the output from the resistor network – as we'll see – isn't continuous but is in a series of fine steps, it has to be fed into a filter. The dual operational amplifier IC4 and its associated components, form a low-pass filter (l.p.f.) which has a cut-off frequency of 25kHz (-3dB point) and a slope of 18dB/octave.

The resistors R22 and R23, which form a potential divider across the 12V supply, add a d.c. bias to the waveform so it can be more easily handled by the amplifier. The operational amplifier (op-amp) I've specified is an NE5532, but

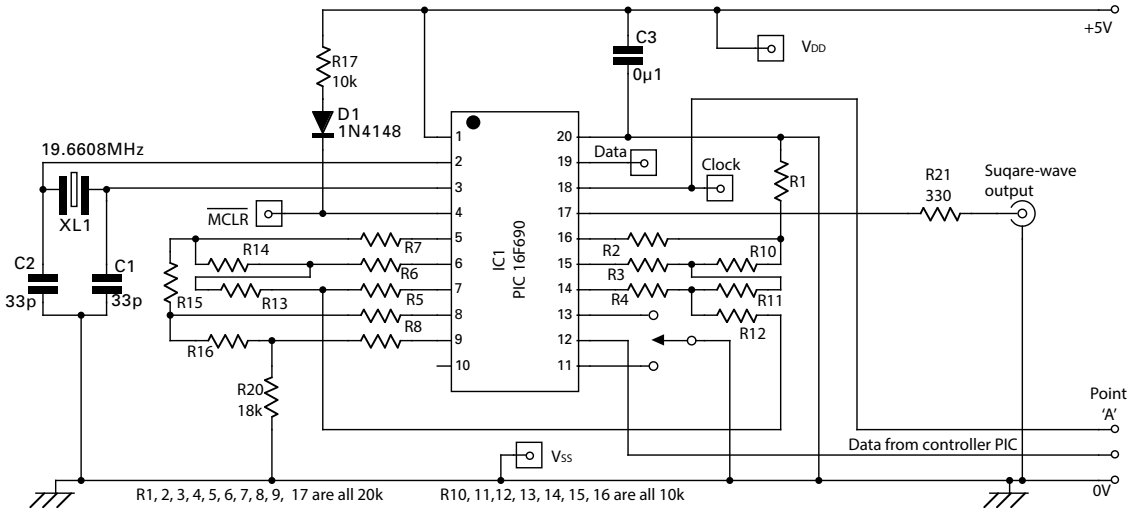


Fig. 1: The audio generator uses two PICs (one shown in upper section (left) and one in the lower section. The top section PIC is the DDS PIC that generates the wanted frequency.

any comparable - **or better** - type can be used. Don't use an LM358 or such like, they're not fast enough.

A Few Points

There are a few points I need to mention about this part of the circuit. First, the PIC (IC1) is running at 19.6608MHz. That's very close to its maximum frequency of 20MHz, so make sure the de-coupling capacitor C3 is as close as possible to pins 1 and 20. Similarly, the leads of X1, C1 and 2 should be very short.

By the way, for greatest accuracy, C1 and 2 should be chosen to suit the crystal's parallel load capacitance. Initially, try a value of around double the crystal's load capacitance less about 10pF.

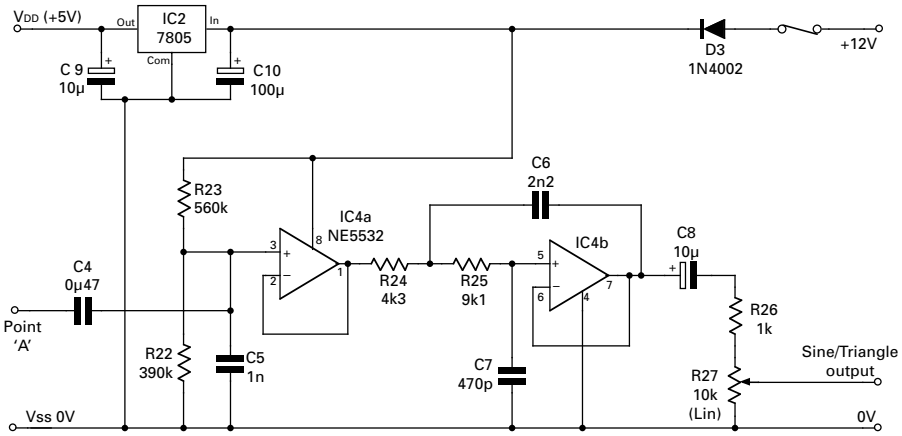


Fig.1: This section of the circuit carries the regulator, the low-pass filter and output section.

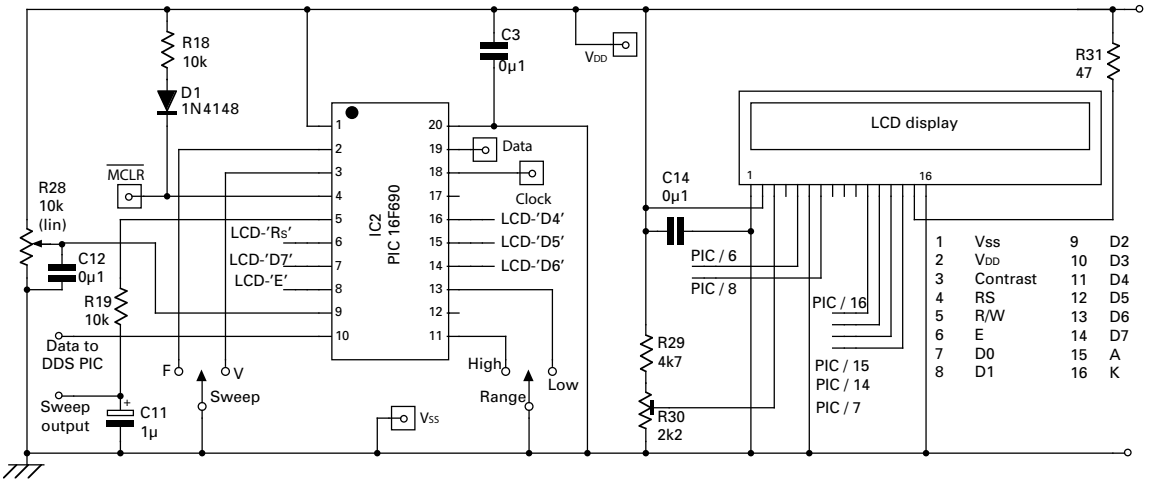


Fig. 1: The PIC in this section of the circuit handles the range and sweep selection switches, the potentiometer that sets the frequency/sweep time, and the liquid crystal display.

The waveform switch S1 can be omitted if only a sine wave output is required. And if the separate square wave output isn't needed, don't fit any socket or the 330Ω series resistor, but you must connect pin 18 on the PIC as shown in the diagram.

Incidentally, the square wave output will have some 'jitter' at higher audio frequencies. This jitter is not cumulative: the output frequency will be accurate but the duty cycle will vary minutely from cycle to cycle.

The circuit can be built on Veroboard and the layout (subject to what I've said about X1, C1 and C2) isn't at all critical. It's relatively easy to position the components substantially as they appear in the circuit diagram. The layout naturally breaks into four sections: the DDS PIC, the Controller PIC, the low-pass filter and the power supply section.

Direct Digital Synthesis

The important feature of the DDS PIC is its use of Direct Digital Synthesis or DDS. In effect DDS is a means by which it's possible to create repetitive arbitrary waveforms of variable frequency from a fixed frequency source.

In practice, sine waves, triangular waves and sawtooth waves are by far the most common, with the sine wave dominating. The DDS technique can

be used to create frequencies from tiny fractions of a Hertz up to frequencies well beyond the v.h.f. spectrum. So how does a DDS work?

Unfortunately, it's actually easier to make a DDS than to explain how it works! Well, I think so, but I'll do my best at an explanation! If you wish to know more, go to **http://en.wikipedia.org/wiki/Direct_digital_synthesizer** where you'll find some very informative links at the bottom of the page.

Here, in **Fig. 2**, I've provided a block diagram of a simplified DDS system. The DDS clock is nothing more than a fixed frequency oscillator, usually crystal controlled. In a purely hardware DDS system what I've just said is true, but in the case of the DDS PIC a software loop provides the DDS clock. However, the execution time of this loop is determined by the PIC's crystal oscillator, so the timing does have crystal accuracy.

The phase accumulator is a binary counter or register, and is usually 24 to 40 bits long. The phase increment is a number (held in a register) of the same bit length as the phase accumulator, which is added to the phase accumulator once every DDS clock cycle. Note that the phase accumulator is allowed to repeatedly overflow, so it does not stop when it reaches its maximum count.

The phase increment is made adjustable in some way and it is this number - together with the DDS clock frequency – which determines the DDS output frequency. Only the most significant eight to fourteen (usually) bits from the phase accumulator are fed to the phase-to-sample converter stage, which is nothing more than a 'look-up table'.

To produce a sine wave output the DDS has stored within it a table of numbers. Each number represents the amplitude of a single cycle of a sine wave that has been sampled at regular intervals. The total number of samples in the table is equal to 2^p, where p is the number of bits used to access the lookup table. That is, the number of bits passed from the phase accumulator to the phase-to-sample converter.

In the case of our DDS PIC, the phase accumulator and phase increment register are both 24 bits long, but only the eight most significant bits of the phase accumulator are used to 'look-up' the sine wave sample value. These operations are done in a software loop which is executed 163,840 times each second. So our DDS clock frequency is 163,840Hz.

In Fig. 2, the sequence of numbers passed to the phase-to-sample converter is represented graphically by (a), and the numbers representing the corresponding sine wave sample values by (b). At this stage, both are simply binary numbers.

One thing to understand is that at the higher DDS output frequencies, not all 2^p samples (that's 256 samples, in the case of the DDS PIC) will be read from the table in each cycle of the (audio) output frequency.

There will be gaps; big gaps as the output frequency approaches an appreciable fraction of half the DDS clock frequency. These gaps will result in a very 'funny looking' sine wave. Look at the voltage at pin 18 on the DDS PIC with an oscilloscope to see what I mean. However, the apparent distortion created by the 'missing' samples will be corrected by the low-pass filter.

The sequence of numbers from the phase-to-sample converter are passed to a digital to analogue converter (DAC). Often this is a hardware DAC, but in our case, it's nothing more than a few resistors connected to one of the PIC's output ports. Notice the DAC is clocked at the same rate as the phase accumulator. The output of the DAC is a voltage directly related to the amplitude of a sine wave at a particular point in its cycle, as shown by (c).

Because the output from the DAC is not a smooth curve but a series of discrete steps, the output is fed through a lowpass filter (l.p.f.). In our case, the dual operational amplifier IC4 provides a Butterworth characteristic l.p.f. with a cut-off of 25kHz and a rolloff of 18dB/octave. Despite the simplicity of the circuitry, the output from the l.p.f. is quite acceptable when viewed on an oscilloscope, even at 20kHz and beyond.

Theoretically, the maximum sine wave output frequency is numerically equal to half the DDS clock frequency. But in practice, the output frequency is often (artificially) limited to less than a quarter of the DDS clock frequency. This is all to do with the Nyquist Sampling Theorem and reconstruction filters.

In this design, the way in which frequency setting information is communicated to the DDS PIC restricts the maximum audio output frequency to just below 40,960Hz, that's one quarter of the 163,840Hz DDS clock frequency used in the DDS PIC. The lower limits I mentioned at the start are actually introduced by the software in the other PIC, IC2.

The Second Feature

The second feature of the DDS PIC that I'd like to explain is its 'poor man's' digital to analogue converter. The arrangement of resistors (shown in **Fig. 3**) is called an 'R2R' ladder, and this simple circuit makes a quite acceptable – and very low cost – DAC As you can see, only two values of resistor are needed, which are in the exact

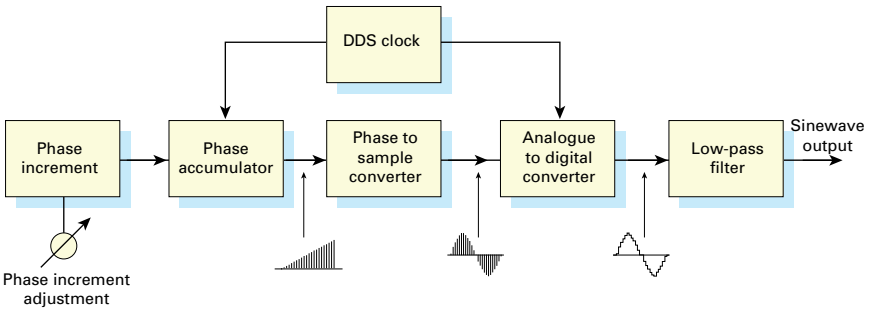


Fig. 2: Block diagram of the PIC- based audio signal generator.

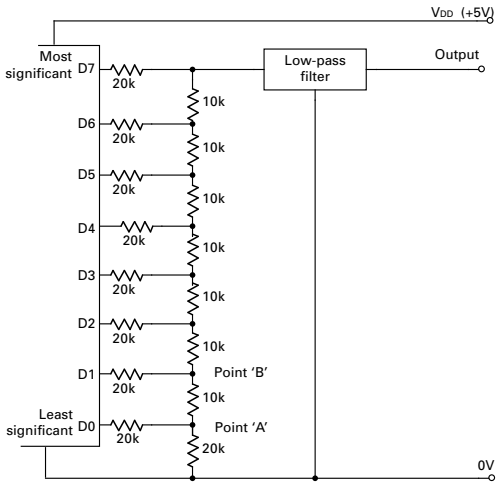


Fig. 3: The R–2R ladder network.

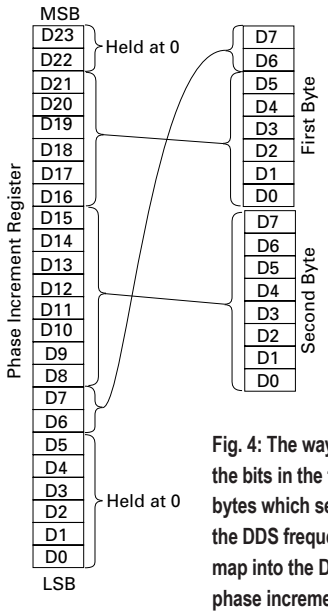


Fig. 4: The way the bits in the two bytes which set the DDS frequency map into the DDS phase increment register.

ratio of 1:2. Hence the 'R2R' name. **Note:** For accuracy, the resistors should be 1% tolerance or better.

I've shown a PIC in Fig. 3 but any suitable digital device can be used to drive the resistor array. Two resistors per digital output are needed, and the resolution of the output as a proportion of the supply voltage (Vdd) is 2^n, where n is the number of digital outputs used. In this case Vdd=5V and n=8. Hence the resolution is $5/2^8 = 5/256 = 0.01953125$V. That's about 19.5mV.

Driving the array is extremely easy: simply write your (8-bit, in this case) digital number to the outputs D0 to D7. Note that D0 is the least significant bit and D7 is the most significant bit.

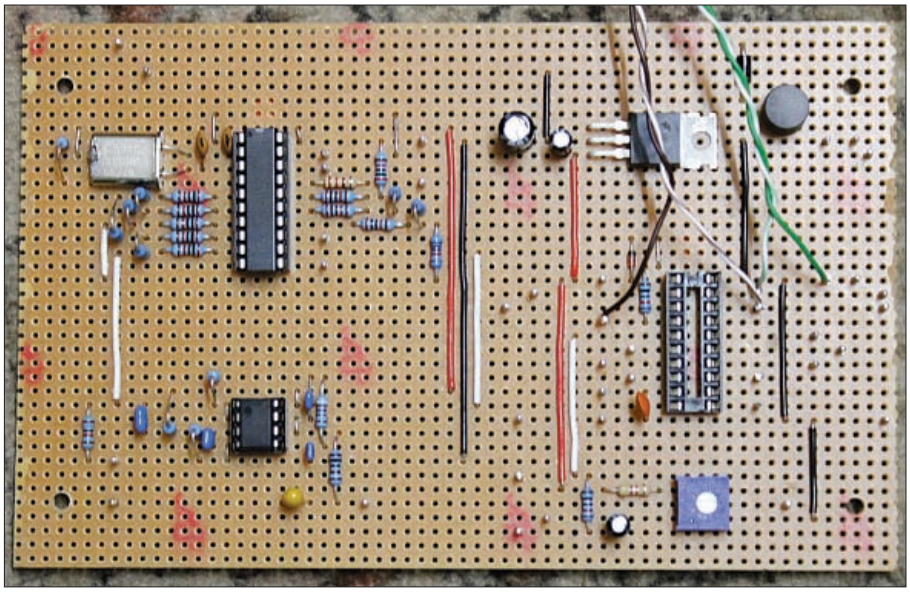
The physical limitations of the device's output circuitry, coupled with the 1% accuracy of the resistors, limits the useable resolution of this arrangement to about eight bits. Which, of course, is fine for many applications and fits in perfectly with 8bit microprocessors. Although more than eight digital outputs (bits) can be used, physical component tolerances rapidly become an issue. Using fewer than eight bits is no problem, just remove two resistors per digital output while maintaining the appearance of the 'ladder'.

Not Obvious?

It may not be intuitively obvious how the circuit works, so I'll explain its operation a little. First, assume that the digital outputs can switch between 0V (Vss) and +5V (Vdd) and have no appreciable output resistance. The latter assumption is clearly not true, but when c.m.o.s. outputs (such as those in the PIC) are lightly loaded, then their outputs do very closely approach the supply rail voltages. If all outputs are at 0V, then the voltage at point C will be 0V too. If just D7 is set to +5V, then what's the voltage at point C now?

It looks like a complex network to solve, but it isn't! Take point A, which has two 20kΩ resistors connected to 0V, one directly and one through D0 (which is at 0V, remember). So point A 'sees' two 20kΩ resistors in parallel connected to 0V. That's equivalent to one 10kΩ resistor connected to 0V. Move up to point B and similarly, point B has one 20kΩ resistor to 0V (through D1 this time) and a 'real '10kΩ resistor in series with the effective 10kΩ resistor at point A. So point B also 'sees' two 20kΩ resistors in parallel connected to 0V.

This reasoning continues up to point C, which has one (real) 20kΩ resistor connected to +5V through D7, and an effective resistance of 20kΩ to 0V. Now the calculation of the voltage at point C is easy: 20kΩ to +5V, 20kΩ to 0V, so the voltage is half of +5V, or +2.5V. And the number which produces this 'half-Vdd' output is 128 (in binary, 10000000), which is classed as half-scale for an eight-bit number.



Phil G4jCP built his protoype unit using Verboard. Although there is no p.c.b. for this unit, Bowood can supply all the parts needed including the pre-programmed PICs. Contact them for more details.

You can repeat the same reasoning for each digital output in turn, which is easy (if tedious) if all the other outputs are at 0V. For example, when just D6 is at +5V, the voltage at point C is one quarter of +5V, and D5 gives one eighth, and so on.

Things become more complex if more than one output is at +5V, but if you're keen to try it, then you'll see that the voltage produced at point C is proportional to the binary number present at the outputs D0 to D7. So, we've made a perfectly usable digital to analogue converter for the price of a few resistors and an eight-bit output port.

Frequency setting information – in the form of a 16-bit number split into two bytes – is sent to the DDS PIC over a serial interface. The controller PIC IC2 generates this number, the value of which depends on the setting of the 10kΩ potentiometer VR1 and the three position range switch S3. While the phase increment register in the DDS PIC is 24 bits long, only 16 bits are accessible over this serial interface (see **Fig. 4**).

Circuitry Quite Simple

The circuitry around the controller PIC IC2 is quite simple, and the PIC is able to use its internal clock as it isn't doing anything that's time critical. Some of you may have noticed the absence of pull-up resistors on the switch inputs. This is because some inputs on the PIC have internal pull-up resistors which can be turned on and off in software.

The attached l.c.d. is run in four-bit mode and may be any 16 character by a two line display that uses an HD44780 compatible controller. If the display has a backlight then please check the data sheet for both its connections and voltage and current requirements.

The display in the prototype had an efficient backlight that only needed 4V at 20mA, hence the 47Ω resistor connected to the +5V supply. Some backlights need far more current – so resistor R31 will have to be calculated accordingly, and if the backlight current exceeds about 30mA then IC3 will need a heat-sink. Alternatively, the backlight can be fed directly from the +12V supply via a suitably rated dropping resistor.

The setting of the frequency adjustment potentiometer R28 is sensed by connecting the wiper to one of the PIC's analogue to digital converter (ADC) inputs. The PIC16F690 has a single 10bit ADC which can be used to measure the voltage on several of the PIC's input pins using a software controlled analogue multiplexer. The ADC is programmed to return a number that varies from zero, when the variable resistor is set fully counter clockwise, to 1023 when the control is set fully clockwise.

