

Practical

WIRELESS

Britain's Best Selling Amateur Radio Magazine

Dual Beam I-Pro

h.f. multi-band antenna reviewed



Practical Way
A tribute to Gilbert Davey

Antennas

Build a rainbow antenna



**Buying
Second-hand**
The FT-847

**It's 70MHz
Contest Time!**



Anytone AT-5555 Reviewed
Multi-mode 28MHz mobile transceiver



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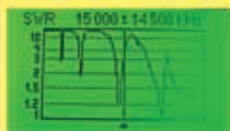
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www.wsplc.com

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NEW

A range of neat hand-held antenna analysers with graphic displays



Get spot measurements or graphic scan of programmed band. VSWR and impedance. USB socket for PC download.

FROM £275.95!

AA-30 100kHz - 30MHz. VSWR & Reactance 2x AA. **£275.95 C**
AA-230 Covering 100kHz - 230MHz, running from internal Ni-MH cell. VSWR and reactance. 1kHz resolution. **£515.95 C**
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AA-520 Covering 100kHz - 520MHz and running from internal Ni-MH cells. Measures VSWR and reactance. **£575.95 C**

YouKits HB-1A-MK3

40m & 20m

The Tiny QRP Radio that fits in your brief case or saddle bag!



This compact "DXpedition in your pocket" is amazing. Full VFO, QSK, Elec Keyer and 4 Watts on AA cells!

£199.95 D



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ICOM

NEW

IC-9100 ALL-ROUNDER

HF to 23cms Base Transceiver



Satellite Mode Operation:
Optional D-Star DV Mode. **£2999 D**

The IC-9100 has received rave reviews and is THE radio for those who want everything in one box! Add the 23cms module & D-Star board to expand your hobby even more. A real gem & comes with 2 year warranty.
UX-9100 23cms **£599** **UT-121** D-Star board **£129.95** **FL-430/1** Roofing filters **£52.95**

HF/6m/2m 100W
70cm 75W
23cm (option) 10W

ICOM

SAVE £300!

IC-7410 HF-6m Transceiver



- * 100W HF-6m all modes.
- * Receiver +3dBm IP3 + 15kHz roofing filter
- * 36kHz DSP IF 32 bit razor sharp filter
- * Internal auto ATU included.
- * USB interface for PC control and audio out
- * Large LCD with comprehensive display
- * Integrates speech synthesizer

Another winning design from Icom, the "expensive" features introduced a few years ago are migrating down to some of the more affordable radios. **£1499.95 £1695.95 D**

ID-E880



2m/70cm 50W Mobile with D-Star & D-Star Repeat Mode. Features GPS compatibility, CTCSS & DTCS, Airband Receive. **£439.95 D**

IC-E80D

- * 2m/70cm Handheld
- * D-Star & Repeat Mode
- * GPS Compatibility
- * CTCSS & DTCS + Airband Receive
- * 1000+ Memories

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In Stock Now £329.95 D

IC-718



Special Offer - SAVE £170!

Great news. We have purchased a quantity of this radio at a silly price. A full 100 Watts HF transceiver base station that offers typical ICOM quality and all the essentials for HF operation. Don't miss out on this one!

£599.95 £429 D

- IC-7800** Deluxe HF / 50MHz All-Mode 200W Transceiver **£8999 D**
- IC-7700** 1.8-54MHz 200W with built-in PSK-31 + keyboard **£6239 D**
- IC-7200** HF & 6m DSP 0.005-3335MHz wideband receive with USB port **£839 D**
- IC-7000** 160m-70cm 100W (hf) Mobile, portable or base station **£1189 D**
- IC-7600** 160m-6m 100W transceiver - building on the old IC-756 **£3299 D**

Other Radios

- IC-910H** **£1299.95 D**
- IC-2200H** **£229.95 D**
- IC-R3** **£399.95 C**
- IC-R6** **£179.95 C**
- IC-R20** **£399.95 C**
- IC-R2500** **£649.95 C**
- IC-R8500** **£1439.95 D**
- IC-R9500** **£10999.95 D**
- ID-1** 23cm **£719.95 D**

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.

Back In Stock! £1265.95 D



FT-2000 160 - 6m Transceiver

This radio needs no introduction. Covering 160m to 6m, it is the favourite of contesters and DXpeditions. Available as 100 Watt or 200 Watt version.

£1999.95 D

"When I switch my FT-2000 on I never cease to be amazed at what this radio offers in terms of value for money. I love the filters and the variable IF - it always seems to be able to pull the weakest of signals out of the noise. For me it is both my DX machine and chat box - you guessed it, I love it."

FT-2000D 200W 160 - 6m 230v AC PSU transceiver **£2599.95 D**

YAESU

Two Great Mobiles

FT-2900E

75 Watt 2m mobile with 3W loud audio, CTCSS, DTMF mic and the "WIRES" internet feature.

£139.95 D

FT-7900E

2m/70cms mobile delivers 50/40W with CTCSS, DTMF, "WIRES" internet, 1000 mems and wide rx up to 999MHz.

£239.95 D

HF Transceivers

- FT-DX5000** 200 Watts of raw power and performance. **£4399.95 D**
- FT-DX5000D** 200 Watts plus additional station monitor. **£4795.95 D**
- FT-DX5000MP** 200 Watts plus additional station monitor & filter. **£5295.95 D**
- FT-DX9000contest** 200W HF - 6m "formula one" contest machine **£4899.95 D**
- FT-DX9000D** Deluxe fully loaded base station **£8199.95 D**
- FT-DX9000MP** Amazing 400W "legal limit" radio **£8999.95 D**
- FT-857D** HF to 2m mobile, portable or base - up to 100W **£679.95 D**
- FT-817ND** 1.8-440MHz all mode transceiver **£509.95 D**

VHF Mobiles & Handhelds

- FTM-350E** 2m/70cm Mobile Bluetooth GPS APRS **£479.95 D**
- FTM-10E** 50/40W 2m/70cms stereo FM **£309.95 D**
- FT-8800E** Dualband Mobile 50W / 30W **£329.95 D**
- FT-8900R** 10/6/2m & 70cm Mobile **£369.95 D**
- VX-3E** 2m / 70cm Handheld Wideband receive **£159.95 D**
- VX-7R** Waterproof dualband handy (silver / black) **£289.95 C**
- VX-6E** 2m/70cms handy, 5W Wideband Receive **£239.95 C**
- VX-8DE** Triple Band 6/2m/70cm Upgraded APRS **£369.95 D**
- VX-8GE** Dualband 2m/70cm 5W + GPS Antenna **£359.95 D**
- FT-60E** 2m/70cms, 5W handy Wideband Receive **£129.95 C**

FT-450D 3yr Warranty!

NEW



£799.95 D

Now with Auto ATU & Extra filter.

Are you looking for a reliable and feature packed HF transceiver that is affordable, yet can compete with the modern day demands of ham radio and the crowded bands? The take a careful look at what this radio has to offer. And to make it even more attractive, for a limited period we are offering you a 3-Year warranty - FREE.

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< VX-8DE

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High quality, accurate
VSWR meters with
large, clear X-needle
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NEW BLACK-BOX-MKII

Now with Switchable Audio Filter!



The airband monitor that safe
to use in the aircraft cabin &
can tune to any unknown
frequency is back with a
switchable audio filter!

- * Non radiating device
- * Antenna built into earpiece
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This amazing little
radio covers 100kHz
- 1.3GHz AM FM &
WFM. 1000 memories,
over 30 programmable
features inc. CTCSS &
DCS. Alphanumeric
memories give
meaningful channels
and there is a built-in
bar antenna covering

100kHz - 5MHz. Inc. NiMH pack &
charger. FREE software database for
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The famous scanner with the quality
performance. 530kHz - 3GHz AM FM
FMW & SSB. Inc. batts, charger +
cigar lead. If you are looking for a truly
wide-band great performer this is the
best in its class!

£469.95 D



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The AR-8600MKII is a
base or portable station
receiver covering 530kHz
- 3GHz. All modes AM
FM FMW & SSB with
standard rotary tuning.

Requires external 12V or optional internal batt pack.
A great station accessory for general listening or
extra receiver.

£669.95 D

KENWOOD NEW TH-D72E

The very latest handheld from Kenwood is a dual bander with GPS, APRS
and TNC capability. The TH-D72 has a built-in SiRF Star III GPS receiver
and its antenna, so that you can enjoy various GPS functions with the radio
stand-alone. You also can output its GPS data (NMEA-0183) to a PC
through the USB port. You can even operate dual receive on the same band.



In Stock Now! £426.95 D

HF Transceivers



TS-2000E £1549.95 D

The TS-2000E is the classic all-band, all-mode base
station covering HF - 70cms up to 100W. Includes dual
channel receivers & DX-cluster monitor with built-in TNC.

TS-2000X +23cm £1799 D

TS-480HX Ideal for mobile, portable or base station. Gives a
massive 200W on HF and 100W on 6m. £879 D

TS-280SAT This model gives 100 Watts on all bands up to 6m,
but adds a built-in automatic ATU. £779 D



Handhelds

- TH-F7E** 2m/70cm 5W (2-pin Kenwood) SMA +FREE Clip Mic £236.95 D
- TH-K2E** 2m 5W 4-Key Keypad (2-pin Ken) SMA +FREE Headset £163.95 D
- TH-K2ET** 2m 5W 16-Key Keypad (2-pin Ken) SMA +FREE Headset £172.95 D
- TH-K4E** 70cm 5W (2-pin Kenwood) SMA +FREE Headset £163.95 D

VHF Mobiles TM-V71E

2m/70cm Dualband Mobile Transceiver. Features:- Wideband Receive,
Built-In Echolink, Simultaneous 2 Frequency Receive, Removeable
Control Head, CTCSS Encode / Decode, 1000+ Memories, Supplied
with DTMF Mic.

- TM-271E** 2m FM 60W mobile. CTCSS, 200 Memories, DTMF Mic £169.95 D
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KENWOOD The Amazing TS-590S!



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

This is not an updated TS-570, but a completely new
design embodying the very best engineering crafted
by Kenwood to compete
with the very best.

£1369.95 D

QUANSHENG TG-UV2

2m/70cm
Dual Bander



- * 3 Power Levels: 5W / 2.5W / 1W
- * Steps: 5, 6.25, 10, 12.5, 20, 25, 30, 50 & 100kHz
- * CTCSS, DCS & 1750Hz Tone
- * Dual Watch
- * 200 Memories Alpha Numeric
- * 2 Deviation Levels
- * 2 Bandwidths
- * CTCSS & DCS Scan
- * Built-In LED Torch
- * Backlit Screen
- * PTT or VOX

£81.95 D

Heil A Great Sounding Name!

NEW Genesis HM-12



The HM-12 Genesis mic from Heil is the
latest dynamic design with cleverly
sculptured frequency response to suit
modern radios. If your radio has an EQ
adjustment, then this is the mic to use
for that distinctive, crisp, Heil sound.
Then look at the price! We also offer the
optional K-901 boom mic assembly that
makes a true multi-adjustable, hands free
system.

- HM-12** Dynamic Mic £69.95 C
- K-701** Desk stand (above) £14.95 C

The new **K-901**
desk mic stand
(approx. 30cm high
with telescopic
boom. Takes all
mic mounts.

£29.95 C

MFJ QRP CW Transceiver

NEW MFJ-9200



£259.95 D

Made in China for MFJ, We are pleased
to announce the introduction of the new
QRP CW transceiver from MFJ. Covering
80m to 15m, it is supplied with one plug-in
module of your choice, as supplied it
covers just one band.

Extra Band Modules £29.95 Each

- * Frequency 80m-15m with modules * RIT
- * 8 mems per band * LCD backlight
- * TX/RX CW * RX SSB * CW offset 700Hz
- * Full QSK * 0.1uv sens. * 600Hz / 2.5kHz bandwidth * Iambic or straight key * CQ & call sign memory * Rx current just 40mA
- * CW speed 3-45 wpm * Transmit 0.9A @ 10v & 1.2A @ 14v * Supply volts 8-14V
- * Size 120 x 80 x 34mm * Weight 7.4oz.

Watson Power Supplies

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25A Peak, 22A Cont. with Noise Offset.

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38 Amp cont, 45 Amp Peak, Switch Mode
PSU with variable voltage, V/A meters, &
noise offset.

£129.95 C

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65 Amp Low Noise PSU.
Patented Noise Control
that permits you to move
any noise away from the
operating frequency.

£239.95 D

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- W-10AM** 10A Analogue variable £59.95 D
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Carriage Charges: A=£4, B=£5, C=£8.50, D=£11



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Martin Jue, President and founder of MFJ (2nd from right) and long time friend, confirmed W&S as the largest MFJ dealer in the world. That means we have the world's largest stock! So now you know where to come for MFJ.

L-R, Randy (MFJ), Jeff Stanton, Phyllis (MFJ), Martin Jue (MFJ President) & Peter Waters. Dayton, Ohio May 2011

MFJ The World's Most Popular AUTO ATUs!

MFJ-993B IntelliTuner Auto ATU 300 Watts 1.8-30MHz



This tuner lets you tune any antenna; long wire, coax cable or balanced feed. You get both analogue cross-needle metering & LCD data display! MFJ's exclusive IntelliTuner Adaptive Search and instant recall algorithm gives you ultra fast tuning with 20,000 memories! Beat that! Select 300 Watts for 6-1600 Ohms matching or 150 Watts for ultra wide 6-3200 Ohms. Versatile antenna selection and pre-used setups are found in milliseconds! This tuner matches virtually anything you throw at it. **£254.95 C**

MFJ-925 Ideal For IC-7000/FT-857D



This compact auto ATU sits nicely under the IC-7000 or FT-857D. It's all you need for a complete automated station that will match any antenna! **£174.95 C**

MFJ-991B 300W Auto ATU



Handles 300W, fitted cross needle meter. Wide range: coax, balanced or wire, 300 Watts level matches 6-1600 Ohms, or 150 Watts with wider range of 6 - 3200 Ohms. **£214.95 C**

MFJ-928 Econo 300W Auto ATU



Here's a very economical Auto ATU. No metering, but lightning fast tuning with 20,000 memories and wide matching range. Leave it in-line and just forget about it! **£203.95 C**

MFJ-929 World's Fastest ATU



World's fastest compact auto ATU. The algorithm offers 132,072 solutions and instantly matches any antenna with near perfect VSWR. Get the best from your antenna! **£214.95 C**

MFJ-998 1.5kW Auto ATU



This Auto ATU will handle really high power, which makes it well above UK limits and also offers great efficiency. You get the same fast tuning, with cross needle metering & LCD display. Coax, balanced or wire. **£669.95 C**

MFJ-927 Remote ATU



Here's a great way to tune wire or coax. This fully weatherproof ATU will sit outside right by your antenna and with the included "power thru" box, you feed the DC supply up the coax. No separate hh cable needed. **£254.95 C**



The World's Most Popular ATUs!

MFJ-949E 300 Watts with Dummy Load



More Hams use the MFJ-949E ATU than any other model in the world! The reason? Because it is reliable and can match just about any antenna. Wires, coax, balanced, it handles them with ease. The large inductor is rugged and the 8-way antenna switch lets you select your antenna, quickly. You get a large 3 cross needle meter which makes tuning easy. You even get an internal dummy load. No wonder it's the hams choice! **£184.95 C**

MFJ-969 300W Roller Inductor



160 - 6m, it will match wire, coax or balanced. It reads true PEP (requires 12v DC or internal cell). Fitted cross needle meter and, Dummy load, and QRM-Free Pre-Tune. **£219.95 C**

MFJ-948 300W Roller Inductor



Very similar to the MFJ-949 above, but without the dummy load. The same 300 Watts and the same great design. This tuner will meet all your needs and your antennas. **£164.95 C**

MFJ-941E 300W 1.8-30MHz



Great value, has cross-needle meter, 1000v balun and 8-position selector switch. A great ATU at budget price. **£144.95 C**

MFJ-945E 300W 1.8-30MHz



Designed particularly for coax mobile systems. Now you can move around the band so much easily. **£134.95 C**

MFJ-989D 1.5kW 1.8-30MHz



The latest version gives lower losses and true peak reading. Includes 6-position antenna switch and dummy load. **£399.95 C**

MFJ-962D 1.5kW 1.8-30MHz



This low profile model retains the 1.5kW and incorporates a roller coaster tuning and twin needle meter. **£299.95 C**

MFJ Vertical HF Antennas



MFJ Vertical HF Antennas. Ideal for small gardens.

MFJ-1796 A 1.5kW 40m - 2m self supporting vertical. Requires no radials. Height 3.65m **£244.95**

MFJ-1798 A 1.5kW 80m to 2m vertical that is self supporting and needs no radials. Height 6.7m **£309.95**

MFJ-1625 Window Ant + Tuner

£204.95 D

MFJ-1796 40m-2m vertical **£244.95 D**

MFJ-1798 80m-2m vertical **£309.95 D**

MFJ-1908H 43ft fibre glass mast **£244.95 D**

MFJ-1922 Digital screw driver control **£101.95 D**

MFJ-1924 Prog. screw driver control **£132.95 C**

MFJ-1925 ATAS-100 controller **£74.95 C**

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MFJ-250X 1kW dummy load (no oil) **£56.95 C**

MFJ-260C 300W dummy load **£45.95 C**

MFJ-261 100W dummy load **£35.95 C**

MFJ-265 2.5kW load fan cooled **£209.95 C**

MFJ-403 Micro CW keyer **£67.95 C**

MFJ-403P Micro travel iambic **£82.95 C**

MFJ-4103 PSU for FT-817 **£53.95 C**

MFJ-417 Pocket morse tutor **£77.95 C**

MFJ-442 Slim electronic keyer **£204.95 C**

MFJ-461 Pocket morse reader **£101.95 C**

MFJ-4726 6-way remote ant switch **£164.95 C**

MFJ-490 Memory keyer + paddle **£249.95 C**

MFJ-495 Memory keyer **£192.95 C**

Hy-Gain Rotators

AR-303X



Lightweight Rotator for small beams. Check out this new low price! **£99.95 D**



HAM-IVX

It's Antenna Time! We carry the full range of Hy-gain rotators & will be happy to advise which is the best for you. We also carry good stocks of rotator cable & antenna accessories.

AR-40X VHF or Mini HF **£309.95 D**

CD-451X Small HF **£489.95 D**

HAM-IVX Medium HF **£669.95 D**

HAM-VX Heavy Duty **£1099.95 D**

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AL-811XCE
600W of PEP power from a desk top linear that covers 1.8-30MHz. Great price! **£899.95 D**



AL-811HXCE
800W of PEP power from a desk top linear that covers 1.8-30MHz. New low price. **£999.95 D**



AL-82XCE
This amp will easily deliver 1.5kW from less than 100W input. 1.8 - 30MHz. Uses 2x 3-500Z. **£2749.95 D**

HyGain Vertical Antennas

AV-14AVQ

10-15-20-40m Vertical Antenna 15.kW 18ft / 5.5m (pictured right)
*Self-Supporting *Automatic Band Switching *Power: 1500W PEP
*Gain: 3dBi nominal * VSWR: <1.5:1 typical *Connector: SO-239
*Vertical angle: 16 degs
*Horizontal angle: 360 degs **£199.95 D**

AV-640 6-40m vertical **£429 D**

DX-77A 10-40m vertical **£479 D**

AV-6160 The new 160m to 6m self supporting vertical. Designed for ground mounting, this is an ideal all-band antenna for those with small gardens. **£429 D**

MFJ For details of the full range of MFJ products - check out our web site!

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



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Note: Due to *PW* bursting at the seams – **Phil Cadman G4JCP's Valve & Vintage** and **Restoring An Old Friend** by **Reg Irish G4LUF** have been held over and will be published as soon as possible. My apologies. **Editor.**

Front Cover: Inside and outside the Anytone AT-5555 rig and George G3RJV's tribute receiver to Gilbert Davey, whose project got him interested in radio!



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Rob Mannion G3XFD/EI5IW's

Keylines

Rob thoroughly enjoyed visiting the Moray Firth Amateur Radio Society – meeting old friends and making new ones.

One of my most enjoyable jobs as Editor of *PW* is visiting Amateur Radio Clubs and recently I had a most unusual trip to the Moray Firth Amateur Radio Society (MFARS). However, without the very willing co-operation of the club and (especially) **Charlie Christie GM1TGY** who acted as my taxi driver – it would have been much more difficult.

I travelled up from Bournemouth and overnight on the Caledonian Sleeper from London to Inverness – and it was great to be back in the Highlands. However, I was shocked to see how much development had taken place around the historic railway station in Inverness!

I continued my journey to Elgin by train to meet up with Charlie. I even caught a brief glimpse of the Burghhead 198kHz transmitter that provides the essential UK BBC Radio 4 service. Sometime later though – thanks to Charlie GM1TGY – I was able to get a closer look.

Later on I enjoyed lunch at my hotel in Fochabers along with Charlie and his wife **Linda**. And – as I was in Scotland – I decided not to miss the chance of 'Tatties' (potatoes) Haggis and 'Bashed Neeps' (mashed turnips – often known as Swedes). Very enjoyable!

Portessie Village Hall

The MFARS committee had decided on a larger meeting place than their usual club house in Fochabers and we travelled to Portessie alongside the Moray Firth for the meeting. It was a fantastic – truly beautiful –

evening. The views across to the Sutherland and Caithness coastline from the hall close to the beach were stunning.

The welcome waiting for me was typically Scottish and I was very pleased to meet an old friend from my broadcasting days – who had driven up from Aberdeen. Another Amateur had driven from Inverness and a remarkable elderly couple had travelled a very long distance by taxi to attend. I felt rather humbled that all these people had travelled to hear a talk about *PW*, my own work and how the team in Broadstone produce the magazine. Don't forget – I'm just part of that team!

I never cease to be amazed just how far people will travel for special occasions in the remoter areas of the UK. My thanks go to the MFARS for helping to make the evening such an enjoyable time – and especially to everyone who was involved in preparing the large amount of tasty refreshments that reflecting the legendary Scottish hospitality so well.

Aberdeen Mini-Bus Breakdown

Despite the good turn-out for the evening a group of Radio Amateurs from the Aberdeen area never arrived. Unfortunately (as we found out later) their minibus broke down en-route and I felt very sad that their efforts came to nothing.

I'm now hoping that the Aberdeen group will eventually receive their own *PW* visit and I'm more than willing to travel to the

'Granite City'. Thanks for trying to join us my friends!

Off-Shore Morse Practice

I learned that Charlie, who works off-shore in the oil industry wants to increase his Morse speed – so he's now using my Datong D70 Morse Tutor during his off-duty periods on his oil rig! We're hoping to work each other on the h.f. bands later on in the year.

On the way home on Saturday Charlie took me to the *Buccaneer* Garage in Elgin – complete with a retired Royal Navy *Buccaneer* aircraft. What a magnificent sight!

We then visited RAF Lossiemouth (formerly a Fleet Air Arm station), which has recently been reprieved from closure following the UK Government's decision to keep it operational. It has changed much since I was based there in the early 1960s!

The final highlight for me on the way to Dalcross (Inverness) Airport was when Charlie GM1TGY drove me to see the Burghhead BBC 198kHz transmitter. Our mutual friend **Donny Noble GM3NCS** (now a Silent Key) who lived in Burghhead used to keep me up-to-date on local matters and what was going on at the transmitter site and was a MFARS stalwart.

Charlie delivered me to Dalcross – thanks for giving up your time Charlie! I squeezed into the Flybe Dash 8 turboprop aircraft and arrived home in Bournemouth at 6pm on Saturday. What a memorable trip!

Rob Mannion G3XFD/EI5IW

Practical Wireless

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Components For PW Projects

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

Photocopies & Back Issues

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

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Technical Help

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



Readers' Letters

Send your letters to:

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

Please note that the opinions expressed in any letter published in *PW* are those of the named correspondent whose letter has been published and they don't necessarily reflect the opinions of the Editorial staff or PW Publishing Ltd. Editor.

April Issue Published in August?

Dear Rob,

After a deliberate digest of **Mr Pumford-Green GM4SLV's** letter in the August issue of *PW*, I found myself reading it all over again. In fact, if I hadn't of known better, I may of thought that this particular issue was published in April, not August!

It seems then, if I have indeed understood GM4SLV's hypothesis correctly, that if someone chooses to remain an M3 licensee – be it, one year or several years, and for whatever reason decide not to upgrade to an intermediate or to an advanced Amateur Radio licence, he or she in doing so, is not (and won't be) demonstrating that they are giving the hobby due consideration, nor treating it "seriously". In other words, if those who choose not to upgrade in a predetermined time according to GM4SLV, then they can be nothing more than second-class operators – for ever!

Besides, what can be so wrong with wanting "to remain on the first step of the incentive licencing scheme for many years"? There is no illegality about it. No official compunction in the licensing conditions to do otherwise.

But not only that, it appears that GM4SLV also believes that unless any Amateur Radio operator is a 'Full' licence holder, then he or she cannot possibly "participate in all its facets". Obviously, these strange observations are either the work of someone completely out of touch with the actual reality of our hobby today, or (more worryingly) the thoughts of many other like-minded 'Full' licence holders.

And as for the implied implication that some M3s are running power levels not permitted in their licence class, may I respectfully remind GM4SLV, that the use of more r.f. power than is permitted in any licence class – has been endemic for decades. It's my opinion that almost everyone 'bends' the rules sometimes – including 'Full' licence holders.

I suggest that GM4SLV reads the letter (August issue – same page) written by **Philip Cadman G4JCP** several

£20 Star Letter

Puzzling Earthing Advice

Dear Rob,

I have just been reading a highly informative article on station earthing and other matters, which has left me scratching my head, somewhat. The item is on the 'Radio Works Reference' web page and entitled 'RF Ground Systems'.

In the course of the article the author states that the common ground or 'heavy earth strap' that all station equipment is connected to, should be dispensed with. Also, that the outer braid of the coaxial cable connecting all station equipment should be relied upon as the station's only earth connection. This is where I become confused, Rob! I have, for almost 60 years on the air, both as a professional and as an Amateur Radio operator, understood that all items of equipment should be connected to a common earthing strip.

The author states that the **only** connection to ground should be the Ground Point on the antenna matching device. He maintains that not to do so will lead to ground loops that will cause considerable problems with radio frequency (r.f.) at the operating position, leading to arcing and being "bitten" by the r.f. on the key or microphone or even on the equipment cases.

The advice flies in the face of all that I have understood over the years and all the information that I and others have given to those studying for their licence. Have we been wrong in advocating a common earthing strip, or is the author out of kilter with so many others who have considerable experience?

I'm really intrigued by this and would welcome the comments of other *PW* readers on this matter. Sincerely yours.

Tony Tuite GW0NSR.

Penmaenmawr

Conwy

North Wales

Editor's comment: *There are some real conundrums in the advice you read Tony! The problems regarding earthing often rise – wraith-like from the ground – perhaps! Please join me on the Topical Talk page 77, for further discussion on this fascinating subject.*

times. In it, he will note that G4JCP considers that our hobby is approaching a precipice so far as actual numbers entering it are concerned. So rather than frighten prospective Amateur Radio candidates off with the prospect of being forced to upgrade and in doing so, perpetrate a clique of superiority, simply because you do not have the correct licence class, will only prevent the growth of our hobby rather than promote and enlarge it. 73.

Ray Howes G4OWY.

Weymouth

Dorset.

Slow Lane To Amateur Radio?

Dear Rob,

I hope you are well – and I've got my soap box out again. This time about the UK slow lane route to a full licence!

At the recent Stockport rally I met a retired gentleman who had worked in radio communications all his life. He spoke with both **Evan Duffield M0TJU** and myself for quite some time, asking if we could advise him how to fast track the exams. He reeled off a list of radio qualifications that he had and told us briefly of his many years of experience.

Now retired, he fancied getting an Amateur Radio licence as he was missing radio, but was frustrated by the fact that he would have to attend the courses, go through everything from scratch, building simple construction projects, etc., before he could get on the air!

Both Evan and myself understood his frustration, but could only advise him to contact the local club and get the quickest way through the three exams to get to where he wanted to be – fully licenced. After speaking to us, he went to the RSGB stand and bought all three course manuals and spoke to a member of the local club about courses as he could see that there was no other way.

My question is – why on earth does someone with professional qualifications and many years of experience in radio communications need to go through the Foundation, Intermediate and Advanced exams and attend the associated courses? I suspect that this gentleman could have taught many Amateurs a lot of things about radio from his wealth of professional experience, but he is treated just the same as a seven year old wanting to enter our hobby!

I think there are people with all levels of experience wishing to enter our hobby and the number of licences issued annually has declined dramatically over the years. It is fast becoming an 'old man's' pastime. However, many of those who do want to join us, both young and old are put off by the fact that they are expected to follow the slowest and/or least experienced pupil on courses and cannot simply "get on with it" through self study and take each exam as soon as they feel they are ready.

There needs to be a fast track entry method, otherwise the number of people entering our hobby will continue to decrease year on year. I consider there needs to be an 'old style' RAE type exam that experienced people can self study for and enter, without the need to attend all the courses and do the required simple projects that they could easily teach the theories of. In this way we would encourage them, rather than put them off. Allow them to get on the air quickly, but still requiring them to pass a qualification exam to ensure that they have the necessary skills.