The fine resolution makes setting the frequency a little tricky sometimes. There are ways of mitigating this potential problem including using either a multi-turn potentiometer, or a reduction drive on a normal potentiometer. Another solution is to wire a low value variable resistor (say, 330Ω or 470Ω) in series with the 'top' of R28 and the +5V supply. Normally set to half travel, this will then give a fine adjustment of frequency.

Frequency Sweeping

As mentioned at the start, the controller PIC can generate a frequency sweep. This sweep is not continuous, but instead it provides a series of 512 discrete

frequencies. If you examine the actual frequencies as listed in the source code, you'll see that I've tried to make the increments logarithmic.

The switch, S2, selects either a fixed time sweep of about 10.5 seconds, or a sweep whose duration can be set by the frequency potentiometer. If you don't need the sweep facility, then don't fit S2.

Many PICs – including the PIC16F690 – have a hardware pulse width modulation module. I've used this to produce a ramp which is available at pin 5 on the controller PIC. The output has to be filtered to produce a d.c. output, hence R19 and C11. The ramp voltage at any instant is proportional to the position in the frequency sweep.

The ramp itself is probably of only limited use, but triggering an oscilloscope – set to 1S/division – on the falling edge will synchronise the 'scope to the sweep and so can be used to display the frequency response of, for example, a filter. If you don't need this kind of facility then simply don't fit R19, C11 and any associated socket.

Programmed In Circuit

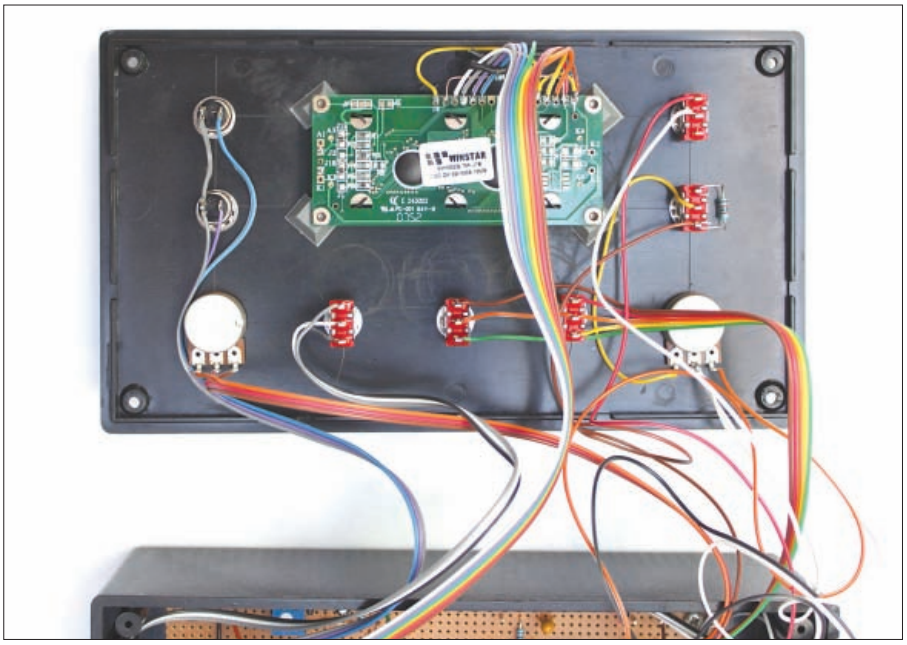
Both PICs can be programmed while in circuit, and to make it easy I've not used the programming pins on the controller PIC. However, the programming clock pin **is** used on the DDS PIC, and so the connection to pin 18 **must be broken** while the PIC is being programmed. Pin 18 can then be reconnected once the programmer has verified the contents of the PIC.

As usual, the source code, object code and any other relevant files are available on my web site at: **www.g4jcp.freeserve.co.uk/** Both blank and ready programmed PICs can be obtained from **Bowood Electronics** in Chesterfield (see advertisement in this issue for contact information).

Because the DDS PIC receives frequency information via its serial interface, it can be controlled by other means, such as a computer. The interface runs at 4800 bits/sec, eight data bits, no parity. Please remember that the voltages are at logic level: you will need a converter if you use the RS232 port on your computer.

The Technical Bit!

Next we come to the technical bit! The way the bits in the two bytes which set the DDS frequency map into the DDS phase increment register is shown in Fig. 4. The DDS clock frequency is 163,840Hz and the phase accumulator/increment is 24 bits long, giving a resolution of $163,840/2^{24}$ = 0.009765625Hz. (This resolution is **not** available via the serial interface).



The completed audio generator and its box. Although the two switches shown in the top left of this picture are shown wired, they perform no function at present.

As you can see in Fig. 4, the least significant-bit of the 16-bit number (bit D0 of the second serial byte) maps to-bit 8 of the phase increment register, and so corresponds to a frequency increment of 2.5Hz (163,840/216). However, the top two bits (which would usually be set to zero if the mapping was one-to-one with the top 16 bits of the DDS phase increment register) are mapped into the top two bits of the **lower** byte of the phase increment register.

The two bits increase the resolution by a factor of four. So the actual resolution available via the serial interface is 0.625Hz. The full frequency range works out at 0.625Hz to 40,959.375Hz. The last figure is equal to 65,535 x 0.625Hz, i.e. $(2^{16}-1) \times 0.625$Hz.

Remember, that a phase increment of zero produces a frequency of 0Hz (d.c.), and in the case of the DDS PIC, the software will also force the DAC output to the mid point (128). The DDS PIC is therefore quite capable of producing c.w. and slow f.s.k. if appropriately driven.

There's a very simple QBASIC program on my web site which illustrates one means of computer control. But the program only works on computers that have a real serial port and can run Microsoft's QBASIC interpreter.

Please note that the DDS PIC has a serial timeout: the gap between the two bytes must not be greater than 50mS or they will be ignored. Finally, the DDS PIC generates a 1kHz tone at switch on, so it generates a tone even if it doesn't receive any serial data. I hope you enjoy the project!

●

The PIC Audio DDS Components List

Capacitors

C1, C2	33pF Ceramic
C3, C12-C14	100n Disc Ceramic
C4	470n
C5	1n
C6	2n2
C7	470p
C8	10µF 16V Tantalum
C9	10µF 16V Electrolytic
C10	100µF 25V Electrolytic
C11	1µF 16V Electrolytic

Diodes

D1, D2	1N4148
D3	1N4002

Fuse

F1	250mA

Integrated Circuits

IC1	PIC16F690-I/P (DDS software)
IC2	PIC16F690-I/P (Control software)
IC3	7805 +5V regulator
IC4	NE5532 or similar

Liquid Crystal Display

LCD	16 character by two lines

Resistors

R1-R9	20kΩ 1%
R10-16	10kΩ 1%
R17-R19	10kΩ
R20	18kΩ
R21	330Ω
R22	390kΩ
R23	560kΩ
R24	4.3kΩ
R25	9.1kΩ
R26	1kΩ
R27, R28	10kΩ linear variable
R29	4.7kΩ
R30	2.2kΩ trimmer
R31	47Ω

Miscellaneous

S1, S2, S3 single-pole changeover, centre off, Crystal X1 19.6608MHz crystal BNC/Phono sockets as required. Enclosure. Parts available through Bowood Electronics, See their advert in this issue for contact details.

Tony Nailer G4CFY's Technical for the Terrified
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More on Antennas and the Noise Bridge

In his *Technical for the Terrified* column, Tony Nailer G4CFY, has more antenna information and responses to readers' E-mails.

I have received a number of E-mails regarding the *Technical for the Terrified* article on antennas in the *PW* August issue. Many radio listeners have also commented on how informative that article was and how much they appreciated an article targeted at the Radio Listener.

Similarly there has been a lot of interest in the Noise Bridge project in *Doing it by Design* in July & September issues of *PW*. Again this was an antenna related product as well as being a piece of test equipment, two subjects which are always popular.

Velocity Factor

I received an informative E-mail from **Tuck Choy M0TCC** who enlightened me that the fastest speed of electrons in a conductor is of the order of 1.5 million metres per second. This compares with the velocity of light in free space of 300 million metres per second. So at best conduction is only 0.5% of that of free space waves.

The reduced velocity of an electromagnetic wave propagating along a transmission line is due to the dielectric between the wires. True air spacing gives a velocity factor close to 100%, whereas foam or semi-airspaced gives about 80%. Solid polyethylene usually is 66%. So it is correct to refer to velocity factors in relation to feeder lines.

Though an antenna is also a form of transmission line it usually works in conjunction with the ground and the dielectric in between is air. The velocity of the wave propagating along it is close to 100%. So it is incorrect to apply the term velocity factor in relation to antennas in the same way that we do to feeders.

The shortening factor applied to antenna wires is to offset the self-inductance of the wire. I'm grateful to Tuck for bringing this to my attention and as a result I have increased my knowledge of antennas.

Resistance & Reactance

A half-wave dipole wire antenna has a feed-point resistance of about 72Ω, but it also has reactance related to the ratio of wavelength to the wire diameter. A graph is included here as **Fig. 1,** taken from the *ARRL Antenna Handbook* 1988 page 2-6 showing both resistance and reactance of a dipole.

A look at the graph in **Fig. 1**, shows that for an exact half-wavelength there is a 'positive' (inductive) reactance of between 30 and 35Ω, depending on the wire diameter. Also that a zero reactance is achieved at around 0.484 to 0.491 of a wavelength. Again this is dependent on wire diameter. These shortening amounts correspond to between 0.96 and 0.98 of a half-wavelength overall.

A graph showing a shortening factor 'k' based on the ratio of wire diameter to a half-wavelength regularly appears in the *ARRL Antenna Handbook*. Such a graph again taken from the *ARRL Antenna Handbook* page 2-2 is reproduced here as **Fig. 2.**

An antenna, cut for half-wavelength on 3.65MHz will have

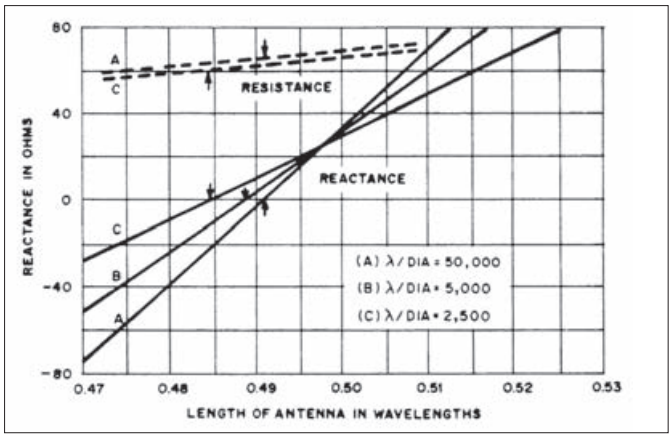


Fig. 1: Taken from the *ARRL Antenna Handbook* 1988 page 2.6 showing both resistance and reactance of a dipole. The original caption read "Resistance and reactance at the input terminals of a centre-fed antenna as a function of its length. As shown by curves A, B and C, the reactance is affected more by the λ/diameter ratio of the conductor than is the radiation resistance."

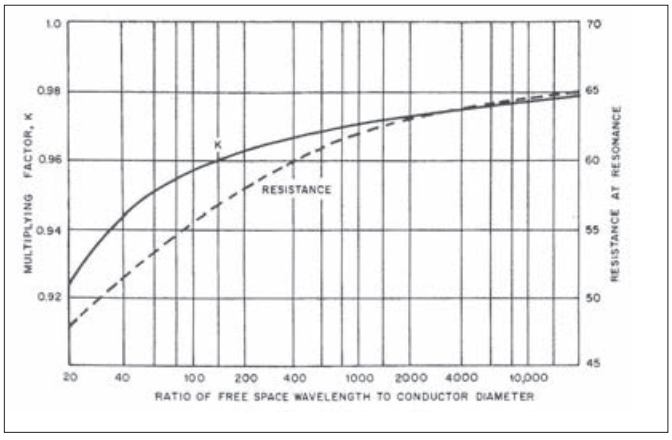


Fig. 2: Again taken from the *ARRL Antenna Handbook* page 2.2 is the antenna shortening factor. The original caption read "The solid curve shows the factor, K, by which the length of a half wave in free space should be multiplied to obtain the physical length of a resonant half-wave antenna versus the wavelength to diameter ratio. This curve does not take end effect or element tapering into account. The broken curve shows how the radiation resistance of a half-wave antenna varies with the wavelength to diameter ratio."

a free space length of 41 metres. If the wire diameter is 2mm, which is 0.002 metres, then the length to diameter ratio is 20500:1.

At that ratio it is off the graph but it can be extrapolated to a k factor of about 0.98. Similarly using 4mm wire with a length to diameter ratio of 10250:1 it is still of the order of 0.98. The feed-point resistance is nominally 65Ω but it's also dependent upon the wire height above ground.

At very high frequency (v.h.f.), let's say 145MHz, the free space half-wavelength is 1.034 metres. Using an aluminium element 10mm diameter for a dipole, the length-to-diameter ratio is, in this case, just 103. The k factor is then 0.96. Note though, that the feed-point resistance is then 60Ω.

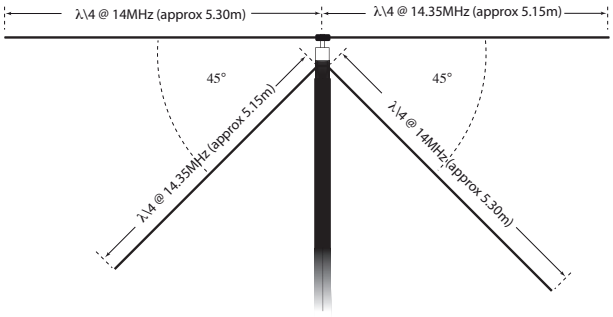


Fig. 3: Michael Doughty G6ZQJ has a wide-band antenna he calls it his 'no-tune dipole'. According to his measurements the standing wave ratio varied from 1.0:1 to 1.3:1 across the band.

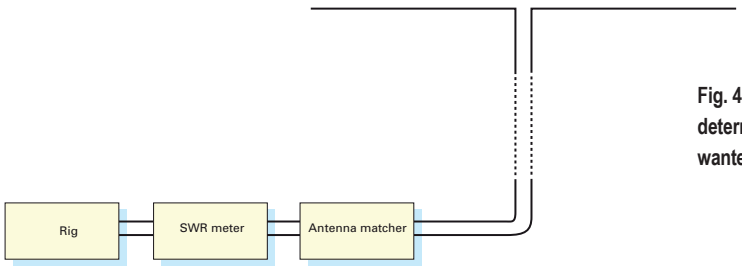
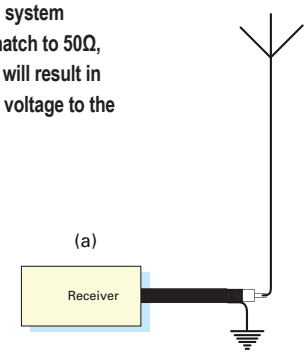


Fig. 4: Using a standing wave ratio (s.w.r) meter to determine how close to 50Ω the antenna system is at the wanted operating frequency.

Fig. 5: If an antenna system represents a near match to 50Ω, then using an unun will result in a reduction of input voltage to the receiver.



Wideband Dipole

I received another E-mail from **Michael Doughty G6ZQJ** about his wide-band dipole. It has a continuous horizontal top wire with one side from the connection point resonant at 14MHz and the other side resonant at 14.35MHz. Beneath this is a continuous wire in an inverted V with sides sloping down at 45° and with resonant lengths reversed from the wire above.

According to his measurements the standing wave ratio varied from 1.0:1 to 1.3:1 across the band. Consequently he calls it his 'no-tune dipole'. An illustration of it is shown in **Fig. 3**.

In my reply to Michael I mentioned those who have bought trap dipoles from me, and how two distinct resonant frequencies occur if the sizes of each leg of a dipole are not the same. This state also occurs if one end is supported within the foliage of a tree while the other end is in the clear and guyed to a support, or if one end is closer to the ground than the other.

Use An SWR Meter

Transmitting Amateurs normally use a standing wave ratio (s.w.r) meter to determine how close to 50Ω the antenna system is at the wanted operating frequency. The arrangement is as shown in **Fig. 4**.

A signal less than full power is transmitted and the forward power reading is set to full scale. The meter is then switched to reverse power and the standing wave ratio noted. If a separate antenna tuner unit (a.t.u) is employed, it is adjusted until the needle shows the lowest reverse reading.

Many Amateurs these days have 'all singing and dancing' transceivers with integral automatic a.t.u. They simply press tune and after a short period of clicking and humming the antenna has been matched to the rig.

Both methods have the disadvantage that with hundreds of thousands of Amateurs world-wide regularly tuning up. These transmissions are adding to the noise and interference on the bands.

Using A Noise Bridge

The **G4CFY Noise Bridge** recently described in the September edition of *PW* – in *Doing it by Design* (*DibD*) offers an alternative method of measuring or tuning an antenna system. It works in conjunction with a receiver or transceiver to allow measurement of resistance and capacitance of an antenna system, including the feeder, and maybe also the a.t.u.

In the noise bridge, a noise source drives the primary winding of a wide-band transformer. The centre tapped secondary side has the antenna system connected to one winding and a series arrangement of variable capacitor and variable resistor connected to the other. The centre tap is connected to the receiver, which acts as a frequency selective balance detector.

When the capacitance and resistance of the variables on one side equals the capacitance and resistance of the antenna system on the other, balance has been achieved and the centre tap feeding the receiver will have no noise on it. The resistance and capacitance is then read from the scales of the variables.

Antenna Measurements

To undertake measurement of a system, comprising an antenna and its feeder, it's connected directly to the bridge without an a.t.u. Select the frequency at which the measurement is required and adjust the variable capacitor,

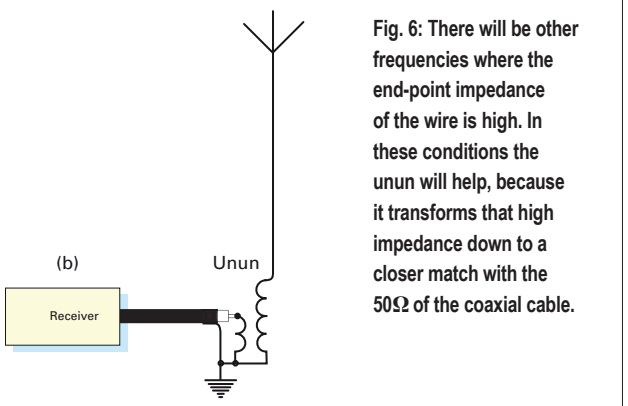


Fig. 6: There will be other frequencies where the end-point impedance of the wire is high. In these conditions the unun will help, because it transforms that high impedance down to a closer match with the 50Ω of the coaxial cable.

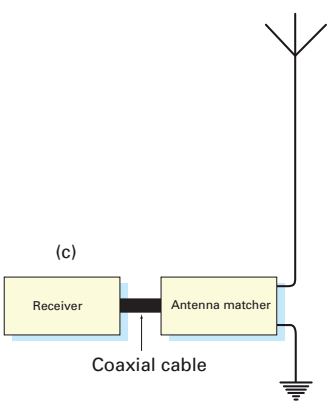


Fig. 7: Perhaps the best overall solution is to bring the antenna wire all the way into the house and to the shack and connect it directly to a receive a.t.u., as shown here.

then the variable resistor, and repeat these adjustments until balance is achieved.

It may be necessary to adjust the receiver r.f. gain when close to balance, though within the limits of accuracy of the scale markings this may be unnecessary. The scales of the variables then give the resistance and ±capacitance. It is not realistic to attempt to scale the unit with reactance because that differs for each specific frequency of measurement.

For those technically adept, the frequency and value of capacitance can be used to determine a value of capacitive reactance where the reading is positive (+C), or of inductive reactance where the reading is negative (-C). This reactance value together with the resistance gives the impedance in the form $R+X_L$ or $R–X_C$.

For those less technically minded, a positive capacitance reading occurs when an antenna is too short at the test frequency and is exhibiting a lack of inductance. Conversely a negative capacitance reading occurs when the antenna is too long at that frequency and has an excess of inductance.

Switching the unit off, not only stops the noise generation but connects the receiver directly to the antenna, completely bypassing the bridge circuitry.

External ATU

The following description is for the transmitting Radio Amateur and works only with an external a.t.u. The bridge is connected between the transceiver and a.t.u, which is connected to the antenna. Set the variable capacitor to zero pF and the variable resistor to 50Ω.

Switch the bridge **On** and select the required frequency with the transceiver. Adjust the a.t.u. for balance, adjusting the receiver r.f. gain if necessary. The antenna system has then been set to a pure resistance of 50Ω. Switch the bridge to **Off** and proceed to operate, safe in the knowledge that the antenna system is a good match to the transmitter.

Internal ATU

Next, I'll consider the case with a transceivers with an internal a.t.u. The bridge will now be used as it was for measurements, to determine on specific bands, or at band edges, how close to an impedance of 50Ω the antenna is. Once this is done and recorded and worked out, it will be obvious which bands are within the capability of an internal auto a.t.u. to match into. Specifically the noise bridge will show the resistance and ±capacitance for those bands where the mismatch is too great for the auto-a.t.u to work with.

Random Wire Antennas

Talking to a large number of listeners since I've taken over **Garex Electronics**, it seems to be a common myth that an antenna needs to be connected to coaxial cable, usually prior to entering the home. Some have a direct connection of an antenna wire to the inner of the coaxial cable and the outer screen connecting to an earth. Others employ an unbalanced-to-unbalanced wide-band transformer, usually referred to as an 'unun', of 4:1 or 9:1, or even 16:1 impedance between random wire and coaxial cable.

Trying to use a random wire antenna over a wide frequency range, either directly connected to the rig, or via a balun and coaxial cable, or just straight to coaxial cable with no unun is likely to be a disappointment. For a given length of wire there will be frequencies where it is a quarter-wavelength, or three quarter-wavelength, or any other odd quarter wavelength, where the end impedance may even be just 36Ω.

In the case of a feed-point impedance close to 50Ω, a direct connection to the coaxial cable will give the best result. (See **Fig. 5**). Using a 4:1,a 9:1 or even a 4:1 unun at these frequencies will actually reduce the voltage fed down the coaxial cable, by factor of two, three, or four respectively.

There will be other frequencies where the end-point impedance of the wire is high. This will be part resistance and part either capacitance if the antenna is short at that frequency, or inductance if the antenna is long at that frequency. In these conditions the balun will help, because it transforms that high impedance down to a closer match with the 50Ω of the coaxial cable. See **Fig. 6.**

Best Recommendation

The best solution is to bring the antenna wire all the way into the house and to the shack and connect it directly to a receive a.t.u., as shown in **Fig. 7.** This unit will tune out the reactance and match the antenna to the coaxial cable, thereby delivering an enhanced level of voltage to the receiver.

Note: It's an important requirement that either the receiver or the a.t.u. has an earth wire attached and is coupled to the receiver using coaxial cable.

I included that last sentence because I had a customer who had bought the receive a.t.u. and phoned me to say it didn't really help. When asked specifically about his set-up, he said he wasn't using an earth connected to the a.t.u and was only using a single wire between the a.t.u coaxial cable connector and the receiver 'ANT' connector. So, in effect the unit was just 'floating' in-line and doing nothing.

Myths Hopefully Dispelled

It's my hope that I have dispelled a number of myths about antennas and that listeners can use the information to improve their receive antenna systems. Also that the use of the noise bridge is understood and that it is not a gadget to tune out unwanted noise but a measuring and tuning aid. If you want to contact me I'm available via **tony@pwpublishing.ltd.uk** Cheerio for now. ●

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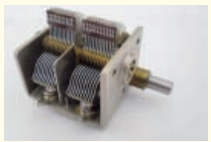

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NEW PRODUCT
G4CFY NOISE BRIDGE, to measure resistance and capacitance of aerials. Also to allow transmitting amateurs to perfectly match the ATU and aerial system without the need to use a tune transmission. Useable 1.8 to 70MHz. **Box kit £56.00. Built £88.00**.

WIDE RANGE POWER METER, 1.8 to 52MHz, four power ranges 1, 10, 100, & 200W with an accuracy of +/-5%. Thruline concept with toroidal current transformer sampling element. Switched forward & reverse reading. SO239 connectors.
Built and calibrated £72.00.

LCR BRIDGE with 5 resistance ranges 100, 1K, 10K, 100K & 1M. 3 capacitance ranges, 100pF, 1nF, 10nF and 3 inductance ranges, 1mH, 10mH & 100mH, plus external reference. Scale calibrated 0.01 to 10 times reference value. Optional drilled and labelled plastic or painted diecast box. **PCB & parts with pot and switch £26.00. With plastic box £39.00, with diecast box £44.00.**

OFF-AIR FREQUENCY STANDARD, crystal calibrator unit phase locked to Radio 4 using a two-loop system. Includes a monitor receiver to ensure Radio 4 is being heard loud and clear. Fixed outputs 10MHz at 2V p-p, and 1KHz at 1V p-p as oscilloscope CAL signal. Switched outputs 1MHz, 100KHz, 10KHz, and 1KHz at 6V p-p, into 500 Ohms. Single board design as featured in July & Sept 2008 PW. Background heterodyne whistle at 2KHz confirms lock condition. 12/13.5V DC operation at 65mA. **PCB kit with ferrite rod £50.00, PCB kit + drilled box and hardware complete £86.00. Ready built £131.50.**

TWO TONE OSCILLATOR
A vital piece of test equipment used together with an oscilloscope for setting up AM, DSB, & SSB transmitters.
PCB & hardware kit £28.00. Ready Built £52.50.

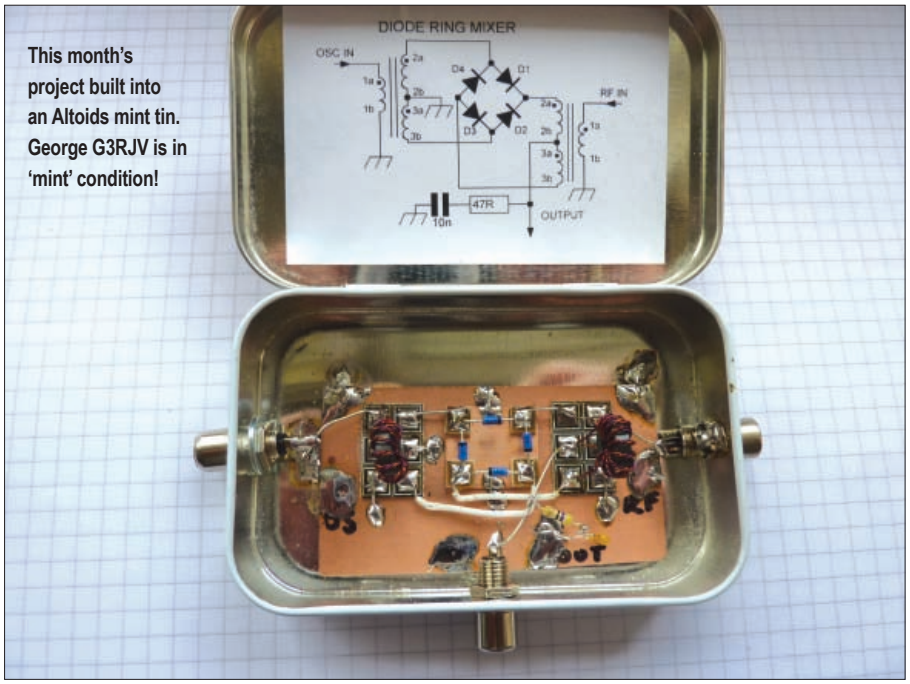
DUAL PEAK/NOTCH FILTER & AUDIO AMPLIFIER

It connects directly to the loudspeaker or headphone socket of the receiver and produces up to ½W of audio to a front facing loudspeaker. The unit can be used to notch out two unwanted heterodynes, or just one while enhancing the wanted audio frequency. Similarly it can be used sharpen otherwise dull speech or to dampen shrill audio. **PCB kit and all the potentiometers £35.75. PCB kit and all the hardware with drilled and labelled box £73.00. Ready Built £112.00.**

Rev. George Dobbs G3RJV's Carrying on the Practical Way
PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-Mail: pracway@pwpublishing.ltd.uk

A Home-Made Double Balanced Mixer – a Step by Step Approach

This month the Rev. George Dobbs G3RJV has something different for his readers– a double balanced mixer. But, of course, you should read the appropriate quote first!



This month's project built into an Altoids mint tin. George G3RJV is in 'mint' condition!

"If you buy what you don't need, you steal from yourself"
Swedish Proverb

Welcome to *Carry on the Practical Way* (*CotPW*)! In the February 2010 edition of this column I ventured back to my first experience of a direct conversion (DC) receiver. I had discovered, on a CDROM given with the wonderful book *Experimental Methods in RF Design* by **Wes Hayward W7ZOI**, **Rick Campbell KK7B** and **Bob Larkin W7PUA,** a file called "W. Hayward and R. Bingham, 'Direct Conversion; A Neglected Technique.' *QST*, Nov, 1968".

I opened the file to discover it was the article from which I built my first ever DC receiver. So, I built a replica of the receiver, using up-to-date UK parts, and offer it to *PW* readers.

Mixer Problems

As I recall it, not long after the article appeared, I received at least three E-mails and a 'phone call from would-be builders, all of whom were having trouble with the receiver mixer. The mixer used four diodes in a ring configuration acting as a double balanced mixer.

I had taken the easy route and used a commercial double balanced mixer module. However, I did briefly describe how to make such a mixer using two toroidal transformers and four diodes.

The thwarted builders all had problems making their double balanced mixers from the information I supplied. Recently, I have been working through a few ideas using such mixers and decided to build my own.

Recalling the problems that arose from the previous article, what I offer below is a 'blow by blow' account for making a diode double balanced mixer. Even if the reader has no immediate use for one, it's a useful module to have in hand for future projects.

Typical Circuit

A typical circuit for such a mixer is shown in **Fig. 1**. It has a number of aliases including; a 'double balanced mixer' (d.b.m.), 'diode ring mixer' or 'diode ring balanced mixer'.

A double-balanced diode ring mixer has two unbalanced to balanced transformers and a four diode ring. The impedance at the three ports (oscillator input, radio frequency input and output) is 50Ω.

To obtain the optimal result Schottky or Hot-Carrier diodes with their low 'turn on' voltage and uniformity should be used for D1 to 4. The turn on voltage is 0.6 to 0.7V for most silicon diodes but a Schottky diode has a turn on voltage as low as 0.2 to 0.3 volts. I used the common 1N5711 Schottky diode. Other suitable types are the BAT42 or the BAT47. I have also achieved good results in the past with cheap silicon diodes like the 1N914.

In Fig. 1, the two transformers, T1 and T2, are configured so that the input and the output terminations have an impedance of 50Ω. The transformers are identical but mounted opposite ways round. **Note:** D1 – 4 must be mounted with their polarity as shown.

The bar on the diode diagram (the cathode) corresponds to a bar, or ring, on the diode casing. I have also added a termination – the 47Ω resistor and 10n capacitor – to the output. Ideally a full diplexer circuit should be added to the output – but this simple 50Ω termination works for most applications.

The most complicated part of the mixer is getting the transformers correctly wound and mounting them in the correct configuration. The diagram, **Fig. 2**, shows the method of winding for T1 and 2.

The three windings (L1, 2 and 3) on the transformer are trifilar windings. The wires making up the three windings are twisted together and wound on the core as one winding.

Dots shown on L1, 2 and 3 represent the start of each winding. Transformers T1 and 2 are identical and are made up from 10 turns, trifilar wound, on an FT37-43 ferrite core.

In Fig. 1, the individual windings are designated as 1a (start) to 1b, 2a (start) to 2b and 3a (start) to 3b. Winding the two transformers, T1 and 2 is not so difficult – it just requires some care and dexterity.

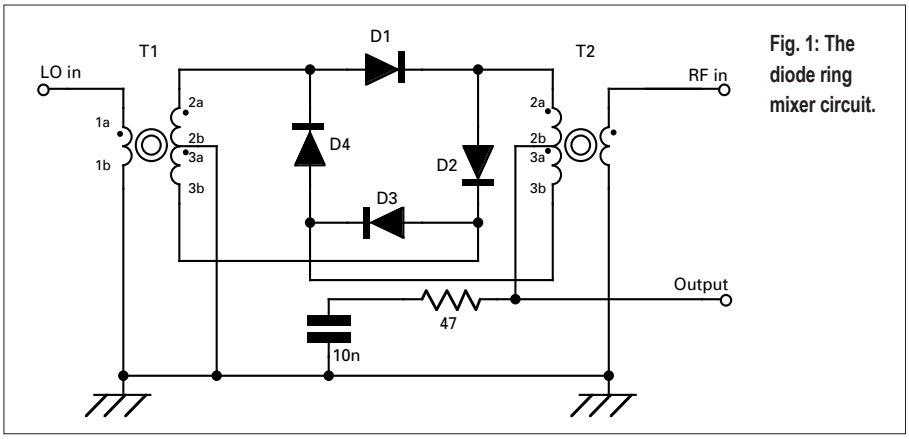


Fig. 1: The diode ring mixer circuit.

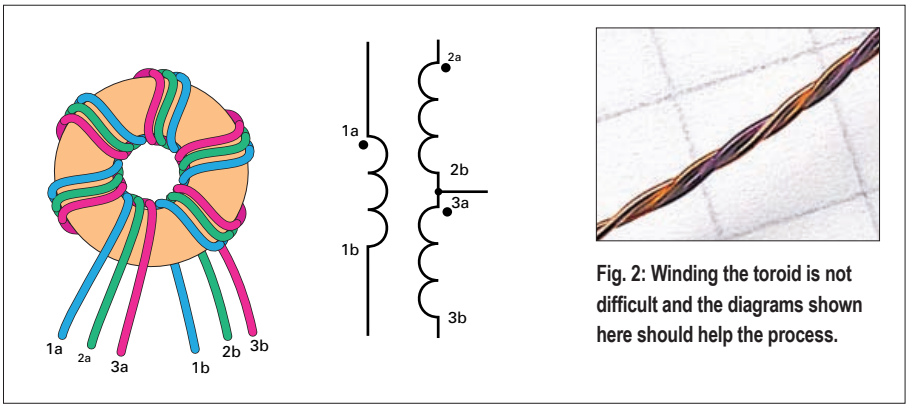


Fig. 2: Winding the toroid is not difficult and the diagrams shown here should help the process.

Preparing The Wires

The first stage is to prepare the three wires. You'll require three lengths of 0.32mm (30s.w.g.) enamelled copper wire, each about 300mm long. Lay the wires alongside each other and tie a knot in one end to secure the wires together. Run the wires between the index finger and thumb to pull them side by side.

Tie a knot at the other end. The three parallel wires need to be twisted together so that they are intertwined as one wire. There are several ways to do this – I'll describe the method that works well for me.

I start by securing one end of the wire so that it cannot move. Holding it in a vice works well – but I use one of those soldering aids called a "third hand". These have a crocodile clip on the end of a moveable arm attached to a heavy base and are used to hold circuit boards for soldering. I then secure one end of the knotted wires in the jaws of the crocodile clip.

Some constructors twist the wires with a hand twist drill but I find this can over-twist the wires. The requirement is only about three to five twists to each 10mm of the wire. My method is to use a pencil inserted inside the knot on the free end of the wires. An ideal pencil is one of those small pencils given to customers of a well-known Swedish "ready to assemble" furniture and fittings company.

The method of adding the twists is rather like winding up the propeller on an elastic band powered model airplane. Holding the wires lightly in one hand, the forefinger of the other hand rotates the pencil to form the twists. The twists will be tighter nearest the pencil end of the wires so the twists have to be pulled down the wire.

Grip the wire, near the pencil end, between the tip of the fore finger and thumb nail and pull the twists along the wire. This will even out the twists along the length of the wire. It will probably also form grooves in your thumb nail!

The distribution and number of twists is not absolutely critical. If the result looks right, it probably is right. The requirement is to produce a combination of the three wires that can be used as one wire. The final appearance can be seen in the photographs. After winding the 10 turns on the core, trim the ends of the wires to about 20mm. The wires need to be untwisted to form six distinct ends as illustrated in Fig. 2.

You'll then have to scrape each wire with a knife blade to reveal about 10mm of clean copper wire. Tin each of the six wire ends using a hot soldering iron and solder. Check the places where the twists begin to ensure that the tinned surfaces are not touching and connecting to adjacent wires.

The next task is to identify the beginning and end of each wire. This will require a multi-meter set on a low ohms range. The meters that have a continuity bleeper on the lowest ohms range are useful here. Some people use an audible continuity tester.

Take one of the wires from the beginning of the winding and position it to the left of the other two wires. Connect this wire to the meter and connect the meter to each of the wires on the other side of the core in turn to find the other end of that winding. Move this wire to the left of the other two wires. You have now identified 1a and 1b. Repeat the procedure to identify 2a and 2b and 3a and 3b.

The wires should be laid out as shown in Fig. 2. An easier method is to use wires coated with different colours of enamel. The colours can be used to identify the wires. I suspect that very few readers will have 30s.w.g. wire in three colours.

I've collected reels of enamelled wire over the years and managed to find three colours of 30s.w.g. wire. In preparing this article I built two prototypes, the second of which used three colours of wire and it does help!

The Pad Method

To place T1 and 2 and the four diodes, I used a pad method of construction. Regular readers will know this method from previous projects. Small copper clad pads are glued to a copper ground-plane (printed circuit board material) and the components are soldered to the pads. The photographs show the use of commercial pads but home-made pads are easy to fabricate.

Saw some narrow strips of printed circuit board material about 5mm wide then use tin snips to cut off square pads. The pads are attached to the ground-plane using cyanoacrylate adhesive. To hold T1 and 2, six pads are mounted as shown in **Fig. 4(a)**.

Twist the ends of wires 2b and 3a together and solder them to make one connection. This leaves five wire ends to connect to the pads. The identified ends of the windings are connected to the appropriately marked pads. This does take a little careful manipulation and good soldering.

Check that each wire is the correct

Fig. 3: George G3RJV mounted the toroid on to a 'six pad' copper 'Island' matrix.

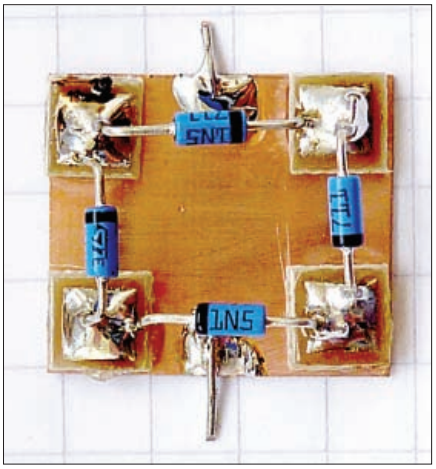


Fig. 4: Close up view of the diode ring mounted on a p.c.b. blank using copper 'Islands'.

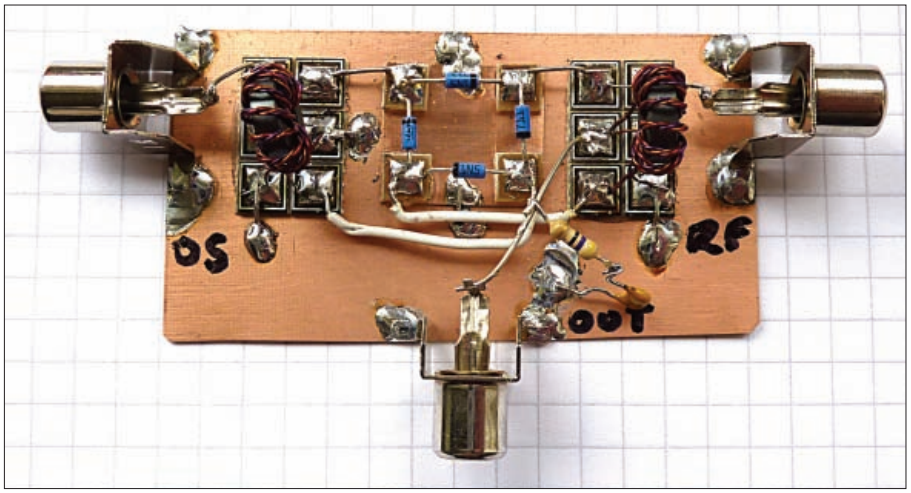


Fig. 5: The completed project built on to p.c.b. material blank and 'Islands'.

one before soldering it in place and check the solder joint when it is completed. Transformer T2 is mounted in exactly the same way as T1. Get this bit wrong and the mixer will not work!

The alternative to individual pads is to use pieces of p.c.b. material already,etched into multi-pad 'blocks' as shown in Fig. 4. A small hacksaw may also be drawn across the copper surface to remove copper channels and form six insulated islands.

Ideally the piece of copper board used should measure about 10 by 20mm but this is rather small and increasing the size slightly will help in making up the board. Such a board can directly replace the pad method and uses the same designations shown in Fig. 4.

The four diodes are also mounted on four individual pads as shown in Fig. 5. Take care to observe the correct polarity (anode and cathode) as mentioned above. As with the transformers, the island method of construction can be used. This time only four islands need to be made using hacksaw cuts.

The Diode Ring

Following my advice, T1, 2 and the diode ring will have been created; each on their own p.c.b. ground-plane. The photograph, **Fig. 5,** shows how these are arranged and interconnected on another piece of printed circuit board material measuring about 70 by 40mm.