I didn't attend any course when I became licensed back in 1980, but I passed the RAE with a Distinction thanks to my technical knowledge and many years experience as a short wave listener. There are a great many potential Amateurs out there who could and would do the same, if we would only open the door for them!

I saw a comment recently in another

Do We Have To Advance To A Full Licence?

Dear Rob,

I read **Mr Pumford-Green's** letter a few times before I decided to put down a reply. The question I feel I must ask is why Mr Pumford-Green feels that people have to advance toward his "ultimate goal" of the full licence?

Whilst I am in complete agreement regarding the mistreatment of foundation call holders by those of 'higher' licence rank, his belief that you must take the next two steps up the licence ladder to prove you're taking the hobby seriously is, to my mind, incredibly arrogant.

It smacks of the old "them and us" attitude that class B callsign holders suffered from many of the Class A licensed types back in the 1970s.

To take your intermediate and then full licence simply to pander to those who've expounded prejudice against the foundation holder is not necessarily going to achieve anything. Many of the 'full' licence holders, if they're of that mindset will still adopt a "Took you X years to get it did it? I got mine in a year" attitude.

I don't recollect ever reading that the Foundation Licence had to be anything other than a foot on the first rung of the Amateur Radio ladder. Surely it's personal interest that matters most? The incentive to advance should come from the person's own drive and not become a prerequisite forced upon you by whatever powers that be who control the licensing of our hobby.

Going back to my allusion to the old class A versus class B situation, my experience when I held my G8 call was that the a large majority of class B v.h.f./u.h.f. only licences were vastly more technically interested in the hobby than the average class A licence holder. Why should this not be the same situation now?

Having come back into the hobby after several years lay off I was amazed at just how far the hobby seemed to have dumbed down and died a death. This opinion was not from listening to any particular section of the licence holding fraternity – but as a general amazement at the lack of basic radio knowledge being regularly expounded on the air.

Personally I never saw and still don't see what benefit was achieved by ditching the old exam scheme and going for the new one. But then again I'm an old timer now and probably my views are somewhat jaundiced.

Overall I felt that while giving out the soothing balm of agreement that foundation licensee abuse is wrong with one hand, it seemed to me that Mr Pumford-Green was being equally as off-hand and disparaging about people who choose not to follow him up his chosen ladder to full licence status.

At least with the old licensing regime we achieved a City and Guilds Institute qualification – which actually meant something at a technical level and looked good on a CV. Now I suspect the best you could do is stick it down in the hobbies and interests section.

When all is said and done this is a hobby and not a career choice and, as such how high we wish to rise is – and should be – entirely up to the individual.

Dale (Slim) Haines G4IPZ
Westerham
Kent

publication attempting to justify our three level examinations saying "to obtain an American Extra, you still have to pass the Technical and General examinations first." This is no justification. Great Britain needs to stop blindly following the Americans in everything we do, like lost sheep!

We need to get back to what we are good at – leading by example – thinking for ourselves! Creating our own ways of

doing things and letting others follow, or even showing others how to do it instead of just following the Americans. Just because the Americans do it that way does not mean that is the best way for us!

Regards,
Gordon Hunter G8WWD
Upton
The Wirral



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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Send your info to:

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West Tyrone GI HF Conference

The **West Tyrone Amateur Radio Club** (WTARC) in Omagh are holding their **HF Conference on Saturday August 20th 2011**. This Conference comes following the very successful DigiCon 09 Conference back in September 2009. A range of speakers from around GI, EI and G will be in attendance to share their various perspectives on aspects of h.f. operation. There will also be in attendance Traders such as, **Tyrone Amateur Electronics** (TAE) and **JBT (Jim Bob)** along with exhibits from the **RSGB** and the **IRTS**. The Event is also supported by *Practical Wireless*. So come along for what will be a Fun Day Out for all the family! We look forward to seeing you there!

Philip Hosey MI0MSO.

E-mail: mi0mso@yahoo.co.uk

For details of the Venue etc go to <http://wtarc.co.uk/GIHFConference.aspx>

European Union To Get 27MHz SSB CB

The ECC Decision (11)03 of June 24, 2011 paves the way for the use of 27MHz single sideband (s.s.b.) CB radio across the British Isles and Europe. It permits the use of s.s.b. equipment running 12W p.e.p. output in the frequency band 26.960 – 27.410MHz.

The ECC Decision came into force on June 24th, 2011 and the preferred date for implementation of this ECC Decision by national administrations is October 1st, 2011.

The ECC Decision ECC/DEC/(11)03 – The harmonised use of frequencies for Citizens' Band (CB) radio equipment can be read via:

<http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCDEC1103.PDF>

Bletchley Park Memorial Dedicated By HM The Queen

Her Majesty The Queen dedicated a public memorial at Bletchley Park, Milton Keynes, Buckinghamshire on Friday July 15th, to commemorate all those that provided vital service at Bletchley Park and its 'Outstations' during the Second World War.

The occasion was The Queen and Duke of Edinburgh's first visit to the home of the wartime code breakers. They were accompanied throughout the visit by **Sir Francis Richards**, Chairman of the Bletchley Park Board of Trustees and **Simon Greenish**, Director of the Bletchley Park Trust.

The Royal Party was provided with a short tour of the museum and shown some of the restoration projects which have taken place at Bletchley Park to rebuild the machines which assisted with the wartime decryption of enemy codes. These included the Turing Bombe, brainchild of mathematical genius **Alan Turing**, and Colossus, the world's first electronic computer. The Queen was also shown an Enigma machine and given a demonstration of how it worked.

At the dedication ceremony, The Queen was introduced to some of the veterans that either served at Bletchley Park or the 'Outstations', where the information was intercepted that Bletchley Park processed. They included **Sir Arthur Bonsall**, veteran of the Bletchley Park air section, who went on to be a Director of GCHQ. Her Majesty was also introduced to some of the relatives of deceased veterans, who had been invited to celebrate the event, including **Sir John Dermot Turing**, nephew of Alan Turing.

Before she unveiled the memorial, The Queen spoke of her deep sense of admiration and gratitude for the men and women who served at Bletchley and the debt the nation owes to them for their achievements. She also emphasised the importance of the intelligence allies with whom the UK worked, and the inspiration Bletchley provides to the intelligence services today, as they continue their vital work of protecting the people of this country.

Following the ceremony, The Queen was shown the Roll of Honour which lists the names of all of those who served at Bletchley Park and its 'Outstations' during the War. This has been compiled over a number of years and includes nearly 11,000 names.

Mrs Sheila Lawn, a veteran of Bletchley Park, said after the ceremony: "It was a very great honour, a great pleasure and the culmination of a great deal of effort to have such a splendid occasion at Bletchley Park with Her Majesty The Queen and His Royal Highness The Duke of Edinburgh present".

Further details from **Caroline Murdoch**

Tel: **(01869) 810443**

E-mail: caroline@redworks.co.uk

Website: www.redworks.co.uk



Her Majesty Queen Elizabeth II leaving Block B at Bletchley Park, accompanied by Prince Philip Duke of Edinburgh following the dedication of the public memorial on Friday July 15th 2011.

Vortex Antenna Systems

Peterborough-based **Vortex Antenna Systems** have announced the launch of their new 'Linear Loaded' h.f. Yagi Antennas. The new 2011 range initially includes linear loaded mono-band dipoles and 2-element models for both 7 and 10MHz (30 and 40m).

Commenting on the new products proprietor, **Steve Lawman G0UIH** commented that "Enquiries both in the UK and from overseas identified an area that was popular with operators interested in the lower bands, but did not have the space for full-sized mono-banders. All Vortex linear loaded models are 75% of full-size, yet performance is very close to the full-size versions".

The Vortex press release states, "Vortex continue their use of premium components including full stainless fittings and Stauffenberg Hydraulic clamps. For the linear loaded designs, six sections of metric 6082-T6 construction grade tubing are also used".

Further information from;

Steve Lawman G0UIH

Tel: (07943) 871893

E-mail: g0uihsteve@aol.com

Website: www.vortexantennas.co.uk

RossComm Are In Business!

Ian Ross M0CZV wrote to Newsdesk: "Dear *PW*, after many years of wanting to start my own business a change of circumstances has provided me with the opportunity to make this a reality. So, on July 1st a new retailer – **RossComm Radio Communications** – opened up 'virtual shop' on the south coast".

Ian continued, "It's a small family business being run by myself and my wife **Mandy** – We have a young family, **James** 7 years old who is looking forward to becoming licenced and **Megan**, 11 years old who is keen to help her Dad in the shop!. Our business model is simply to aim to provide great value and good old fashioned service we hope to be able to offer *PW* readers a first class service".

Ian continued, "We are offering a range of Amateur Radio and commercial radio equipment and spares including workshop Manuals for Yaesu and Vertex, h.f. antennas and baluns, microphones, r.f. connectors and spare boards for Yaesu and Vertex equipment.

"We are continually expanding our range of antennas and have just added a beautifully built Kevlar half-sized G5RV antenna, along with QRP resonant end-fed antennas. All are custom made here in the UK for RossComm Radio Communications".

Ian remembers, "To think that I first bought a copy of *Practical Wireless* when I was 10 years-old in 1976 and will now be appearing as a trader in my favourite magazine! I was licenced as G1HDS when I was 18 years old – so you could say that radio has been a major part of my life as I am now in my 40s.

"As we are just getting things off the ground we are trading from home. For now we will very much be an e-commerce based trader.

We will be offering some great value items including baluns and h.f. antennas throughout as we get the business off the ground. We also hope be able to attend some of the Radio Rallies this year – details will be posted on our website.

"We have our own website and **RossCommRadio** has just been created on eBay, and we have an eBid shop <http://rosscomm-radio-bits-n-bobs.ebid.net> so lots of ways for people to find us. Our website continues to be updated each day and I working hard to keep the content fresh."

Kind regards, Ian Ross M0CZV

E-mail: enquiries@rosscomm.co.uk

Website: www.RossComm.co.uk



Ian Ross M0CZV is now in business – operating as RossComm Radio Communications.

First Customer In The World To Buy The New Wouxun KG-UVD1P/L



Jack Bryant G4LTR receiving the very first Wouxun 70/144MHz hand-held to be sold by **Martin Lynch G4HKS** of **ML&S Ltd.** at their store in Chertsey, Surrey.

The new Wouxun KG-UVD1P/L is the first hand-held transceiver ever designed to operate on the 4m and 2m bands. Martin and his team thought it would be a good idea for Wouxun to produce the new 70/144MHz model – they took up the challenge and within a record time produced the version for Martin G4HKS, their sole distributor in the UK.

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

New Radio Receiver From Bonito In Germany

Dennis Walter from the company Bonito contacted *Newsdesk*: "We presented a new receiver – the **IF-Receiver Bonito RadioJet 1102S** at the 'Hamradio' Amateur Radio festival in Friedrichshafen this year. The show was extremely successful for us and the RadioJet seemed to be the 'magnet' of the whole show.

"We're hoping we can deliver the first units at the end of September. Please look for all the details on our website http://www.bonito.net/radiojet/infos/en_rj10_home.htm

We will be showing the RadioJet 1102S at the UK's National Hamfest in Newark, Nottinghamshire this September."

Dennis Walter.

BONITO-Vertrieb

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E-mail: dennis@bonito.net

Websites: www.bonito.net

www.meteoserver.net

The QRP In The Country Event Escapes (Most of) The Rain!

The *PW* Editor reports on the 2nd QRP in the Country event at Tim Walford G3PCJ's farm in Somerset – where it seems they missed most of the rain on Sunday July 17th!

Rob G3XFD

writes: When I left Bournemouth for Somerset at 7am on Sunday July 17th the weather was dry and the sky didn't look too bad – but after I'd picked up my passengers – **Tex Swann G1TEX**, **Phil Ciotti G3XBZ** and

Colin Redwood G6MXL – as we were approaching Dorchester the sky became leaden. On the A37 between Dorchester and Yeovil it rained so hard and became so dark we weren't able to see the mast at the Rampisham Down shortwave transmitter site very well – while normally they dominate the skyline towards the west. But we didn't need to worry because after one shower in the early part of the day – the rest of the day proved to be warm sunny and dry.

However, just in case, **Tim Walford G3PCJ** opted to use the large new (clean) farm barns so that we were under cover. Everything was under cover – except the (fiendish difficult and great fun) 7MHz based direction finding hunt. I enjoyed trying this last year but left it to others to get frustrated this time!

Club Support

The QRP event was well supported by clubs this year and visitors arrived from as far away as Cornwall, Manchester and Northamptonshire. **The Weston Super Mare Radio Society** had a stand that was showing a large number of *PW* projects built by club members. The *PW Chatterbox* 1.8MHz transceiver (designed **George Dobbs G3RJV** – who was a guest this year) took pride of place and everyone was keen to describe their constructional experience.

The **Poole Radio Society** also had a stand and **Phil Ciotti G3XBZ** was on hand to share the experiences he's gained from assembling his Elecraft K2 and other kits. Much interest was shown in the Elecraft.

Next door (using a spare table we had), the **Radio Amateurs Invalid & Blind Club** – the charity for disabled Amateurs had a

stand and the members attending were kept busy describing their charity's work to help the blind and disabled to get on and stay on the air.

The **Yeovil Amateur Radio Club** had a large display of vintage and home-brewed equipment on display and a YouTube video can be seen at <http://www.youtube.com/watch?v=hYxHDGWL4PM> and there's also an amusing apology regarding the *PW* 'Coffee Can' antenna project from the April 2010 *PW* that was thought to be an April Spoof!



Fig. 1: The Buildathon event – organised and overseen by Steve Hartley G0FUW – was held in a comfortable new office building on G3PCJ's farm. The busy constructors can be seen working on their Carey receivers.

The **Radio Society of Great Britain (RSGB)** had a stand to 'fly the flag' on its members' behalf and **George Dobbs G3RJV** had a large flat bed farm trailer to himself to support the G QRP Club, with copies of *Spratt* for interested visitors. George also had his copy of the Gilbert Davey book (see this month's *Carrying on the Practical Way*) that helped him into the radio hobby.

The **Blackmore Vale Amateur Radio Society** had a good selection of miniature Japanese Direction Finding (DF) receivers on their stand. Willing victims (I mean participants, of course) could then take them out into a nearby field to try and (frustratingly in my case) to find all four hidden beacons operating on 7MHz. Great fun!

There were a great many other attractions – including a pair of Second World War Wireless Set 17 in operation, together with excellent food stalls manned by many volunteers – including some from the **British Young Lady's Amateur Radio Association (BYLARA)** but they made sure their stand was not left unattended!

Tex Swann G1TEX and I thought that it was rather unwise for our friend **Robert van der Zaal PA9RZ** (Chairman of the **Benelux QRP Club**) to be left in charge of the locally brewed beer (from the farm next door) and Somerset cider. But despite

our worries Robert survived the experience and there was enough 'local brew' to go around. He even kindly remembered to bring a large mature Edam cheese for Tex and I (his traditional gift for the *PW* team). Robert regular supports as many of the QRP and home-brew radio events he can in the UK.

The Buildathon

I eventually found time to visit the Buildathon and managed to catch a few moments of **Steve Hartley G0FUW**'s time to interview him for my YouTube report. The hush and concentration seemingly radiating from the Buildathon constructors was almost palpable. Despite this, the youngest – a very keen young man – managed to look up from his Carey receiver to show the delight on his face, clearly demonstrating how much he was enjoying the experience. Later, I was told that all the Careys were finished and were working okay! Congratulations to Steve G0FUW and everyone who took part!

Altogether, the 2011 QRP in the Country event was an astounding success – the organisers and everyone involved were

pleased and tired – but without exception we're all looking forward to the 2012 event – and for those who want to escape from all the hype surrounding the 'London Athletics' – it will be the ideal diversion!

Further details from **Tim Walford G3PCJ**, **Walford Electronics**, **Upton Bridge Farm**, **Long Sutton, Langport, Somerset TA10 9NJ**. Tel: (01458) 241224.

E-mail: walfor@globalnet.co.uk



Fig. 2: The Buildathon constructors all successfully completed their Carey regenerative receivers at the QRP in the Country event at Long Sutton Farm on July 17th 2011.

Videos Available

Note: Rob produced a number of videos at the QRP in the Country event. A number can be found at the following addresses (see YouTube site for the full selection of videos).

<http://www.youtube.com/watch?v=wpTp9-GYecQ> Showing the Buildathon under way with Steve G0FUW describing the process.

<http://www.youtube.com/watch?v=8-KDpQd1s1k> Here the Rev. George Dobbs G3RJV discusses – and shows – the Gilbert Davey book that led him into the radio hobby.

<http://www.youtube.com/watch?v=PqJf-7JWqRs> Tim Walford G3PCJ discusses his ideas for the QRP in the Country event. Jo' and George Dobbs also discuss the event on camera.

KENWOOD

Authorised dealer

Hand-helds

TH-D72E Dual band 2/70cm with GPS & APRS	£429.95
TH-F7E Dual band 2/70cm RX 0.1-1300MHz	£239.95
TH-K2ET Single band 2m with 16 button keypad.....	£169.95
TH-K2E Single band 2m	£164.95
TH-K4E Single band 70cm	£164.95



Mobiles

TM-D710E Dual band 2/70cm with APRS RX 118-524MHz & 800-1300MHz, 50 Watts	£444.95
TM-V71E Dual band 2/70cm with EchoLink RX 118-524MHz & 800-1300MHz, 50 Watts	£299.95
TM-271E Single band 2m, 60 Watts.....	£169.95

Base

TS-590S HF & 6m 100W all mode transceiver.....	£1,369.95
TS-2000X All mode transceiver HF/50/144/430/1200MHz 100 Watts All mode transceiver.....	£1,799.95
TS-2000E All mode transceiver HF/50/144/430MHz 100 Watts All mode transceiver	£1,549.95
TS-480HX HF/6m 200 Watts Transceiver.....	£879.95
TS-480SAT HF/6m 100 Watts Transceiver	£779.95

Accessories

PS-60 25amp power supply unit ideal for the new TS-590S	£329.95
SP-23 External speaker	£71.95
SP-50B Mobile speaker	£29.95
MC-90 Deluxe desk microphone suitable for DSP transceivers	£204.95
MC-60A Desk microphone with pre-amplifier	£124.95
HS-5 Deluxe headphones.....	£56.95



Handhelds

KG-UVD1P Great value dual band 2/70cm	£92.95
KG-679E Superb single band 2m	£59.95
KG-UVD1PL New fab dual band 4m/70cm handle just	£99.95



Accessories

WO/ELO-001 Battery eliminator	£10.49
WO/CCO-001 12v Car charger	£10.49
WO/SMO-001 Speaker microphone	£15.49
WO/PSO-110 Programming software.....	£20.49
WO/CASE Leather case	£10.49



TYT-800 2m 144-146MHz 5 watts 199 channels amazing	£49.95
TYT TH-UVF1 2/70 5 watts 128 channels	£99.95



Accessories

TYT-BE Battery eliminator	£14.95
TYT-SP Speaker microphone	£14.95
TYT-EP Ear piece.....	£9.95



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!



Hand-helds

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	£239.95
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	£104.95



Mobiles

IC-7000 All mode HF/VHF/UHF 1.8-50MHz, 100 Watts output.....	£1,195.95
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 compatible, 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



Base

IC-9100 HF/VHF/UHF All in one transceiver to 23cm (optional) - amazing! In stock NOW	£2,999.95
IC-7800 HF/6m All mode 200 Watts Icom flagship radio	£8,995.99
IC-7700 HF/6m 200 Watts with auto ATU transceiver	£6,399.95
IC-7600 HF/6m 100 Watts successor to the IC-756.....	£3,399.99
IC-7410 HF to 6m 100W all-mode.....	£1,695.95
IC-7200 HF/VHF 1.8-50MHz RX 0.030-60MHz, 100 Watts output (40w AM)	£839.95
IC-718 HF 1.8-30MHz RX 300kHz - 29.999MHz, 100 Watt output (40w AM)	£599.95
IC-910H dual band with optional 23cm, 100 Watts output.....	£1,299.95

Accessories

PS-125 25 amp Power supply unit	£329.95
SM-30 Desktop Microphone designed for SSB and FM	£119.95
SM-20 600 Ohm 8-pin deluxe base station microphone	£169.95
SP-10 Mobile 5w speaker 4 Ohms	£54.95
SP-22 Mobile extension speaker	£34.95
SP-20 Base station speaker with filters.....	£184.95
SP-21 Base station 3w speaker 8 Ohms	£119.95
SP-23 Base station speaker with built in high and low pass filters.....	£149.95



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

The Quansheng TG-UV2 is a dual band 2m/70cms handheld. It covers 136.00 - 173.995, 400 - 469.995MHz and FM broadcast 88-108MHz. The radio includes 7.2v 2Ah Li-ion battery for extended life. It also comes with AC charger, carry strap and belt clip. This is a very robust radio - don't underestimate its performance from the price!



YAESU

Authorised dealer

Hand-helds

VX-8DE Tri band same spec as VX-8E but with enhanced APRS	£369.95
VX-8GE Dual band with built-in GPS antenna and wideband 100-999.90MHz Rx	£359.95
VX-7R Tri band 50/144/430MHz RX 0.5- 900MHz, 5 Watts output.....	£299.95
VX-6E Dual band 2/70cm RX 1.8-222/420-998MHz, 5 Watts output.....	£239.95
FT-60E Special offer £179.95 now £129.95 while stocks last	
VX-3E Dual band 2/70cm RX 0.5-999MHz, 3 Watts output.....	£159.95
VX-170E Last few at this price.....	£99.95
FT-270E Single band 2m, 144-146MHz, 137-174MHz Rx	£104.95



Mobiles

FT-857D All mode HF/VHF/UHF 1.8-430MHz, 100 Watts output.....	£679.95
FTM-350 Dual band with Bluetooth, GPS & APRS.....	£479.95
FT-8900R Quad band 10/6/2/70cm 28-430MHz, 50 Watts output.....	£369.95
FT-8800E Dual band 2/70cm RX 10-999MHz, 50 Watts output.....	£329.95
FTM-10E Dual band 2/70cm, 50 Watts output	£309.95
FT-7900E Dual band 2/70cm 50/40 Watts with wideband RX.....	£239.95
FT-2900E Single band 2m 75 Watt heavy duty transceiver	£139.95
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.....	£789.95
FT-817ND HF/VHF/UHF Backpack Transceiver RX 100kHz - 56MHz 76-154MHz 420-470MHz 5 Watts	£509.95

Base

FT-DX5000MP Deluxe HF/6m all mode 200W transceiver with 300Hz roofing filter & SM-500 station monitor	£5,295.95
FT-DX5000D Deluxe HF/6m all mode 200W transceiver with SM-500 station monitor	£4,795.95
FT-DX5000 HF/6m all mode 200W transceiver	£4,349.95
FT-2000D HF/6m All mode 200 Watts transceiver RX: 30kHz - 60MHz.....	£2,599.95
FT-2000 HF/6m All mode 100 Watts transceiver RX: 30kHz - 60MHz.....	£1,999.95
FT-950 HF/6m 100 watt transceiver with DSP & ATU RX 30kHz - 56MHz.....	£1,299.95
FT-450AT Compact transceiver with IF DSP and built in ATU, HF+6m 1.8-54MHz, 100 Watts output	£719.95
FT-450 Compact transceiver with IF DSP, HF+6m 1.8-54MHz, 100 Watts output.....	£639.95
FT-450D "New" model compact transceiver with built-in ATU	£799.95

Accessories

MD-200A8X Ultra high fidelity desktop mic	£239.95
MD-100A8X Deluxe desktop microphone.....	£119.95
FP-1030A 25amp continuous power supply unit	£199.95
SP-2000 Base station external speaker	£179.95
MLS-100 High power mobile speaker	£29.95
MLS-200 Compact mobile speaker	£26.95
ATAS-120A Active tuning antenna system.....	£299.95

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)	£69.95
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!

ZL5-2 2 Metre 5 Ele, Boom 95cm, Gain 9.5dBd	£59.95
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
HB9-10 10 metre (Boom 52")	£69.95
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)	£22.95
HLP-4 4 metre (size approx 600mm square)	£34.95
HLP-6 6 metre (size approx 800mm square)	£39.95

MOONRAKER G5RV Wire Antennas

The most popular wire antenna available in different grades to suit every amateur All from just £19.95!

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 Trapped Wire Dipole Antennas

Commercial quality trapped wire dipoles that resonate, so require no ATU!

MDT-6 FREQ: 40 & 160m LENGTH: 28m POWER: 1000 Watts	£79.95
MTD-1 (3 BAND) FREQ: 10-15-20 Mtrs LENGTH: 7.40 Mtrs POWER: 1000 Watts	£69.95
MTD-2 (2 BAND) FREQ: 40-80 Mtrs LENGTH: 20Mtrs POWER: 1000 Watts	£79.95
MTD-3 (3 BAND) FREQ: 40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts	£129.95
MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts	£69.95
MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER: 1000 Watts	£119.95

(MTD-5 is a crossed dipole with 4 legs)

MOONRAKER MTD-300 2-30M Broadband wire dipole antenna

The MTD-300 broadband wire dipole antenna is designed to provide optimum performance over a wide frequency range and is very easy to assemble and use.

- Frequency 2-30MHz ● Radiator length: 25m (82ft) ● Type: Terminated Folded Dipole ● Radiation: directional ● Feedline: 50 Ohm coax (30m) ● Connector: SO239
- SWR: <2.0:1 to <3.0:1 depending on factors ● No transmatch required ● Power: 150W (PEP)
- Spreaders: 46cm (18in) ● Weight 3.1kg.

MOONRAKER Multiband Mobile

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 38" 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, 3/8" 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, 3/8" 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, 3/8" fitting, (great for static use or even home base - can tune on four bands at once)	£69.95
ATOM-AT4 10/6/2/70cm Gain 2m 2.8dBd 70cm 5.5dBd, Length 132cm, PL259 fitting (perfect for FT-8900R)	£59.95
ATOM-AT5 5 Band mobile 40/15/6/2/70cm, Length just 130cm, 200W (2/70) 120W (40-6M) PL259 fitting, (great antenna, great price and no band changing, one antenna, five bands)	£69.95
ATOM-AT7 7 Band mobile 40/20/15/10/6/2/70cm, Length just 200cm, 200W (2/70) 120W (40-6M) PL259 fitting, (Brilliant antenna HF to UHF with changeable coils)	£79.95

DIAMOND ANTENNA Yagi Antennas

Diamond performance from the superb Diamond factory

A502HBR 6m 2 Elements, Power 400W, Gain 6.3dB, Radial Length 3m	£99.95
A144S10R 2m 10 Elements, Power 50W, Gain 11.6dB, Boom Length 2.13m	£94.95
A144S5R 2m 5 Elements, Power 50W, Gain 9.1dB, Boom Length 95cm	£49.95
A430S15R 70cm 15 Elements, Power 50W, Gain 14.8dB, Boom Length 224cm	£74.95
A430S10R 70cm 10 Elements, Power 50W, Gain 13.1dB, Boom Length 119cm	£59.95

MOONRAKER HF Mobiles

Get great results with the Moonraker range of HF mobiles ! ... from as little as £17.95!

AMPRO-10 28MHz, Length 220cm, 38" fitting (slimline design)	£19.95
AMPRO-12 24MHz, Length 220cm, 38" fitting (slimline design)	£19.95
AMPRO-15 21MHz, Length 220cm, 38" fitting (slimline design)	£19.95
AMPRO-17 18MHz, Length 220cm, 38" fitting (slimline design)	£19.95
AMPRO-20 14MHz, Length 220cm, 38" fitting (slimline design)	£19.95
AMPRO-30 10MHz, Length 220cm, 38" fitting (slimline design)	£19.95
AMPRO-40 7.0MHz, Length 220cm, 38" fitting (slimline design)	£19.95
AMPRO-80 3.5MHz, Length 220cm, 38" fitting (slimline design)	£24.95
AMPRO-160 1.8MHz, Length 220cm, 38" 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 Ground Plane Free Colinear Verticals

We have always wanted antennas without radials without the compromise of performance - well now you can.

SQBM110P 2/70cm, Gain 3.6dBd, RX: 25-2000MHz, Length 100cm, SO239 fitting	£54.95
SQBM1010P 6/2/70cm, Gain 1.5/2.0/5.0dBd, RX: 25-2000MHz, Length 140cm, SO239 fitting	£84.95
SQBM1010N 6/2/70cm, Gain 1.5/2.0/5.0dBd, RX: 25-2000MHz, Length 140cm, N-Type fitting	£89.95
SQBM225P 2/70/23cm, Gain 2.5/5.0/8.5dBd, RX: 25-2000MHz, Length 130cm, SO239 fitting	£79.95
SQBM225N 2/70/23cm, Gain 2.5/5.0/8.5dBd, RX: 25-2000MHz, Length 130cm, N-Type fitting	£84.95

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
MR0525 2/70cm, Gain 0.5/3.2dBd, Length 43cm, PL259 fitting (high quality)	£19.95
MR0500 2/70cm, Gain 3.2/5.8dBd, Length 95cm, PL259 fitting (high quality)	£26.95
MR0750 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
MR0800 6/2/70cm Gain 3.0dBd/5.0/7.5dBd, Length 150cm, PL259 fitting (high quality)	£39.95
MR0273 2/70/23cm Gain 3.5/5.7/5.5dBd, Length 85cm, PL259 fitting (high quality)	£49.95

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

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

CHAMELEON ANTENNA

The CHAMELEON V1 HF/VHF/UHF Multiband AntennaTM is a revolutionary antenna that stands at a mere 8.5 feet tall and contains a unique trap coil design.