The transformers T1 and 2 are arranged back-to-back with the diode ring in the centre. The single windings, 1a to 1b, become the oscillator input (osc In) and radio frequency input (r.f. in) and the output is taken from the 2b/3a connection on T2. The arrangement of the boards in Fig. 5 follows the alignment of the pads as shown in Fig. 4 and the layout of the circuit diagram in Fig. 1. Additionally Fig. 5 shows the connections between the pads or islands. **Note:** Don't forget to connect the 2b/3a connection on T1 to ground.

For the initial testing of the mixer I added three p.c.b. type phono sockets and a simple audio amplifier as shown in **Fig. 6**. The amplifier is a standard LM386 circuit that I have used many times with a single stage, 2N3904, pre-amplifier. This is because a diode ring mixer is a passive (unpowered) circuit and some signal is lost in the process so a reasonable amount of audio amplification is required.

Adding an input filter and a variable crystal oscillator (VXO) gives a simple test receiver. My test receiver showed that the mixer did work although it suffered from broadcast station break-through. However, this isn't surprising, as almost anything added in front of a high gain audio amplifier will pick up strong broadcast stations! Putting the mixer circuit inside a screening box is important. I used that old standby of the radio constructor – an *Altoids* mint tin. (Any similar metal tin or enclosure could be used).

The mixer in the tin is a handy module for any test bench and can form the basis of a useful receiver. I intend to follow up this article by describing additional circuits to go with the mixer module. The module could also be used to replace expensive commercial diode ring mixers, like the SBL1 or TUF-1 in other circuits. Hopefully I have described a foolproof method for making such a mixer. Enjoy the project! ●

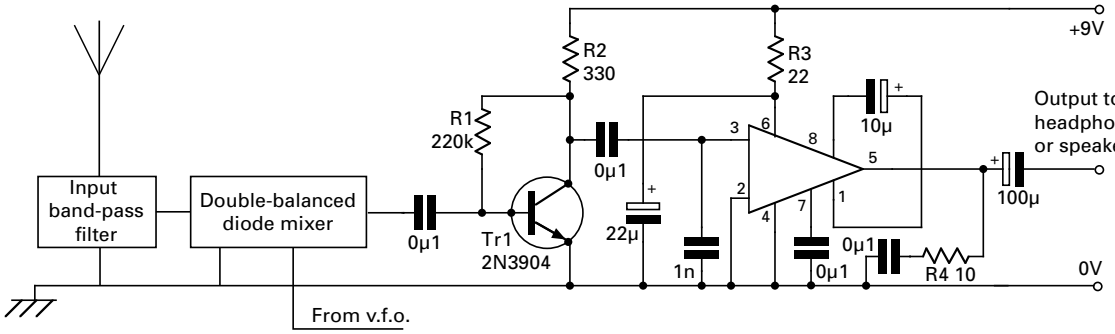


Fig. 6: To create a radio, George G3RJV used a high gain amplifier in conjunction with the double-balanced diode mixer.

Rallies

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.

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

SEPTEMBER

September 15th/16th
Transmission 2012
A newly formed group, the Central Radio Amateur Circle (CRAC), has volunteered to run Transmission – an annual contest and fundraising event for the British Wireless for the Blind Fund (BWFB). All money raised will go direct to the BWFB and will help to purchase specially adapted receivers for people living with sight loss.
Martin Hallard G1TYV
E-mail: radio-circle@live.co.uk
www.blind.org.uk

September 15th/16th
The AMSAT-UK Space Colloquium
The AMSAT-UK Space Colloquium 2012 will be held at the Holiday Inn, Guildford GU2 7XZ. The event will include a full lecture programme, a Gala dinner on the Saturday evening along with a fund raising auction, the AMSAT shop and GB4FUN.
www.uk.amsat.org

September 16th
The Torbay Communications Fair
The Torbay Annual Communications Fair will be held at Newton Abbot Racecourse, Newton Abbot, Devon TQ12 3AF. The doors will open at 10.00am (9.30am for the disabled) and admission will cost £2.00. There will be trade stands, a Bring & Buy, an RSGB bookstall, catering and facilities for the disabled.
Mike Dixon
Tel: 01803 557941
E-mail: rally@tars.org.uk

September 22nd
The Fog on the Tyne Rally
The Angel of the North Amateur Radio Club and the South Tyneside Amateur Radio Society will be holding The Fog on the Tyne Rally at the Whitehall Road Methodist Church Hall, Bensham, Gateshead NE8 4LH. The doors will open at 10.30am and admission will cost £1.50. There will be trade stands and catering will be available.
Nancy Bone G7UUR
Tel: 01914 770036 (Evenings)
E-mail: nancybone2001@yahoo.co.uk
www.anarc.net

September 23rd
The Great Northern Hamfest
The 22nd Great Northern Hamfest will be held at the Barnsley Premier Leisure Complex, Queens Ground, Queens Road, Barnsley, South Yorkshire S71 1AN. The doors will be open between 10.30am and 3.00pm and admission will cost £3.00. There will be trade stands, special interest groups, an RSGB bookstall, family attractions, a licensed bar, catering and facilities for the disabled.
Ernie G4LUE
Tel: 01226 716339
www.greatnorthernhamfest.co.uk

September 28th/29th
The National Hamfest*
The National Hamfest, organised by the RSGB in association with the Lincoln Short Wave Club, will be held at the George Stephenson Pavilion, Newark and Nottinghamshire Showground, Lincoln Road, Winthorpe, Newark NG24 2NY. The doors to the main hall will be open between 10.00am and 4.00pm on both days and the outside display area will open at 9.30am. There will be free parking, trade stands, a Bring & Buy, a flea market, special interest groups, catering and facilities for the disabled. In addition, there will be a range of RSGB stalls and Morse proficiency tests will be available on demand.
www.nationalhamfest.org.uk

OCTOBER

October 6th/7th
BATC Convention
The British Amateur Television Club (BATC) Convention will be held at the Everest Community Academy, Oxford Way, Basingstoke RG24 9UP. The doors will open at noon on Saturday 6th and the programme of lectures will commence at 1.30pm. On Sunday 7th, the event runs from 10.00am to 4.00pm, with the BiAGM taking scheduled for 11.00am. Online registration for the convention costs £10.00 for the two days or £7.50 per day on the door, with a 20 per cent discount for BATC members. In addition to the programme of lectures and BATC BiAGM, there will be trade stands, a Bring & Buy, special interest groups and a test and fix area.
www.batc.org.uk/club_stuff/convention/index.html

October 7th
The Autumn Hangar Sale
The Autumn Militaria, Electronics and Radio Amateur Hangar Sale will be held at the Hack Green Secret Nuclear Bunker, Nantwich, Cheshire CW5 8AL. The doors will open at 10.00am and admission will cost £2.50. There will be civil, military and vintage radio equipment plus vehicle spares and more.
Rod Siebert
Tel: 01270 623353
E-mail: coldwatr@hackgreen.co.uk
www.hackgreen.co.uk

October 7th
The Blackwood Rally
The Blackwood and District Amateur Radio Society Rally will be held at Coleg Gwent, Risca Road, Cross Keys NP11 7ZA. The doors will open at 10.00am and admission will cost £2.00. There will be talk-in on V44 (S22), car parking, trade stands, a Bring & Buy, special interest groups, catering and a prize draw.
Dave GW4HBK
Tel: 01495 228516
E-mail: gw4hbk@talktalk.net
www.gw6gw.co.uk

October 12th/14th
The RSGB Convention
The RSGB Convention will be held at Horwood House, Little Horwood, Nr. Milton Keynes, Buckinghamshire MK17 0PH.
www.rsgb.org/rsgbconvention

October 14th
The Hornsea Rally
The Hornsea Amateur Radio Club Rally will be held at the Floral Hall, 7 The Esplanade, Hornsea, East Yorks HU18 1NQ. The doors will open at 10.30am. There will be car parking, trade stands, a Bring & Buy, special interest groups, a prize draw, a licensed bar, catering and facilities for the disabled.
Rick M0CZR
E-mail: R106221@aol.com
Duncan G3TLI
E-mail: g3tli@hotmail.co.uk
www.hornseaarc.co.uk

October 20th
The Rishworth QRP Convention
The Rishworth QRP Convention will be held by the G-QRP Club at Rishorth School, Rishworth, Sowerby Bridge, West Yorkshire HX6 4QA. The doors will open at 10.00am and admission will cost £2.50. There will be talk-in on S22, on site car parking will only be available for the disabled but plenty of on street parking is available locally. There will be trade stands, surplus junk, a Bring & Buy, lectures on QRP related subjects, a large social area and catering (with the famous pie and peas) will be available all day.
www.gqrp.com/rishworth.htm

October 20th
The Carrickfergus Rally
The Carrickfergus Amateur Radio Group Rally will be held at Downshire School, Downshire Road, Carrickfergus BT38 7DA. The doors will open at 12.30pm and admission will cost £3.00. There will be car parking, trade stands (access for traders from 10.00am), a Bring & Buy, special interest groups, RSGB bookstall, Morse tests, catering and facilities for the disabled.
Tim MI0TBL
E-mail: carg@hotmail.co.uk
www.radioclubs.net/carg

October 21st
The Galashiels Rally
The Galashiels and District Amateur Radio Society Rally will be held at the The Volunteer Hall, St Johns Street, Galashiels, Scottish Borders TD1 3JX. The doors will open at 11.30am (11.15am for the disabled) and admission will cost £2.50. There will be trade stands, a Bring & Buy, a prize draw and catering will be available.
Jim GM7LUN
Tel: 01896 850245
E-mail: mail@gm7lun.co.uk

October 27th
The Radio Astronomy Group
The British Astronomical Association Radio Astronomy Group General Meeting will be held at the National Space Centre, Leicester LE4 5NS. This is an all-day event featuring keynote presentations, members' papers, displays of equipment and results. Admission costs £15.00 (£12.00 for BAA members) and includes a buffet lunch, tea/coffee during the day and entry to the National Space Centre. Car parking is free.
Paul G4CSD
Tel: 01256 470135
www.britastro.org/radio

October 28th
The Llandudno Rally
The Llandudno Rally will be held by the North Wales Radio Society at the John Bright School, Maesdu Road, Llandudno LL30 1LF. The doors will open at 10.00am and admission will cost £4.50, There will be car parking, trade stands, a Bring & Buy, special interest groups, catering and facilities for the disabled.
Gordon MW0GBR
Tel: 07733 531766
E-mail: rally@nwrs.org.uk
www.nwrs.org.uk

NOVEMBER

November 4th
The Holsworthy Rally
The Holsworthy Amateur Radio Rally will be held at Holsworthy Community College, Victoria Hill, Holsworthy EX22 6JD.
Roger Williams
Tel: 07773 983691
E-mail: gsowter@talktalk.net

November 10th
The Rochdale Rally
The Rochdale & District Amateur Radio Society will be holding their Traditional Radio Rally at the St Vincent de Paul's Church Hall, Caldershaw Road, off Edenfield Road (A680), Norden, Rochdale OL12 7QR. The doors will open at 10.30am (10.15am for the disabled) and admission will cost £2.50 (with concessions for the under 12s and the over 65s). There will be talk-in on S22, a Bring & Buy and catering will be available.
Dave G0PUD
Tel: 01706 346517
E-mail: dave.shaw1@sky.com
www.radars.me.uk

November 11th
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: info@radiofairs.co.uk
www.radiofairs.co.uk

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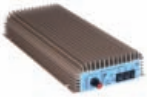

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A Low Cost Scanning Receiver for v.h.f.

Tim Kirby G4VXE presents his round-up of your activities above 30MHz and looks at an economical scanning receiver for v.h.f. and u.h.f.

Welcome to the column where we enjoy Amateur Radio above 30MHz – the *World of VHF* (*WoVHF*). If I said to you that you could have a reasonably sensitive v.h.f./u.h.f. scanning receiver that works on all modes for around £13, you'd be interested, I expect!

The other interesting aspect is that it provides a 'toe-in- the-water' to the world of Software Defined Radio (SDR), where the signal processing and decoding is done within your computer as opposed to the radio itself.

I'd been aware that people had been making various USB television dongles do interesting things, but it wasn't until **Richard Cooper G4WFR** (Southampton, Hampshire) mentioned on Twitter that he'd been trying one out, that I saw the specifics and how easy it would be to get something going.

The key point is that the USB dongle must have the RTL2832U chip and the E4000 tuner in it. A variety of different devices are available in this configuration, but I used a Newsky TV DVB stick which I found on eBay for the princely sum of £13 including postage.

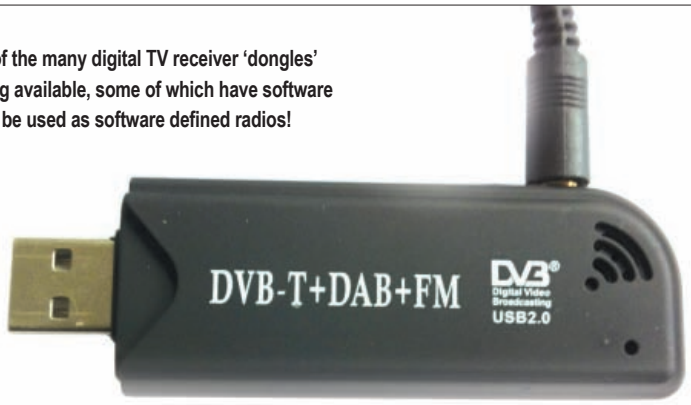
And full instructions of what you need to do to install the drivers and *SDR#* software are on Richard G4WFR's webpage **www.m9t.co.uk/**

The dongle comes with an antenna lead terminated in a Belling Lee socket. Therefore, I made up an adapter from a Belling Lee plug, to allow me to connect the dongle to my external v.h.f./u.h.f. antennas.

First Experiments

My first experiments, however, were using a 144/433MHz handheld in the shack to check that the dongle worked – it did....but! And here is a cautionary note, it seems that the front end on the dongle was not protected and I blew it up! Suddenly the £13 SDR project became the £26 one, as I had to order another dongle!

A number of people have suggested that the static protection diodes are missing on some of the dongles, so **Mike Willis G0MJW** (Harwell, Oxfordshire) suggested incorporating some protection in the adapter lead – he suggests a resistor, perhaps 1kΩ across the dongle input and an isolating capacitor (1nF) should do the trick. Thanks Mike! In any event, I recommend not transmitting too close to your dongle!



This is just one of the many digital TV receiver 'dongles' that are becoming available, some of which have software allowing them to be used as software defined radios!

Just on an internal antenna, I found I could receive 144MHz packet transmissions, 433MHz weather stations, Airband transmissions and of course, Band II f.m. In stereo.

Once the external antennas were connected, results were even better of course. One of the advantages of the SDR approach, is that you can see a panoramic display of where all the signals are on the band – so you can easily zero in on the activity, by clicking on the appropriate part of the display. The *SDR#* software works on all modes, so you are not just confined to n.b.f.m. or a.m. – you can listen on w.f.m. or s.s.b./c.w. It's very flexible.

Good friend of *Practical Wireless*, **David Butler G4ASR** (Herefordshire) tried out the dongle and *SDR#* software during a 70MHz Sporadic E opening, with his 70MHz Yagi antenna connected. He was able to decode the wide-band f.m. radio stations from Eastern Europe and then, as propagation changed, he was able to listen to an Estonian station on s.s.b. on 70.200MHz and then noticed a signal slightly higher up the band which provide to be another Estonian station using f.m.! David also connected his 144MHz Yagi antenna and was able to copy the GB3VHF beacon on 144.430MHz easily, at the same time, seeing APRS transmissions on 144.800MHz f.m.

What a flexible and useful little receiver project! Although you **do** need a reasonably up-to-date computer with a fairly fast processor and USB2.0. If you are a Linux user, then there's plenty of software to use in the same way that I have described. I hope you will be tempted to try it out and see what you can hear.

Project Horus Australia

It was good to hear from **Steve Mahony VK5AIM** (Elizabeth, South Australia) who very kindly included an article from the Australian magazine *Amateur Radio* on Project Horus, which is the Australian project, masterminded by **Terry Baume VK5VZI** to send balloons to 'Near Space'.

Some flights have carried RTTY

beacons, the 25mW signals have been decoded over 700km distant from the balloon. Other flights have included; an APRS beacon – the transmitter of which could be on the air for a period in excess of 24 hours powered by a pair of AA lithium batteries, or a cross-band repeater between 433MHz and 145MHz – which has proved very popular.

From an altitude of around 35km based on the usual launch site, the coverage of the repeater covers from west of Adelaide all the way across to Sydney in the East and almost to Tasmania in the south. A great project and we'll look forward to hearing more about future flights. Thanks Steve!

Heliograph Experiments

While it's not strictly v.h.f./u.h.f., I feel certain that readers will be interested to hear about the experiments that **Richard Gosnell G4MUF**, **Giles Herbert G0NXA** and **Ian Hopkins G4WUH** who have been making with heliographs. In other words they're reflecting the rays of the sun using a mirror that can be seen over long distances. Richard writes, "My planned foray into trying heliographing (flashing a mirror) over some distance has come to fruition at last.

"I knew that the only way to line-up the mirror beam accurately was to play the blob of reflected light onto an object in the foreground such as a fence post or tree foliage, all while holding the mirror as near as possible to my eyes to minimise parallax errors. This had to be done, such that the intended target appeared near-exactly in-line with, but not obscured by, the illuminated edge of my sighting object.

"During a walk on the Malvern Hills I carried an A4-sized mirror with me and I had made a schedule to be on S20 (145.500MHz) with Giles G0NXA, who kindly positioned himself down in the Severn Vale, at a point where he could see the whole line of the Malverns. There was irritating altocumulus cloud to begin with, and we were about to give up, but finally it cleared and we proceeded with the experiment.

"Giles had calculated the compass bearing from his location to one or two of the summits on the hills so I could look through my Sylva prismatic sighting compass, and note the point away in the vale at which I should aim my beam. After a few probes around with my beam, he reported back on 2m simplex that he saw random brief flashes, and they were quite bright, over a distance of 13.7km.

"After our picnic lunch on the hills, Ian G4WUH joined in the fun from near

Fig. 1: The rooftop 'portable heliograph' that Ian G4WUH used in his experiments with G4MUF.

Odda's Chapel near Tewkesbury and this was also successful over a 16.5km distance. Finally, from a footpath near Kempley, Ian saw my flashes again, still with talk-back on 145MHz, this time with me on British Camp at a distance of 13.3km – Ian also made a video of the 'flashing' as well as the 145MHz talk-back.'

The GB3WGI 144MHz Transatlantic Beacon

Thanks go to **John Worsnop G4BAO** for the update regarding the plans for the GB3WGI beacon, which is to try and exploit the Transatlantic path on 144MHz. John writes, "Over in the USA, **Brian Just WA1ZMS**, is making the final preparations to ship the beacon transmitter over to Northern Ireland. Thanks to the kind donation of antenna parts and clamps from **Derek Hilleard G4CQM** at Powabeam Antennas, beacon keeper, **Gordon Curry GI6ATZ**, is in the process of building the antenna system for the beacon, and installing the emergency shutdown system. We are aiming to have the beacon up and running before the year's end."

The 50MHz Band

Graham Boor G8NWC (Spalding) caught the Aurora briefly on July 15th and was able to work GM0OQV (IO85), MM0BSM (IO86) and MM0AMW (IO75).

Paul Bowen M0PNN (Shropshire) says that the Es season is winding down, but there is still some DX around – Paul sent in an interesting log, the highlights of which are UT8IV (KN87) and UY5QO (KN77) on July 1st. He caught a good opening to the USA on July 3rd, working N3DB, K3ZO and K1HTV (FM18). Closer to home, but just as nice was 1A0C on the same day.

July 4th was a good day with 1A0C worked again and OH0CO (KP00), ES5GP (KO38), ES2QN (KO29) and ES5QA (KO38) all worked. Paul found the band open to the south east on July 5th, working 9H1XT (JM75), 9H1CG (JM75) IS0BRS/P (JM49) and IF9ZWA (JM67).

During the Aurora on July 9th, he worked GM8LFB (IO88) and GM8IEM (IO78). July 14th was a good day, with YL, F, I, OE, OK, SM, ES, OH, EA, LA, EI all worked. Paul says that the aurora on July 15th was the best he's heard since getting his licenced. He worked GM3COQ (IO86), MM0CEZ (IO75), GM3WUX (IO75), GM0OQV (IO85), LA8HGA (JO58), EI4QF (IO54), G8BCG (IO70), GW4ZAR (IO83), GM4ZNC (IO75), EI9FBB (IO51), GD6IA (IO74) and PA2M (JO21). Nice contacts on July 18th were 5C13KD (Morocco) and CT7/G3SED by Es.

Stewart Wilkinson G0LGS (Cheltenham, Gloucestershire) had a successful time during the Aurora on July 15th working 27 QSOs – the highlights of which were GM7PKT (IO76), GM4PMK (IO66), EI4FK (IO54), G1BBY (IO95) and SM7FJE

(JO65). Stewart has a good station and runs 400W to a 4-element LFA-S at 6m AGL.

Peter Goodhall 2E0SQL (Oxford) has added a rotator to his 50MHz antenna system which as he puts it, saves a lot of running up and downstairs! Peter worked GW2OP/P (IO71) during VHF NFD and made his first 50MHz Auroral QSO with Jim Rabbetts GM8LFB (IO88) on July 15th. Peter found some Es on July 26th, working SM2VJX.

Jeremy Smith M0XVF (Spennymoor, County Durham) enjoyed a QSO during the Aurora on July 15th with G7DWY (IO93). What was notable was that Jeremy was using his 7MHz dipole as an antenna!

Ernie Stagnetto ZB2FK (Gibraltar) caught a five minute opening on July 18th when he worked six stations in five minutes starting at 1820z; EI2KC, S57R, S52NR, G4HBA, EI9HC and S59ACP.

Philip Oakley G0BVD (Great Torrington, Devon) has made some interesting QSOs throughout the month, mostly by Es but the real highlight was working GM8LFB (IO88) via the Aurora on July 15th. This was a particularly special QSO as Phil and Jim speak regularly on-line, but had not had an on-air QSO before!

The 70MHz Band

Peter Lee G4GEW (Coulsdon, Surrey) wrote to the Editor wondering why, given that there are more and more countries getting access to 70MHz, there's not more commercial equipment available. In trying to answer Peter's question, I think it is probably fair to say that the mainstream manufacturers will probably not come out with any specific gear for the band unless countries (markets) such as the USA or Japan are able to use the band.

However, perhaps we may see 70MHz included in more multi-band rigs. The FT-847 was a first step in this direction, but needs a fair amount of 'improvement' to make it into a serious rig for the band. Most people still use transverters on 70MHz to good effect.

Here at **G4VXE** I have made a few interesting QSOs during the month. July 14th was a good day with plenty of Es around, mostly towards Estonia and Finland. Later in the day, a weak EA8BPX was heard working into Estonia – that's a good long path!

The 144MHz Band

Paul Bowen M0PNN worked a good number of stations on the band during the National Field Day contest on July 7th/8th. Highlights were ON4WY (JO10), GI1CET/P (IO74), MM0CPS/P (IO84). PA1T (JO33), TM2K (JO10), GI4GTY/P (IO74), GM6MD/P (IO75), DF0MU (JO32) and GM0FRC/P (IO86). There was an exciting Es QSO on July 13th when Paul worked I5TWK/8 (JN70) at 1504z. During the Aurora on July 15th he worked GM4BYF (IO85), GM0HTT (IO89) and GM8IEM (IO78). Paul worked a new square on July 17th; G7RAU/P (IN79) at the Lizard in Cornwall.

Fig. 2: The Athens QRP Net team with their 6-element 144MHz Sandpiper antenna used from Mount Parnitha.

Stewart Wilkinson G0LGS (Cheltenham, Gloucestershire) worked GM0HTT (IO89) and GM0PWS (IO87) during the Aurora on July 15th.

Peter Goodhall 2E0SQL (Oxford) worked a few interesting stations during the VHF National Field Day on July 7th and 8th including GW2OP/P (IO71), TM2K (JO10) and ON4WY (JO11)

Panos Dadis SV1GRN (Athens, Greece) reports that his friend **Costas SV1IXP** has been experimenting with an SDR transceiver of his own design that covers both 144 and 432MHz. Panos said that it performed very well when they operated as SX1Q during the Aegean VHF Contest on July 7th and 8th and that it was a pleasure to be able to watch the panadapter display of the band and see where the activity was.

On July 22nd the Athens QRPNet team (including Panos) operated portable from Mount Parnitha (KM18) and made some good QSOs including SV2BBO/P (KN10), SV8/SV1MNE/P (KM27), SV9AQI (KM25) and TA1BM (KM39)

The 432MHz Band

Paul Bowen M0PNN worked EI9E/P (IO62) for a new country on the band during NFD, just using his vertical!

Satellite Operations From Scotland

Peter Goodhall 2E0SQL (Oxford) wrote from Scotland where he was holidaying and operating as 2M0SQL/P using his FT-817 and Arrow satellite antenna. Peter writes, On July 30th, "I decided to get on the air, sat on my Gran's front lawn (IO87IP) in Elgin, I managed to work 2O12W via FO-29 at 13:05. It was then decided to go to the beach, so operating from the harbour front in Lossiemouth (IO87IR). I managed to work DG0EA, EA1QS (IN52QL), G1SSA/P (JO02BE) EA1BYC at 14:00 I have to admit I got some strange looks from people operating with the hand-held beam from the breakwater!

"Next day, I again did some operating from Gran's front lawn, in Elgin (IO87IP). First up was VO-52 at 1907 when I worked OH5LK (KP30ON) who gave me a 55 report which isn't bad considering the antenna and power level I was more impressed as I had no way of hearing myself on the downlink! Next pass was SO-50 at 19:21 when I worked DL6ZG (JO21WB) and G1SAA/P (JO02BE)".

From home in Oxford, Peter has made a good haul of QSOs on the satellites as usual. A particularly nice one was with G0UFV on AO-27 who said that it was his first ever satellite QSO! Peter made some excellent QSOs on FO-29 in particular, with the highlights being R7LB (LN17), EA8HB (IL18) and CT3FM (IM12).

That's All Folks!

Please keep your interesting emails, pictures and news coming – they are very much appreciated. The September/October period typically brings good tropo on the bands and perhaps this year, there will be some F2 to look for on 50MHz. Keep me posted and enjoy the bands! ●

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Don't forget – all reports to Carl by the 15th of each month please!

Celebrating Amateur Radio & The Titfield Thunderbolt!

Carl Mason GW0VSW starts off his round-up of your h.f. reports and activities with news for radio and railway enthusiasts. Don't forget to send in your news and photos by the 15th of each month please!

Welcome to this month's *HF Highlights* (*HFHL*) and I'm starting with news of a rather interesting Special Event station being run by the **British Railways Amateur Radio Railways Society** (BRARS). **Mark Proctor G1PIE, Fig. 1**, wrote in to say "I'm running the club callsign **GX4LMR** (**Fig. 2**) to celebrate the 60th anniversary of the filming and screening of *The Titfield Thunderbolt* produced by Ealing studios in 1952-1953.

The film is a 1953 British comedy film about a group of villagers trying to prevent British Railways from closing the fictional Titfield branch line. It was written by T.E.B. Clarke and was inspired by the restoration of the Welsh narrow gauge Talyllyn Railway which was the world's first heritage railway run by volunteers.

Nearly all of the location work for the film was shot in the picturesque Cam Valley just a couple of miles South of Bath. The railway in question was the Limpley Stoke to Camerton branch of the Great Western Railway which had closed in 1951 when Camerton Colliery stopped operating in 1950. Titfield station was, in fact the old station at Monkton Combe though the set designers made various 'period' alterations to the building.

The film was the first Ealing comedy to be shot in Technicolor and one of the first colour comedies made in the UK. A special QSL card with a railway theme has been produced. The call will run will run through to end of the year and operation is expected to be on 7MHz s.s.b. and PSK.

A QSL will be good via the bureau or direct to **Pam Proctor 2E1HQY** (**Fig. 3**). Check out the BRARS website at **www.radioclubs.net/britishrailwaysars/** for up-to -date news and information and **www.british-film-locations.com/Titfield-Thunderbolt-(1953)** or **http://eis.bris.ac.uk/~liserc/tit.html** for further details on the railway and film, which is still available from Amazon.co.uk at £5.67 (**Fig. 4**).

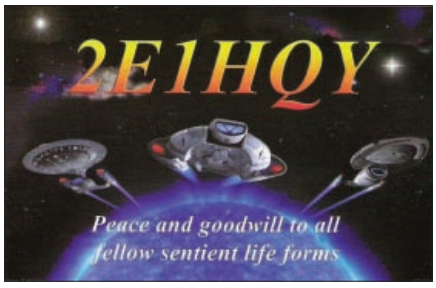

Fig. 3: Pam Proctor 2E1HQY (also a *Star Trek* fan!) is handling the QSL cards for GX4LMR.

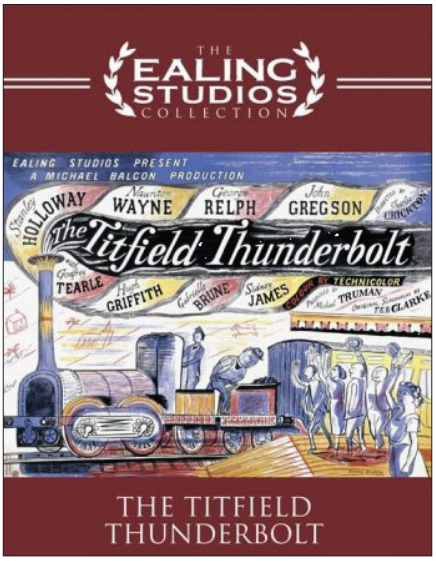

Fig. 4: The *Titfield Thunderbolt* film is still available and often appears on TV.

The DX News

I'll start off the DX news by mentioning the special event stations **7T50I** operated by **Radio Club Algiers** and **7U50I** and **7V50I** both operated by **Radio Club Laghouat**, and **7W50I** operated by Radio Club Bou-Saada and **7Y50I** operated by Radio Club Mostaganem. These stations will be active until the end of the year on all h.f. bands to celebrate the 50th anniversary of the independence of Algeria.

A special award is available for working the Algerian stations and 7T50I is worth 10 points, the rest five points and any 7X station is worth three points. You need 50 points for the award and further

Fig. 1: British Railways Amateur Radio Railways Society (BRARS) member Mark Proctor G1PIE is also Star Trek fan!

Fig. 2: The Special Event Station GX4LMR is celebrating the 60th anniversary of the filming and screening of The *Titfield Thunderbolt* produced by Ealing studios in 1952-1953.

details can be found by at **www.ara-dz.org/**

Your Reports

On to your reports next and first to the **Aberdeen Amateur Radio Society** (**GM3BSQ),** which takes part in the RSGB Low Power Contest every year and is known by its members as their 'QRP Field Day'. This year they operated from Walker Park, Aberdeen not far from Girdleness Light House and the site of previous AARS events.

The weather was extremely windy at this exposed location, so strong that the team could not rig their tent and equipment. So after several failed attempts they had to abandon the site.

Team member **Allan Duncan GM4ZUK** came to the rescue and offered his home QTH with large garden to set up the station in what turned out to be a rather more sheltered part of the Aberdeenshire Countryside! After collecting all their equipment from the original site the operators moved location and managed to rig a smaller tent and an 11m mast in Allan's garden making their first "CQ" calls an hour later than expected at 0958UTC.

The contest is very sedate and even includes an hour's lunch break at 1300 local during which time Allan kindly supplied burgers from his BBQ set-up. These were very welcome by the other operators **Michael Gerrard MM0ROV** (**Fig. 5**) and former Radio Officer **Norman Mackenzie GM3WIJ**.

The equipment used included an Elecraft K2 running 10W with a 3.5/7MHz trap dipole and a Netbook computer running *SD* logging software, all powered from batteries. Band conditions seemed reasonable at the time though the amount of activity on was very low.

An 'EA' contest was also running at the same time which did not help matters so, with their late start and lack of stations in the contest they did not do

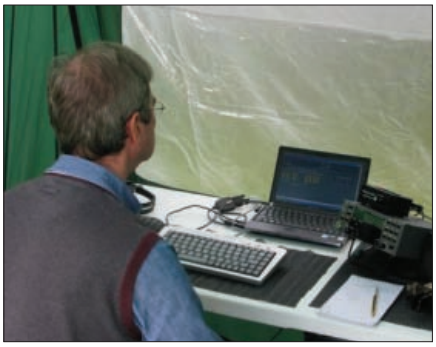

Fig. 5: Michael Gerrard MM0ROV operating the Aberdeen ARS station GM3BSQ during the low power field day from Allan Duncan GM4ZUK's large garden.

nearly as well as last year when they won the 10W /P section with 120 QSOs. This year the total was almost half that with just 68 QSOs making the log, a big disappointment for the team. However, a good time was had by all and plans are already being made for next year's contest.

On to another Scottish activity next and reporting back from his trip to one of the most southerly Scottish islands, the Isle of Arran EU-123 is **Geoffrey Pendrick MM5GAC/P** who commented "Conditions on the bands were very poor during the day and I found working late into the evening on the 7MHz bands got me better results. By the end of the week 239 contacts had made my log and the WAB square NS02 was of interest to a good number of those that did manage to get me and many had not worked Arran before!

"The rig used was the Yaesu FT-840 running around 80W and the antenna was a simple 30m (100ft) top doublet inverted. It was not my intention to run a DX station but just to see who I could work in the time available. My log contains contacts with stations throughout the UK, also into Belgium, Czech Republic, France, Germany, Holland, Ireland, Italy, Norway, the Shetland Islands, Slovenia and the Ukraine.

If those stations that contacted me would like a QSL card to confirm the contact I am more than happy to oblige." Geoff's details are on *qrz.com* under his callsign M5GAC.

Also on the band was **Martin Addison 2E0MCA** in Finchley, London whose log included s.s.b. QSOs with F2YT/P (France) 0821 in WFF FFF-1146, ON2WAB/P (Belgium) 1051, DN4SB (Germany), **Fig. 6**, at 1230 with a special callsign used for the education and training of pupils of St.Bernhard-Gymnasium in Willich-Schiefbahn and a large list of UK stations using a Yaesu FT-2000, running 10W to a half sized G5RV. He is now looking forward to doing some portable work with a newly acquired FT-817.

In Tamworth, Staffordshire **Geoffrey Powell M1EDF** worked **Mike Gloistein GM0HCQ/MM**, **Fig. 7**, again on board the Royal Research Ship (RRS) *James Clark Ross* using c.w. at 60W on 10MHz and a doublet antenna at 2011UTC with band conditions rather poor at the time.

The 14MHz & 18MHz Bands

On the 14MHz band now and **Bill Ward 2E0BWX** in Edwinstowe, Nottinghamshire who used an Icom IC-7400 and 25W to a Pro whip and with PSK31 logged F6EAO/P (France) 1130, RA3YAO (European Russia) 1148, S51ZZ (Slovenia) 1246, OZ9ACV (Denmark) 1256, DK9MH (Germany) 1415, EC1DBO (Spain) 1429 and EN3DC (Belarus) 1959UTC.

The PSK signals from **Tom Hutton G0HUT** in Farnborough, Hampshire found ON5IK (Belgium) 0931, and at 1057 he worked Special Event station DQ775BLN (Germany) – **Fig. 8** – which was celebrating the 775th anniversary of the founding of the city of Berlin. Then came EO2012I (Ukraine) 1442 with a special callsign for the EU Football Championships (QSL via US7IO). Next into the log went A45XR (Oman) 1751 and R12GGGR (European Russia)

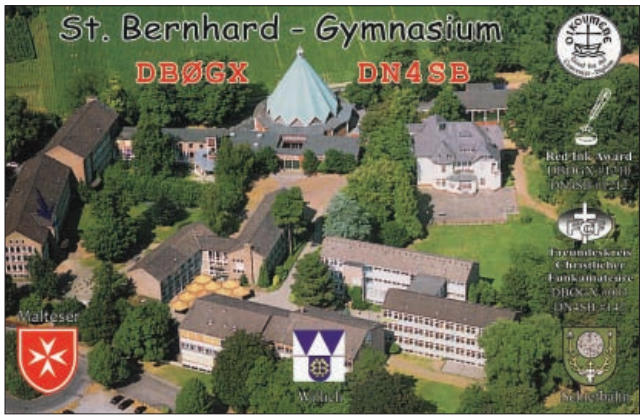

Fig. 6: The DN4SB QSL card sent to Martin Addison 2E0MCA following their QSO.

Fig. 7: Mike Gloistein GM0HCQ/MM operates from the Royal Research Ship *James Clark Ross.*

Fig. 8: The QSL card sent to Tom G0HUT after he worked the Special Event station DQ775BLN.

Fig. 9: Colin Goodwin 2E0BSW received this QSL card from HF2012EFC (Poland).

Fig. 10: George G3ICO received this QSL card from VR2KF after a 5W c.w. QSO on 18MHz.

at1750 (a special callsign from the Marine Academy RZ1AWZ, St. Petersburg (QSL via UA6MM). Tom was using a Yaesu FT-450 and 30W to a Cobra vertical antenna.

In Malvern, Worcestershire **Colin Goodwin 2E0BSW** used a Icom IC-703 and 10W to a 14MHz dipole from Miracle antennas to log RK3QZ (European Russia) 1802 and CT1DQV (Portugal) at 1943. Next came HF2012EFC (Poland), **Fig. 9**, at 1949 with another special EU football callsign. Colin was using a Q-TEQ Penetrator antenna and the last stations worked was ER1MM (Moldova) 1805 and YU2TT (Serbia) at 1809UTC.

The 18MHz band provided **George Davis G3ICO** in Yeovil with CO8LY (Cuba) NA-015 at 1050, OH0/OK1AMM (Aland Islands) EU-002 at 1315, LY54SOP (Lithuania) 1407 and points for the Sea Of Peace award given for contacts with different countries or areas bordering the Baltic Sea and Norway every year from July 1st to July 31st of July. (QSL via LY5W).

Next into the log were JE2EHP/6 (Japan) AS-007 at 1426, W7QS (USA) 1442 in Seattle, Washington, A6/DL9WVM (UAE) 19025C13YR (Morocco) 1916 (a special callsign to mark the 13th Anniversary of the enthronement of His Majesty King Mohammed VI (QSL via 6K5YPD). Then came VR2KF (Hong Kong), **Fig.10**, at 1854UTC. All were achieved on the key using an Elecraft K2 using 5W to a doublet antenna.

The 18MHz band also provided **Eric Masters G0KRT** in Worcester Park, Surrey with a few c.w. QRP contacts. He worked SQ5OUO (Poland) 1528, EW8A (Belarus) at 1534 using a Kenwood TS-570 at 5W and modified W3EDP antenna tuned with an SG-230 smart tuner

It was another Special Event operation for **John Wakefield M0XIG** who used the call **GB5NTT** for **Nettlecombe Tout Telegraph** to commemorate over 200 years of the Royal Navy's Shutter Telegraph system between London and Plymouth. There were c.w. contacts for John with RY7G (European Russia) 1345, OM3CND (Slovak Republic) 1400, EA5VK (Spain) 1402, HA0HW (Hungary) 14.3, S51GL (Slovenia) 1404, IK7YZL (Italy) 1527, and DK4WF (Germany).

Finally, John worked PC5WB (Netherlands) at 1913UTC. He was using a Yaesu FT-1000MP MkV, an Acom 1000 amplifier running 300W. The antennas were either a Butternut HF6V vertical with 100 10m radials or a WA2NAN G5RV inverted with centre at 10.6m (35ft) and ends at 7.6m (25ft).

In Biggleswade, Bedfordshire **Owen Williams G0PHY** used a Yaesu FT-2000 and 100W to a dipole antenna working AT1HQ (India) at 2030, 9K9HQ (Kuwait) at 2138 and CX1AA (Uruguay) at 2140.

THE 21 & 24MHz Bands

On the 21MHz band Owen worked one station, HD2A (Ecuador) at 2206 UTC before calling it a day.

In Kitchener, Ontario in Canada, **Dennis Upton VE3UTN** continues to sing the praises of his indoor 'Crown' wire loop which is based on one I constructed to fit in my loft a few years ago. Dennis now uses his for SSTV, s.s.b. and PSK operating and modified my original design to fit under his roof.

Dennis was curious how this would perform outside and wanted to experiment further and after discussing this with fellow members of the **Elmira ARC VE3ERC** they set up a 'super' Crown loop for their annual field day. The antenna was constructed from wire 77m (250ft) long in the same shape as the original design – but in the middle of a local farmer's field.

Fortunately, the weather was good and the antenna was soon finished and ready for the first tests. The bands were not in great shape but DX was heard with good signal strengths. However, to transmit and be heard, far more power had to be used than the usual 10W Dennis uses at his QTH.

The members decided that this was probably because the wire was so close to the ground at its lowest points and should really be elevated higher for better results. The plan now is to rebuild the antenna. Watch this space!

Back at his QTH Dennis found 21MHz open and logged PSK stations CU5AQ (Azores) EU-003 at 1452, HB9BRU (Switzerland) 1515, ON4AVT (Belgium) 1523, ZS6GRL (South Africa) 1918, YV6DH (Venezuela) 2033, MQ0WAY 2119, EI7GB (Ireland) EU-115 at 2134, LW1DG (Argentina) 2156, HC6EP (Ecuador) 2303 and TI3VLM (Costa Rica) 2321UTC using a Yaesu FT-857D and 10W.