This antenna is ideally designed for mobile, portable or base station purposes were limited space is a concern.

Frequency Range: 80/60/40/30/20/17/15/12/11/10/6M + 2M/1.25M/70cm (144MHz - 500MHz) + USAF MARS/CAP (3.3MHz, 4.5MHz & 7.6MHz) £249.95

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!

NEW GP2500F fibreglass version now in stock £279.95

HUSTLER HF Verticals

Brilliant HF antennas that can be ground mounted if required which in today's limited space is a popular option. Also extra trap tuning is also available to get that perfect match if required.

Hustler 4-BTV 4 Bands 40-10m 1000W Length 6.52m Weight 6.8kg	£189.95
Hustler 5-BTV 5 Bands 80-10m 1000W Length 7.64m Weight 7.7kg	£229.95
Hustler 6-BTV 6 Bands 80-10m 1000W Length 7.30m Weight 7.5kg	£269.95



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The Dual Beam I-Pro h.f. multi-band antenna

Dave Mason G3ZPR is a busy man – and he thinks antennas are taking over his life! This time he looks at another I-Pro antenna system.

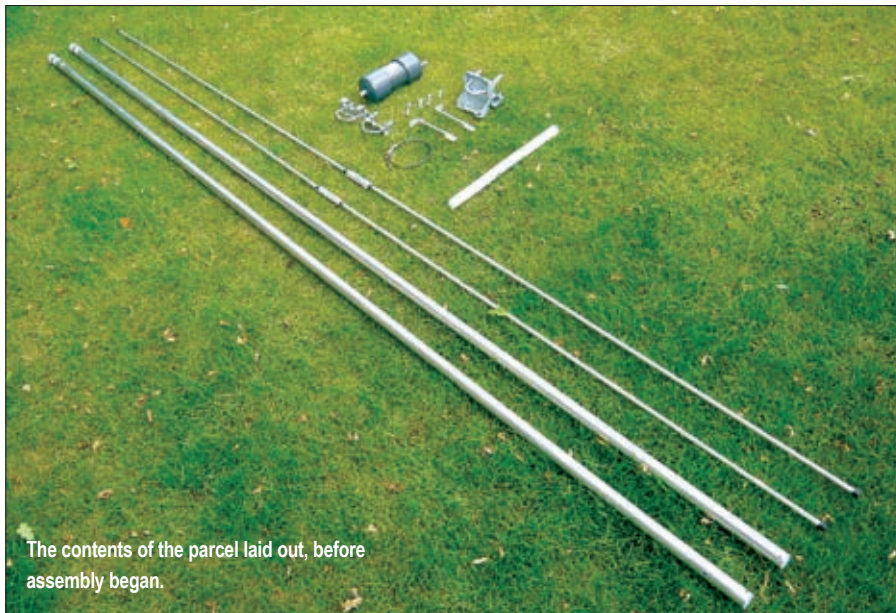
Antennas are gradually taking over my life! There always seems to be another type, shape, size or 'Just the one you've been waiting for' that does everything for everyone with no space, at no cost – and probably no results!

Well, testing antennas is what I'm here for. I'm willing to put them to the test in my location to see if they fit my garden and my pocket and give the results claimed for them by their designers on behalf of *PW* readers.

Absolute fairness is required when carrying out any antenna evaluation exercise. It requires the most thorough testing, with the reviewer (me) being prepared to take into consideration the likelihood of totally different results in a different location to mine and at a different time in the sun spot cycle. As this article will show – even the season has a marked effect on results and nature's beauty may be quite unhelpful to the poor reviewer!

Conditions can often be frustrating, making it necessary to repeat tests at different times, paying homage to propagation and Antipodean time with the hope that perseverance will pay off and the antenna under test will show it's merits.

Such is the case with the Dual Beam I-Pro from the Pro Antennas Stable. This is designed solely as a fixed station antenna so there is no opportunity to tour it around as with a mobile or portable design. The conditions are fixed – as in my back garden – so, here we go!



The contents of the parcel laid out, before assembly began.

Well Packed

The elements of the dual beam come well packed in a rigid cardboard tube together with an accompanying box for the smaller components. Everything arrived in good condition. The list is as follows;

- 4 x 35mm M6 stainless set screws
- 6 x M6 Nylon insert stainless nuts
- 6 x M6 stainless backing washers
- 1 x Galvanised mast head support bracket
- 1 x Pre-drilled GRP rod Centre support insulator
- 2 x Matching transformer connection bars
- 1 x Pro Antenna matching transformer
- 1 x Stainless clip to secure matching transformer
- 2 x End element securing brackets
- 2 x 3/8in Alloy elements with plastic end caps
- 2 x Pre-drilled 1in diameter main element sections and Assembly Instructions.

Tools Required

The tools required for the assembly are two 10mm spanners or a single 10mm spanner plus 10mm socket and wrench. One 15mm spanner and a plain screwdriver. Self-amalgamating weather-proofing tape and pvc insulating tape.

The Antenna Described

The Dual Beam Antenna is described

as a "Non-resonant design requiring an internal or external antenna tuning unit (a.t.u.) for the 14 to 28MHz bands (20 to 10m) operation and an external a.t.u. for the 40m and 30m coverage. A rotator should be used to take advantage of the directional properties."

The antenna should be mounted at a height of at least 9m a.g.l. to clear surrounding buildings. The design has an upper power limit of 400W peak envelope power (p.e.p.) but the user is also cautioned not to exceed the power handling capacity of the a.t.u. in use.

Good Quality Materials

The materials used are of good quality to provide good resistance to weather and corrosion. Aerospace alloys are used for the elements with good corrosion resistance and all fixings are of stainless steel. The heavy gauge steel mast head support bracket is galvanised and will accommodate mast sizes from 1.5 to 2in.

Standard Of Engineering

Good engineering ensures that the parts actually fit together with no rough edges or swarf from the cutting and drilling processes of manufacture. Thought has also gone into the transformer design and its housing and

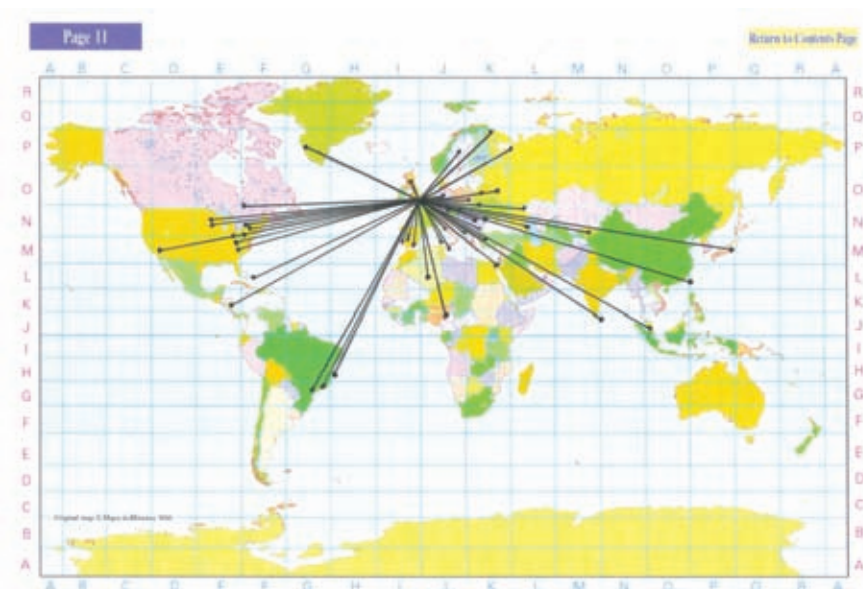


Fig. 1: Chart showing a summary of the practical 'on air' tests.

Carl Kidd G4GTW comments: Many thanks to **Dave Mason G3ZPR** and **PW** for the review opportunity.

Dave has provided a thorough and comprehensive review that will be a great reference document to the **PW** reader considering investing in a Dual Beam Pro. Dave's multi sectional 30ft mast support does demand additional installation help. This may sound a little daunting to a single hander. It's worth mentioning that the Dual Beam Pro is extremely light weight, (4kg) TV antenna brackets and masts are proving to be perfectly adequate fixings. Very reasonable installation costs can be offered by domestic TV aerial installers. For 95% of the year my own Dual Beam Pro is fixed pointing east and west. This provides me with a wide coverage of countries and perhaps once or twice a year I bother to rotate it to the south to occasionally work South Africa.

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Hedge End
Southampton SO30 4TP
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E-mail:
carl.kidd@ntlworld.com
Website:
www.proantennas.co.uk

so, it's fully sealed and weatherproofed with good mechanical connections to the driven elements.

Simplicity of design and assembly have made the whole device easy to construct. And although assistance would have been helpful in the assembly, I found it be essential for the final erection.

Clear instructions are provided for the construction and I was taken step-by-step through the process. The first task was to fit the two connection bars to the matching transformer. A caution is given to ensure that the back nut is held with one spanner while tightening the locking nut with the other spanner.

Care also needs to be taken in ensuring these pre-formed bars are correctly oriented when fixed or they will not align with the element fixing points.

The GRP central insulating rod is then passed through the clamping section of the mast head support bracket, the alloy centre being centralised in the boom clamp. The

clamp **must not** be tightened at this time.

The two main 1in dipole sections can now be fitted using only the outermost two bolts (35mm M6) and the prepared matching transformer then attached using the innermost bolts.

The end capacity elements are then fitted to their respective ends of the horizontal sections and their fixing brackets located between white tape markers.

The central square alloy component of each end element must show the slotted side outermost. All parts must then be leveled symmetrically, locking up each bolt in turn.

If a rotator is to be used – the stub axle is fitted and rotator assembly attached. Detailed instructions are provided for alignment.

Note: I had to make sure that I didn't forget to attach your coaxial feeder to the antenna using a PL259 Plug into its SO239 socket **prior** to raising the completed assembly. Weatherproofing of the connection with self-amalgamating tape is important too and I suggest leaving a loop of coaxial cable before taping it to the mast. This loop should allow for the full rotation of the rotator).

Erecting The System

My advice to anyone owning the antenna that you should be be sure to have competent assistance for this part of the process! At my home QTH I used six of my ex War Department 5ft sections to make a 30ft mast. the antenna was fixed and the entire assembly raised with the help of fellow club member **Sean Metcalfe 2E0CMT**, and clamped to a well buried pole (i.e. my wife **Vivienne's** washing line post).

A minimum coaxial feeder length



A close up view of the central insulating rod, matching transformer and rotator in their final positions.

The Dual Beam Pro Specifications

Turning radius required:	2.5m
Overall span of main rotatable element:	5.0m
Overall span of end elements:	2.5m
Total weight including support bracket and centre feed transformer:	4.0 kg
Upper power limit:	400W
Dual Beam Pro price:	£219.00
P&P:	£8.99

of 20m is prescribed which, together with the low losses on the transformer, helps to bring the standing wave ratio (s.w.r.) down to acceptable levels. Any excess feeder should be coiled up at the transceiver end. The use of high specification 50Ω cable will always pay off.

Garden conditions, trees, etc., can radically affect performance and my particular location suffers from a magnificent oak tree. Whilst this is on adjacent parkland it's canopy overhangs three properties and the Local Authority considers it's beauty over-rides any effects it may have on my property – so, I have to live with it. It's considerably higher than the antenna on the mast – but the rotating elements of the antenna just cleared the tree. (This could have an adverse effect on performance).

The Dual Beam is bi-directional (as with any dipole antenna). As a beam it has the advantage of covering 360° within 180° so making all directions available within a half rotation. A polar diagram is include in the instructions to help the purchaser understand this effect.

Getting Started

Getting started, I coupled the antenna as advised – via a Z11 automatic a.t.u. (a.a.t.u.) – to a Kenwood TS-570D running 100W. My trusty DX-70TH was being fitted into a case for some serious portable work – so it was having a well earned rest.

I had a quick run through the bands, checking the s.w.r. and power (firstly without an a.t.u.) with results ranging from 1.2:1 to 5:1. Then I repeated the exercise with the a.t.u. and found the results to be very acceptable with the s.w.r. ranging from 1.2:1 to 2.5:1. This is in line with the designer's comments that "it's normal in use to see an s.w.r. on your feeder and this is why the antenna is described as requiring the use of an a.t.u."

On The Air

Once I got on the air it didn't take long to get a very respectable list of QSOs. Despite this it's always necessary to consider the propagation predictions to avoid wasting time on a band that's not open.

My on the air test periods included very early mornings, very late nights



The tree on the left of the photograph towers to twice the height of the beam.

and specific slots during the day. Remember – if you want to work them, you've got to chase them!

Antenna Performance

The antenna's directional properties and gain gave me a real problem and I then began to suspect the effect of the trees on the null point. I seemed unable to identify any perceptible change in signal irrespective of beam heading. Discussions with those 'of greater wisdom than I' seemed to favour the theory that the very close proximity of the trees to the antenna was affecting the directional properties.



Sean tightens the final bolt.

The branches were scattering the incoming signal sufficiently to give the impression that the antenna was behaving as an omnidirectional device. I had no other precedent to guide my thoughts on this matter, save to say that I have witnessed the performance of an identical antenna in an unobstructed location where the directional properties were quite clearly demonstrated.

Notwithstanding my comments – the results clearly showed that this antenna is an excellent design. It will fit in most back gardens, with an impressive performance easily out-performing my Comet Vertical and good enough for an Amateur in any location. I have worked more countries during the brief evaluation exercise than any other comparable period and enjoyed every moment. Most of the 'pile ups' were eventually broken – even if it did take some patience!

The 50MHz Bonus

I was given to understand that the Dual Beam could also be used on the 50MHz (6m) band. Apparently, at 50MHz, the antenna exhibits a clover leaf radiation pattern typical of a 1.5 wavelength dipole.

While the Designer makes no claim for 50MHz band in his specification – I just had to put it to the test! A 'sked' was set up with a friend and test calls made using both s.s.b. and f.m. modes. The s.s.b. test gave only a fair report – but the f.m. QSO attracted an excellent report. The antenna exhibited a directional property on 50MHz.

The Final Words

Now for the final words! The judgment of any antenna must be based upon its performance. No device can be everything to everyone, we must each consider our own location, cost and what's acceptable to our neighbours and the Local Authority.

My verdict on the Dual Beam would be that it is an excellent performer. It gives a better signal/noise ratio and a performance edge against wire dipoles and verticals by its polarisation. It's ability to be steered – helps to sort out the station you want from others crowding around the same frequency. The antenna is also reasonably priced and could well be an answer to short gardens and community acceptability.

I always favour the Map method of illustrating the countries worked during the tests, a picture speaks better than 1000 words and so include it here (Fig. 1) for your consideration.

I am obliged to the designer of this antenna for the opportunity to review it. The experience has been both pleasurable and rewarding.

Dave G3ZPR ●

Editor's thanks: Organising any form of Amateur Radio activity takes a great deal of hard work and contests can bring many administrative worries! So, on behalf of everyone who enjoys the relatively new PW 4m contest I thank Colin Redwood G6MXL for his hard work. We can show our gratitude for his continuing efforts by making sure we enter the contest! Good luck everyone! **G3XFD**.

70MHz Contest Time!

Colin Redwood G6MXL with details of the third *Practical Wireless* 70MHz Contest.

**Sunday September
25th 2011 from 1200 to
1600 UTC**

The 3rd Annual *Practical Wireless* 70MHz Contest takes place on Sunday September 25th 2011 from 1200 to 1600 UTC. It has become impossible to find a date in June that does not clash with other contests, so I am hoping the September date will prove popular with entrants.

The contest has also been split into two sections this year. The low power section remains 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.

Other than the change of date and the addition of a high power section, the rules are very much in line with those used last year, which 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 frequency modulated (f.m.) transceivers have come onto the market in the last year or so which cover the 70MHz band. These include the Wouxon KG-UDV1P/L 4m and 2m dual-band hand-held, the Wouxon KG699E/4m handheld, and the Mydel ML-5189 mobile. Hopefully, the availability of these budget-priced

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 on 4m 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 Suggestions

Next, some operating suggestions. 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

Practical Wireless 70MHz Contest 2011

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**

- Name of entrant, club or group, as it is to appear in the Results List:
- Callsign including any /P suffix (e.g. G6MXL/P) used during contest:
- Name and address for correspondence:
- Details of location of station during contest:
- Locator (6 characters), as sent during contest (e.g. IO80XR)
- Single operator / multi-operator (please delete)

If multi-operator, please list names and callsigns of operators:

- Total number of contacts:

Total number of locator squares worked:

- Locator squares worked. Highlight or cross with an X each square worked:

IO58	IO68	IO78	IO88	IO98	JO08	JO18	JO28	JO38	JO48
IO57	IO67	IO77	IO87	IO97	JO07	JO17	JO27	JO37	JO47
IO56	IO66	IO76	IO86	IO96	JO06	JO16	JO26	JO36	JO46
IO55	IO65	IO75	IO85	IO95	JO05	JO15	JO25	JO35	JO45
IO54	IO64	IO74	IO84	IO94	JO04	JO14	JO24	JO34	JO44
IO53	IO63	IO73	IO83	IO93	JO03	JO13	JO23	JO33	JO43
IO52	IO62	IO72	IO82	IO92	JO02	JO12	JO22	JO32	JO42
IO51	IO61	IO71	IO81	IO91	JO01	JO11	JO21	JO31	JO41
IO50	IO60	IO70	IO80	IO90	JO00	JO10	JO20	JO30	JO40
IN59	IN69	IN79	IN89	IN99	JN09	JN19	JN29	JN39	JN49
IN58	IN68	IN78	IN88	IN98	JN08	JN18	JN28	JN38	JN48
IN57	IN67	IN77	IN87	IN97	JN07	JN17	JN27	JN37	JN47
IN53	IN63	IN73	IN83	IN93					

List below any squares worked which are not in the above grid:

Specimen Cover sheet.

The 3rd *Practical Wireless* 2011 70MHz Contest Rules

1. General: The contest is open to all licensed 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 25th 2011.

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 don't 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 sta-

tion is worked and is unable to send their 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 = $52 \times 5 = 260$.

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** are 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:

callsign (**including /P suffix**) of your station
your locator as sent
sheet number and total number of sheets (e.g. "Sheet no. 3 of 5")
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:

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

callsign used during the contest **including any /P suffix** (e.g. G6MXL/P)
name and address for correspondence
location of the station during the contest

full 6-character locator as sent during the contest
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

total number of contacts and locator squares worked (not required for a log sent as a computer file)

list of locator squares worked (not required for a log sent as a computer file)

a full description of the equipment used including transmitted p.e.p. output power

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
antenna used and the approximate station height in metres above sea level (a.s.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
the following declaration must be included in the E-mail text or written and signed by the entrant: "I 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.

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 G6MXL, 53 Woodpecker Drive, Poole BH17 7SB.

Entries must be received not later than Tuesday October 18th 2011. 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 publi-

cation 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 2011.**

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 Flue, 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 is wise to have an alternative site available in case this problem does arise.

8. Poor Signals: Make sure that your transmitter is properly adjusted and is not radiating a broad or poor quality signal, e.g. by over-driving or excessive speech compression. 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 is 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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All our brackets are of high quality, British made and galvanised.

The Anytone AT-5555

Multi-mode 28MHz mobile transceiver

Rob Mannion G3XFD has been enjoying operating on the 28MHz band using a budget priced multi-mode rig – and the band's beginning to show signs of 'waking up' he says!

I've never forgotten 1968 – the year I came on the air as G3XFD – and one particular highlight of the year for me was the great DX available on 28MHz (10m). In those days my main station (most of us used 'separates' in those days) consisted of a KW *Vanguard* transmitter running 50W a.m. or c.w.

Incidentally, I should have mentioned the the Geloso variable frequency oscillator that the *Vanguard* was constructed around was running out of 'steam' – radio frequency (r.f.) drive – on 28MHz. So, in reality I was lucky to get 35W input to my lovely old transmitter.

The other half of my station was formed by the Eddystone 750 double superhet receiver. It too was 'running out of steam' up on 28MHz and the r.f. control usually had to be turned right up to maximum gain.

However, in late summer 1968 the signals being received from all over the world were booming in. They were incredibly strong! I remember working a station who used to call, "CQ" from Rhodesia and made sure everyone knew that he didn't want to work "Any Box 88" stations (Russians and other Communist Bloc stations). My antenna was very simple in those days – just a short wire antenna but I 'worked the world' with ease.

To be quite frank, the DX I worked during the wonderfully persistent conditions on 28MHz in the latter half of 1968 has never re-appeared for me! In one afternoon I **worked all continents** using a.m. and my



Fig. 1: The transceiver is smart looking and although it is clearly a CB radio design there are many controls on the front panel that will be familiar to most of us.

(probable) 35W – and everyone else was doing the same. It was a truly thrilling experience to work Hawaii and get "5&9" and then be called by VK (Australia) and ZL (New Zealand) stations!

It was quite disappointing when 10m settled down into the doldrums again – with only the occasional burst of activity. Despite this, the 28MHz band has always been fascinating to me – and always full of surprises!

Despite never repeating my successes of 1968 – even by the time I had a KW2000A single sideband (s.s.b.) transceiver, I've never lost interest in the band. So, when I heard that the Anytone AT-5555 28MHz budget priced multi-mode transceiver was to be available – just as 10m is 'waking up' – I knew this was a review for the Editor to undertake.

The Rig Described

The Anytone AT-5555 clearly shows its origins as a transceiver designed for the CB radio market on 27MHz. However, all of the transceivers sold by Nevada in Portsmouth are being programmed for the 28 to 29.7MHz Amateur band. Although Nevada were preparing the rigs for the Amateur bands – I was in a hurry and we asked to have the first one and program it ourselves.

The 'AT-5555s on sale to customers

will be programmed so that one bank of channels is allocated for repeater use with the narrow band frequency modulated (n.b.f.m.) repeaters on 10m. (More about this later).

Unusually, the microphone connection is mounted on the left side of the transceiver casing, although I didn't find this location to be difficult – but it did seem a little odd at first. The transceiver is smart looking and although it is clearly a CB radio design there are many controls on the front panel (see Fig. 1) that will be familiar to most of us.

I won't bore everybody by explaining all the controls one-by-one as they are fairly standard for a CB rig. Instead I'll mention those that may be unfamiliar. The first unfamiliar facility is the public address (PA) mode. This requires the connection of an external loudspeaker but as there's only 4W of audio available it wouldn't be very useful outdoors – loud enough to shout at a nearby driver perhaps!

The second unfamiliar control is the infamous 'Echo' facility often found on CB rigs. If like me you've heard operators on the 27MHz using the Echo facility it can sound absolutely ridiculous! However, I took the opportunity (while the transceiver was connected to a dummy load) to monitor the quality of speech on f.m. with a very

small amount of Echo running. The result was quite interesting!

Although I would be extremely careful (and very unlikely to use it anyway) using the Echo facility on the Amateur bands it's worthwhile mentioning that a **very small** amount of Echo (known as reverberation) **can** enhance the audio quality. Indeed, broadcast studio engineering can involve a great deal of planning to allow very small amounts of reverberation within a studio. In this way a 'flat' sounding broadcast transmission is avoided.

The **Clarifier** control (which has 'fine' and 'coarse' settings on the 'AT-5555 plays an extremely important role operating the transceiver as – unlike most modern Amateur Radio transceivers, this rig does not have a continuously tuning variable frequency oscillator (v.f.o.). Instead, it uses a rotary channel switch selector controlling the frequency of the main phase-locked loop synthesiser. The Clarifier comes into play when the transmission being received is 'between' the synthesiser step.

The transceiver is a true multi-mode rig and provides amplitude modulation (a.m.), c.w. (Morse), narrow band frequency modulation (n.b.f.m. - normally referred to as f.m.) and single sideband (s.s.b.). I was rather intrigued to find that the 'AT-5555 could operate c.w. – but more on the point later.

The brightly lit light liquid crystal display (l.c.d.) is very large and clear. It was obviously made that way, bearing in mind the bright daylight conditions in vehicles. In fact, it was one brightest and clearest displays I've come across and I found it ideal for my purposes.

The receiver section uses a double superhet design with a 10MHz first intermediate frequency (i.f.) and a 455kHz second i.f. Low level modulation is used for s.s.b. and high level for a.m. transmissions. Variable capacitance modulation is employed for n.b.f.m. modulation.

On The Air

I was very keen to get the 'AT-5555 on the air but I ran into a few problems. My good friend **Phil Ciotti G3XBZ** was standing by to undertake some tests between us (we're only about 4.8km (3 miles) apart. Unfortunately, as I had the very first rig available we hadn't then programmed it so that it could work split frequency with 29MHz repeaters.

Another problem occurred that led me to believe that I was getting r.f. feed-back in my shack. Whenever I transmitted I found that I was getting

audio feedback – but oddly, there seemed to be none of the squeaks and squeals associated with r.f. getting into an audio stage. In fact, it was very clean audio.

Discussing the problem with the *PW* Technical Editor **Tex Swann G1TEX** we decided it was switching fault of some kind. However, it wasn't a fault! The technical staff at Nevada found it was an audio monitoring mode that had been inadvertently switched on and it was soon switched off again.

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Website:
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Fig. 2: The rather spartan back panel, has little more than a d.c. power socket, an SO-239 antenna socket and two 3.5mm jack sockets, one for the external speaker and the other for a Morse key.

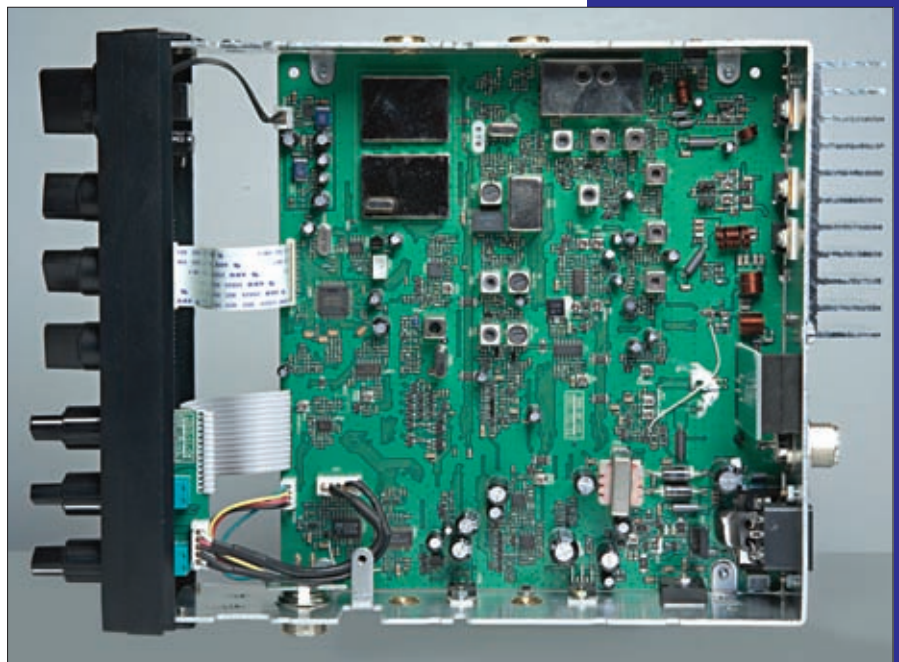


Fig. 3: A very clean single main board takes care of all functions. All power transistors and amplifiers are attached to the wall of the chassis. The r.f. p.a. stages are at the top and are coupled to the heat sink.

For my on-air tests I was using a long wire antenna with my little LDG automatic antenna tuner (a.a.t.u.) placed on top of the 'AT-5555. I had a great number of contacts on 10m –

some were local and some were with other stations in the UK looking for n.b.f.m. (f.m.) contacts on 29.6MHz.

I worked several stations on the Isle of Wight and then came across a perplexing problem! Phil G3XBZ could hear me on 10m – but I couldn't hear him! Indeed, we seem to have an r.f. version of 'The Bermuda Triangle' between us because we have great difficulty working each other on **any** of the h.f. bands! Despite this, we have no problems whatsoever on 70 or 144MHz!

Bournemouth QSO Via Switzerland!

Ever resourceful, Phil suggested that as we could both hear the 10m Swiss repeater (it's often quite a strong signal here in the south west) he would call me on the repeater. I then duly gave him a "5&9" reports and we both burst out laughing as we'd just managed to contact each other over a pathway of well over 1600km (1000 miles) when we were less than 5km apart in Bournemouth!