The 21MHz band was also chosen by **Terry Martin MQ0CLH** in Wantage, Oxfordshire for airing the 'MQ' jubilee prefix and it proved to be very popular. Using an Icom IC-756 Pro running 100W to a home-brew doublet antenna Terry worked s.s.b. logging RN6LQ (European Russia) 0942, and HA6VH (Hungary) at 0943.

Then came IZ2EIH (Italy) 0946, F6EKI (France) 0946, UA9SGQ (Asiatic Russia) 0952, HB9TLM (Switzerland) 0955, JA4MOK (Japan) 0956, EA1FL/P (Spain) 1000, SP5VJO (Poland) 100. Finally, he worked K2WCT (USA) 1003 in Rockaway, New Jersey, EA8CAZ (Canary Islands) AF-004 at 1028 and SM6USW (Sweden) 1046UTC.

Trying the 24MHz band Eric G0KRT found conditions poor but using 100W s.s.b. he found 9A8VB (Croatia) at 1818, while 5W c.w. just worked 5P12EU (Denmark) at 1845 with a call celebrating the Danish Presidency of the EU (QSL via OZ0J).

The 28MHz Band

Finally, the 28MHz band had a few short openings and Eric G0KRT used 100W s.s.b. to contact YT0HQ (Serbia) 0923 and later I5KAP (Italy) at 1451 – while 5W QRP c.w. worked OZ2TF (Denmark) at 1833.

George G3ICO in Yeovil managed one QRP contact with 7Q7BP (Malawi) at 1412UTC (QSL via G3RMC.

Signing Off

Well that's it for this month and it was good to see all your reports which showed that despite the relatively poor conditions there was still plenty to work! 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 time I wish you all good DX.73,Carl GW0VSW ●

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It's time to get ready for a great day out on 70MHz! Sunday September 23rd 2012.

The Fourth Practical Wireless 70MHz Contest

Sponsored by InnovAntennas

The Editor's acknowledgements: My thanks go to our Contests Adjudicator **Colin Redwood G6MXL** for his hard work organising our v.h.f. contests. It's imperative that everyone who can get on the air to support the contest does so this year. Please join in and enter a log! Good luck everyone! **Rob G3XFD.**

The 2012 Contest Introduction

The 4th *Practical Wireless* 70MHz Contest takes place on Sunday September 23rd 2012 from 1200 to 1600 UTC. As in 2011, the contest is split into two sections. The low power section continues with a power output limit of 10W, which enables Foundation Licence holders to compete on an equal basis. A high power section has also been added to allow stations to run up to the full power permitted by their licence conditions.

The rules are very much in line with those used last year, and are based on the popular *Practical Wireless* 144MHz QRP Contest. For those new to the 4m band, the *Practical Wireless* 70MHz contest is a perfect introduction to the friendly nature of contesting to be found on the band.

Choice Of Equipment

The choice of equipment at 70MHz is somewhat limited in comparison with 144MHz. Please don't let this put you off, as 70MHz is a band where f.m. and a.m. modes can be used to make some quite long distance contacts. Cheap ex-PMR equipment running a.m. or f.m. is used by many stations to great effect on the band.

A number of f.m. transceivers have come onto the market in the last year or so which cover the 70MHz band. These include the Wouxan KG-UDV1P/L 4m and 2m dual–band hand-held, the Wouxan KG699E/4m handheld, and the Mydel ML-5189 mobile. Hopefully the availability of these cheap transceivers will encourage more readers to join in this year.

Transverters are another popular way to get on the band, using a main rig, usually on 28MHz and, on transmit, convert the signal up to 70MHz. On receive the transverter converts the 70MHz signal back down to 28MHz. A few transverters have also been made to enable a main rig on 144MHz to use the 70MHz band.

Note that transverters usually require a drive level much less than the full output power of most h.f. and v.h.f. transceivers, sometimes just as little as a few milliwatts. Spectrum Communications in Dorchester have a good range of transverters available as kits or ready to use.

Antennas For 70MHz

With comparable antennas needing to be twice the size that they are on 144MHz, many stations will perhaps be using nothing more than a simple dipole or quarter-wave vertical. Most stations with Yagi antennas are likely to have fewer than six elements.

For operation on a.m. and f.m., vertically polarised antennas are generally used. For operation on upper sideband and c.w. most stations use horizontally polarised antennas. As the 70MHz band has gained popularity in recent years, many antenna suppliers have added 70MHz antennas in their ranges.

Operating Modes

For those used to s.s.b. and c.w. on other bands, I would suggest spending some time on f.m. and a.m. You could be in for quite a surprise at just how many stations are using these modes.

If you are new to 70MHz, the one thing that you may find different to other bands is that slow QSB (fading) is a common occurrence on the band. You may find that stations disappear for a minute or two and then re-appear.

If you are using a directional antenna, please don't forget to rotate it. In previous years there has been activity from almost all parts of the British Isles, including a number of EI stations. Some stations probably missed out on contacts simply by not looking for contacts in all directions, or trying to work stations off the back of their beams.

Your Import Entry!

After the contest, please submit your entry! Although electronic entries via E-mail are preferred, the 'computer-phobes' among you will no doubt be pleased to know that you can easily submit an entry without going anywhere near a computer if you wish!

The preferred form of a log is a computer file sent by E-mail. This may be a file generated by contest logging software, such as EI5DI's *SDV* or *MINOS*, provided it contains all the information listed above.

The log spreadsheet has proved to be popular with many entrants over the last two years. It can be downloaded from the PW Contest web site at **http://www.pwcontest.org.uk**

Submitting logs using either the spreadsheet or REG1TEST format will assist the adjudicator.

Files in any other suitable format (plain text is fine provided each of the items required is separated by a separating character such as a comma or tab) can also be accepted. Please don't mix separators within your entry!

All entrants should please note that the contest web site is **www.pwcontest.org.uk**

E-mailed entries should be sent to **contest@pwpublishing.ltd.uk**

Postal entries should be sent to **Colin Redwood G6MXL, 53 Woodpecker Drive, Poole, Dorset BH17 7SB.**

No matter how you submit your entry, please note that it must be **received by October 16th 2012. Late entries will not be accepted.** If you are entering by post, you are recommended to use first class post.

Please clearly mark your entry for the 70MHz contest.

Make A Note Of The Date!

Make a note in your diary now, the Fourth *Practical Wireless* 70MHz Contest takes place on **Sunday September 23rd 2012**. Don't forget to charge your batteries a day or two before, and make a note in your diary to remind yourself to submit your 70MHz entry to be received by **Tuesday October 16th!** Let's hope for some good propagation on the day so that we can all have a really enjoyable time.

Good luck to you all – and if you enter you could win an InnovAntenna Prize donated by Justin Johnson G0KSC!

The 2012 Rules

Practical Wireless 70MHz Contest 2012

Date 23rd Sept 2012	Callsign (incl /P)	Locator	Sheet no. of

Time **UTC** (BST-1)	Callsign (including /P)	Sent		Received		Locator *
		Report	Serial	Report	Serial	

The preferred form of contest logging sheet.

1: General; The contest is open to all licenced Radio Amateurs, fixed stations or portable, using s.s.b., c.w., a.m. or f.m. in the 70MHz (4m) band. Entries may be from individuals or from groups, clubs, etc. The duration will be from 1200 to 1600 UTC on Sunday September 23rd 2012.

All stations must operate within the terms of their licence and only transmit within the 4m allocation they are licensed to transmit in. Stations using transverters are reminded to be particularly careful to ensure that they donít transmit out of band.

Subject to licence conditions, split frequency operation is permitted for the purpose of working stations in countries with different 4m allocations. Cross band contacts where either station is NOT operating between 69.0MHz and 71.0MHz, will not count for points.

Entrants must observe the band plan for their country and keep clear of normal calling frequencies (e.g. 70.200MHz). Entrants must avoid using any frequency that is obviously in use for non-contest purposes. The 4m band is not an exclusive amateur band in many countries. Contest stations must allow all other users (including non-amateur users) of the band to carry out their activities without hindrance.

The station must use the same callsign throughout the contest and may not change its location. Special event callsigns may not be used. Entrants not operating as a fixed station must use the /P callsign suffix.

2: Contacts; Contacts will consist of the exchange of the following minimum information.

(i) callsigns of both stations (including any /P suffix)
(ii) signal report, standard RS(T) system
(iii) serial number: a 3-digit number incremented by one for each contact starting at 001 for the first contact
(iv) locator (i.e. full 6-character IARU Universal Location for the location of the station).

Information must be sent to, and received from, each station individually, and contacts may not be established with more than one station at a time. Simultaneous transmission on more than one frequency is not permitted.

If a non-competing station is worked and is unable to send his full universal locator, their location may be logged instead. However, for a square to count as a multiplier (see rule 4), a full 6-character locator must have been received in at least one contact with a station in the square.

Contacts via repeaters or satellites or using digital modes (including DSTAR) are not permitted.

3: Power; In the low power section, the output power of the transmitter or transverter final stage must not exceed 10W p.e.p. If the equipment in use is usually capable of a higher power, the power shall be reduced and measured by satisfactory means. The simplest way is often to apply a (variable) negative voltage to the transmitter a.l.c. line reached via the accessory socket. Stations cannot rely on feeder loss to meet the 10W power limit.

In the high power section, stations may use whatever power they are permitted to use by their licence conditions.

4: Scoring; Each contact will score one point. The total number of points gained in during the contest will then be multiplied by the number of different locator squares in which contacts were made (a ‘square’ here is the area defined by the first four characters of the universal locator).

Example: 52 stations worked in IO81, IO90, IO91, IO92 and JO01 squares; final score = 52 x 5 = 260.

Only one contact with a given station will count as a scoring contact, even if it has changed its location, e.g. gone /M or /P. If a duplicate contact is inadvertently made, it must still be recorded in the log and clearly marked as a duplicate (not necessary in computer logs submitted by E-mail).

5: The Log; Logs may be submitted by E-mail or by post. In either case the log must contain the following information for each contact:

(i) time (UTC - NOT BST)
(ii) callsign of the station worked (including any /P suffix)
(iii) report sent
(iv) serial number sent
(v) report received
(vi) serial number received
(vii) locator received (or location).

The preferred form of a log is a computer file sent by E-mail. This may be a file generated by logging software, provided it contains all the information listed above, or a file in any other suitable format (plain text is fine) provided each of the items above is separated by a separating character such as a comma or tab. Give the file a name including the station call sign (e.g. g6mxl-p.log), and send as a standard E-mail attachment to **contest@pwpublishing.ltd.uk**

Most formats of log are acceptable. The REG1TEST format or the spreadsheet available on the contest website **www.pwcontest.org.uk** is preferred. If there is any problem with your entry, you will be contacted by E-mail.

If a computer log file is not available, a paper log may be sent by post. This must be clearly written on one side of A4 sized paper only, ruled into columns for each of the items listed above. Underline or highlight the first contact of the locator squares worked. At the top of each sheet, write:

(a) callsign (including /P suffix) of your station
(b) your locator as sent
(c) sheet number and total number of sheets (e.g. ìSheet no. 3 of 5î)
(d) 70MHz.

Log sheets and covering information sheets which may be used for paper-based

entries are available for downloading from the contest web site **www.pwcontest.org.uk**

6: Entries; The covering information listed below must be provided with each entry. The preferred method of submitting this is by the use of the online facility on the web site **www.pwcontest.org.uk**

Alternatively, the information may be written in the E-mail message to which the log file is attached. For entries sent by post, it should be written on a separate sheet of A4-sized paper.

The information required for every entry is:

(a) name of the entrant (or of a club etc. in a group entry as it is to appear in the results table and on the certificate
(b) callsign used during the contest including any /P suffix (e.g. G6MXL/P)
(c) name and address for correspondence
(d) location of the station during the contest
(e) full 6-character locator as sent during the contest
(f) whether single or multi-operator (a single-operator is an individual who received no assistance from any person in operating the stations, which is either his/her permanent home station or a portable station established solely by him/her); if multi-operator include a list of operators' names and callsigns
(g) total number of contacts and locator squares worked (not required for a log sent as a computer file)
(h) list of locator squares worked (not required for a log sent as a computer file)
(i) a full description of the equipment used including transmitted p.e.p. output power
(j) if you are entering the low power section, and the transmitting equipment (including any transverter employed) is capable of more than 10W p.e.p. output, a description of the methods used (i) to reduce and (ii) measure the output power
(k) antenna used and the approximate station height in metres above sea level (a.s.l.)
(l) if you receive or send a report of poor quality signals (e.g. wide / splattering), full details of the complaint, including time, callsign, nature of complaint and actions taken during the contest to investigate and resolve
(m) the following declaration must be included in the E-mail text or written and signed by the entrant: ìI confirm that the station was operated within the rules and spirit of the event, and that the information provided is correct!

Failure to supply the required information may lead to loss of points or disqualification.

Practical Wireless
70MHz Contest 2012
Please do not write above this line

70MHz Cover Sheet

The following information must be provided, as required by Rule 6.

PLEASE ENSURE THAT THE CALLSIGN INCLUDING ANY SUFFIX (e.g. /P) AND THE LOCATOR ARE THE ONES THAT YOU USED DURING THE CONTEST

(a) Name of entrant, club or group, as it is to appear in the Results List:

(b) **Callsign including any /P suffix (e.g. G6MXL/P) used during contest**:

An example of the top of a cover sheet that should accompany each entry.

Entries & Other Information
Entries by E-mail must be sent to **contest@pwpublishing.ltd.uk**
Paper entries should be sent to: ***Practical Wireless* Contest, c/o Colin Redwood G6MX**L, **53 Woodpecker Drive**, **Poole**, **Dorset BH17 7SB**.

Entries must be received not later than **Tuesday October 16th 2012**. Late entries will be disallowed.

Any other general comments about the station, the contest and conditions during it are welcome (written on a separate sheet of paper in the case of entries sent by post). Photographs of the station are also invited. Please note photographs cannot be returned and may be used for publication in Practical Wireless or on the **www.pwcontest.org.uk** website. If these are not available by the time the entry is submitted, they may be sent later by E-mail or post, to arrive by **November 1st 2012**. The results will be published later this year in *Practical Wireless*.

7: Miscellaneous; When operating portable, obtain permission from the owner of the land before using the site. In particular observe any restrictions on access associated with Bird 'Flu, Blue Tongue and Foot & Mouth, etc. Always leave the site clean and tidy, removing all litter. **Observe the Country Code**.

Take reasonable precautions to avoid choosing a site which another group is also planning to use. It's wise to have an alternative site available in case this problem does arise.

8: Poor Signals; Make sure that your transmitting equipment is properly adjusted and is not radiating a broad or poor quality signal, e.g. by over-driving, excessive speech compression or low voltage supply. On the other hand, be aware that your receiver may experience problems due to the numerous strong signals it will have to handle, and that this may lead you to believe that another station is radiating a poor signal. Before reaching this conclusion, try heavy attenuation at the received input.

The use of a high-gain r.f. pre-amplifier is likely to worsen strong-signal problems, so if you do use one, it's best to be able to switch it off when necessary.

If you receive or send a report of poor quality signals (e.g. wide / splattering), you must record on the cover sheet full details of the complaint including time, callsigns of stations involved, nature of complaint and actions taken during the contest to investigate and resolve.

9: Adjudication; Points will be deducted for errors in the information sent or received as shown by the logs. Unmarked duplicate contacts in paper-based logs will carry a heavy points penalty. Failure to supply the complete information required in rule 6 may also lead to deduction of points. A breach of these rules may lead to disqualification. In the case of any dispute, the decision of the adjudicator will be final.

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Ecoflex 10 Connectors
- **PL259** connector (part: 7378) **£5.95**
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Price: £1.39 per mtr, **£125.00** per 100m drum

Aircell 5 Connectors
- **PL259** connector (part: 7760) **£2.25**
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- **BNC type** connector (part: 7720) ...**£3.25**

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Specification
- Diameter: 7.3mm
- Loss per 100m: 6.28dB @ 100MHz, 4.52dB @ 50MHz

Price: £1.99 per mtr, **£179** per 100m drum

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L3.5.....3.5 MHz coil for UHV6.....25.95
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SB92M.....145/433/1200MHz 60/30w..0.39m.....39.95
SB94M.....145/433/1200 MHz 60w 0.6m.....44.95
SB96M.....145/433/1200 MHz 60w 0.83m.....39.95
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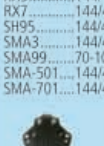

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An E-mail from Australia Sets Harry Thinking!

Harry Leeming G3LLL remembers his time running Holdings – a well known Amateur Radio and electronics business in the north west of England. He was always busy!

Welcome to *In The Shop* (*ITS*)! An E-mail from Adelaide in South Australia started me thinking, how things have changed in the 75 years that I have been around. Exchange of information is the recipe for progress and yet in the 1930s not many companies, let alone private individuals, could afford to discuss a problem on the 'phone with someone at the other end of the earth!

Even in the 1950s a ten minute chat to VK would cost about the same amount as an average week's wage. I have been writing for various technical magazines for over 40 years, and until comparatively recently most enquiries arrived via the post. However, for the last 10 years E-mails have gradually increased and now 95% of enquiries and comments arrive this way. Using E-mail saves me a great deal of time and is preferable to a letter or the telephone.

Fig. 1: The original battery on the Yaesu FT-290 Mkl is fitted with solder tags.

Brain In Gear?

A telephone call does not really give me time to put my brain in gear. On the other hand E-mail gives me the chance to hunt up manuals, make sure I give the right answer and perhaps more importantly they costs me nothing!

E-mail also enables people to share their experiences and if it wasn't for the information people kindly share with me, I would have had problems keeping this column going! So, back to the E-mail from Adelaide.

Ben Broadbent VK5BB made contact to tell me about his 28 year-old Yaesu FT-290 MkI. One morning when he switched it on, he found that the memories and the main tuning had defaulted to 145MHz A quick check showed that the 3V memory battery was down to 0.9V, and needed replacing.

The original battery is fitted with solder tags, see **Fig. 1**, is difficult to obtain and expensive; fortunately Ben managed to obtain and fitted a battery holder. This made things very much simpler as a standard CR2025 battery, (5 for £1 from the Pound Shop in the UK) would fit.

Ben's replacement battery however, only lasted a few months but (surprisingly) when he removed it he found that over a few hours the battery slowly recovered most of its lost voltage. This indicated that something in the FT-290 was draining the battery. Tracing through the components in the circuit diagram, Ben's eyes lighted on C03 on the control unit (**Fig. 1a**). This goes from the back-up battery line to chassis and (importantly) is an electrolytic capacitor.

Sure enough, when Ben tested C03 he found that it was leaky. Electrolytic capacitors do tend to become leaky with age and so to be on the safe side he fitted a 5V tantalum replacement. Ben carried out this repair a few years ago and is happy to report that the battery and rig are still going strong. (It will now presumably outlast me!)

Many thanks Ben for that information, it warns us all that sometimes a component

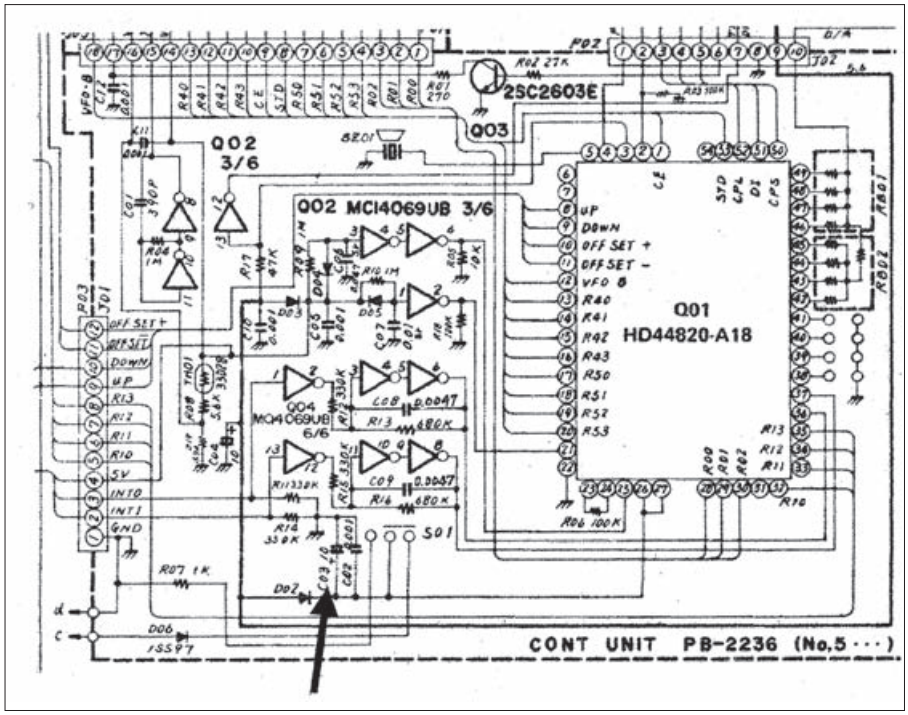


Fig. 1a: AFter looking closely at the circuit diagrams for the FT-290, shown here, Ben VK5BB spotted capacitor C03 (arrowed), which was draining the back-up battery.