Despite our problems working each other directly, Phil G3XBZ was able to evaluate my voice and the speech quality on the AT-5555 as being "very good" on f.m. and s.s.b. Later I was also able to work several stations using a.m. and hearing the differential sideband phasing distortion caused by propagation, brought back many memories.

Later – with the help of Nevada, Tex G1TEX programmed the 10m repeater frequencies and offsets into the rig for me and I then enjoyed several QSOs via the Swiss repeater. I've heard a number of American 10m repeaters but have yet to manage a QSO – but it won't be long before I do!

As I was intrigued at the provision of c.w. on the rig, I listened to some QSOs at the lower end of the band. Operating the rig on c.w. is simple and straightforward. I then used the rig to monitor the International Beacon Project (IBP) beacons on 28.200MHz and it proved to be both very sensitive and selective, whenever southern European stations appeared (literally from nowhere) to swamp the band. Ten metres can be like that at times!

I thoroughly enjoyed having the AT-5555 running on stand-by in my shack. I would either leave it on the 29.6MHz f.m. calling frequency or on 28.200MHz listening for the IBP beacons. Leaving it tuned to 28.200MHz gives a good indication of the general state of propagation but I have been surprised at times when someone from Middle Europe has popped out of nowhere on

Manufacturer's Specifications

General

Frequency range:	28 to 29.7MHz (programmed by Nevada before despatch). Available in selectable Bands (A, B, C, D, E, F).
Channels:	60 (programmable) channels in each band.
Frequency control:	Phase-locked synthesiser.
Frequency steps:	(selectable) 10Hz, 100Hz, 1kHz, 10kHz.
Operating temperature range:	-30°C to +50°C.
Input voltage:	13.8V nominal, 15.9V maximum. (11.7V minimum on transmit).
Current consumption:	Transmit (a.m. full modulation) 5A, receiver (squelched) 600mA. Transmit (s.s.b.) 21W p.e.p. 6A.
Dimensions:	280 x 250 x 60mm.
Weight:	2.8kg (6.8lb)
Antenna connector:	SO239 u.h.f. type.

Transmitter

Power output:	a.m., c.w. and f.m. 12W output, 21W s.s.b. 21W p.e.p.
Modulation:	Low level modulation (s.s.b.), amplitude modulation. Variable capacitance modulation (f.m.).
Intermodulation distortion:	s.s.b. 3rd order, more than -25dB, 5th order, more than -35dB.
Carrier suppression (s.s.b.):	-55dB.
Unwanted sideband:	-50dB.
Microphone:	Dynamic microphone with p.t.t., Up/Down control and ASQ control.

Receiver

Frequency response:	(a.m. and f.m.) 450Hz to 2.5kHz.
Sensitivity:	s.s.b.: 0.25µV for 10dB (S+N)/N at greater than 500mW of audio output. a.m.: 1µV for 10dB (S+9)/N at greater than 500mW of audio output. f.m. 1µV for 20dB for (S+N)/N at greater than 500mW of audio output.
Selectivity:	(a.m. and f.m.) 6dB at 3kHz, 50dB at 9kHz. (s.s.b.) 6dB at 2.1kHz, 60dB at 3.3kHz.
Image rejection:	More than 65dB.
Intermediate frequencies:	(a.m./f.m.) 1st i.f. 10.695MHz, 455kHz 2nd i.f. (s.s.b.) 10.695MHz).
Adjacent channel rejection:	(a.m./f.m.) 60dB, (s.s.b.) 70dB).
Radio frequency gain control:	Adjustable gain to -45dB.
Automatic gain control (a.g.c.):	Less than 10dB change in a.f. output for inputs from 10 to 100,000µV.
Squelch control:	Adjustable, threshold less than 0.5µV. Automatic squelch Control (ASQ) only on a.m./f.m.
Automatic noise limiter:	Switchable.
Noise blanker:	(r.f. type). effective on a.m., f.m. and s.s.b.
Audio output:	4W into 8Ω.
Frequency response:	300Hz to 2.8kHz (using 8Ω built-in speaker). External speaker 8Ω. (internal speaker disabled when external speaker connected).



Fig. 4: The programming interface and software CDROM. Unusually you have to remove the covers, to fit the interface into a small p.c.b. mounted socket just visible to the right of the upper flat ribbon cable in Fig. 3.

f.m. – so it's a good idea to monitor both channels.

The AT-5555 is excellent value for money and I've been impressed with its performance and it's a real 'fun' rig. Even after the 10m activity has 'peaked' (if it ever does!) I've found that (except for Phil G3XBZ and I working directly!) the band is a great place to meet up

with friends. In fact, it's been a tradition in many clubs to have local nets on 28MHz and I have no doubt they'll be joined by DX stations popping up from nowhere to join them very soon! (I've already worked friends who've bought the AT-5555 and I'm sure I'll be working more very soon!).

My thanks go to **Mike Devereux G3SED** of Nevada for the loan of the review transceiver, which costs £149.95 plus P&P. It was great fun to use!

The Practical Wireless Archive 2010 on CDROM

You've been asking for them and you've been waiting for them! At last they're here!

The new 2010 *PW* archive is on a single CDROM and it's provided in a searchable PDF form. It's ideal for any computer – there'll be no problems!

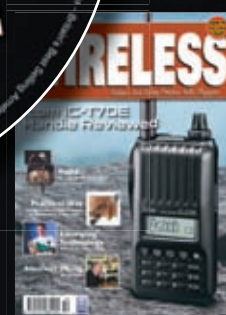
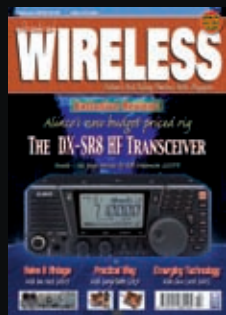
Once you've purchased the 2010 archives there'll be no need to search through a year's worth of paper magazines or struggle to hold a heavy set of issues in binders! The CDROM will make things so much easier!

Find the articles you want much quicker. Enlarge the article and circuit diagrams to suit your needs. Use your CDROM archive as much as you like and keep your paper magazines in pristine condition to be read and enjoyed when you've found what you need on the CDROM!

The CDROM *PW* archive for 2010 contains the complete *PW* – including the full editorial, adverts, etc. In other words – nothing is left out. No short change here – you get a fully readable archive of your favourite magazine in an amazingly compact and convenient form!

The Editor Rob Mannion G3XFD has already tried out the CDROM archive – and here's what he thinks: "What a wonderful idea! Readers have been asking for archived issues for a long time – and I can tell you that wait will have been worth it! Every day I work on *PW* I need to research previous issues so the *PW* 2010 Archive on a CDROM is perfect and I thank my colleagues for their hard work in preparing it. So, don't delay – order yours now and you'll always be 'looking back' in a much more convenient style!"

The *PW* 2010 Archive CDROM costs £14.99 plus p&p. Please see page 75 for ordering details.



Buying Second-hand

This month Chris Lorek G4HCL gives some advice and useful tips on a popular 'all-round' h.f., v.h.f and u.h.f. base station transceiver.

Some months ago I detailed a couple of 'all-round' mobile h.f./v.h.f./u.h.f. mobile transceivers, the Alinco DX-70 series and the Icom IC-706 series. Since then I've been asked by several readers to look at an economic base transceiver for these bands that's readily available on the second-hand market. Indeed, Stuart Atkinson G3YPS in particular asked me if I could cover the Yaesu FT-847, including details on getting it to cover the 'top end' of the 7MHz (40m band). So here goes!

In the FT-847, Yaesu have come up with a carry-around sized set giving multi-mode transceive operation on h.f., 50, 144 and 432MHz (6, 2 and 70cm). Additionally, it also includes full-duplex satellite capability between band ranges, a cross-band repeater facility is also built in. On transmit it provides 100W output on h.f. and 6m, 50W on 144MHz and 432MHz, and with receive

coverage across 100kHz -30MHz, 36-76MHz, 108-174MHz and 420-512MHz.

Yaesu FT-847 UK Models

Models of the FT-847 supplied to the UK market also had 70MHz (4m) transmit capability added. (I'll discuss this a little more about this later).

Unlike earlier h.f./v.h.f./u.h.f. multi-mode rigs on the second-hand market the FT-847 has true switchable narrow and wide frequency modulation (f.m.) channel spacing (12.5kHz and 25kHz spacing) operation. For satellite enthusiasts it has several 'satellite memories' with Doppler shift track-tuning between bands.

Yaesu launched the FT-847 back in 1988, and I was pleased to be able to perform the UK's first ever technical review on the transceiver following a 'preview' review a few months earlier. Even though at the time I had a line-up of transceivers from h.f. up to 23cm, I was so impressed with the FT-847 that

I've had one in my shack now for over 12 years.

At the outset I must say that it wasn't (and still isn't) a 'top flight' h.f. transceiver. Indeed, my FT-990 dedicated h.f. transceiver knocked the spots off the FT-847 regarding h.f. performance. Instead in my opinion it's an excellent 50, 144 and 432MHz base transceiver, with h.f. 'thrown in' for good measure. (Although the h.f. performance can be significantly improved with additional optional filters if the owner wished).

When the FT-847 first came onto the market the price tag was a hefty £1695. However, nowadays should be able to pick up a second-hand unit for rather less than half that price now.

The receiver has an intermediate frequency (i.f.) shift and switchable attenuator, slow/fast automatic gain control (a.g.c.), i.f. noise blanker and radio frequency (r.f.) amplifier, an audio-based DSP (Digital Signal Processor) system is also included. This offers variable low and high-cut audio filtering for speech modes and selectable 25, 100, 200 and 400Hz audio bandwidths on c.w. There's also a DSP noise reduction mode, plus an automatic digital audio notch with the capability of notching multiple tones at the same time.

Ceramic i.f. filters are used for all modes, with available bandwidths of 2.3kHz (s.s.b./c.w. and narrow a.m.), 9kHz (a.m. and narrow f.m.) and 15kHz (f.m.). Optional plug-in Collins mechanical filters are also available (more of this later). On transmit, an r.f. speech



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Yaesu FT-847



Rear panel view of the FT-847.

processor for s.s.b., plus a built-in c.w. keyer are fitted, an audio monitor also lets you hear what your transmitted signal sounds like at any time.

Satellite Operation

The built-in satellite mode gives you full-duplex cross-band transceive, i.e. simultaneous transmit and receive between bands. Additionally, the push of a button allows the operator up-link (transmit) and down-link (receive) frequencies to 'track' each other. As some satellite modes use inverting transponders, it's also possible to select 'reverse tracking'; the sub-tune knob also gives the operator the capability of manual adjustment of your uplink.

Dual frequency displays are provided, and there's a dedicated satellite 'memory' variable frequency oscillator system. These can store up to 12 operating modes into different memories, e.g. for different satellites and modes

Rear Panel Connectors & Remote Operation

On the rear panel of the transceiver are separate antenna sockets for h.f., 50, 144MHz and 432MHz and you can select the h.f. socket to also be used for 6m if you wish. For example if a compact h.f./50MHz yagi or multi-band vertical antenna is used. The dedicated 'Tuner' socket interfaces with Yaesu's FC-20 optional external tuner, or their ATAS-100 auto-tuning antenna system.

The 'Stby' socket carries separate transmit switching lines for each band range for use with separate linear amplifiers and masthead pre-amplifiers. Additionally, an RS-232 CAT socket allows remote control using one of the many readily-available Amateur Radio logging and rig control programs.

Note: I personally use *FT-847 SuperControl*, finding this to be a great asset to using the set at home. This also (uniquely) allows the transceiver to be used as a full dual-way cross-

band repeater rather than a 'one-band to another' one-way repeater. This is a very useful for remote operation around my house – allowing me to use a tiny 2m or 70cm hand-held to work through to another band!

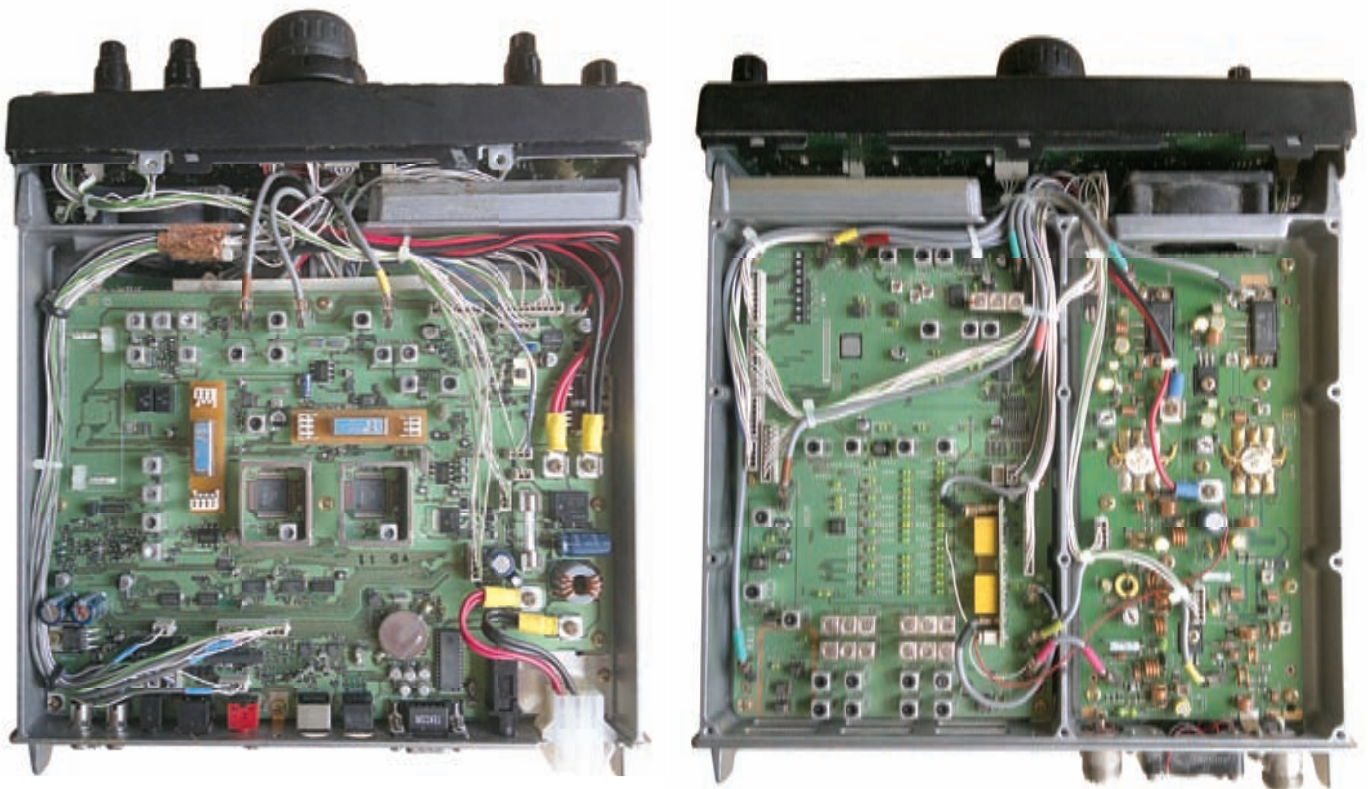
High Frequency Improvements

For s.s.b. and c.w., the transceiver is fitted with a pair of 2.3kHz bandwidth 455kHz ceramic i.f. filters on plug-in boards. One is used for transmit and the other used for receive. Two filters are employed because in satellite full-duplex mode both filters need to be used simultaneously and whether or not the transceiver is operating in satellite mode the receiver filter is always used in the receive path and the transmit filter always in the transmit path.

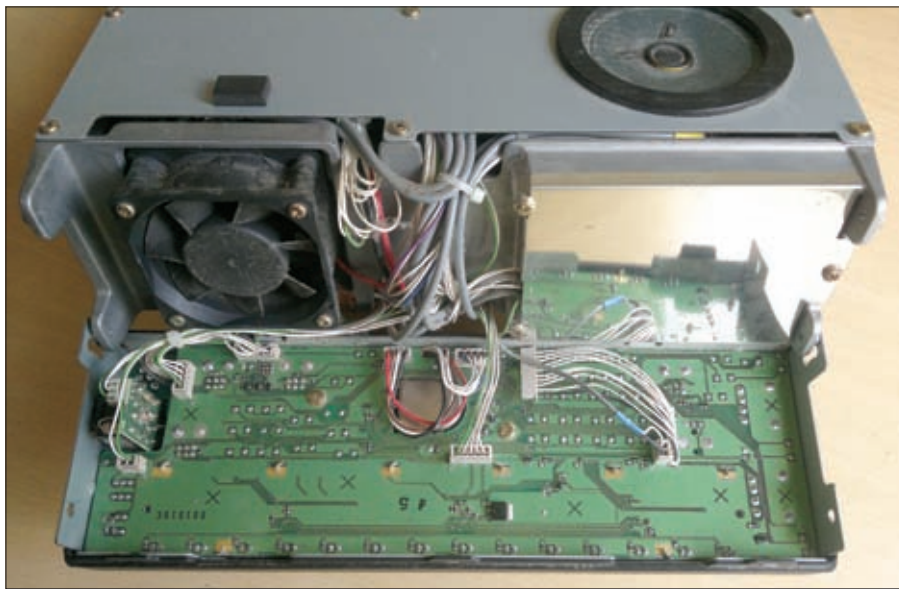
There's the facility of replacing one or both ceramic plug-in filters with optional plug-in YF-112S-02 Collins mechanical 2.3kHz bandwidth filters. Additionally there's also an empty space for the addition of an optional plug-in YF-115C Collins mechanical 500Hz bandwidth c.w. filter on receive.

On s.s.b. and c.w. receive (compared to the fitted ceramic filter) the Collins mechanical filter will provide a much deeper suppression of interference to the side of the current operating frequency. However, the -6dB 'nose' bandwidths of both the ceramic and mechanical filters on s.s.b. are the same at 2.3kHz (the c.w. filter, of course, being much narrower).

The use of an optional mechanical filter on the s.s.b. transmit side has the advantage of providing a very flat, natural-



Internal views of the FT-847.



The front panel unscrewed.

sounding frequency response which has very little ripple to give a more faithful reproduction of the operator's microphone audio. Also, if you're using data over air, such as PSK, the low group delay of this filter should provide a higher data throughput. Note: My transceiver still has the ceramic filters fitted – but I'm on the lookout for some mechanical filters!

Transmit Modifications

Next, I'll describe the 1.8 and 7MHz band modifications – providing the 'official' transmit extension modification from the manufacturers themselves for wide-band h.f. settings, enabling owners to expand the h.f. coverage of the FT-847 to 500 kHz per band. My thanks go to Yaesu for permission to reproduce this. The modification will also extend v.h.f. and u.h.f. coverage and will modify some other settings as shown in the accompanying table.

Important note: Don't forget it's the responsibility of every licenced Radio Amateur to ensure they don't transmit outside of our permitted bands! These modifications will also clear any memories and individual changes to settings – so make a note of these before you carry out this procedure. Here's how!

First, disconnect the transceiver from any power source and then remove the top and bottom covers. Next, turn the transceiver upside down to locate the jumpers. All normal precautions to protect against static electricity should be followed. To extend the transmit ranges, JP1001, JP1002 and JP1006 should be shorted and JP1003, JP1004, JP1005, JP1007, JP1008 and JP1009 should be open circuit. **Leave all the other jumpers as they are.**

Next, re-fit the covers, plug the power supply back in and then while

pressing the '**Fast**' and '**Lock**' buttons on either side of and just below the main v.f.o. knob, switch the set on. The modification can be reversed by re-linking the original jumper settings and again re-setting the transceiver on switch-on. So it could be worthwhile taking a note of the original jumper settings.

The frequency ranges following modification are;

Transmit coverage;

1.80 - 2MHz
3.50 - 4MHz
7 - 7.50MHz
14 - 14.50MHz
21 - 21.50MHz
24.50 - 25MHz
28 - 30MHz
50 - 54MHz
140 - 154MHz
420 - 470MHz

Receive Coverage;

100kHz - 30MHz
33MHz - 56MHz
76 - 108MHz
108 - 54MHz
420 - 470MHz

The default channel spacing on v.h.f. is set at 12.5kHz and for u.h.f. 25kHz, and default repeater shifts are set to 100kHz for h.f., 500kHz for 6m., 600kHz for v.h.f. and 1.6MHz for u.h.f.

Operation On 70MHz

The UK models of the FT-847 had 70MHz transceive enabled. However, very early models (i.e. with serial numbers commencing '8', signifying 1998) reportedly had a firmware limitation, which was later addressed by Yaesu.

Later 1988 models, and those with from 1999 onwards, are reportedly quite okay, i.e. serial numbers beginning

with '9' onwards. When I first tested an early 1998 model I found that on 4m the transceiver gave around 35W output but that it drew over 18A from my power supply. "Something's wrong!" I thought.

Two other very early FT-847 users in the UK who I talked to at that time also found the same. A test with my spectrum analyser showed that the transmitter was putting out a 'hedgehog' of out-of-band spurious emissions with the worst spurii being just 9dB below the 4m output power level. A check by another FT-847 user who also had a spectrum analyser revealed the same.

So, if you're an owner intending to use the '747 on 70MHz I'd advise you first perform a quick check with an r.f. power meter to ensure you're putting out around 40W or more on this band – and with a current drain from your power supply of less than around 12A. If your interest is 4m operation, check this before buying if at all possible, or if you're buying from a distance – ask the seller to do this and to verify it's okay.

On-Off Power Switch Failure

Apart from rear panel fan noise, which isn't a fault but a bit of an annoyance (more of this later), a common failure I know of with FT-847s is the front panel on-off power switch. After around ten years of everyday use mine went intermittent and I'd often have to fiddle with it to get the transceiver to switch on. Opening the transceiver up showed this was a tiny two-pole changeover switch, with only two of the contacts used to switch the radio on.

Examination of the circuit diagram show this switches positive d.c. voltage to the coil of an internal power relay. This coil sensibly has a back-EMF protection diode fitted to prevent switch burn-out due to voltage peaks. Even so, I guess years of use had just worn the switch out due to current inrush to the coil, and a search showed that this was a common failure with other FT-847s around the world.

Rather than trying to replace the switch, which is a major job involving front panel dismantling, I simply used a pair of short wires to bridge the two poles of the switch solder contacts on the front panel p.c.b. – so that both of these would be used in parallel, see the accompanying photo. Yes, I've subsequently seen another photo on a 'mod sheet' with much tidier soldering than mine!

To get to the switch solder contacts you'll need to remove the top and bottom lids, then the four side screws holding the front panel to the body, and then simply hinge the front panel

forward. This 'doubling up' of the switch contacts would I feel be a useful 15-20 minute preventative measure against subsequent failure if you buy or own an FT-847.

Fan Noise

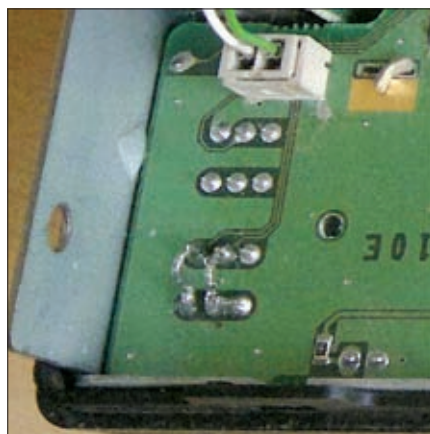
The transceiver has two fans, a larger controlled-speed internal one behind the front panel and a smaller rear panel fan – which runs continuously and is rather noisy for its small size. I simply unplugged it to save my ears when using the radio on receive, see the accompanying photo and I know that many other FT-847 users have done the same.

I've never had any problems of the transmitter power amplifier (p.a.) heat-sink overheating, although if you use the transceiver for long 'ragchews' on maximum power I'd advise against disconnecting this. Or more usefully you could add a small rear panel toggle switch to enable it when needed, or instead internally wire it to the p.a. fan which operates at a low speed on receive and at a higher speed on transmit.

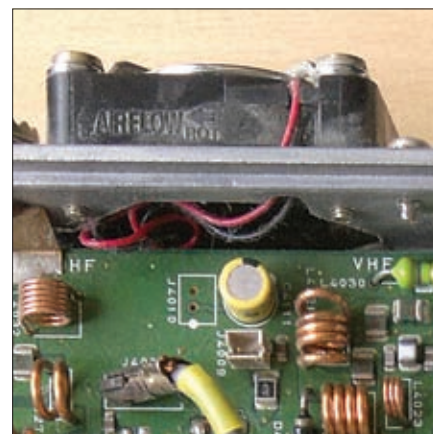
However, if you're buying second-hand, take a quick look inside the radio in case an earlier user has disconnected this, you might like to reconnect it! Earlier users may have alternatively modified the wiring to this or possibly fitted a thermostatic switch, again a quick look inside will reveal all.

Other Modifications & Improvements

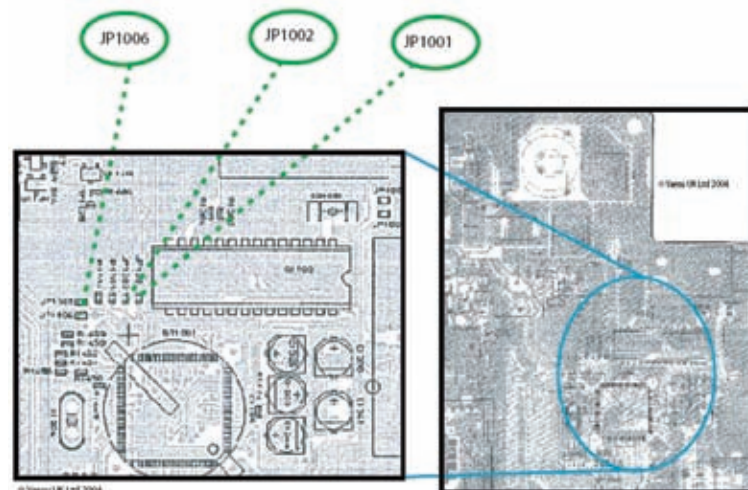
There are numerous other documented modifications for performance improvements, including 4m mods and enhancements, fan modifications, volume control mods, alignment, an SSTV interface and so on. If readers would like a copy of these together with the user manual, technical service



The On/Off switch linked.



The real panel fan disconnected from J4009.



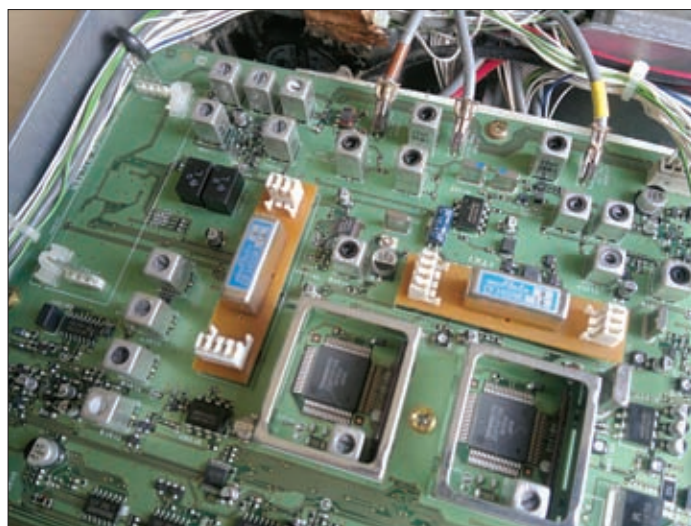
Expansion link locations.

manual, schematic diagrams etc. all in electronic PDF format on a data CD (the total file sizes, are too large to print or E-mail – I'll also include the 54Mb sized *FT-847 SuperControl* program on the CD) I'll be pleased to oblige by post in return for a sleeved blank recordable CD plus with a stamped self-addressed return mailer (remember to add sufficient postage to each, typically 'large letter' stamps of 75p each).

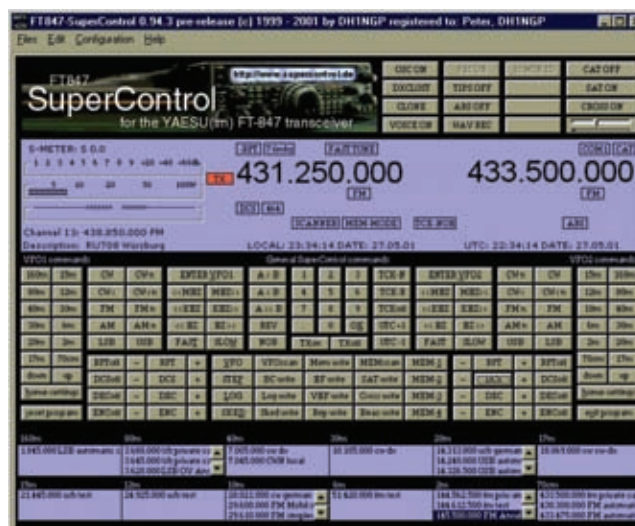
Alternatively just either send £2 in coins taped to a card or a PO/cheque for £2 (made out to me) together with your postal address and I'll provide

the sleeved CD, CD mailer and return postage. See below for my contact details.

That's it for my bi-monthly feature this time. My last column on the Trio 9R-59DS h.f. receiver brought a tremendous response from readers – including scores of requests for further information. And I thank you for your many kind comments. I've plenty of ideas lined up for future *Buying Secondhand* columns, but if readers would like a specific type of equipment covered then please do get in touch, I'm all ears! Cheerio for now.



Optional filters may be plugged in.



FT-847 SuperControl.

KITS & MODULES



TRANSVERTERS for 2 or 4 or 6 metres from a 10 metre rig, or 4 or 6 metre from a 2 metre rig. Includes new overtone local oscillator, and integral interface unit. 20dB receive gain, 25W transmit power. Low level drive dual IF versions **TRC2-10dL**, **TRC4-10dL** & **TRC6-10dL**, high level drive single IF versions **TRC2-10sL**, **TRC4-10sL**, **TRC6-10sL**, **TRC4-2sL**, **TRC6-2sL**, Complete kit **£179.00**. Built **£266.00**.

TRANSVERTERS for ICOM rigs, supplied with cables. Automatic with no cable switching. IC756Pro & II & III, 775, 781, 7600, 7700, & 7800 use type **TRC4-10L/IC1**. IC735, 761, & 765 use type **TRC4-10L/IC3**. Built to order **£280.00**.

PSK31 INTERFACE KIT. Module as described in PW Feb 2009. Suitable for a variety of digital modes. PCB and components **£21.00**. Box kit complete with cables but excluding microphone plug **£35.50**.



STATION PREAMPS for 2 or 4 or 6metres. RF & DC switched. Adjustable 0-20dB gain. 100W power handling. **RP2S**, **RP4S**, **RP6S**, **PCB & Hardware kit £35.00**, Ready Built **£57.00**.

MASTHEAD PREAMPS, for 2 or 4 or 6metres. 20dB gain 1dB NF. 100W through handling. RF switched & DC fed via the coax. Heavy duty waterproof masthead box, and a DC to RF station box with SO239 connectors. **RP2SM**, **RP4SM**, **RP6SM**, **PCB & hardware kit £41.00**, Ready Built **£65.00**. Masthead fitting kit **£6.00**.

MASTHEAD PREAMPS 400W rated, for 2 or 4 or 6metres. RF switched. DC fed via a separate wire. 20dB gain 1dB NF. Heavy duty waterproof masthead box with SO239 connector. **RP2SH**, **RP4SH**, **RP6SH**. **PCB & hardware kit £42.50**, Ready Built **£65.00**. Masthead fitting kit **£6.00**.



5W WIDE-BAND HF AMPLIFIER
A useful push-pull broadband amplifier module giving a nominal 5W output over the range 1.8 to 29.7MHz with drive levels ranging from 37 to 97mW. Harmonics typically are 2nd -42dB, 3rd -18dB, 4th -49dB, and 5th -29dB. Should be used in conjunction with a double Pi type low pass filter, either harmonic halfwave or 5 element Chebychev. Normal supply 13.5V DC with current between 900mA and 1.86A. Full kit of parts with heatsink but without wound toroids **£29**. Full kit with wound toroids **£39**. Ready built **£49**. Price includes postage but not low pass filters.

NEW PRODUCT

CTCSS TONE ENCODER as described in PW July 2011. All nine tones 67, 71.9, 77, 82.5, 88.5, 94.8, 103.5, 110.9, 118.8Hz link or switch selectable. PC board size 67x55x12mm. PCB kit inc PIC but excluding switch **£21.00**. Built inc PIC but excluding switch **£30**. Optional 9-way switch **£2.00**.

TRANSMIT AMPLIFIERS, for 2 or 4 or 6m, single stage RF switched, class AB linear. 13.5V DC operation. Diecast box with SO239 connectors and heatsink. TA2SA 5W in 25W out, TA4SA 2.5W in 25W out, TA6SA 2W in 25W out, Kit **£63.00**, Built **£82.00**. TA4SB 7.5W in 50W out, TA6SB 5W in 50W out, Kit **£70.00**, Built **£89.00**. With **RECEIVE PREAMP** 0-20dB adjustable gain, TARP2SA, TARP4SA, TARP6SA, Kit **£89.00**, Built **£123.00**. TARP4SB, TARP6SB, Kit **£92.00**, Built **£126.00**.

CLASSIC 20/80m SSB RECEIVER



Classic superhet receiver for 20 and 80m using a 9MHz IF and a 5.0-5.5MHz VFO. Uses a 6 crystal ladder filter with near symmetrical passband, 2dB insertion loss, 1.8:1 shape factor, and 70dB stopband. Minimum discernable signal 0.2uV. Fixed tuned bandpass preselector on 20m, tunable preselector on 80m. Logarithmic AGC and Signal meter response. Maximum signal handling 1mV. 500mW audio output. Supply requirement 13.5V at up to 250mA. VFO with its drilled box, preselector and main board PCB's and component kits including crystals **£92**. Complete kit including box and hardware **£147.00**. Ready built **£240.00**.

TWO TONE OSCILLATOR

as featured in PW March 2005. 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**.



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**.

SPECTRUM COMMUNICATIONS

12 WEATHERBURY WAY, DORCHESTER, DORSET DT1 2EF. Tel & Fax: 01305 262250



PORTLAND VFO

A rock stable FET VFO. Meets the requirement for the Intermediate Licence VFO project. Modified to allow alignment to top and bottom of required band. Several versions available: 5.0 - 5.5MHz for 20 & 80 metres; 7.0-7.2MHz for a direct conversion for the extended 40metre band; or 7.900 - 8.400MHz for use as part of a mixer-

oscillator system as local oscillator for 4m RX or TX. Supplied with Buffer 2A to deliver 1.6V p-p into 50Ω with 2nd harmonic 40dB down. **PCB and component kit with potentiometer £18.00. Drilled Box and PCB kit with potentiometer and feedthroughs £27.00. Ready built £50.00.** State required frequency when ordering.



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.**

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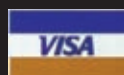
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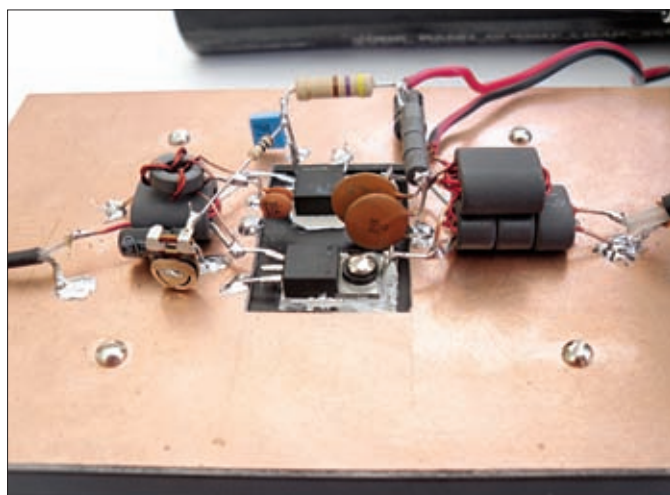




Tony Nailer G4CFY's Doing it by Design

PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW

E-mail: tony@pwpublishing.ltd.uk



More Development The 50W HF Amplifier

More on designing the 50W h.f. linear amplifier from Tony Nailer G4CFY, in his *Doing it By Design* column.

I'm pleased to be back again with *Doing it By Design* (*DiBD*) and pleased to be able to progress the amplifier project again and apologise for missing out the *DiBD* article in July *PW*. Back in April when I should have been doing the development and writing the article I was heavily overloaded at Spectrum and doing a bit of overtime to keep up. Also high power amplifiers are always a bit daunting because of the tendency for them to go 'click' at switch-on and then nothing happens!

The transformer design necessary for this amplifier was dealt with in *DiBD* in May's *PW* and was of necessity heavily mathematical. Looking back at it now I must congratulate those* who make up the presentation for the clever way the blocks of calculations were separated from the text.

*Our pleasure Tony – Comment duly passed on to Art Editor **Steve Hunt!** Editor.

Development Model

The circuit for the development model of the 50W h.f. power amplifier is shown in **Fig. 1**. You'll probably notice that it's very similar to the 5W amplifier without the feedback components.

The development prototype was made using a piece of blank printed circuit board (p.c.b.) and cutting out a rectangular hole to allow the TO220 devices to be bolted to

the heat-sink together with mica insulators. The circuit board was also bolted directly to the heatsink using four 6BA x 6mm brass screws.

Transformers were wound as shown in the drawings **Fig. 2**, **Fig. 3**, **Fig. 4** and **Fig. 5**. These were arranged piggy-back and wired directly to the transistors and the bias components were also added dead-bug style. The whole assembly is as shown in the heading photograph.

Initial tests

Prior to the 'test drive', the bias current of the main amplifier transistors was set to 50mA total. With the driver stage disconnected the main amplifier oscillated, but it stabilised when the input was terminated by a 50Ω resistor.

The main amplifier was connected via the previously designed 5W amplifier to the signal generator. The output was taken out into a good 200W load, via a Bird Thru-line Wattmeter, with a 50W 2-30MHz element. The set-up is as shown in **Fig. 6**, though for reasons of photography the set up is un-powered.

I also used an oscilloscope to measure the peak-to-peak voltage across the input transformer of the main amplifier and to observe the purity of the output waveform.

At switch-on nothing went 'click' or 'bang' and power output

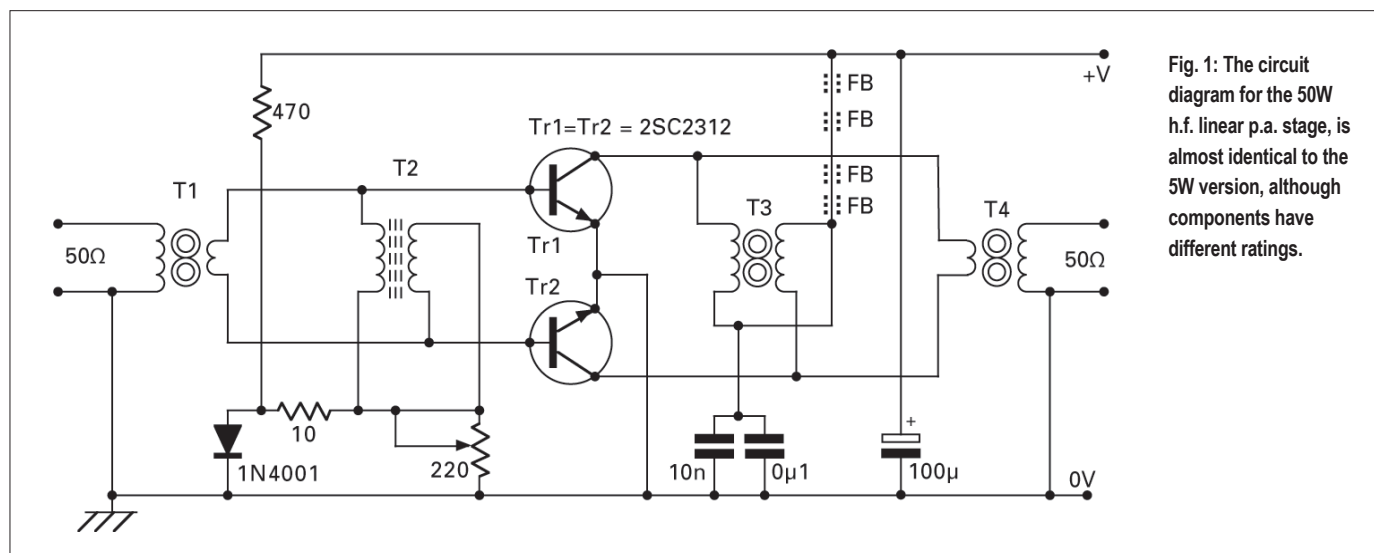


Fig. 1: The circuit diagram for the 50W h.f. linear p.a. stage, is almost identical to the 5W version, although components have different ratings.

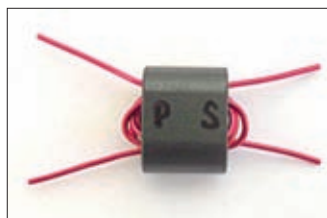


Fig. 2: Input transformer T1, wound on a type 43 dual aperture core 10.3mm long was originally 3t primary (21s.w.g.) and 1t secondary (20s.w.g.). Then it was changed to 4t primary and one 2t secondary.



Fig. 3: Windings transformer T2 on a T37-61 core with 2+2 turns (25s.w.g.) bifilliar wound. the end of one winding is connected to the start point of the other.

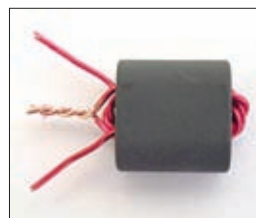


Fig. 4: Transformer T3 is wound with 2+2 turns of bifilliar wound 21s.w.g. enamelled wire on a type 61 dual aperture core.

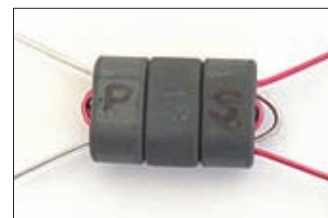


Fig. 5: Output transformer T4 has a primary of one turn (20s.w.g.) and a secondary of three turns (21s.w.g.) wound on a stack of three type 43 dual aperture cores, each 6.6mm long.

was observed! A quick check over the range revealed that at low frequencies the unit would oscillate at output levels above 30W and could actually go off the 50W scale. The output fell off sharply above 14MHz and would become unusable at 18MHz. So, it was then time to walk the dog and think about the problems.

Solving The Problems

I wondered if I'd used the correct ferrite cores, because the darned things just don't have markings that identify the individual items. Previously though, I had marked all the type 61 cores by pencil – but not the type 43.

In the previous *DiBD* article the 'Calculations 2 – second attempt for transformer T1' was undertaken for a type 43 core. The choice of 4:1 turns ratio was based on the work of other authors. The same input transformer in the 5W amplifier was a 2:1 turns ratio using a type 43 core.

On checking the board I found that, for the input transformer T1, I had used a 13.4mm long type 61 binocular core instead of a 10.3mm type 43. Also I had used a stack of three 6.6mm long type 61 cores for the output transformer T4, instead of type 43 again.

Upon further examination of my ferrite core stock, I found that I didn't have the 6.6mm type 43 cores required for the output stage, but I knew a man who did – **Robin Sykes G3NFV of Sycom**. I put in a call to him and he kindly put three of them together with a type 43 10.3mm core for the input stage.

New Transformers

Upon receipt of the new cores I wound an input transformer with a three-turn primary and single-turn secondary. I also wound a new output transformer using the stack of three 6.6mm type 43 cores, with a single turn primary and a three-turn secondary.

Testing the amplifier again showed a significant improvement, with a power output of 11W being achieved on 21MHz. But the gain varied quite dramatically across the high frequency (h.f) spectrum. I achieved 50W output on 5-13MHz but saturation and oscillation limited the power outputs on some other frequencies.

I thought maybe it was the turns ratio on the input transformer so I took one turn off the primary side. This did improve stability but the power output still varied considerably.

After yet more dog walking, I realised that by reducing the input turns on T1 I was also reducing the inductance below the required level to achieve a 200Ω inductive reactance at the lowest frequency. So what needed to be done was to increase the primary turns to four turns and secondary turns to two turns. It turned out that I'd made the same mistake on the 5W amplifier too.

The 5W Amplifier Revisited

After realising the mistake with the 5W amplifier, I made up two new input transformers and fitted one to the 5W amplifier prototype. On testing this amplifier into a dummy load and wattmeter, I found that it was much improved from the previous performance. It now only required between 27mW and 50mW from 1.8 to 21MHz and 100mW on 29MHz for 5W output.

Return To The 50W project

After the improvement to the 5W amplifier design, I returned to the 50W project. Reconnecting the driver and main amplifier and observing waveforms at both interstage and output, the results were stable and clean up to 30W but thereafter the waveforms became corrupted.

In some cases the waveform showed sharper peaks indicating even order harmonics and on other frequencies the waveform squared off indicating odd order harmonics.

At low frequencies, outputs of well over 50W could be achieved, but were rich in even order harmonics. Drive levels from the 5W stage needed to be 4–5W over the h.f. range to achieve the 30W output, except at 14MHz where 9.6W was required. Full 50W output was achieved for 5W drive between 2 and 3.65MHz.

Unwanted Modulation

Observing the signal on the oscilloscope revealed that at 30W and above, the waveform became amplitude modulated with a saw tooth envelope. As the Bird ThruLine Wattmeter does not have a 'sniffer' output to observe the waveform on an oscilloscope or spectrum analyser, I changed over to a ex-military dummy load meter with a sniffer output.

I haven't checked if the modulation frequency is related to the carrier frequency as the unwanted modulation effect occurred at all frequencies – so, it's not frequency specific. There are several possible causes that immediately came to mind. The possible causes include, 'squegging', inadequate de-coupling, supply current limitations, incorrect transformations and parasitic oscillation.

'Squegging' arises when the instantaneous supply current cannot be delivered due to too much inductance in the supply rail and insufficient supply de-coupling. It can also happen for certain frequencies, at which there's feedback from the collector rail to the base bias line.

So, initially I tried adding a 470μF electrolytic to various places on the collector supply and then to the base bias point. There was no difference at all! Changing over to a higher current rated power supply also had no effect.

Transformers Revisited

Another possibility is that my calculations of transformers

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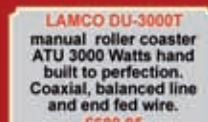
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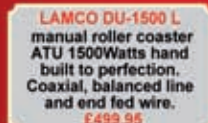
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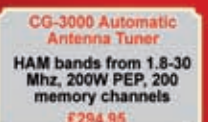
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and baluns went wrong somewhere and I had either too much, or too little inductance, or the wrong transformation or the wrong type of cores. All are possibilities and as mentioned previously I have suspicions of possibly mixing up the type 43 and type 61 cores.

I have tried to be meticulous about marking toroids received from suppliers. I have noticed that their order codes for the toroids suggest that they source them from two different manufacturers, and that could be the reason the surface finishes are different. (For example – one could be using a highly polished mould resulting in a shiny core.

The input transformer had already been rewound using a four-turn primary and a two-turn secondary. This alone has improved both 5W and 50W amplifiers. It was necessary to look again at the output transformer and in particular the determination of maximum flux density.

May's DiBD Revisited

Time to revisit May's *DiBD* column next! When I had originally derived the equations for the alternating current (a.c) flux density β_{ac} I had been surprised at the small size dictated by my calculations. Re-working the Calculations 6 from *DiBD* in May's *PW*, I noticed that although the result was actually correct, I had included an unwanted 10^6 in the denominator (under the line).

Checking the other calculations for β_{ac} showed an inconsistency of use of the formula, although the results were all correct. In Calculations 2 to 4, frequency f was in Hz so 1.8MHz was used in the form 1.8×10^6 Hz, and A_e was in m^2 so $19.57mm^2$ was used in the form $19.57 \times 10^{-6} m^2$. In calculations 5-7 the 10^{-6} was missing from the A_e in the denominator, though the answer is right.

To ensure readers are clear about the formula for a.c. flux density, I have arranged it in System International (SI) format where measurements are in metres.

$\beta_{ac} = V \times 10^4 / (2 \times \pi \times f \times A_e \times n)$, where V is peak value, f is in Hz, A_e is in m^2 and n is number of turns.

It's useful to note that the formula works just as well if f is input in MHz and A_e is input in mm^2 because the 10^6 cancels with the 10^{-6} .

Calculations Up-date

In May's issue, Calculation 1 was to determine the total length required for dual aperture type 61 cores and gave an impractical result. Calculations 2 was for a dual aperture type 43 core for which a 10.3mm long core would suffice.

Calculations 3 was for a standard toroid of type 61 material, the FT37-61 and was found to be more than adequate for

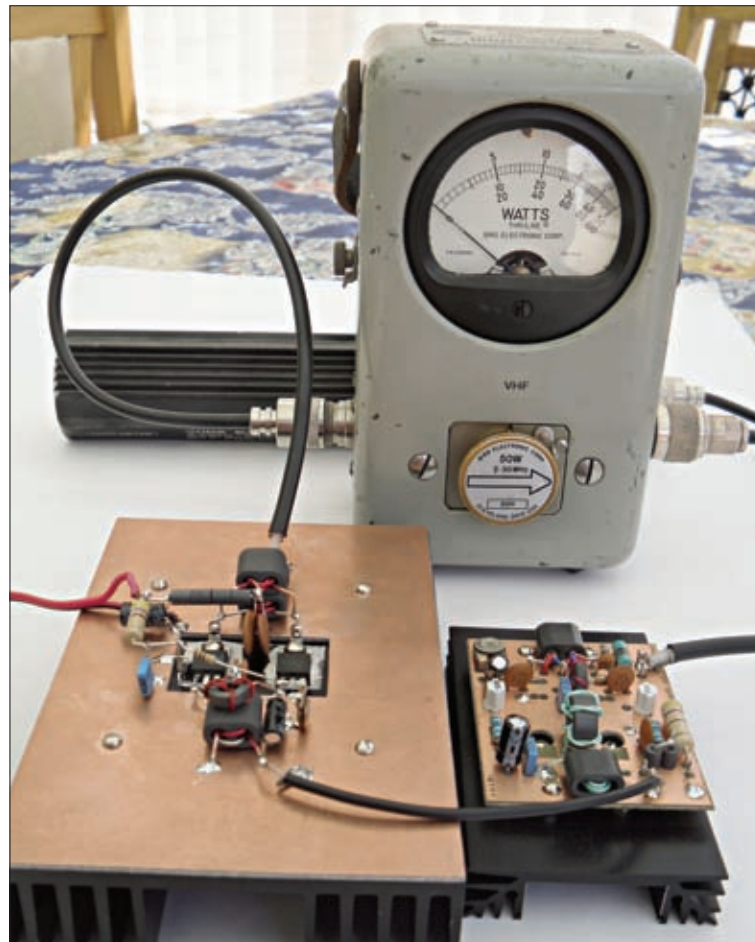


Fig. 6: The layout for testing, though this photograph was taken without power or input signals to the project.

the task. Calculations 4 was also for a dual aperture core type 61 some 10.3mm long, but somehow it was printed as a standard toroid. I missed that when I proof-read the article before publishing, so I have to share the blame for that one. The calculation showed that the 10.3mm long core would have peak flux close to saturation.

Calculations 5 was for a dual aperture core type 61 material 13.4mm long. This increased size core would have peak flux well below saturation. Now Calculations 6 was for dual aperture core type 43 and resulted in a length of 16.3mm. I then stated that such a core could be made using a 6.6mm and a 10.3mm stacked to give 16.9mm.

Then I stated the 6.6mm core is Fair Rite type 2843 000 302 and is available from RS code 467-3551. This is completely wrong.

The 6.6mm long type 43 dual aperture core is Fair Rite 2843001502 and **is not** available from RS.

That core was formerly available mail order from Robin at Sycom – but he has now stopped selling components by mail order. Don't despair, though as in future Spectrum will stock all the cores used in this project and the popular dust iron ones specified in many articles in *PW*.

Subsequently I have made that transformer using a stack of three 6.6mm long type 43 cores giving a length of 19.8mm and an area of $37.62mm^2$. Using that area in the Calculations 6 gives a peak flux of just 554 Gauss.

Calculations 7 undertook two related iterations. The first using type 43 standard toroids FT50A-43, which determined that 4 cores might not be enough but 6 was really a bit of overkill. Then the calculation was done for the smaller FT50-43 cores and showed that 4 cores probably would be sufficient.

Surprisingly the flux density with 3 turns was under 400 Gauss leading to the suspicion that my calculation of a.c. flux density might be wrong by a factor of ten. Nevertheless I have gone over the equations and derivations a number of times and can find no fault with them.

Above 30W Level

The amplifier still oscillates above 30W level and no amount of de-coupling has any effect. I have also tried adding capacitors across the input, between the transistor bases and across the collectors with no effect. Next, I intend to change the input core to a slightly larger one and use three-turn primary and a one-turn secondary. If that doesn't work I need more dog walking to think about what to try next!

If you have any thoughts or comment on *DiBD*, I can be contacted on tony@pwpublishing.ltd.uk Cheerio for now!



A Practical Tribute to Gilbert Davey

The Rev. George Dobbs G3RJV remembers his early days in radio constructions and pays his own tribute to Gilbert Davey – starting with a very appropriate quotation.

"Gilbert Davey has topped the popularity poll among Boy's Own Paper contributors for the past ten years. This is all the more surprising when you realise that he rarely has more than three articles a year in the magazine. But his subject is Amateur Radio and that seems to be about the most consistent of all boys' hobbies."

Jack Cox, Editor of *Boy's Own Paper*.

Welcome to *Carrying on the Practical Way (CotPW)* where this month I'm remembering a specialist writer who helped me into the hobby. Sometime around the end of the 1950s, I borrowed

a book from the Grimsby library called *Fun with Radio* by Gilbert Davey and built the one-valved and two-valved radios described in the book.

The book was easy to understand and the radios worked well. In more recent times I spotted a copy of the book in a secondhand bookshop and bought it for old time's sake; albeit the revised edition of 1965 (Photo 1).

So, it was with some sadness that I read the letter from **Les Franklin** in the July 2011 copy of *PW*. The letter spoke of the death of Gilbert Davey in April at the age of 97 and *PW* Editor **Rob G3XFD**, who surprisingly had not heard of Gilbert Davey (perhaps he is too

young!*) promised to attempt to find the Amateur Radio callsign of Mr. Davey.

Wishing to come to his aid, I did an extensive web search on Gilbert Davey. The first thing I discovered was the informative website of Les, the author of the letter, at thestudioeonevalveradio.org.uk. And any historical references in this article come via that website.

** Editor's comment: My pocket money was strictly limited George! I could only afford PW and rarely ever saw BOP – but it now seems I should have seen both magazines!*

One-Valved Radio

Although I failed to find any callsign associated with Gilbert Davey I thought that a fitting tribute to him might be to offer a version of his one-valve radio from *Fun With Radio*. Although he was a Major in the Royal Signals during the Second World War, Gilbert Davey – I think he was a true radio 'amateur'. He worked for the Pearl Assurance Company from 1947 until his retirement, beginning in London and ending in Peterborough.

In the late 1940s he began to contribute practical radio articles to the *Boy's Own Paper*, edited by Jack Cox. These proved to be very popular and attracted a personal mail of literally thousands of letters. At the end of the 1950s he appeared in a BBC television series called *Studio E* a forerunner of the *Blue Peter* programme, although for a while *Blue Peter* was broadcast concurrently with *Studio E* as a programme for younger children.

The *Studio E* six part series on how to build a one-valved radio invited viewers to send for a leaflet on how to build the radio, and Davey received over 26,000 requests. If only a simple home-made radio could solicit that interest now, I'm sure Rob and the *PW* team would be delighted!

The circuit shown in **Fig. 1** is my version of the Gilbert Davey one-valved receiver that appeared in *Fun With Radio* and was also featured in the *Studio E* one-valved radio. It's the classic Armstrong regenerative receiver. A link winding (L3) induces the incoming radio signals to a tuned circuit (L1 and C1). The 220pF capacitor couples the tuned signal to grid 1 (pin 6) of the valve and the 2.2MΩ resistor facilitates grid leak detection of the signal.

A regenerative receiver achieves its



The modern reproduction of a Gilbert Davey receiver built by George G3RJV.

excellent gain and selectivity by feeding back some the signal to the input tuned circuit. This feedback is achieved via L2, which is connected to the output at the valve anode (pin 2) and is closely coupled to L1. In the old days of radio L2 would be called the 'tickler coil'.

The amount of feedback is controlled by C3, usually called the regeneration control. The operation of this control is the key to successful listening on a regenerative receiver. For amplitude modulated (a.m.) signals it is set just below the point where the feedback causes the valve to oscillate.

For signals that require the injection of a carrier signal, Morse code (c.w.) and single side-band (s.s.b.), the control is set just above the point of oscillation. The point of oscillation is identified by a rushing sound in the receiver output. This being a one-valve radio, there's no extra amplification and the signals are heard on high impedance headphones...but more on this point later.

The 1T4 Pentode

The receiver uses a 1T4 pentode valve which was designed for battery radio use. An equivalent type is the DF91. I also tried a DF92 pentode (an equivalent is the 1L4) and both worked well in the circuit.

All of the valves mention fit into a B7G valve base. Note that grid 3 (pin 5) is internally connected to the negative voltage side of the filament at pin 1.

Pin 1 must be connected to the negative of the filament supply and pin 7 to the positive of the filament supply. In my version of the circuit there is one electrical difference, in that I altered the placement of the 22kΩ bias resistor to grid 2 (pin 3) on the valve which gives some improvement to the performance.

Other differences have to do with the sourcing of parts for a project more than 50 years old. The main tuning capacitor (C1) and the reaction control capacitor (C2) are both modern polyvaricon variable capacitors. I must admit to being cautious about using a polyvaricon for C3 as it carries a relatively high voltage between the plates. However, in practice it wasn't a problem.

Several suppliers stock a two-gang polyvaricon capacitors; the two gangs having a nominal capacitance of 150pF and 60pF. Measuring the larger gang showed it had a capacitance range of some 10pF to 150pF making it ideal for the tuning and reaction capacitors of the receiver.