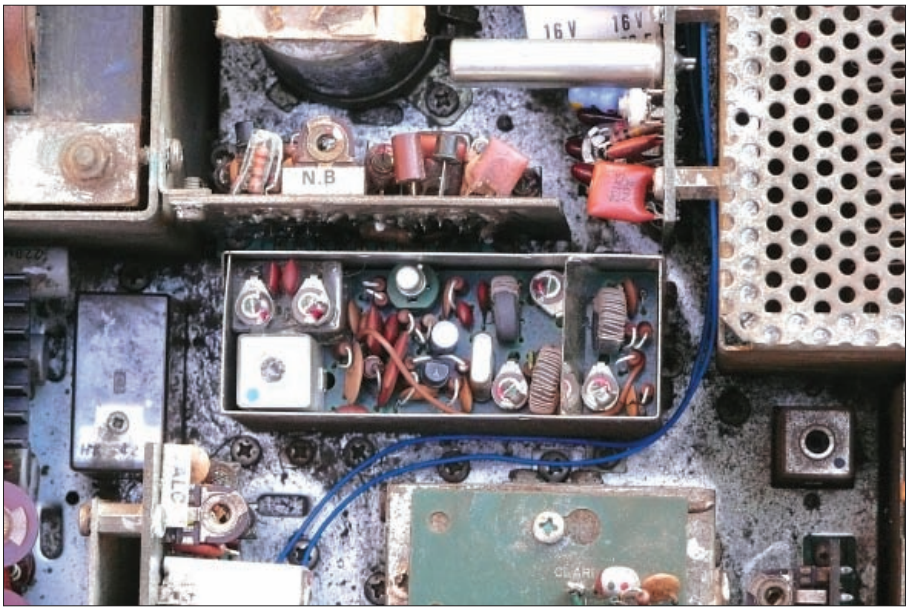
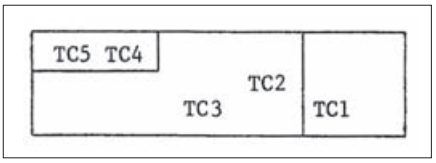


Fig. 2: The band-pass filter for the FT-101 MkI, MkII, B, and E. and inset, the layout of the components.



failure may have been caused by a fault on another part. Flattening a battery may not matter, but blowing a new pair of power amplifier (p.a.) valves because you didn't trouble to check the bias voltage before plugging them in, is another story.

Back To The Scrap 101B

Continuing on from last month. Having got the rig up and running it was time to make a few tests. The 'easy' band to get most equipment functioning on is 14MHz (20m) and so I tried peaking up the antenna, radio frequency (r.f.) and driver trimmers. It seemed to work reasonably well, but there was a lot more drive above 14.3 MHz, than there was at the low frequency (l.f.) end of the band. It was time to have a look at the band-pass filter.

For some odd reason, while fairly full alignment instructions are included in the Yaesu user manual for most circuits, the bandpass filter isn't mentioned. So, I'll describe how I do the job..

The bandpass filter for the FT-101MkI, MkII, B, and E is shown in **Fig. 2**. First note that the ceramic trimmers may be stiff – but don't force them but if necessary try warming (but not melting the solder on) them with a hot iron.

Next, tune up the rig into a dummy load at about 14.050MHz. Completely de-tune the p.a. tuning and back off the drive control until the p.a. current (I/C) is below 100mA. Then adjust TC3 for peak drive, while turning down the drive control to keep the I/C below 100mA.

Tune the rig to 14.450MHz and peak TC1, once more keeping the I/C below 100mA. Repeat the operation at around 14.250 MHz, this time peaking TC2. Repeat these operations until around the same amount of drive is available across the band.

Note: TC5 and TC4 are in circuit only on receive, their settings are very sharp and make a lot of difference to the gain of the receiver. You should peak these using the S-meter and the crystal calibrator, and the band-pass filter is aligned.

Once I had the bandpass filter correctly aligned it was time to align the antenna r.f. and driver stages. As the set had been badly treated I had to go through the full alignment procedure. However, if you only want to touch up the alignment on your own rig it's not that difficult a job to do yourself.

General Alignment Instructions

The following advice applies to all rigs. Don't play around with trimmers needlessly, although if you are reasonably capable you should be able to 'peak up' a rig safely without having to go through the whole procedure.

The rig will be live, so make sure that you have someone else with you who knows how to switch off the mains.

Don't forget: When aligning any rig, first **double check** that you are adjusting the correct trimmers.

Most of the rigs I got in were where the alignment had been 'mucked up', the result of someone turning the wrong trimmers. So, to try to help – I'm going to tell you the method I use, to double check that I am on the correct trimmer. It probably breaks all the health and safety rules, as some of the trimmers have a voltage on them, but, **at your own risk**, you should be okay if you follow the instructions carefully.

1: Sit on wooden chair with your feet off the floor.
2: Place one hand in your pocket.
3: Hold a very small screwdriver with your other hand and touch your finger on the blade.
4: Make sure that one hand is still in your pocket, and 'tickle' the live end of the receiver trimmer (which you think you need to adjust) while it's receiving the crystal calibrator's signal.

A 'click' should be heard, and the strength of the calibrator will alter only when you touch the correct trimmer.

Next, in the transmit mode set the drive to give you about 100mA p.a. current and (with one hand still in your pocket) you'll find that the p.a. current alters as you touch the correct driver stage trimmer. If you have to adjust the oscillator injection trimmers, the beat note of the calibrator will alter when you touch the correct one.

Note: Before you adjust a core, try inserting the metal screwdriver in the coil, this should noticeably detune the coil when you hit the correct one.

Alignment Of The FT101 MkI

Now you know which trimmers to turn, (see **Fig. 3**) proceed as follows;

1: Tune to calibration point in centre of each band and peak the preselector for maximum on receive.

2: Leave the pre-selector control set, switch to transmit, set the carrier control to give about 70mA, and tune 'Load' and 'PA' for the maximum r.f. output.

3: Trim driver anode tuning capacitor on the band in use (TC6TC10) for maximum r.f. power out reducing the drive control setting if the p.a. current exceeds 100mA. Repeat above once or twice with the pre-selector slightly either side of the receive peak. Compromise for maximum transmit drive if necessary. Leave pre-selector at this setting and peak antenna trimmers TC11-14 and TC29 for maximum in the receive mode.

Note that TC1-TC5 operate on transmit and receive, and should not normally need touching at this stage, unless they have been 'got at' TC28 does tend to drift and may need peaking for maximum drive on 1.8MHz (160m).

On 28MHz

1: Tune to 28.6MHz (or wherever peak performance is required), and tune pre-selector for maximum on receive.

2: Switch to transmit and with a small amount of carrier inserted, tune 'PA'

and 'Load' controls, and re-tune pre-selector for maximum r.f. power output, noting whether it's necessary to tune the Pre-selector in the h.f. or l.f. directions.

3: Set preselector halfway between points of peak performance on receive and transmit, and trim grid capacitor TC5 for maximum RF output, reducing drive if PA current exceeds 100mA. Repeat 13 a few times until points of peak performance in transmit and receive coincide. Compromise for maximum drive if necessary.(Note wrong make of 12BY7A may make TX & RX peaks differ, see 'In The Shop' April 2012.)

4: Adjust the antenna trimmer TC15 for maximum receive strength

Local Oscillator Trimmers

If the set suddenly goes dead on one band – usually 21MHz (15m) – slightly adjust the oscillator trimmer until it comes to life. If necessary set the trimmer for maximum receive gain and transmit drive, but not too near the point where oscillation ceases.

So, with the FT-101B aligned, it seemed okay on most bands – but it was a bit short of drive on 1.8, 21 and 28MHz. This is a common trouble with these rigs and I'll look into it next month

The Yaesu FT-480 Multi-mode

'**Joe**' E-mailed me about the Yaesu FT-480 which he had just got from E Bay. This is somewhat of a 'classic' rig, which will now be about 30 years old. It was intended for 144MHz mobile multi-mode operation, but most of my customers used it as a base station. It was well known for its excellent audio quality on both transmit and receive. On the negative side however, it has a few quirks.

Joe complained first that the manual states that it's rated "30W p.e.p." on s.s.b., and "30W d.c." on f.m. and c.w., the most he could get out of it was 5W. This reminded me of the statement from a Diplomat who, when appearing in an Australian court on behalf of the British government, was accused of lying. His reply was that he certainly had told no lies, but he did admit to being "Economical with the truth"! And that just about sums up the FT-480 specification!

The "30W p.e.p." on s.s.b. refers to the peak d.c. input to the power amplifier stage, and likewise so does the "30W" d.c. The actual radio frequency power output of an FT-480, should normally be about 10-12W, but therein lies one of its quirks. For some odd reason the FT-480 is fantastically sensitive to feeder length – even when the s.w.r. is 1:1. So I told Joe to try a few different lengths of patch lead and see what happened. He did this and E-mailed me back to report that he now had just over 10W, and that "All was well" (But it wasn't!).

A few weeks later Joe E-mailed me again – he was getting fantastic reports on f.m., but when he went over to s.s.b. he was told that his transmission was distorted. I advised him to go to f.m., switch the rig to the 1W low power setting, and see what happened.

Switching to low power resulted in no output and I then had to advise Joe that this was a sure sign that the p.a. module was faulty. As they were difficult to get hold of (and expensive) Joe decided to use the rig only in the f.m. mode and to look around for a cheap side-band rig.

The M57713 p.a. module used in the FT-480 is a linear device that should work in class A/B, but as they get older some of these units become none linear. Hence the distortion on s.s.b., and the zero output when switched to low power.

My advice is that If you are thinking of purchasing an FT-480, or any other multi-mode 144MHz rig that uses the M57713, be sure to check the operation in the sideband mode.You should also listen to the quality of the transmitted signal **before** parting with your cash. If you don't – you may make an expensive mistake.

Many Thanks!

Many thanks to all those people who have entrusted me with their valuable equipment over the years. I have now have been engaged in repairs to all sorts of electronic equipment for almost 60 years. This has ranged from from1930s radios, to TVs and Hi-Fi equipment and eventually Amateur Radio equipment. Additionally, during my National Service, in the late 1950s at Manorbier in South Wales, I even worked on radio controlled target practice aircraft. Do any readers remember them?

Unfortunately however, I'm not getting any younger, and so I have decided to close down my workshop and get rid of a lot of spares and 'junk' so that we can move to a smaller house in the next year or so. I hope to be able to carry on this column for a while yet – but from now on it will only be based only on past experience, as I shall not be able to do any more repairs.

If anyone wishes to provide a repair service to the older Yaesu equipment in the north of England, please let me know and I'll pass the details on to any E-mail enquirers. ●

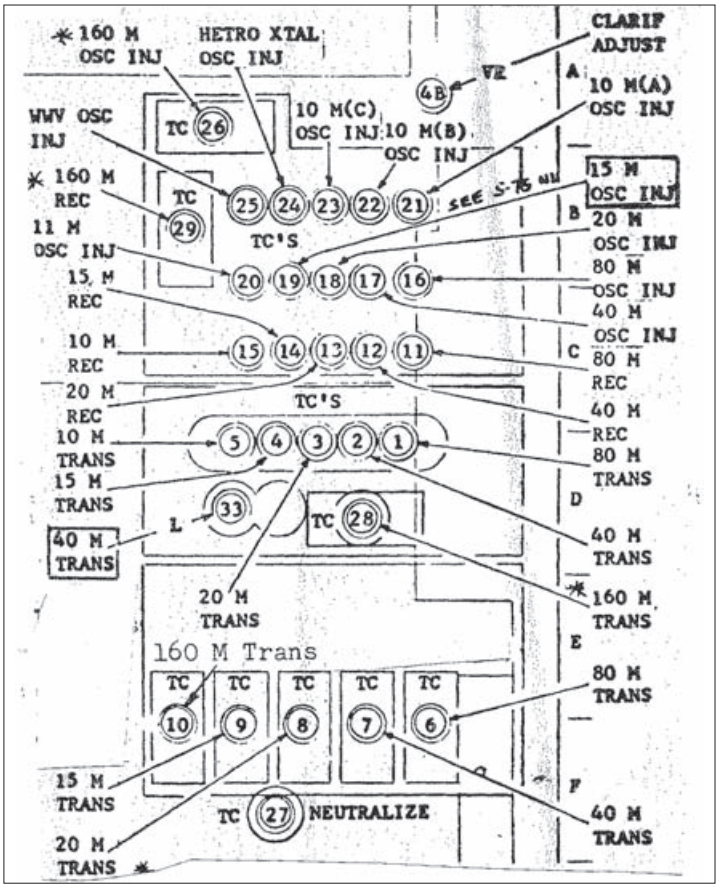


Fig. 3: Alignment of the FT-101 Mkl requires that you know which trimmers to turn. Harry offers his advice on how to the job correctly.

Problems

I like to hear about problems with older equipment, particularly pre-1990 Yaesu rigs. Please E-mail 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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Ian Liston-Smith G4JQT's Valve & Vintage
48 Swansea Road, Reading RG1 8HA

Remembering the 1960s and 1970s!

Ian Liston-Smith G4JQT looks at a relic from the 1960s and 1970s – the Codar AT5. Many of us couldn't afford them originally – and they're still popular collector's item!

To many older *PW* readers the Codar AT5 1.8 and 3.5MHz (160 and 80m) variable frequency oscillator (v.f.o.) controlled transmitter may evoke fond memories of their early years of holding an Amateur Radio licence. This resilient little transmitter is still sought after by amplitude modulation (a.m.) enthusiasts, and a fully working example can give a good account of itself – even 40 or more years later.

Most Memorable

The AT5 is probably Codar's most memorable and best designed piece of Amateur Radio equipment. The transmitter was produced from the mid 1960s until the early 1970s, but when they turn up now they are frequently in a sorry state, having suffered various brutal modifications.

The circuit cannot be described as truly original, as it's very similar to many a.m. transmitter designs that appeared in the Amateur Radio press in the 1950s and 1960s. Nevertheless, it does include a couple of clever features in a comparatively compact design.

The manual states that the AT5 has a d.c. input of 10W on a.m. and 14W for c.w. With a good set of valves (all of which are still obtainable) this corresponds to a maximum radio frequency (r.f.) output of about 7W of a.m. and 10W of c.w. on 1.8 but a little lower on 3.5MHz.

There were also a number of Codar accessories available. The most commonly found and most useful is the matching and equally well-built mains power supply – which also contains the transmit/receive switching. The mobile accessories however, are somewhat rarer.

Rough & Ready Manual

The manual is a rather rough and ready affair with some minor drawing errors which Codar never corrected. The transmitter has had a few circuit modifications during production (described later), but most of them were not included in later versions of the manual.

Despite the shortcomings, the text clearly describes the circuit operation, along with detailed installation and operating instructions. It also includes useful voltage and current readings.

The AT5 VFO

According to Codar, "The VFO is a new type of modified Vackar circuit developed by Codar and is extremely stable. Temperature compensating capacitors are used to obviate frequency drift." Despite the claim, their drift seems to be no better or worse than the any other v.f.o. controlled valve amateur equipment.

For both 1.8 and 3.5MHz coverage the v.f.o. runs from about 1.75 to 2.2MHz. For 'Top Band' operation the v.f.o. V1 (EF80) is followed by the buffer V2 (EF80). For 3.5MHz the buffer is followed by the series-tuned circuit, L3/C9 which simply shorts the fundamental to earth. So this means the drive on 3.5MHz relies on the v.f.o./buffer second harmonic, explaining the slightly reduced output on this band.

The RF Output Stage

In the c.w. mode, the h.t. is applied directly to the r.f. output valve V3 (6BW6). This is followed by a conventional pi-output stage, using the low-loss air-spaced Codar "Qoil", L4.

Harmonic attenuation (and the v.f.o. fundamental 'sub-harmonic' when operating on 80m) leaves something to be desired by modern standards. The cathode keying of V3 gives a surprisingly good c.w. note with little or no chirp.

The Modulator

There's enough gain to fully modulate the transmitter using a crystal microphone and Codar recommend the Acos type 40. The microphone input is followed by a two-stage audio amplifier V4A/B (12AX7) with adjustable gain via preset R14. (The capacitor C18 is wired to the top of R14 and V4B grid to the wiper, not as published in the manual.)

The mystery rear rubber grommet holds R14's "control key". This plastic square-ended spigot is usually missing, but a carefully angled screwdriver works just as well.

The modulator doesn't use a conventional modulation transformer but a tapped choke, where the hight tension (h.t.) is fed in at the centre, modified Heising modulation. One end feeds the anode of the class-A modulator valve V5 (6BW6) and the other the anode and screen of r.f. power amplifier V3.

The magnetic effects from the standing current flowing through each half of the choke tend to cancel out, allowing use of a smaller choke than would otherwise be necessary. This method may not accurately match circuit impedances, but is satisfactory. It's not unique to the AT5 – the *Minitopper* published in *The Short Wave Magazine* August 1962 is at least one other design that uses this centre-tapped choke modulation method.

Good, undistorted modulation is achieved up to about 70 to 75%. Despite this, it sounds better than might be expected. I've not noticed any significant "FMing" of the carrier when listening to the output on an s.s.b. receiver. (This can be a shortcoming in some simple v.f.o. controlled a.m. transmitters).

A basic modulation indicator is included across the modulated h.t. feed to V3, consisting of nothing more than a neon bulb in series with a capacitor. As the modulated h.t. swings up and down, it causes the neon to strike and vary in brightness, thus providing a rough indication of the presence of modulation. Unfortunately there is a price to pay for this simplicity; each time the neon strikes it puts a small "dink"

into the modulating waveform – the greater the modulation level, the greater the dink!

Dave Evans GW4GTE, published a detailed analysis of this along with other AT5 observations in the **Vintage and Military Amateur Radio Society** (VMARS) magazine *Signal*, issue 5, October 2007. Although I've seen this distortion myself, I suspect the effect varies from set to set since the two AT5s I currently own show almost no sign of this on the modulation envelope.

Mains Power Supply

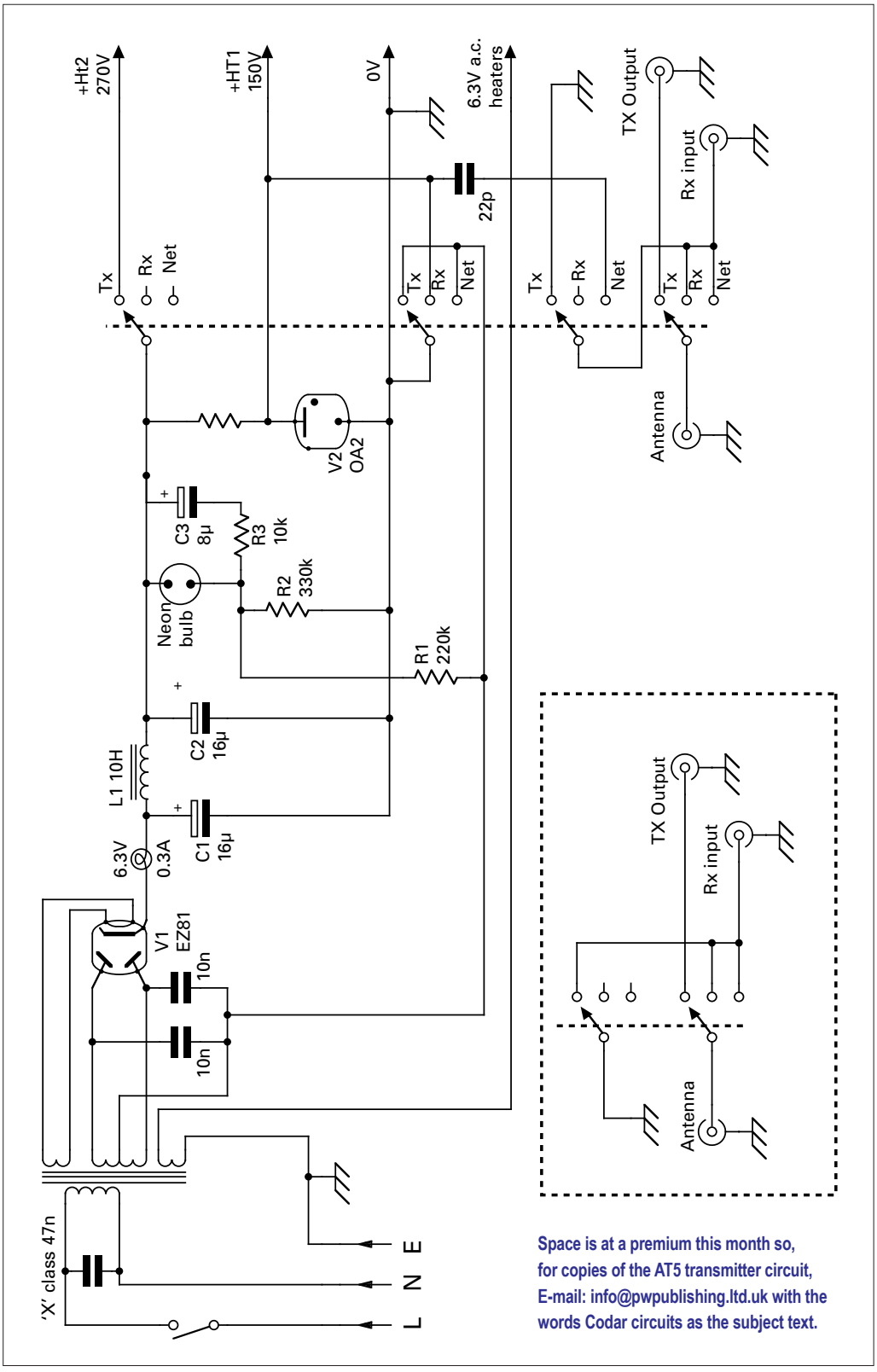
The separate Codar 250/S power supply uses a full-wave valve rectifier circuit using an EZ81 rectifier valve. The 250/S provides the 6.3 volt alternating current (a.c.) for the heaters, about 270 volts h.t. and a stabilised 150V for the v.f.o. via an OA2 neon voltage regulator. The power supply chassis also incorporates the antenna input and outputs and the **Net-Standby-Transmit** control switch.