Fine tuning, often called 'band-

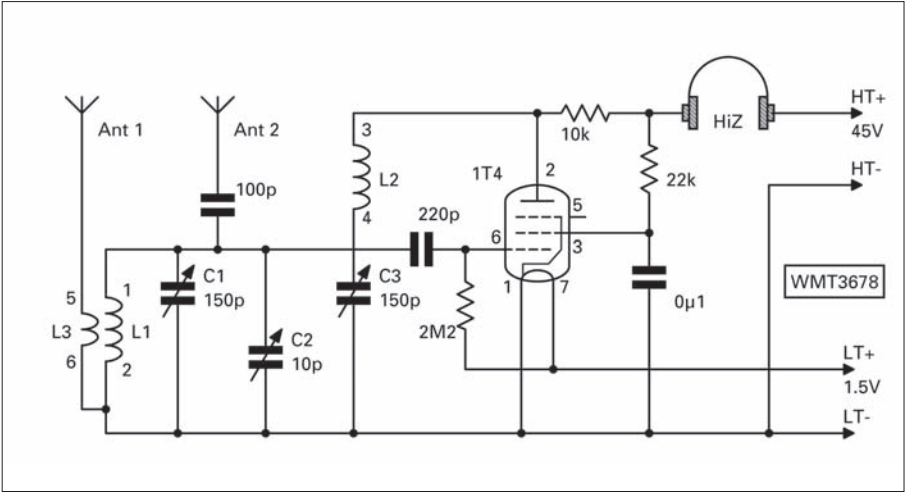


Fig., 1: George's version of the Gilbert Davey one-valve receiver that appeared in *Fun With Radio*.

Fig. 2:

Windings on ferrite rod coil

Range (MHz)	L1 turns	L2 turns	L3 turns	Wire (s.w.g.)
4 – 14	15	8	4	28
10 – 30	6	4	2	22



Fig. 3: After looking around the house for a suitable coil former, George found one with the right diameter of about (50mm) in a soft plastic material – a furniture polish spray-can lid! L1 is 10 turns, and L2 is five turns, with a 3mm gap between them.

spread tuning' is added to my version of the radio used a 10pF variable capacitor. I am afraid that readers are on their own in the sourcing of this part. Any decent variable capacitor with a value of a few pico-farads (pF) connected in parallel with C1 should help in fine tuning of stations. Alternatively, mechanical band-spread tuning could be facilitated by adding a reduction (slow motion) drive to C1.

Another component problem is finding a suitable coil for L1, L2 and L3. A Repanco DRR 2 coil was used in the *Fun With Radio* design but these have disappeared in the sands of radio history. I am lucky enough to have

some Denco green, Dual Purpose (DP) plug-in coils. These were designed for exactly this sort of radio.

The Denco coils be found for sale on-line but usually at greatly inflated prices. The main photograph of my receiver shows a Denco coil being used but readers will spot some insulated lead-through connectors, added to enable alternative coils to be used. Note that these are just insulated lead-through terminals – don't use lead-through capacitors!

The photograph also shows that I built the receiver on a metal chassis. This is because it's vital that the receiver is screened by metal between the internal components and the control knobs as hand capacitance can cause havoc with the tuning stability.

Alternative Coils

Readers may like to experiment with their own versions of the coils but I offer two possible alternatives; a ferrite rod coil and a 'furniture polish lid coil'. The ferrite rod version is taken from that excellent website MDS975.co.uk run by **Mike Smith, M0MTJ**. It must be a good website because it has a lot of material on my 1970s Ladybird book *Making a Transistor Radio!*

Just below that material, Mike offers a homemade alternative to the Denco green range coils. The table – Fig. 2 – shows the arrangement of L1, L2 and L3 on a short piece of 10mm ferrite rod. These can often be culled from old transistor radios. The diagram has numbers showing how the windings

connect to the circuit in Fig. 1. The table shows the numbers of turns required for short wave bands. As with all home wound coils the frequency coverage is only approximate.

Mike advises coil winders to begin by making a paper sleeve to fit over the ferrite rod and winding L1, securing each end with a small piece of Sellotape®. The winding L2 is wound over the centre of L1 and secured with tape. Winding L3 is wound alongside the L1 winding.

For those not experienced in regenerative receiver coils, the connections shown for L2 may appear to be the wrong way round. This is because the signal in L2 must be in phase with the signal in L1. If you fail to get this right and the regeneration control does not work, just reverse the connections on L2. I have had to do that several times in the past when winding regenerative receiver coils! Should regeneration not occur smoothly over the whole tuning range, experiment with the number of turns on L2.

The furniture polish lid coil is shown in Fig. 3. I was looking around the house for a suitable coil former with a diameter of about 2 inches (50mm) in a soft plastic material. The larger diameter coil mimics many of the coils wound for regenerative receivers in the early days of radio. Very quickly my eyes spotted a tin of spray furniture polish in a kitchen cupboard.

The diameter and length of the plastic lid were both ideal. The details in Fig. 3 shows that I only wound the L1 and L2 coils. In my experiments with the Denco coil version I had not been using L3 but connecting about five metres of wire to the 'Ant 2' point in Fig. 1. This worked well and is a simpler arrangement. Readers may like to experiment with alternative values for the 100pF coupling capacitor from the antenna.

Should readers wish to add a winding for L3, about two or three turns could be wound over L1 at the end nearest L2.

The coils are very simple to wind on the polish lid. At the beginning and end of each coil, I made two small holes in the soft plastic and looped the wire through the holes to hold it in place. A small piece of Sellotape can be placed over the windings to keep the turns in line.

The 10 turns used for L1 give an inductance value of some 9.3µH

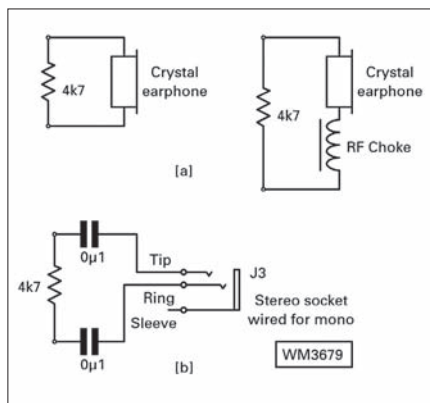


Fig. 4: Various options for audio output from the one-valved radio set described this month.



Fig. 5: Combining five 9V batteries together to make a 45V supply

which should produce a tuning range of around 4 to 16MHz. The number of turns for L1 could be amended for alternative frequencies by altering them. The number of turns on L2 should be increased or decreased in proportion to L1.

High Impedance Headphones

Our final component procurement problem is the high impedance headphones used for the audio output. I happen to have two sets of high impedance headphones which present an impedance of 4,000Ω. These headphones are like gold dust and readers may not have access to similar headphones. Two possible solutions are offered in Fig.

4. The simplest is to use a crystal earpiece as shown in Fig. 4 (a).

The crystal earpiece has very high impedance and is used in parallel with a 4.7kΩ resistor to replace the

headphones in Fig. 1. **Barry Zarucki M0DGQ**, submitted a regenerative receiver called 'The Takeaway Two' to *SPRAT*, the journal of the G QRP Club. Barry suggested adding a radio frequency choke (r.f.c.) of 10 to 22mH in series with the earpiece to block any r.f. signal in the earpiece leads to maintain receiver stability. This has not been a problem for me but it may be worth including Barry's choke.

The diagram, Fig. 4(b) offers a suggestion for using a computer amplified loudspeaker. Again the 4.7kΩ resistor replaces the headphones and the audio voltage across the 4.7kΩ resistor is connected via two 100nF capacitors to a stereo jack socket wired for a mono output. The amplified speakers are plugged into this socket.

The *Fun With Radio* receiver was powered with a purpose made battery giving a low tension (l.t.) of 1.4V and a high tension (h.t.) of 90V. The low tension voltage is easy to obtain with a single 1.5V battery cell. My h.t. supply was 45V obtained by connecting five 9 volt PP3 batteries in series as shown in the photograph, Fig. 5. The 45V volts proved to be enough to power the receiver.

Hopefully I've provided enough information to enable the reader to replicate the Gilbert Davey one-valved receiver without having recourse to vintage or specialist parts. It may need a little experimentation but the results from this old radio design are very gratifying for the low number of parts. It's a good way to remember one of the rather forgotten pioneers of Amateur Radio construction.... and Rob G3XFD really doesn't know what he missed!



Looking at the underside of the one-valved receiver chassis, you could make the chassis up out of soldered-together p.c.b. material, if you have some to-hand.

George spotted this copy of the book in a secondhand bookshop and bought it for old time's sake. This one is the revised edition, rather than the original that was produced several years earlier.



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G3GIQ Silent Key. Henry Lewis, G3GIQ sadly passed away Tuesday evening, July 5th 2011. Henry was one of my oldest chums having the privilege of his friendship for over 43 years. He was my best man at my wedding to Jennifer and we named our youngest son Henry, after him. "Mr Famous" will be missed by many thousands of Hams around the world who spent most of his life dedicated to Amateur Radio. If you would like to send any words please do so, direct to me at G3GIQ@MLandS.co.uk. Our sympathies go out to Susan, his long term friend with whom Henry left Ealing in London to start a new life together in Devon in January this year.

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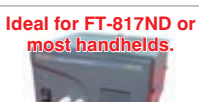
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The Rainbow Antenna

(You'll soon see the reason for the name!)

In his visit to the *Antenna Workshop*, Roy Walker G0TAK says there's a rainbow over Cumbria!

I'm very lucky in the Amateur Radio field, people who know that I'm interested in training young people (principally in the Air Training Corps) give me bits of unwanted kit to use for the training. I have also trained myself "*never to say No*", just in case the stuff may come in useful.

The latest acquisition is a couple of rolls of American 'Planar cable' (flat) which, as it says on the label is "Appliance wiring material intended for internal wiring of electronic equipment". Each roll contains 100ft (sorry Editor – 31.25m – but it is American!) of ribbon cable with 26 individual wires, each of 28a.w.g. diameter, and rainbow coloured for ease of identification. I felt that there must be a use for this booty, other than only as stated 'on the box'.

With the relatively small diameter of each conductor – it is after all only 'hook-up' wire – there will be limited

current carrying capacity. You can get over this restriction of course by 'doubling-up' wires, or even going to the extent of using the whole of the ribbon as a single cable.

One of the biggest advantages is that the cable rolls up nicely, without any of the knots and twists associated with normal cable. This makes it ideal for portable operation. How about these for a few ideas for antennas?

The NVIS Antenna

To create an antenna suitable for near vertical incidence skywave (NVIS) use, cut off 32 feet (10m) of the cable, bare and tin all the wires at one end and solder them to a single common point **Fig. 1** and **2**. Stretch out and support the wire on the top of a few agricultural 'electric fence' posts and feed it against ground, or another similarly prepared counterpoise cable.

Depending on propagation and your choice of frequency, this will be superb for NVIS propagation. The United States Army has used antennae similar to this to great effect.

Long Wire

For use just as a long wire, without cutting the wire to any specific length, prepare the wire as for the NVIS antenna. Unroll it from the reel to the furthest you can reach, throws it over a tree, rest it on a hedge, whatever you can find. It will not be significant if there's still a bit of wire still on the reel. Feed it against a decent ground and you're in business!

A 9:1 'unun' would probably be beneficial at the feed point to 'tame' any high impedance 'seen' by your transmitter and tuner combination. At the end of the day, pack it back on the roll.

Wire Counterpoise

To use the wire as a counterpoise, prepare the wire as before, cut one or two lengths and use them as a counterpoise to your portable vertical antenna. As an alternative, cut two equal lengths from your roll, though not cut specifically to frequency. Deploy them at the base of your vertical, rolled out to a specific length according to your chosen frequency.

I use a 9m 'Roach Pole' supported vertical to great effect for portable



One end of Roy's 'Rainbow' antenna set out as an NVIS antenna.

operations. It's fed against a decent earth (if I can find one) or a counterpoise, via a home brew 1:1 balun or more recently via a 9:1 unun.

A QRO Dipole

For use as a full-power dipole, cut and prepare two lengths of the wire (cut them a bit longer than you anticipate allowing for trimming), solder all the wires together. mount a dipole centre in the middle and an insulating device at the 'far' ends and you have your dipole.

A suitable insulator can be made from a piece of clear plastic similar to my sketch, **Fig. 3**. You'll perhaps need a clamping plate of the same material to hold the ends of the element. You'll need a further hole for the support rope.

A QRP Multi-Band Dipole

Perhaps, you'd like to operate it as a low-power multi-band antenna. Then cut and prepare two lengths of the wire (cut them a bit longer than you anticipate, to allow for trimming) mount a dipole centre in the middle. Decide how many different dipoles you wish to make and divide that number into the total number of wires at your disposal.

To keep the maths simple enough for me to understand, let's say you want to work on three bands. Then divide the number of wires by the number of bands ($26/3 = 8.6$ wire). That gives a figure of 3×8 wires per dipole with a couple of 'spare' to 'double up on two bands.

Cut the longest dipole down through eight wires, cut the second dipole to a little over length through the next eight wires etc. Each successive dipole will of course be shorter than the last, and you will end up with three dipoles and quite a bit of waste ribbon cable for other projects.

Of course, the more wires you include in one 'bundle the greater current capacity; so if you want eight different dipoles $26/8 = 3$ and you will end up with eight dipoles of three wires and one of two wires, and a correspondingly lower current handling capacity.

Sacrificing power handling for versatility, for a 'real QRP' antenna, you can cut each wire to a different length and end up with nine 'band-spread' dipoles, the majority being cut to the top, centre and bottom end of the band.

Be aware, that all these wires in close proximity will inevitably interact with one another. To achieve the best results will involve a fairly tedious process of testing, cutting and re-erecting your antenna in a format which



Fig. 1: Carefully pare back the insulation of all the wires by about 10-12mm and tin the ends.



Fig. 2: Then solder the shaped 'end-piece' (made from heavier plain copper wire) in place.

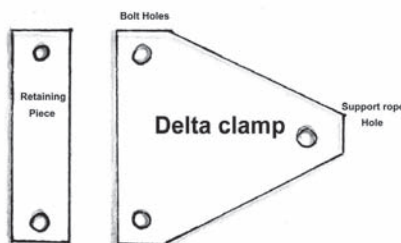


Fig. 3: Roy's sketch of a suitable centre-piece for an antenna for higher power use.

is fairly typical of our operating habits. As you get near to a 'perfect' (let's just settle for acceptable') matching then stop cutting, it's a devil of a job to stick bits of wire back on again and still make it look neat.

I hope this may have given you the seeds of some ideas for your own projects, but do remember, never throw anything away! ●



Fig. 4: The end of the NVIS installation, can be held in the 'clamps' of an insulated pole designed for electric fences.



Roger Cooke G3LDI's Morse Mode

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The Morse Mode

Roger Cooke G3LDI has news of some success by the the c.w. 'boys' in Essex and Bath.

The Essex CW Amateur Radio Club (ECWARC) has just won the Region 12 Club of the year award and is doing very well, sponsoring Morse tuition and encouraging amateurs to obtain their RSGB Certificate. Colin Wilson M1OCN has done very well, and has passed the RSGB 12w.p.m. test. He has just had his first QSO with a station in the USA, so is feeling very happy about that.

Colin's pleasure was enhanced as he's also been awarded The ECWARC Memorial Trophy for his outstanding progress in learning Morse Code during the c.w. classes offered by **Andrew Kersey G0IBN** during 2010. The Trophy, **Fig. 1**, was donated to ECWARC by the family of the late



Fig. 2: Colin M1OCN (on the left) was presented with the ECWARC Trophy by Steve G4ZUL, the club's chairman.



Fig. 1: The Essex CW Amateur Radio Club Trophy was donated by the family of the late Peter Hale G4OAD.

Peter Hale G4OAD and has been fully refurbished by G0IBN over many months during last year.

The award was presented to Colin by ECWARC chairman **Steve Cocks G4ZUL** on 3rd May 2011. ECWARC would like to thank the Chelmsford ARS for their help and support in making this possible. Colin M1OCN is on the left in **Fig. 2**, and on the right is Steve G4ZUL who made the presentation.

The Essex CW Club is a group supporting and encouraging the learning and use of Morse code. Further

appoint a c.w. representative in order to encourage Morse activity within their Club. Andy would then be prepared to exchange information on activities and so on.

The Bath Boys!

A similar success story has happened in Bath. This is probably old news now, but it's difficult to keep current in a bi-monthly column! Starting with 11 students, the course used a mixture of G4FON generated Morse and hand sending from **Robin Thompson G3TKF**, and **Steve White G0FUW**.

Once the group had the code mastered sending to each other was introduced. They ended up with six five word per minute passes and one 12w.p.m. pass. Four students withdrew for various reasons. Robin G3TKF has registered as an assessor and both Robin and **Lewis Thomas G4YTN** helped with the tuition. The class can be seen in **Fig. 3**.

It's always very refreshing to hear success stories like this. And it just goes to show that although Morse is no longer a 'requirement' for a full licence, there is still considerable interest in the self training side of the hobby by learning the code and using it on the air.

If your club has a similar success story, please let me have some details so it can be reported in the *Morse Mode* column. Remember too that putting something back into the hobby can give a lot of satisfaction. Becoming a GB2CW volunteer can do just that. E-mail me if you are interested. 73 and May the Morse be with you! Roger, G3LDI

details can be found at their web site: www.essexcw.org.uk

Andrew G0IBN is their secretary, who says, if there's any interest, that he's offering to give a talk to clubs on Morse. He'd also like to hear from any club that's willing to



Fig. 3: All busy, learning the code at the Bath Amateur Radio Club Morse class.



Rallies

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AUGUST

August 12th

The 18th Mini Rally Night

The Cockenzie and Port Seton Amateur Radio Club 18th Annual Mini Rally Night will be held at the Community Centre, Main Hall, Port Seton, East Lothian. It's an opportunity to bring along your own junk and sell it yourself. The event runs between 6.30pm and 9.30pm and admission costs £2.00, tables will be available on a first come first served basis.

August 14th

*The Flight Refuelling Hamfest

The Flight Refuelling Amateur Radio Society Hamfest will be held in the Cobham Sports and Social Club Ground, Merley, Nr. Wimborne, Dorset BH21 3AA. The doors will open at 10.00am and there will be talk-in on S22, car parking, trade stands, a car boot sale, a licensed bar and catering.

Mike M0MJS

Tel: 01202 883479

E-mail: frars@frars.org.uk

www.frars.org.uk

August 14th

The Friskney Rally

The Friskney & East Lincolnshire

Communications Club Rally and general car boot sale will be held in the Friskney Village Hall, Church Road, Friskney, Lincolnshire PE22 8RD – 7.5 miles south of Skegness. The rally will be open from 10.00am to 6.00pm and admission will be £1.50. There will be talk-in on S22, car parking, a prize draw, catering and facilities for the disabled.

Brendan 2E0BDS

Tel: 01754 820060

E-mail: felcc@btinternet.com

www.felcc.com

August 20th

The GI HF Conference

The GI HF Conference will be held at the Technology Education Centre, Omagh BT78 1FA. Registration will take place from 11.00am.

Philip M10MSO

E-mail: mi0mso@yahoo.co.uk

August 21st

The Rugby Rally

The Rugby (Princethorpe) Annual Radio Rally will take place at Princethorpe College, Princethorpe, Rugby CV23 9PU (SP395710). The rally will be open from 10.00am to 4.00pm and admission will be £2.00. There will be talk-in on S22 and RB06, car parking and catering.

Tony

Tel: 07759 684411

E-mail: rally@rugbyats.co.uk

www.rugbyats.co.uk

August 27th/28th/29th

Wainwrights on the Air

If you're wondering what to do over the August Bank Holiday period then why not get involved in the Wainwrights on the Air (WOTA) activity weekend. It is an adventure radio programme for amateur radio enthusiasts who enjoy being out on the fells in the English Lake District as well as those who just like collecting contacts with unusual locations. The majority of stations will be operating on 2m using frequency modulation (FM) and calling on S20.

www.wota.org.uk

<http://wota-blog.blogspot.com>

August 28th

The Milton Keynes Rally

The Milton Keynes Amateur Radio Society Rally will be held at Bletchley Park, Sherwood Drive, Bletchley, Milton Keynes MK3 6EB. There will be trade stands, special interest groups, GB2BP and you can visit the Bletchley Park Museum while you're there.

www.mkars.org.uk

August 29th

The Huntingdonshire Rally

The Huntingdonshire Amateur Radio Society Bank Holiday Monday Rally will take place at St Neots Community College, Barford Road, St Neots PE19 2SH. The rally will open at 10.00am and admission will be £2.00. There will be talk-in on S22 (V44), car parking, trade stands, a car boot sale, a Bring & Buy, catering and an RSGB bookstall. Indoor tables need to be booked in advance.

Clive Burchell G3NKK

Tel: 01480 810473

E-mail: clive.burchell@btinternet.com

SEPTEMBER

September 4th

The Telford Rally

The Telford and District Amateur Radio Society will be holding the sixth Telford Hamfest at the Enginuity Technology Centre, Coalbrookdale, Telford TF8 7DU. The doors will open at 10.30am and there will be talk-in on S22 and GB3TF (433.2MHz), trade stands, special interest groups and discounted admission to the Enginuity Centre.

Martyn G3UKV

Tel: 01952 255416

www.telfordhamfest.co.uk

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Mike Richards G3WNC's Data Modes

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Operating Data Modes

This month Mike Richards G4WNC has updates on V4 Protocol, a run through the Olivia data mode and a look at the latest 30m Digital Band Plan.

Welcome to *Data Modes (DM)* where we enjoy the latest in Amateur Radio keyboard activity. Those of you who have been trying V4 Protocol will know that there have been a number of changes over the past month or two. It's important to remember that it's currently in the 'Alpha' stage of its development, a stage means it's by no means the finished article. You can expect to see many changes and updates as the system evolves.

The Alpha stage makes working with the mode that much more interesting, because you can actively contribute to the development of the system and help make it a success. After all, this self-education is one of the cornerstones of Amateur Radio.

In order to provide useful help for the software author it's important to develop good operating disciplines and take careful note of your operating conditions, especially if you are reporting problems of any form to the author.

The more information you provide, the more useful your information becomes. Usually you'll find that Alpha stage software has the facility to run debug logs – these are detailed text files that log all the transactions in detail

along with a time stamp. V4 Protocol is no exception and the debug logs can be enabled via the Setup menu.

If you do notice a problem, the best approach is to work with a fellow Amateur to determine the precise set-up and conditions where the problem manifests itself. The ideal solution is to get to a point where the problem is repeatable so, that it can be replicated under test conditions to allow a solution to be found.

Once you've arrived at a repeatable problem state, you need to report the problem back to the author, along with full details of the test conditions and copies of the debug logs. All too often you see a collection of 'whinges' on user groups that only serve to annoy rather than help the author.

It's important to remember that most of the people that create the new modes for us to enjoy, do so on a completely voluntary basis for their own self-education. So, be nice to them! At the time of writing, V4 Protocol was at version 0.3.0.1 and seems to be working quite well

The 30m Band

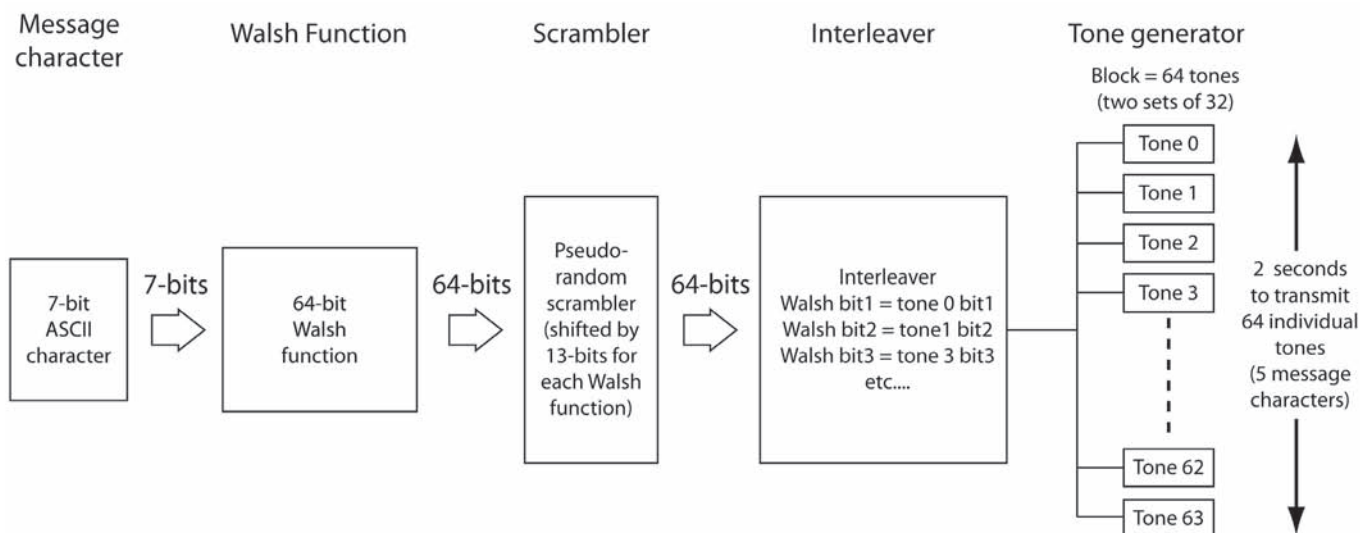
Ian Wade G3NRW has pulled together a very useful band utilisation chart

covering the use of digital modes on the 10MHz (30m) band. The chart is an excellent piece of work that provides some much needed and extremely useful guidance. In addition to showing the allocation for the various modes, Ian has also included dial frequencies as well as the actually frequency band occupied.

The chart has been based on the assumption that the operator operates upper sideband (u.s.b.) – the norm – to support digital modes. The chart is updated regularly so is bang up-to-date and includes the allocations for new modes such as V4 Protocol. I would recommend that you keep an eye on the download site to make sure you always have the latest information. The official download site is: http://homepage.ntlworld.com/wadei/30m_band_utilization.htm

The Olivia Mode

Whilst the Olivia mode's not used as often as PSK31 or JT65A, it's still a powerful and active mode that has its place in Amateur Radio. The system was devised by **Pawel Jalocho** towards the end of 2003 and was designed for use on the h.f. bands in poor propagation conditions.



Olivia Encoding and modulation process, though mathematically complex, isn't too difficult to get an overview.

As regular readers will know, h.f. propagation plays havoc with many data modes. Olivia, along with a few others, attempts to mitigate the problems by using multiple tones and modern error correction codes. Olivia has been shown to operate successfully with signals that are up to 14dB below the noise floor, so it's a very useful weak signals mode.

Olivia Inside Out

The Olivia data mode uses a two-layer approach, with one layer dealing with error correction, whilst the other handles the modulation system. The modulation layer in Olivia uses Multiple Frequency Shift Keying (MFSK) with a number of configurations available. The most common uses a 1000Hz bandwidth and 32 equi-spaced tones giving a tone spacing of 31.25Hz.

Tones in the 100Hz bandwidth Olivia modulation system, are sent one-at-a-time at a rate of 32 baud or once every 32mS. Each of these tones is carefully shaped with a soft rise and fall to avoid the 'key click' that would otherwise occur. This shaping is done in software using Fast Fourier Transforms (FFT) to derive each tone from the 8kHz sampling rate.

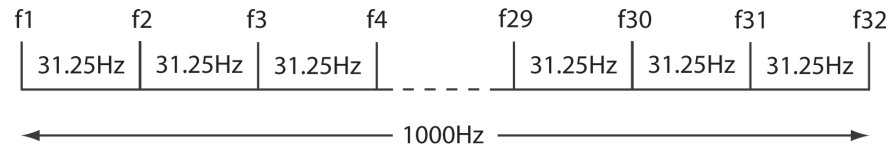
To avoid an 'idle' condition with a continuous tone, the Olivia modulator introduces a random $\pm 90^\circ$ phase shift. As with some of the modes I've covered earlier in the series, the Gray code is used to map the 5-bit symbols to tones.

At the core of all weak signal modes is a robust error correction technique and Olivia breaks away from the usual NASA convolutional coded system that we've seen used many times before. Instead, Olivia makes use of Walsh functions, to generate a recoverable code. Mathematically this is a complex process (see Fig. 1) that we don't need to analyse in detail, so I'll stick to discussing the practicalities!

Walsh Functions

When used in Olivia, the main purpose of the Walsh function is to expand the incoming 7-bit ASCII message characters to a 64-bit pattern that the decoder can use to recreate the original 7-bit character. However the resultant 64-bit pattern is constructed in such a way that the original 7-bit character can still be recovered even if half of the 64-bit pattern becomes corrupted in transit.

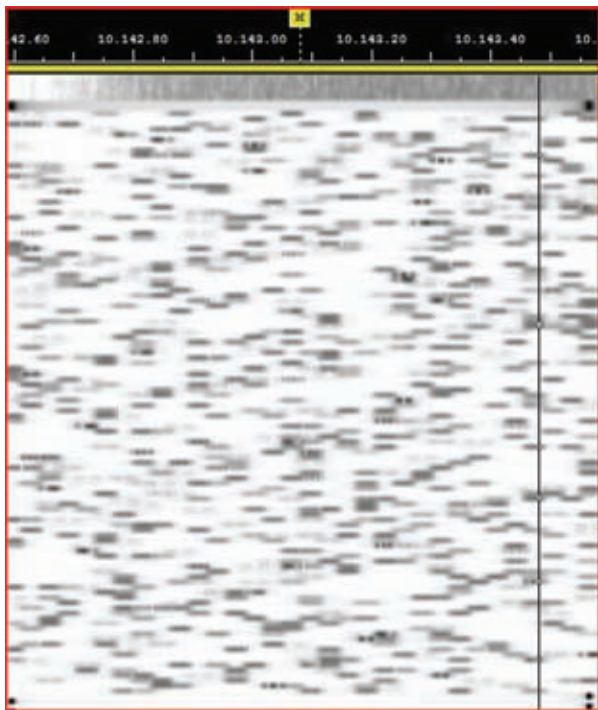
The Walsh Function error correction is the heart of the Olivia error correction system. Once created, the 64-bit Walsh functions are applied to a scrambler that mixes the 64-bit signal with a pseudo-



Olivia Tones cover 1000Hz and are separated by 31.25Hz.

Table 1 – Olivia Tone Table

Symbol or Tone Number	Binary Representation				
	16	8	4	2	1
0	0	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
4	0	0	1	0	0
5	0	0	1	0	1
6	0	0	1	1	0
7	0	0	1	1	1
8	0	1	0	0	0
9	0	1	0	0	1
10	0	1	0	1	0
...	...	...	...	...	...
31	1	1	1	1	1



Waterfall spectrum of 32/1000 Olivia signal during operation.

to 31 – see Fig. 2 and Table 1 for an illustration. The next step is to group together two sets of tones to make a 64-tone block – this will be used to convey five message characters. The interleaver then takes the first Walsh function and uses bit one to set the first bit of the first tone.

After setting the first bit, the next bit is then used to set bit 2 of the second tone and so on until all five 64-bit Walsh functions have been mapped to tones. Scrambling and interleaving may seem a bit excessive but the purpose is to spread each message character in time and frequency and so increase its chance of getting through.

Olivia Modes & Operation

Olivia supports a large number of variants and these are usually described as a combination of tones and bandwidth. So, the system I've

random sequence that is rotated by 13-bits for each subsequent Walsh function.

The output of the scrambler is then applied to an interleaver and tone generator. As you will have noted from the modulation section, there are 32 tones at our disposal which means each tone or 'symbol' as they are formally known is able to carry 5-bits of information.

You may like to think of the tones, as representing the numbers from 0

covered in detail so far is Olivia 32/1000, i.e. 32 tones, or symbols, with 1000Hz bandwidth.

Other common formats you may encounter include are labelled: 4/125, 8/250, 8/500 and 16/500. There are many other modes available as the number of tones can be set to 2, 4, 8, 16, 32, 64, 128 or 256 and the bandwidth can be 125, 250, 500, 1000 or 2000Hz. The typing speed of the 32/1000 mode is relatively slow as it sends five characters every two seconds or around 28w.p.m.

As Olivia has been designed primarily as a weak signal mode it's not really practical to just tune around in the hope of finding a signal as the signal may be below the noise level although still be de-codable! The solution has been to use channelisation with a range of fixed frequencies for "CQ" calls. I've shown these frequencies and the related modes in **Table 2**.

Olivia Software

Software for Olivia is freely available and the ever popular *Ham Radio Deluxe* includes all the popular variants in its *Digital Master 780* program. This can be downloaded from: <http://www.ham-radio-deluxe.com/>

Another popular alternative is *MultiPSK* as this includes a wide range of

Table 2 - Olivia Calling Frequencies

Band	Olivia 16/500	Olivia 32/1000
40m	7.0424 or 7.0725	
30m	10.1425 or 10.1415	
20m	14.07565	14.1065
17m	18.10265	
15m	21.0865	21.1525
12m	24.9215	
10m	28.076	
6m	50.2915	

digital modes as well as Olivia. You can download a copy from the following site: http://f6cte.free.fr/index_anglais.htm

Contestia Variant

In 2005 **Nick Fedoseev UT2UZ**, developed an Olivia variant that was designed to provide faster typing speeds at the expense of resilience. The new mode was called Contestia and has proven to be a useful addition. The additional speed has been achieved by reducing the block size from 64-bits down to 32-bits and using a 6-bit character set as opposed to the 7-bit ASCII set used in Olivia.

Performance of Contestia appears acceptable and there are many active users around. The weak signal performance is not as good as Olivia,

but only by a few dB and the use of a 6-bit character set results is all upper-case character QSOs, which again, is not really a problem. As for many years it was the default in RTTY operating!

Operating Olivia

Like all new modes, the trick is to listen first and get familiar with the mode's operating quirks before you start transmitting. Probably the best time to look out for Olivia is at weekends - park yourself on the calling channel of a band that's open and see what you get. Alternatively, you can keep a watch on the excellent Hamspots site at <http://hamspots.net/olivia/> where you can see the level of activity and spot stations you may be able to link-up with.

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SFI 85, A 13, K 4

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10:01:14 : UTC

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Local Spots / Chat / Skeds

de [KA1GMN](#)

10143.00 kHz

OLIVIA 8/250

CENTER FREQ 10143 KHZ CQ

[age +6h] Jul-06 03:21utc

de [KA1GMN](#)

10143.00 kHz

OLIVIA 8/250

CENTER FREQ 10143 KHZ CQ

[age +6h] Jul-06 03:19utc

[SP6QHS](#) de [F1ABE](#) (OBC-186)

14074.20 kHz

8/250

TU 73 Stefan

[age +8h] Jul-04 17:36utc

[KJ5XF](#) de [KJ5XF](#)

14074.26 kHz

OLIVIA

Calling CQ

[age +8h] Jul-03 13:33utc

de [KJ5XF](#)

14074.00 kHz

OLIVIA

CQ CQ DE KJ5XF

[age +8h] Jul-02 20:53utc

[UR4IOR](#) de [UR4IOR](#)

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14108.50 kHz

32/1000

Merci Dany 73

[age +8h] Jun-29 05:05:00

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DX

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Mode

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PE1AUV

+8h

[CO3JY](#)

10142.45

OLIVIA

Cuba

K3DCW

+8h

[W3YJ/8](#)

14072.51

OLIVIA

United States

KF7HNA

+8h

[KL7RS](#)

14074.85

OLIVIA

AZ

United States

AB9TA

+8h

[K0AXX](#)

14074.00

OLIVIA

TX

United States

K3UK

+8h

[WB8ROL](#)

18102.36

OLIVIA

OH

United States

WT9S

+8h

[KG6AF](#)

14073.37

OLIVIA

CA

United States

NW7US

+8h

[NY7U](#)

14075.00

OLIVIA

WA

United States

KF7LJH

+8h

[ND2K](#)

14073.31

OLIVIA

NJ

United States

NW7US

+8h

[WB8ROL](#)

14072.00

OLIVIA

OH

United States

AA5JJ

+8h

[W3YJ/8](#)

14073.10

OLIVIA

United States

EA8TL

+8h

[WB2PHL](#)

10142.48

OLIVIA

NY

United States

G8SQH

+8h

[N4UM](#)

10142.48

OLIVIA

FL

United States

G8SQH

+8h

[N4UM](#)

10142.44

OLIVIA

FL

United States

G8SQH

+8h

[WB8ROL](#)

14074.75

OLIVIA

OH

United States

K5DDM

+8h

[KE5CQ](#)

14072.23

OLIVIA

TX

United States

NW7US

+8h

[KE5CQ](#)

14070.78

OLIVIA

TX

United States

NY4FD

+8h

[IK7XNF](#)

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[KE5CQ](#)

10142.25

OLIVIA

TX

United States

WB2RYV

+8h

[KE5CQ](#)

10142.23

OLIVIA

TX

United States

G4VLC

Hamspots web site showing Olivia activity.



Colin Redwood G6MXL's What Next?

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Amateur Radio Repeaters

In this months What Next? column, Colin Redwood G6MXL takes a look at Amateur Radio repeaters, what they are and how they serve the Amateur community.

Welcome to *What Next?* (WN?) and I'm starting this time by posing a question: Why do we need repeaters? The answer is quite simple – for those operating in less than ideal circumstances, such as from a car, or using a portable hand-held transceiver, or operating from a poor location, a well-sited repeater can extend the range of contacts that can be made (Fig. 1).

Most Amateur Radio repeaters operate in one of the v.h.f. or higher bands. They receive signals from Radio Amateurs and re-transmit them, usually on another frequency in the same Amateur Radio band. In the UK, repeaters have callsigns in the form of GB3xx, where xx are two letters. The callsign is transmitted in Morse code for identification purposes.

Until a few years ago, repeaters only used Amateur Radio frequencies to receive and transmit on. Most repeaters are built to varying degrees by Radio Amateurs – very much in the tradition of our hobby.

More recently, repeaters have appeared using the internet to link to other repeaters either nearby or worldwide using *Echolink*. I'll look at these on another occasion and concentrate on in-band repeaters in this *What Next?*

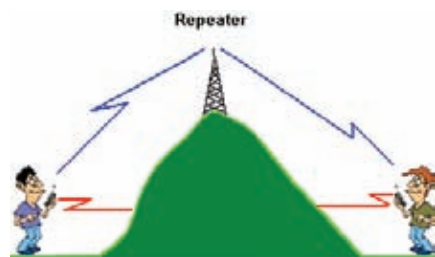


Fig. 1: Showing how a well sited repeater can increase the coverage of a poorly sited hand-held or mobile station

Although most narrow-band frequency modulated (usually referred to as f.m.) radiotelephony (speech) repeaters in the UK, are in the 145MHz (2m) and 433MHz (70cm) bands, there are also some in the 29MHz (10m) 50MHz (6m) and 23cm 1297MHz (23cm) bands.

Frequency Shift

The illustration, Fig. 2, shows a very simplified block diagram of a typical 'phone repeater. Note that most repeaters share a common antenna for receiving and transmitting. The repeater must therefore use a different frequency for receiving and transmitting. The difference in the transmit and receive frequency is known as the repeater shift. Repeaters in the UK operating on 144MHz use a shift of 600kHz.

As an example, a repeater that

receives on 145.000MHz will transmit on 145.600MHz. Someone using the repeater will therefore need to transmit into the repeater on 145.000MHz and listen to the repeater on 145.600MHz. This shift is known as -600kHz, as from a user's perspective, the transmit frequency is 600kHz lower than the user's receive frequency.

For most UK 70cm band repeaters with outputs between 433.000MHz and 433.375MHz the shift is +1.6MHz, although for some with outputs in the range 430.825MHz to 430.975MHz the shift is +7.6MHz.

Amateur Television Repeaters

There are a number of Amateur television (ATV) repeaters in the UK that operate in the 23cm, 13cm and 3cm microwave bands. As these bands are quite wide, the repeater shifts are much larger and can even exceed 200MHz!

Receiving & Transmitting Instantaneously

As I've already indicated, repeaters receive and transmit simultaneously on frequencies quite close together in the same amateur frequency band, often sharing the same antenna. In normal circumstances this would be impossible. So much of the transmitter's signal would get into the receiver that at best it would de-sense the receiver, almost certainly overload it, and probably even damage it.

To prevent all the problems, very

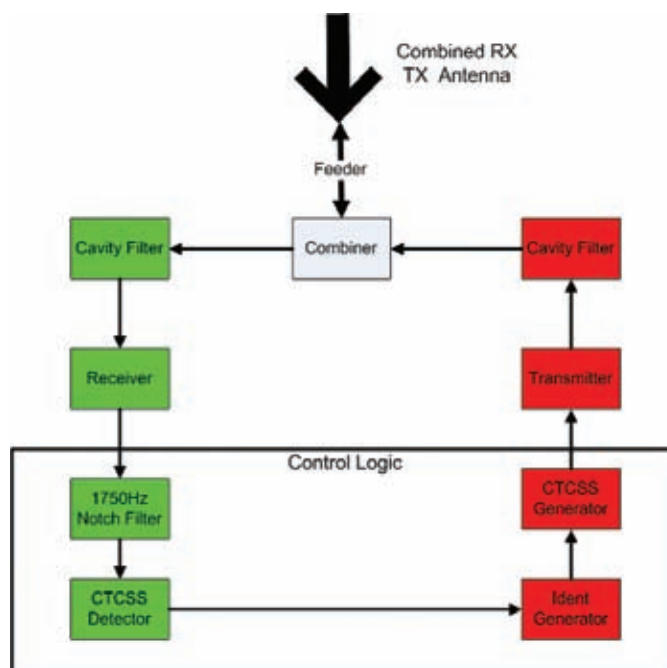


Fig. 2: A very simplified block diagram of a typical phone repeater. Note that most repeaters share a common antenna. The green boxes represent parts of the receive chain, red boxes represent parts of the transmit chain.

Fig. 3: A much simplified flowchart of a typical repeater's logic. This is a simplified and updated version of the flow chart that appeared in the July 1981 issue of *Practical Wireless*.

sharp filters are installed in both the transmitter and receiver paths. These filters are special types called cavity filters that have very narrow bandwidths.

The Repeater's Receiver

As a repeater's receiver will be operating on just one frequency, it doesn't need to be particularly sophisticated, especially as it's going to be un-manned almost all the time. However, the receiver does need to handle signals of varying strengths and not be affected by signals on any other frequency, so filtering and squelch operations are important features.

Repeater Logic

The logic that controls repeaters is quite complex. The flow chart, shown in Fig. 3, is a simplified overview, giving an idea of the key functions.

The Repeater's Transmitter

As with the receiver, the repeater's transmitter will be operating on just one frequency. It will experience a wide range of temperatures and power supply voltages and it will need to tolerate standing wave ration (s.w.r.) variations resulting from everything that the weather can throw at an antenna at the top of a tall building or a mast on the top of a hill.

Using A Repeater

Before starting to use a repeater, the first thing to establish is the frequency on which you need to listen. Secondly, you'll need to know the repeater shift. Not all transceivers automatically engage their repeater shift according to the 2m and 70cm band-plan. For these it will be necessary to enable the repeater shift on the transceiver.

Accessing Repeaters

Unlike a traditional contact, where you can just call "CQ" or reply to a "CQ" call, to make a contact through most repeaters requires an additional technique to 'open up' the repeaters. There are several reasons for this.

Firstly, if the repeater was constantly transmitting, it would be using more power from the mains electricity supply.

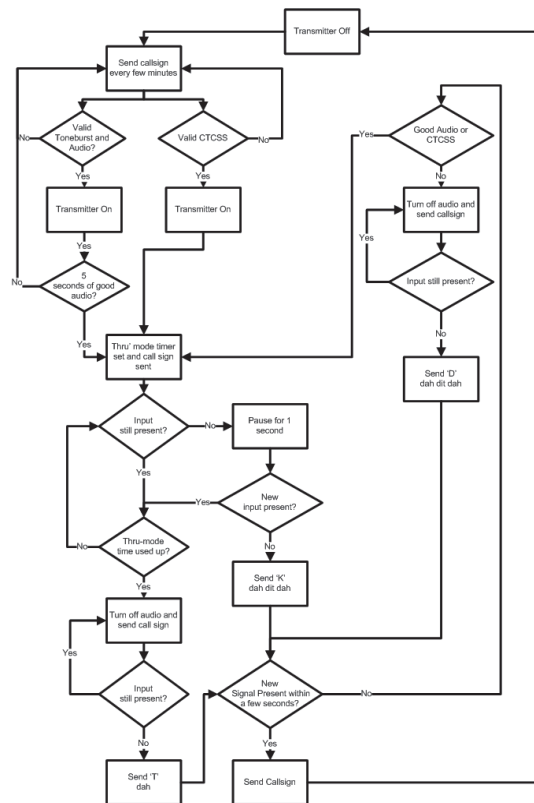


Fig. 4: Map of UK showing CTCSS allocations by county. Note Northern Ireland uses H, and the Channel Islands use B. Courtesy of RSGB Emerging Technology Coordination Committee.

Over the course of a year, this would add significantly to the costs of running a repeater.

Secondly, during periods of enhanced tropospheric propagation, the repeater might relay signals from outside its area, causing interference to other repeater signals on the same frequency at considerable distances. Over the years, two techniques for accessing repeaters have been used.

Tone Burst Technique

The tone burst technique is the older of the two methods used to access repeaters. With this technique, an audio tone of 1750Hz is transmitted for at least half a second followed by at least 5 seconds of well modulated audio (speech).

The tone burst 'opens up' the repeater, causing it to start transmitting on the output frequency what it's receiving on the input frequency. Many repeaters will stop re-transmitting if the tone burst is not followed by a few seconds of well modulated audio.

The tone burst technique works well. But with the ever increasing number of repeaters coming on the air, there were increasing instances of repeaters opening up from signals outside their immediate area, or causing interference to repeaters outside their area on the same frequency.

The Introduction Of CTCSS

In an attempt to overcome the

limitations of the tone burst technique, Continuous Tone Controlled Squelch System (CTCSS) was introduced. The CTCSS technique uses a continuous low-frequency almost inaudible tone. Different frequencies are used around the country, to give greater protection to signals within a geographic area (See Table 1 on the following page and Fig 4). In the UK, CTCSS is mandatory for all 50MHz (6m) repeaters and for new repeaters on other bands. The 1750Hz tone burst access is now an optional feature on repeaters in the UK.

If you operate in various parts of the country, it may be a good idea to save the various repeater parameters such as shift and CTCSS settings into the memories of your transceiver. These days transceivers have many memories available especially for this purpose.

Second-Hand Transceiver?

If you are thinking of buying a second-hand transceiver, it's worth checking that it is fitted with CTCSS and 1750Hz toneburst. For many older transceivers, CTCSS was not fitted as standard. Likewise some older transceivers didn't support both repeater shifts for the 70cm band.

Time-Out Feature

Many, though not all, repeaters have a built-in time-out feature. After an 'over' (chat session) has elapsed (typically 90 seconds or two minutes), the repeater either stops relaying the input, or

transmits Morse code over the top. At the end of the extended over instead of transmitting a 'K' (*dah dit dah*), they will transmit a 'T' (*dah*), to indicate that the transmitting station timed out.

At the end of an over, it is important to wait for a 'K' in Morse, before starting the next over so that timer is reset to get the full 90 seconds. Some repeaters transmit a 'D' (*dah dit dit*) if your audio is weak (under-deviation).

Keep Overs Short!

When using repeaters, it is a good idea to keep 'overs' short to avoid timing out. Licence conditions still apply. Rather than calling CQ, many stations say that they are 'listening through the repeater'. Remember that many repeaters require 5 seconds of audio after the toneburst, so you may need to extend what you say to something like: "This is G6MXL, Golf Six Mike X-Ray Lima listening through GB3xx".

Co-ordination Committee

Amateur Radio repeaters in the UK are co-ordinated by the RSGB's Emerging Technology Co-ordination Committee (ETCC). They have an excellent web site at <http://www.ukrepeater.net> which I suggest readers interested in repeaters explore at their leisure. There you will also find the CTCSS setting for each repeater.

Contests & Awards

When you make a contact through a repeater, your station is actually making a contact with the repeater, and the other station in the QSO is also making contact with the repeater. As a result, almost without exception Amateur Radio contest rules prohibit contacts made through repeaters. Furthermore, most Amateur Radio award schemes don't allow contacts made through repeaters to count for their awards.

Who Runs Repeaters?

You may ask the obvious question: Who runs repeaters? The answer (In the UK), is that repeaters are generally run by small groups of Amateurs who are interested in building and maintaining a repeater for an area. Some of these groups are part of a local club and some are a completely separate organisation.

Repeater Keeper

A repeater is licensed by Ofcom as Notice of Variation to the 'Repeater Keepers' Amateur Radio licence. One of the duties of the Repeater Keeper is to have shut-down arrangements in place.

In the event that a repeater is found to be causing interference, it is obviously important that it can be shut down

Table 1: CTCSS frequencies by counties. There are a few exceptions, so refer to the ETCC web site.
Courtesy of RSGB Emerging Technology Coordination Committee.

CTCSS by County allocation

County	Tone	Frequency	County	Tone	Frequency
Aberdeenshire	A	67.0 Hz	Humberside	E	88.5 Hz
Angus	F	94.8 Hz	Isle of Man	H	110.9 Hz
Anglesey	H	110.9 Hz	Isle of Wight	B	71.9 Hz
Argyll and Bute	G	103.5 Hz	Kent	G	103.5 Hz
Avon	J	118.8 Hz	Lanarkshire	G	103.5 Hz
Ayrshire	G	103.5 Hz	Lancashire	D	82.5 Hz
Bedfordshire	C	77.0 Hz	Leicestershire	C	77.0 Hz
Berkshire	J	118.8 Hz	Lincolnshire	B	71.9 Hz
Border Counties	J	118.8 Hz	London	D	82.5 Hz
Buckinghamshire	C	77.0 Hz	Lothians	F	94.8 Hz
Cambridgeshire	F	94.8 Hz	Merseyside	D	82.5 Hz
Caithness	C	77.0 Hz	Norfolk	F	94.8 Hz
Channel Islands	B	71.9 Hz	Northamptonshire	C	77.0 Hz
Cheshire	G	103.5 Hz	Northern Ireland	H	110.9 Hz
Cleveland	J	118.8 Hz	Northumberland	J	118.8 Hz
Clwyd	H	110.9 Hz	North Yorkshire	J	118.8 Hz
Cornwall	C	77.0 Hz	Nottinghamshire	B	71.9 Hz
Cumbria	C	77.0 Hz	Oxfordshire	J	118.8 Hz
Derbyshire	B	71.9 Hz	Perthshire	F	94.8 Hz
Devon	C	77.0 Hz	Powys	G	103.5 Hz
Dorset	B	71.9 Hz	Shropshire	G	103.5 Hz
Dumfries and Galloway	G	103.5 Hz	Somerset	C	77.0 Hz
Durham	J	118.8 Hz	South Yorkshire	B	71.9 Hz
Dyfed	F	94.8 Hz	Staffordshire North	G	103.5 Hz
Essex	H	110.9 Hz	Staffordshire South	A	67.0 Hz
Fife	F	94.8 Hz	Suffolk	H	110.9 Hz
Glamorgan	F	94.8 Hz	Surrey	D	82.5 Hz
Gloucestershire	J	118.8 Hz	Sussex (East and West)	E	88.5 Hz
Greater Manchester	D	82.5 Hz	Tyne and Wear	J	118.8 Hz
Gwent	F	94.8 Hz	Warwickshire	A	67.0 Hz
Gwynedd	H	110.9 Hz	West Midlands	A	67.0 Hz
Hampshire	B	71.9 Hz	West Yorkshire	D	82.5 Hz
Hereford and Worcester	J	118.8 Hz	Wiltshire Northern	J	118.8 Hz
Hertfordshire	D	82.5 Hz	Wiltshire Southern	B	71.9 Hz
Highland (West/Islands)	E	88.5 Hz	Worcestershire	J	118.8 Hz
Highland (East Coast)	A	67.0 Hz			

promptly. Repeater Groups normally have a small team of people who can each be called upon to shut down the repeater.

Finance & Subscriptions

Most repeater groups obtain their funding from fellow Amateurs. If you use a repeater regularly, please consider either joining the relevant group or at least making a donation from time-to-time.

Many repeater groups attend their local Amateur Radio rallies to make themselves known to local Amateurs and to encourage donations, payment of subscriptions, etc.

The running costs of a repeater can be surprisingly large. Leaving aside

insurance, equipment costs and site rental, the electricity bill for a repeater that is on 24 hours a day, 365 days a year can be a significant burden to a repeater group – unless it's well supported.

Outside The UK

If you are planning to use repeaters in another country, you'll need to become familiar with all aspects of repeater operation in the country. Just about every repeater parameter can be different. The band-plan, repeater shifts (often around the other way on 70cm in many European countries), and access is often either with CTCSS or just with a carrier. See you next month!

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What Sort of Propagation Mode?

Tim Kirby G4VXE has been busy twittering and responds to a reader's question on v.h.f./u.h.f. propagation modes.

Welcome to the *World of VHF (WofVHF)* where we concentrate on Amateur Radio above 30MHz. Philip Oakley G0BVD (Great Torrington in Devon) asked me on Twitter the other day about the differences between Meteor Scatter (MS) and Sporadic E (Es) propagation and how would he know what he was listening to?

A great question Philip! – and I did my best to answer it in the 140 characters that Twitter provides.

Nevertheless, I thought it would be worth spending a paragraph or two discussing the topic a little more generally. How exactly do you know

what sort of propagation that you are taking advantage of on the v.h.f./u.h.f. bands?

Let's start with Ground-Wave/Tropospheric propagation. The ground wave coverage area is how far your signal will travel from your station without any external propagation enhancements.

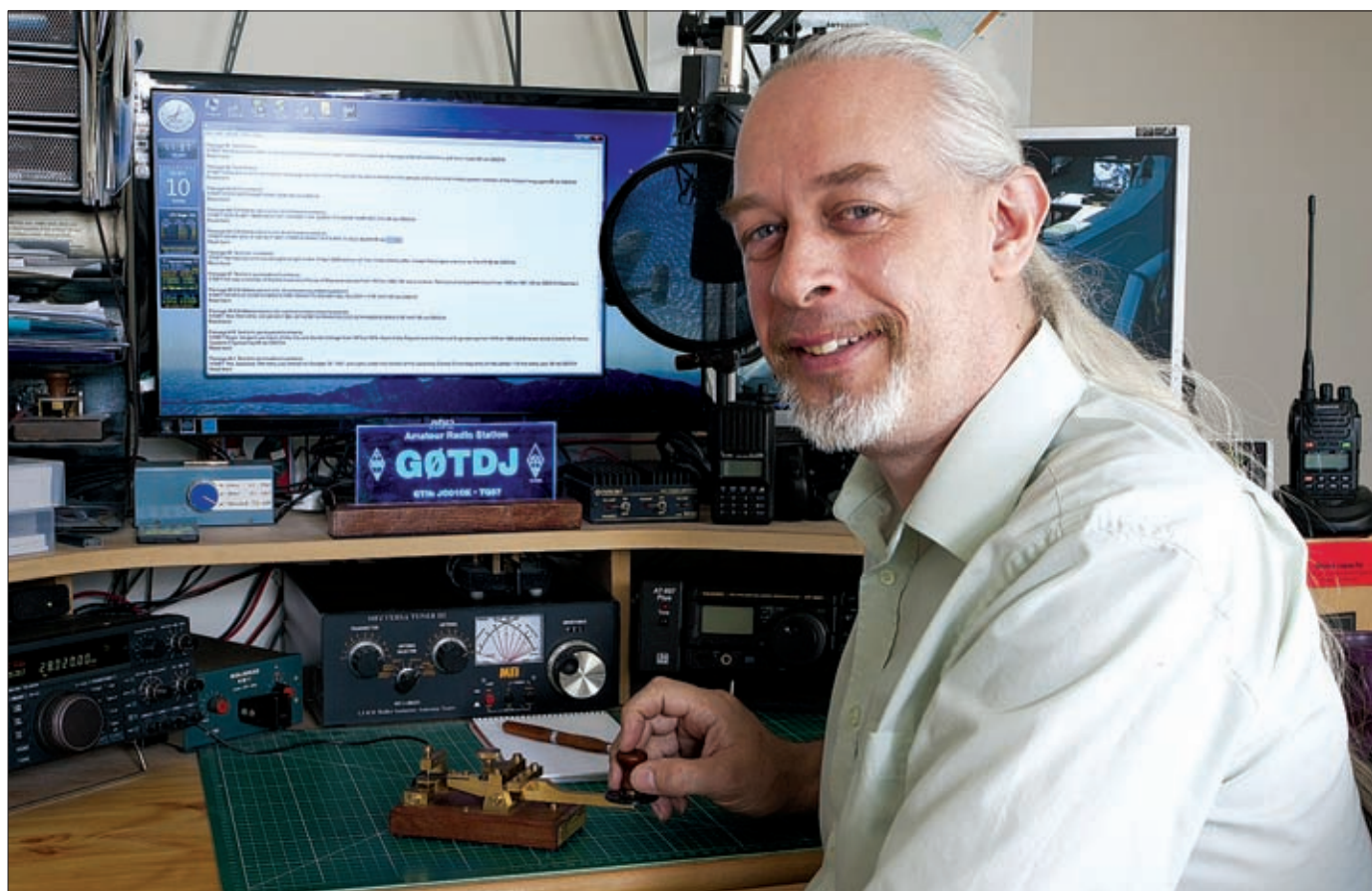
The higher up your antenna is, the better range that you will have from ground wave. Signals from ground-wave are liable to be stable and constant, because (largely – but there are always exceptions!) there will be no enhancements to the signal.