During Standby (receive), a simple combination of resistors and a capacitor causes another neon indicator bulb to flash. A steady glow is maintained during Net and Transmit. However, this neon has no detrimental effect on the performance of the AT5!

A 6.3 volt 0.3a (300mA) bulb in the rectifier cathode acts as an h.t. fuse and glows reasonably brightly during transmit, although it is hidden inside the power supply. The power-supply smoothing choke is the same as that used in the modulator.

The 9-pin sockets at the back of both the 250/S power supply and the AT5 carry low tension (l.t.) and h.t. supplies. The interconnecting lead therefore has a plug at each end. Beware – these voltages are available at the plug **before** connecting it to the AT5. You'll get a nasty jolt (or possibly worse!) should you touch the h.t. pins of this plug if it gets pulled out of the AT5 power socket.

Incidentally, on page 7 of the AT5 manual, the labelling of pin 7 and 8 of the round voltage plug is transposed! It should be pin 7 that provides HT1 150V and pin 8 that provides HT2 at 270V.



Space is at a premium this month so, for copies of the AT5 transmitter circuit, E-mail: info@pwpublishing.ltd.uk with the words Codar circuits as the subject text.

Corrected Codar 250/S power supply. Inset shows NET-STANDBY-RECEIVE switch before improved net signal modification. Other added components are 0.047uF X-class capacitor across the mains-transformer primary winding and 0.01uF high-voltage capacitors across each half of the secondary.

Mobile Transmitter

The AT5 valved transmitter can also used while mobile, with the Codar 12/MS 12-volt power supply unit. This uses two NTK401/OC28 germanium power transistors as an oscillator. The chopped 12V waveform feeds a step-up toroid transformer. This is followed by a silicon diode bride rectifier to provide the 150 and 250V h.t. **Note:** The 12V input can be wired to operate in a positive or negative earthed vehicle.

The l.t. supply is taken directly from the vehicle's 12V supply as the power socket on the AT5 is wired so that the connecting lead can be wired for

running the 6.3V filaments from either a 6 or 12V supply.

The matching 12R/C switching unit takes care of switching the h.t. feeds and antenna connections to a receiver. Codar's matching receiver was the 12V , germanium-transistorised T28, which could also be mounted under the dashboard.

Codar Modifications

Making modifications to vintage equipment can be a contentious subject, but those that follow don't change the outward appearance of the AT5, and some were done by Codar later anyway. There were also some minor cosmetic changes, most noticeably the transmitter knobs of which there were various types.

As far as I can ascertain, Codar made only a few modifications to the AT5 circuit during production. The most significant and useful change was the switched tapping for 3.5MHz of the air-spaced p.a. Codar "Qoil" L4. Before this modification, it was easy to select the wrong anode dip when tuning up on 3.5Mz. This alteration was often done by owners of early models by mounting a toggle switch through the front or side panel.

However, a much neater job can be achieved by fitting a new double pole double throw (DPDT) slide switch in place of the old front-mounted single pole single throw (SPST) slide switch, as Codar eventually did. This switch is (or was) a standard part so shouldn't be too difficult to source. The extra contacts in the new switch are wired to short out part of L4 on 3.5MHz.

If you wish to add this modification, the hardest part is soldering the tap onto a turn in the air-spaced coil L4. The p.a. coil wire is quite thin and bare with very small gaps between turns and it's easy to accidentally solder a bridge between them. Slot some stiff paper each side of the chosen turn before soldering. It may be necessary to push the soldered joint inwards to clear adjacent turns.

Until March 1965, the p.a. anode current meter was wired into the cathode of V3, and this is how it is shown on most circuit diagrams. Later AT5s had it wired in series with the h.t. feed to the r.f. choke (r.f.c.) in V3 anode to show true anode current.

Another modification carried out by Codar was to change the value of R1 from 100kΩ to 47kΩ in the v.f.o. because earlier models were said to have oscillator starting problems. In later AT5 production R1, C2, C3 and C4 are in the screening can of the v.f.o. coil L1.

Some examples of the AT5 transmitter have a fairly weak Net signal. This makes it difficult to hear the v.f.o. on the desired transmit frequency to which the receiver is tuned – especially if the band is quite noisy.

Codar's unusual modification added to later AT5s was to add a 22pF capacitor from the 150V v.f.o. h.t. line directly to the receiver antenna input via the Net-Standby-Transmit switch. This requires a bit of re-wiring of the antenna changeover switch to do the job properly. If you decide to do this, use a quality high-voltage capacitor because a modern receiver will not like 150V on its antenna input if this capacitor fails short circuit!

While rewiring the switch, I also replaced the unscreened wiring with 50Ω coaxial cable for the all leads carrying r.f. and joined their screens together and earthed them where they connect to the sockets at the rear of the chassis.

The AT5 was designed for a 70Ω antenna system – or at least that's what the Belling-Lee r.f. sockets suggest. However, using it with 50Ω cables and accessories is not a serious problem. Nevertheless, the Codar manual suggest that a high-voltage capacitor of between 500 pF and 1000 pF be added across the load capacitor C14 if matching is difficult.

Curing Drift

Despite Codar's claimed "extreme stability", v.f.o. drift on the AT5 can be a problem after 40 years or so. Unless you intend to talk exclusively to other a.m. stations, any stations demodulating your signal using an s.s.b. receiver really won't appreciate having to follow a drifting carrier.

Heat-induced drift is reduced by putting the mains PSU next to the AT5, not above or below it. Clean all the valve pins and holders with a suitable contact cleaner – including the neon voltage stabiliser. Check that the bulb fuse is making good contact and thoroughly clean the contacts in the Net-Standby-Receive switch as this can be a common cause of frequency jumps. Poor contacts here will also reduce r.f. output and receiver sensitivity as it also routes the antenna connections.

If L1 has loose turns or a loose core, this can also be the cause frequency stability problems. To realign the v.f.o., adjust L1 at the low frequency end of the scale and the oscillator trimmer C5 at the high frequency end. Access to C5 is via a blanking grommet under the chassis. This grommet should be kept in place to help reduce drift from circulating air currents.

Additional Modifications

An examination of the circuit diagram shows that there is no proper r.f. de-coupling on the h.t. lines – Codar obviously relied on the electrolytic capacitors in the power supply to achieve this. Nevertheless, it's good practice to place appropriately rated 0.01µF disc capacitors across any electrolytic h.t. decoupling capacitors in r.f. circuits to prevent possible instability.

I have also changed the two-core mains lead for an earthed three-core version to connect the chassis to mains earth. But beware – doing this to old equipment with a mains transformer may lead to its insulation breakdown. But as the transmitter was designed to be used with a good earth (if not actually a mains earth) this shouldn't be a problem. If you do this, ensure that the self-tapping screw near the point where the mains lead enters the power unit doesn't pierce the insulation.

Consider putting an X-class capacitor (i.e. a capacitor specifically designed to be placed across the mains) of about 0.05µF across the transformer primary. This will help keep r.f. from getting into the mains from the power supply unit (p.s.u.) and help reduce voltage transients reaching the p.s.u. from the mains. I have also added one 0.01µF, 2kV capacitors across each halve of the secondary winding of the mains transformer for the same reason.

Amplitude Modulation Today

Of course, a.m. is relatively rare on the bands now, but it still to be found, particularly on 160m nets, and on 80m between 3.615 and 3.625MHz.

Those interested in using a.m. are welcome to join the VMARS net on around 3.615MHz on a Saturday mornings. See **www.vmars.org.uk**

The Codar AT5 is a basic, well-built transmitter, but electronically, there was nothing really revolutionary about it – even back in the 1960s. It has its quirks – nevertheless, I think it's well worth nurturing back to full health and of course using it on the air! ●

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Vintage gear for M3s by R Hankins, G7RVI/M3RVI – *VMARS Newsletter* February 2003

The Codar AT5: tales and tweaks by D Evans, GW4GTE – *VMARS Signal* October 2007

Review: Codar AT5 transmitter by DV Newport, G3CHW - *RSGB Bulletin* May 1965

The AT5 – an old friend by RQ Marris, G2BZQ

www.thisismoney.com (historical inflation calculator)

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No CW Test in Japan!

Roger Cooke G3LDI provide his regular look at the ever busy world of the Morse and Amateur Radio on the key. And it seems that Japan is in the news this time!

Welcome to the world of Amateur Radio on the key – the *Morse Mode* (*MM*). I'm starting off with the news that Japan has announced the scrapping of its Morse test for its highest licence classes. This took effect in October last year but I have only just caught up with this date in my file of information to use. This is a problem with having a bi-monthly column. However I do my best to juggle information sent to me, especially if it is publicity for an event, or time sensitive in any way.

I must admit that this news has not diminished the amount of JA stations on the air! I suspect they will operate a similar scheme to our GB2CW one in the UK. A total of 39 people responded to the public consultation on scrapping the Morse test. Japan introduced the world's first 10W Foundation HF No-Code licence in the 1950s but had until now retained Morse for Classes 1&2. The Ministry of Internal Affairs announcement in Google English **http://tinyurl.com/3s4bljx**

Spitfire Key

More feedback has been received about the *Spitfire* key and it's come from **Albert Heys G3ZHE** who lives in Wigan. Albert writes, "Dave Gemmel's key is an ex *Spitfire* type. **Keith Ford** of the **Warrington ARC** had collected a *Spitfire* control panel which included the key, before he died about 15 years ago.

"Keith was active with the Air Training Corps (ATC) in the Merseyside area and a member of the group in Manchester who restored the *Lancaster* and other Second World War aircraft. I bought a type D key from a local junk shop for 75p over 20 years ago and it's still in use today. I also saw a type D on an RAFARS stand in Blackpool.

"The label on it said "Siemens Telegraph key 1928". When the label was removed, quite a few extra bits were revealed. A RAFARS member recognised the key as a type D and then commented how he hated the soft contact at the bottom. He said that he used to put a coin under the bottom contact to make it more solid!"

Thanks for the feedback Albert!

Feedback From South Africa

issuel've received some more feedback from *PW* supporter **Dave Gemmel, ZS6AAW** in South Africa. Dave regularly sends me feedback for *MM*, being very keen on the mode himself.

This time he tells me about the time he spends in his local museum. He says, "I've had plenty of fun running a special event station for JOTA or the ZS6MUS from the Wireless Room at the SAAF Museum near Pretoria! On these occasions I make sure that a Morse key (straight, of course!) and oscillator are on hand. Believe it or not it's usually the children and ladies who are the most interested. I confess that I do use my 'ancient' rig (ALDA 103) on these special museum occasions. I suppose I should be using an old military rig.

Thanks for the up-date Dave! Incidentally, Dave reminds me of my old friend **Dick Bendicksen N7ZL**, now a Silent Key. Dick used to spend lots of time in the Seattle telephone museum, renovating old equipment and making sure everything in there worked.

A Call From Cairns VK

Mike Patterson VK4MIK writes from near Cairns in Northern Queensland. He has a question about a Morse key in another article. I wonder if anybody can help? He writes, "In the April issue there was an article by **Ross Bradshaw G4DTD** on the Diplomatic Wireless service which was very interesting. Do you know what type of Morse key it is on the vessel *City of St. Albans* radio shack bench on page 44?

"We have quite a growing interest in Morse in our area and have a regular morning net that sees **Rob Muller VK4ARQ** keeping in touch with Amateurs from near and far and encouraging them. We also have some mentors, **Ross Anderson VK4AQ**, **Eric Neale VK4EDN** and **Keith Searle VK4BKS**, who advise on sending and when bad habits are developing. Ross VK4AQ – who is a Navy sparker by the way – can be seen in **Fig 1.**


Fig. 1.

I don't think that term requires any explanation!"

Thanks for the information Mike! It sounds as though Morse is really gaining in popularity, even more so than when it was compulsory to take a Morse test. It's gratifying to see and long may it continue.

Morse Memories & Information

If you have any interesting Morse information, stories or pictures, please let me have them. I am nearly up to date with the input I have received so could use some more. Your stories and pictures are always interesting to others.

73 and May the Morse be with you!
Roger G3LDI. ●

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Tel: 01367 243819 (Faringdon, Oxon).

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ICOM IC-R8500 professional receiver. Frequency range 0.1 to 2000MHz. All-modes unit, boxed as new with manual and PSU, etc. £895.
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ICOM IC-7200 RADIO fitted with front handles, carrying handle and rubber feet. Also, mobile bracket in mint condition. Boxed and complete, £550. Tel: Mike 01926 812604 (Warks).

MARCONI MARINE APOLLO Rx 15kHz-28MHz Solid State G.C., £150. Hi-Mound Bk-100 bug key, £25. Morse trainer with Hi-Mound Hk-708 key and buzzer mounted on board, £20. P&P extra. Tel: Rob 01273 834355 (Mid Sussex).

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E-mail: vincentvoy@hotmail.co.uk

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01702 206835

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Bencher	ST-1	Bencher Chrome Single Paddle on a Black metal base	£79.00
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Yaesu	DMU-2000	Data Management Unit for FT-2000/D Transceivers will Need Monitor and Keyboard	£699.00
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Yaesu	FC-902	1.8-30MHz 500W Matching Manual ATU + Meters	£125.00
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AOR	AR-MINI	500kHz-1300MHz All Mode Hand Held Receiver 1000Ch.	£109.00
Icom	IC-746	HF,6m,2m All Mode Base Transceiver + Auto ATU, Gen.Cov. 12V	£699.00
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Daiwa	PS-313	30A Max Power Supply	£69.00
Hansen	FS-7	SWR & Power Meter 144-430MHz	£20.00
Icom	IC-2200H+UT-118	2m FM Mobile Transceiver 55W 113ch. + CTCSS & Optional UT-118 D STAR Unit	£279.00
Yaesu	GS-065	Medium Duty up to 65mm Thrust Bearing	£35.00
Yaesu	FTM-10E	2m,70cm FM Mobile Transceiver + Remote Waterproof Head & BlueTooth Ready 50W,35W	£229.00
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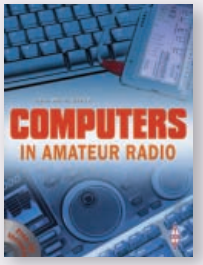

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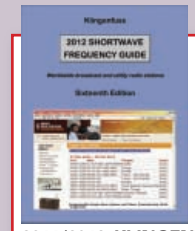

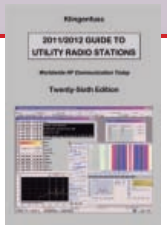

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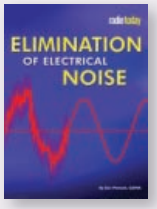

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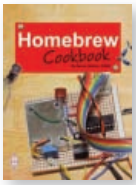

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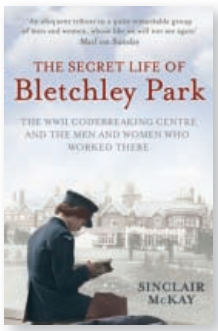

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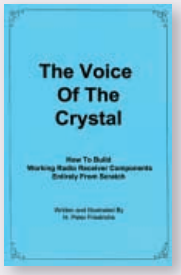

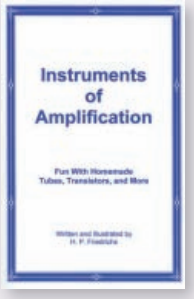

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Rob Mannion G3XFD writes: Peter Friedrichs has written a truly superb book but has chosen a title that really hides its 'light' under the proverbial bushel! Armed with the book an interested constructor can literally build a radio from scratch anywhere! 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 reflects on topics raised in this month's *Letters* pages and comments on the feedback he's received regarding publicising local club activities.

The letter written by **Stuart Crowther MM6HFC** – in *Letters* this month – regarding the efforts of the **Moray Firth Amateur Radio Society** to publicise their activities to the 'outside world' cheered me up considerably. It's always good to hear of effective public relations (PR) activities. However, I fully realised that the club was 'switched on' when I visited them last year to provide a *PW* 'club talk'.

I was also pleased to hear from Stuart MM6HFC – a Journalist himself – that he supports my idea of preparing information in PDF form to help clubs get the most effective forms of publicity. I've also been pleased at the response from Amateurs all over the UK requesting copies of the PDF. I've replied to everyone who has contacted me, advising them that the document is not yet finished.

Unfortunately, the monthly 'treadmill' of *PW*'s production schedule overtook me and although I'm about half way through preparing the documents – completion will now have to wait until this issue goes to press. But you can be sure that everyone who has requested a copy of the document will be sent one eventually and I'm hoping this will be by early September!

In the meantime, I would be very pleased to hear from you regarding any successful *PW* and publicity your club has achieved. As I've mentioned before – some clubs have had some excellent results in their local area.

By sharing your success we could perhaps help other clubs to do the same! Incidentally, I think it would be an excellent idea to include any suggestions/techniques from you in the planned document. 'Many hands make light work' so they say and as I'm 'digitally compromised' I could do with your 'hands' to help! So, let's be hearing from you readers!

Vintage TV & Mobile Equipment

The letters from **Malcolm Parkin M3OAM** and **Dennis Easterling M0JXM** (*Letters* this month) provided fascinating reading and I hope that their letters will encourage other readers to write in. I was particularly interested to read about Dennis' purchase on Lisle Street because I bought my first VCR97 tube for as an oscilloscope project from the same shop. Incidentally, I hope his wife recovered from her shock in the street!

I've heard from a number of Radio Amateurs who entered the hobby via home-brew TV projects. And although I have mentioned him before – I have fond memories of an Engine Driver friend of mine (now a Silent Whistle) who specialised in converting valved TV receivers into very efficient and effective v.h.f. receivers! He was a very talented self-trained engineer! So, please share your own experiences readers.

The 2012 Newark Show

Tex Swann G1TEX, the PW Publishing Ltd. team and I look forward to meeting readers at the Newark Show and hopefully, we'll get an opportunity to chat to many of you. Many article ideas and initiatives have come from readers we've met at shows and clubs. So, please make sure you come and chat – and don't be put off if there's a small queue – you, your opinions and interest are important so, we'll get to you as soon as possible!

This year's Newark Show will be a poignant one for me because I'm planning to retire at the end of September 2013, after almost 25 years as the Editor of *PW*. My retirement as Editor will mean that I'll be able to step back from the busy and demanding production schedule and hand over to the new Editor. Stepping back will also mean I can have more time for my own Amateur Radio activities and still write for *PW* – without worrying about those ever-present deadlines!

My publishers **Steve Hunt** and **Roger Hall G4TNT** would like to hear from anyone who is interested in acting as the *PW* Editor and you'll be welcome to come to the *PW* stand at the Newark show to discuss matters. Anyone who might be interested – and is perhaps rather unsure what's required – can chat to any of the team and Tex G1TEX and myself would be pleased to meet a potential *PW* team member. I've always considered my work as the Editor as a privilege and I would be delighted if the person taking over the job came from our readership. I've had a wonderful time working on your behalf.

Rob Mannion G3XFD/EI5IW

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