Tropospheric Propagation

As we've discussed before and Richard Gosnell G4MUF has admirably described, tropospheric propagation allows your v.h.f./u.h.f. signals to propagate along a duct. Under these conditions, signals will probably be comparatively steady in strength and generally, will build or decline over a period of hours, normally building when the barometric pressure is falling.

Having said that, you'll often notice brief enhancements as a weather front comes through and also in the mornings and evenings around sunrise and sunset. Ground wave and tropospheric propagation occur on all of the v.h.f. bands, but it's fair to say that they are usually less marked on the lower v.h.f. bands such as 50MHz. However, 70MHz is well known for having very long fades – so if your tropo contact fades out on 70MHz, it's well worth being patient and waiting – very often the signal will come back.

As Richard G4MUF has previously described, as we go up in frequency, a smaller tropo duct is required to



Steve Smith G0TDJ is shown here in his shack, wrote about his activity during VHF NFD, when he and a group of North Kent Radio Society members went to Shooters Hill "to give away points".

propagate the signals and thus those ducts will form much more easily. This is why we'll often see tropospheric openings on 432MHz and above before they affect 144MHz and the lower v.h.f bands.

Over the last few months we've talked a lot about Sporadic E (Es). It's characterised by very strong signals – often fading quite rapidly (this is caused by the movement of the reflecting cloud). The distance to the station that you are hearing is a tell-tale sign of Es. Normally, particularly on 144MHz, the minimum distance for an Es contact is around 1300km depending on the maximum usable frequency (m.u.f.).

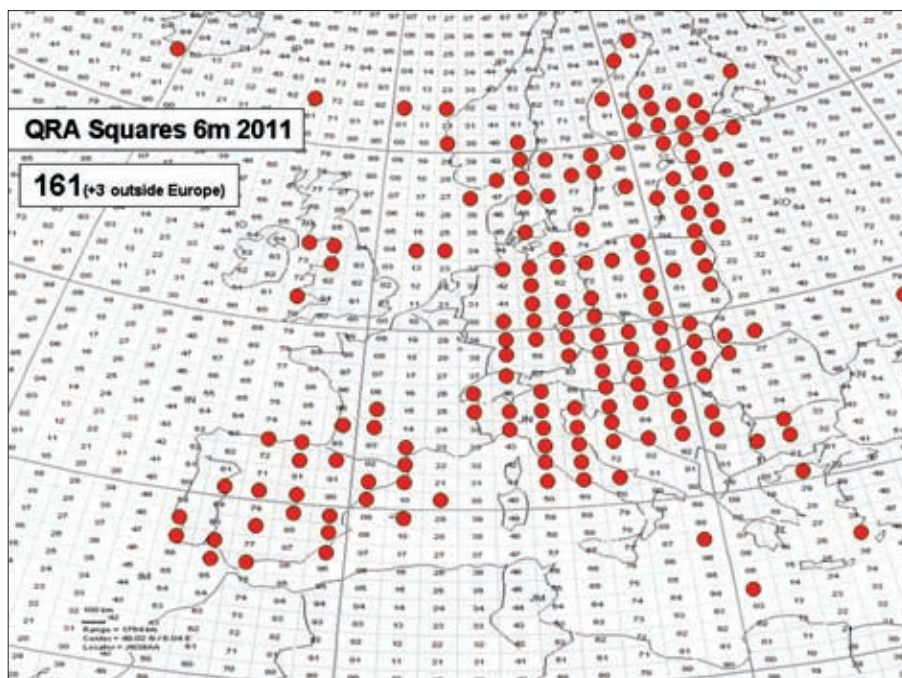
So, if you are hearing a very strong station from, let's say, Finland on 144MHz with no other stations heard along the path from you to the DX, it is almost certainly Es. Es is more common on the lower v.h.f bands such as 50 and 70MHz.

However, contacts on 432MHz are almost unheard of! And – particularly on the lower v.h.f. bands – the Es skip distance decreases as the m.u.f. rises. **Ken Eastty G3LVP** (Cheltenham) told me the other day that many years ago he believes he worked in Northern Ireland from Essex on 70MHz by Es. The m.u.f. must have been particularly high that day! So, as we've discussed before, if you're hearing GM stations from the south of England on either 28 or 50MHz, you should be looking for Es on 70MHz and above!

But, back to Phil's question – what's the difference between Es and Meteor scatter (MS)? The similarity is the fact that the reflection is taking place in the E layer, so you can expect to work the same sort of distances on Es and MS. The main difference is that normally Meteor Scatter signals only last for a maximum of a few seconds. Typically, you might be listening on 144.300MHz and you might just hear a loud but brief part of a "CQ" call before the signal is gone. That's meteor scatter!

On the lower v.h.f bands, meteor reflections are longer but often weaker. Despite this, it's unusual – particularly out of main meteor shower periods – to hear reflections longer than 30 seconds or so.

As we go up in frequency, the length of meteor reflections generally gets shorter – so anything over 5 or 10 seconds is pretty good on 144MHz and anything over a second or so is notable on 432MHz. So, if the signals you are listening to is there for over a few seconds, it's almost certainly Es rather than MS.



In his first report for the column, Keith Williams GW4OKT, has been working 50MHz c.w. since May 1st saying that he's already made over 400 contacts in the band!

Naturally, it's not always as cut and dried as the examples I've given above. Sometimes you get combinations of different types of propagation! As you listen more and become more experienced, the distinctions will become clearer to you – but it's a fascinating journey! Thanks again to Philip G0BVD for his thought-provoking question and I hope you found the answer interesting!

Perseids Meteor Shower

While I'm on the subject of meteor showers (MS), one of the most active showers of the year takes place in August and is called the Perseids. If you've never listened to MS activity on v.h.f. then why not give it a go? The shower peaks on August 12th and 13th. This year may not be so good visually, as the light from the full moon will interfere, but of course, that will not affect radio propagation!

Why not listen on perhaps 144.200MHz, the 'random' (i.e. unscheduled) meteor scatter calling frequency – or 144.300MHz with your beam towards Central Europe. You should hopefully hear some loud bursts! If you have 50MHz, try listening to 50.150 or 50.200MHz. If you are on Twitter, you can join in the Meteorwatch experiment (<http://www.meteorwatch.org/>) by tweeting when you see (or hear, on the radio) meteor reflections. Tag your tweet with the 'hashtag' #meteorwatch to take part.

Crete DXpedition SY9VHF

During the six day period between June

30th and July 5th, the Greek Dxpedition team under the special callsign SY9VHF, was QRV from the island of Crete (SV9). The locator was KM15TI and they operated from a mountain top at 1200m ASL. Operators were Yannis SV1BJY, Michalis SV8GKE and Pantelis SV2HWR. The team worked on the usual 50 and 144MHz and also on 70MHz, 432MHz, 1296MHz and 10GHz.

On 10GHz the team worked: SV first QSOs over 300km and 400km with SV8ECK, SZ8S/SV8FMY and SV8GXC/1. On 144MHz: achieving their first CW-EME QSOs with ES6RQ, OZ1HNE and OK1MS. In total they logged about 3000 QSOs in six days.

The 50MHz Band

On to 50MHz band now and **Jeremy Smith M0XVF** (County Durham) wrote for the first time. He said "after reading your column in the July *Practical Wireless*, I decided to make a simple dipole for 50MHz and strung it across the beams in the loft to give the band a go.

"On June 18th, I contacted S57JZ, S53A, YT2F, OK1VAM, YU1BN, HA8FM, YT9A, YT0A, YT5MW, OE3A and S57C all within half an hour or so, using 10W from my Yaesu FT-450. Over the next day or so, I made many more contacts, but I have been pleasantly surprised by 6m with my very modest set up."

Peter Goodhall 2E0SQL (Oxford) has had a good month, reporting, 'G, GM, SM, LA, HA, OK, LZ, EA, CT and one OE!' I was pleased when one

morning called "CQ" and GM4ODA/P (IP90JA) came back. Although we suffered from heavy fading – it was great to get that square in the log!

Well done Peter!

It was also good to hear from **Mark Haynes MODXR** (Harlow, Essex). Following his house move last year, Mark has not yet been active from his new QTH, but has been active from his work's club station as G8VYK. He reports working two USA stations in June with lots of contacts around Europe with very strong signals.

One mid-week lunchtime, Mark had his very own pileup from Spain and Portugal! He feels that the openings seem to have been more frequent and longer lasting than last year.

It was good to hear from **Keith Williams GW4OKT** (Flintshire, Wales) for the first time. Keith has been working 50MHz c.w. since May 1st and has already made over 400 contacts! He says 'I'm very pleased with my first real attempt at this band. I use an Elecraft K3 with a Watson Tribander and 100W of c.w. For next season I may try a 3-element LFA Yagi, but for this year I think I will continue with the vertical'.

Congratulations Keith! The band can be very noisy when it is open, so c.w. really cuts through all that. Keeping the "CQs" and the exchanges short also helps as the fading is quite fast and deep at times. I would encourage all Amateurs to have a go at this mode

on 50MHz, it is very rewarding. Not all QSOs are at 25w.p.m. and it's only generally a simple exchange of signal report and locator square information. In Keith's log, I noticed some nice DX including EA8EY (IL18) on June 24th, UY6IM (KN88) on June 28th and UT8IO (KN87) on July 6th.

Philip Oakley G0BVD (Great Torrington) has been making some nice QSOs via Es using his IC706MkIIg and a V2000 vertical. Best DX has been OH1O (KP10) at 1982km worked on June 23rd. Phil worked ZB2B and CN8SG on June 22nd as well as catching other openings on June 17th, 27th, 28th, July 3rd, 6th and 7th. He wonders why, when making Es QSOs, some people feel the need to make a lengthy QSO – rather than realising that others are waiting to try and make a contact.

Mark Marment CT1FJC in Portugal has, once again, sent a really fascinating log with lots of interesting QSOs. On June 20th, he had a good opening to the USA and Canada working 28 US and 8 Canadian stations. Best DX was W4ENN (EM64) at around 6800 km.

On June 23rd Mark worked PJ6D (FK87) on c.w. and then on the 24th there was another excellent opening to North America when Mark worked 59 USA and 8 Canadian stations, all on s.s.b. Best DX was K7KV (CN87) at 8563 km. On the 25th PJ6D was

worked again, this time on s.s.b. together with some USA and Canadian stations.

Mark found that the 26th was good towards South America with PZ5RA (GJ25), HC5VF (FI07), PJ2/DJ9ON, YV6BFE (FJ78) being worked. The morning of the 27th was good to the East, with UK9OM (MN51) then JH4MGU (PM75) and JH4IFF (PM74) followed by a Caribbean opening in the evening with WP4U (FK68), FS/K9EL (FK88), V25DR (FK97), PJ76 (FK88) and 9Y4D (FK90) worked.

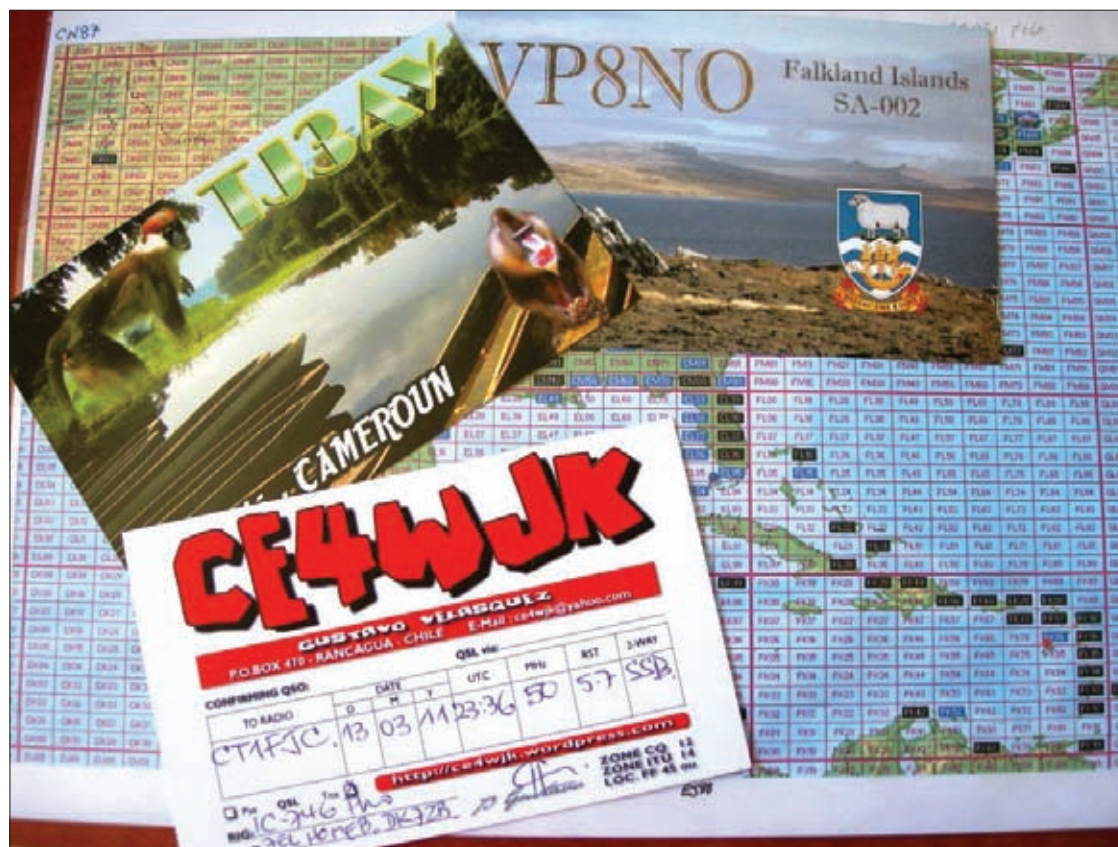
The DX continued on the 30th the highlight being VR2XMT (OL72) – a difficult QSO to make because of the wall of European stations that Mark had to break through. EX9T (MN82) as well as V44KAI, J68HS and TA4/G4IJD were also worked.

On July 1st, VU and XV stations were heard on c.w. but it was hard to break the pile-ups. A65BP (LL75) was a nice new one on July 2nd as well as HR9/WQ7R (EK66) who popped up on a seemingly dead band at a distance of 7874km. A fantastic log, Mark – well done! It's exciting to see what propagation is available on the band.

Congratulations to **Ronald Pincho ZB2B** (Gibraltar) on his new callsign. Ronald enjoyed a multi-hop Es opening to the USA on July 8th working a pile-up of mainly North American stations. The majority of stations were in grid squares FN42, FN20 and FN00 but the best DX was W5UN (of 144MHz EME fame!) in EM23, Texas.

Showing the opening was clearly multi-hop, Ronald worked CU3EJ, CT3NA and EA8BWL on the first hop. Ernie ZB2FK was on as well and made a number of North American QSOs using his FT-2000D and V2000 vertical antenna.

It was good to speak to **Alan 2E0YBT** (Knaphill, Surrey) on the GB3FX repeater at Farnham. Alan told me that the dipole antenna used by the repeater had been replaced. The work seemed to have been very



Some of the QSLs and contacts on 50MHz that Mark Marment CT1FJC made during June.

worthwhile as signals are noticeably stronger in this part of Oxfordshire and Alan had several reports of stations on the M40 near Oxford being able to use the repeater successfully.

Here at G4VXE it's been good to catch a few of the openings during the month. Using just the vertical means that – so far at least – the real long DX openings have been out of reach, but very many single-hop Es QSOs have been made all around Europe which provides plenty of interest. Although not worked, I did hear J48YA and A45XR during a morning opening to the East. Additionally, HB0/PA0MW was a nice one worked on July 2nd. And, just as I was writing this column on July 10th, I worked 5C12M (Morocco) on c.w.

The 70MHz Band

David Smith G4DAX (Whitby, North Yorkshire), following the Es opening on July 6th wrote; "Having knocked off a few on 50MHz, I thought I might try 70MHz with my recently built transverter. Running a barefoot 12W and driven by an old FT-747 (from a junk sale) I heard OM5KM calling "CQ" from JN98 square.

"I called him and he came back immediately with a 59 report. Not all that unusual you might say? Except that I was using my old vertical dipole for local 4m f.m. contacts, not yet having sneaked a proper horizontal beam up! I know that there is a lot of polarisation 'twisting' with Sporadic E, but when you consider say, 16dB of cross polarisation loss on the path, the ionisation must have been very strong". Nice contact, Dave and it's amazing what you can do with a simple vertical antenna!

In fact, here at G4VXE I was really pleased during the v.h.f. field day on July 2nd/3rd to make a few QSOs using my 7W to a vertical. The best DX was G0VHF/P in JO01 at around 190km. All credit to the operators and the

equipment at the other end for digging out my signals!

It was also good to work the Flight Refuelling Club, G4RFR/P (IO80) over a distance of around 120km with the same set-up. Using the same system to make some Es contacts, I was pleased to find the band open on June 10th when I worked OH1ND (KP00) and LA9DL (JO59).

The 144MHz Band

Peter Goodhall 2E0SQL reports; "This month's 144MHz UK Activity Contest was my best ever, as I achieved 25 QSOs. It seems low, but considering that I only work 8 - 10 stations normally, something was working well! I also went on for the PW 144MHz QRP contest and the RSGB's Backpackers contest. This wasn't a QRP effort from me but I still had fun and worked a total of 11 QSOs – the best being TM7T. I also had a quick go in the VHF Field Day with my best DX on the band being GM3HAM/P (IO74)".

Here at G4VXE the main activity has taken place during the various contests. Naturally, I made a few QSOs during the *Practical Wireless* 144MHz QRP Contest! Best DX was TM7T (JO00). During VHF NFD, like 2E0SQL, my best DX was GM3HAM/P. No Es QSOs for me on the band, I've not been at the radio at the right times, I think, but it sounds like there have been a few openings which have got as far as 144MHz. If you've worked anything good let us know!

Steve Smith G0TDJ wrote for the first time regarding his activity during VHF NFD and says; "A group of North Kent Radio Society members went to Shooters Hill in Greenwich to give some points away. We used my own callsign of G0TDJ/P. We worked GB2NWA (North Weald Airfield) just before the contest on a home-modified HB9CV and 7-Elle ZL special. We then worked 16 contest stations including G2AS/P

in Sheffield. The equipment was an FT-817 (5W) to an 8-element Tonna from JO01AL. Steve was also the first person to report to *WoVHF* using the new *Google Plus* system!

Steve also mentions his Slow Morse broadcasts on 144MHz, which take place on Thursday evenings at 7:30pm local time on 145.250MHz f.m. for an hour's session. 'I normally do a call-in afterward just like the news broadcasts. This gives any listeners or participants an opportunity to offer suggestions, reports or ask questions. My location is Crayford (JO01ck) and I transmit with 25W into a Diamond X50 antenna.

I always use a Swiss straight key for my Morse sessions since I believe that anyone learning Morse should hear it from a human operator rather than software or keyer. I'm currently up to 40 broadcasts which means I'm 12 away from completing my first year as an RSGB Slow Morse broadcaster."

Keep up the good work Steve!

Phil Oakley G0BVD (Great Torrington) enjoyed VHF NFD on July 2nd. He ended up working EI9E/P, GW2OP/P and G14GTYP/P – all new countries for Phil on 144MHz!

The 432MHz Band

Finally, up to the 432MHz band reports where Phil Oakley G0BVD (Great Torrington) worked EI9E/P and GW2OP/P during the VHF NFD on July 2nd.

During the UK Activity Contest, I was pleased to work GD8EXI (IO74) on 432MHz for the first time from this QTH. It's not a brilliant take off from here. Nothing too distant during NFD, but it was nice to work PA6NL/P (JO21) – who seems to be workable under pretty much any conditions from this part of the UK.

That's it for this month – keep those reports coming in – it's great to hear from you. See you next time. Tim G4VXE.

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HF Highlights

Carl Mason GW0VSW has much information from your reports this month and also suggests using loop antennas on the h.f. bands. All reports to Carl by the 15th of the month please!

Welcome to this month's *HF Highlights (HFH)* and I begin with loop antennas prompted by an E-mail from new *PW* reporter Frank Wyer G8RY. Many of you will be familiar with what a loop is – but I wonder just how many of you have tried one on the air?

Loop antennas can come in various shapes and sizes and could be the answer to modern living when difficult locations or antenna restrictions would normally prevent high frequency (h.f.) operating. Indeed, several Summits On The Air (SOTA) stations I've worked recently – have put out very good signals running less than 5W with very small portable loops.

At my QTH I have a 'Crown' wire loop in my loft which works very well on a number of bands including 50MHz. Nowadays Frank uses a loop designed by Italian **Ciro Mazzoni I3VHF**. **Ciro** has designed his loop antennas for both professional and Amateur Radio operators who had limited space but still want a good antenna that will allow

operation on their chosen bands. With smaller dimensions than a classic dipole it has to have high efficiency!

The loop antenna's bandwidth can cover more than one band within our Amateur Radio frequency allocations with care and the task of creating an antenna of a manageable size that would still perform like a full size antenna was not an easy one. **Ciro** has dedicated his professional life to experimenting and testing of a variety of designs in order to produce what he feels is a superior product.

He has been analysing loop antennas for over 30 years – beginning with the first ever built and designed by K. H. Patterson for the USA Armed Forces. Over the years there have been many designs, though the efficiency has varied dramatically. However, **Ciro** has now produced a product that he feels meets his design aims that included performance, quality, durability and easy assembly. These antennas aren't cheap by any means but the quality looks superb, so if you are interested

in his loop design take a look at the following website www.ciomazzoni.com/English/index.htm

Finally, if any of *HFH* readers have any experience of loops or use one regularly – please write in and share your experiences. We'll all be very interested!

The DX News

On to some DX news now and to Brazil where **Orlando Perez Filo PT2OP** and **Fred Carvalho PY2XB** will be operating as **PQ8OP** and **PQ8XB** from the Bailique Archipelago SA-045 in the Atlantic Ocean during the second half of August. Operations are expected to be on all h.f. bands – although no further information was available as the column was being put together.

Market Reef EU-053 is a small rocky reef in the Baltic Sea between Sweden and Finland which has been divided between the two sovereignties since the Treaty of Fredrikshamn of 1809. The island is roughly 350 metres (1,150 ft) long by 150 metres (490 ft) wide and its name probably comes from its usefulness as a navigation mark before there were lighthouses.

However, there's a now a lighthouse on the Finnish side of the current border, although this has been unmanned and automated since 1979. In Amateur Radio we consider the Finnish part called Market Reef a separate DX entity distinct from both Finland and Sweden. The official prefix for use on the Finnish side is OH0 as in the rest of the Åland Islands but OJ0 is the optional prefix for Market Reef.

A fee is charged for using an OJ0 call sign, while the use of the OH0/ prefix in front of your own call is free. In the 1960s when the Finnish part of the reef was given its special status in Amateur Radio the lighthouse keeper at the time became a licenced Amateur Radio operator using the call OH0MA.

Market Reef will soon be activated by Belgium Amateurs Max Van Rymentant ON5UR, Marc Celis ON8AK, Jelmer Vos PA5R and Dervin Beldman PD9DX. They will be active from the reef as **OJ0UR** until 20th August 20th. The QSL route is via M0URX and the web pages for this DXpedition can be found at www.united-radio.be

Finally, we're off to Italy where Lucio Di Fabio IK8EJN and other operators from ARI Termoli will be active as **IL7A**

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Date: December 13, 2010 Time: 15:55 UTC
Band: 20M UR Sigs: 599
Thanks for the FB QSO. 73's

The K4SKA QSL card received by Steve Wellon M0SAS for a 14MHz PSK QSO.



The 7W6W QSL card received by Roy Walker who was operating as F/G0TAK on 14MHz c.w. while on holiday in France.

from the Tremiti (Tremor) Islands EU-050 an archipelago in the Adriatic Sea, north of the Gargano Peninsula. They constitute a commune of Italy's Province of Foggia and form part of the Gargano national park. The name of the Islands relates to their seismic hazard as there is a history of earthquakes in the area. Operation will be during August and QSLs should be via IK8EJN.

Your Reports

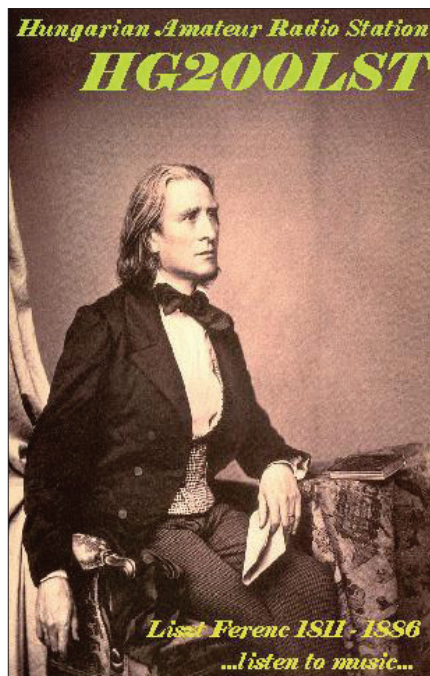
On to our first log – which is from **Eric Masters G0KRT** in Worcester Park, Surrey and the only reporter to mention 3.5MHz in his log! Eric says that QSOs were had with Mark G4RCD in Harrogate at 1946 and Robert G3VCA in Lincoln at 1952UTC. Band conditions were described as “not too good” so far as Eric was concerned.

Eric says that the 7MHz band was also in poor shape and only two German stations were worked, DJ0OD at 1411 and DQ0V/P at 1436UTC. All contacts were made using a Kenwood TS-570 at 5W to a modified home-brew W3EDP antenna 26m (84ft) long with counterpoises tuned with an SGC-230.

On the 10MHz band was **George Davis G3ICO** in Yeovil, Somerset who used his Elecraft K2 at 5W with a 40m (128ft) long doublet antenna to work c.w. stations OJ0B (Finland) 1308 and OY/PA2A (Faroe islands) EU-018 at 1814UTC.

Meanwhile, **Roy Walker G0TAK** had returned from a break in Paris where he was able to operate from his hotel balcony. With a choice of two rigs, an Elecraft K2 and his Kenwood TS-580S Roy enjoyed not only the good weather but a bit of operating too as **F/G0TAK!**

Roy's 7MHz 5W QRP log included PA1MAX (Netherlands) 0800, I1ULJ (Italy) 0803, S51ZG (Slovenia) 0815, HB9ANR (Switzerland) 0904, PC6SISWL (Netherlands) at 1257. This was a call celebrating the 65th Anniversary of the International Short Wave League (QSL via PA0FAW). Then



The HG2000LST QSL received by George G3ICO following a QSO on 14MHz c.w.

came F3ET (France) 1632, DL7CF (Germany) 1639 and John G0JSE in Stoney Stanton at 1655. Roy then worked EA2EA/P (Spain) at 1736 who was operating SOTA from EA2/NV-031. Next into the log was Paul GW0TAU at 1815 in Swansea, 7S6W (Sweden) EU-043 at 1847 (QSL to SM6MIS via the bureau or SM6WET direct). During his break Roy had 79 QSOs with 12 DXCC using an 15m end-fed wire and SRC Unun.

The 14MHz Band

The 14MHz band provided **Martyn Medcalf M3VAM** in Chelmsford, Essex some contacts. He was using a Yaesu FT-897 with 10W s.s.b. and a Comet CHA-250BX Vertical antenna to work EW4AR (Belarus) 1047, SN2B (Poland) 1051, OH2V (Finland) 1052, SB3EB (Sweden) 1059, EO3Q (Ukraine) 1143 and ED5K (Spain) at 1158. Then came OL9Z (Czech republic) 1341, S52OC (Slovenia) 1354, LY2IA (Lithuania) 1359, 9A3B (Croatia) 1443 (QSL via 9A1AA) and finally, LZ5K (Bulgaria) at 1506UTC.

New reporter **Frank Wyer G8RY** in Newmarket, Suffolk is 84 years young and still enjoys h.f. operating using an Icom IC-7800 with a Mazzoni magnetic loop mounted about 4m above ground. He has been using PSK this month and was pleased to work JT1AS (Mongolia) at 2205UTC (QSL direct only to PO Box 719, Ulaanbaatar-23, Mongolia). I hope Frank sends in some more reports as it would be interesting to see what can be achieved with a loop antenna compared to a dipole, vertical or beam.



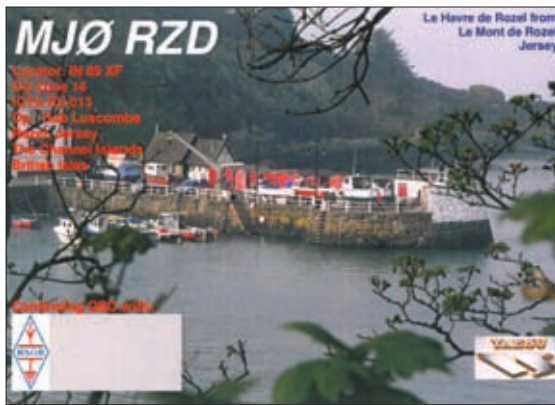
The HB10K QSL card sent after he was worked by Eric G0KRT on 28MHz s.s.b.

Also new to the column is **Rob Luscombe MJ0RZD** in Jersey, Channel Islands, who is the secretary, webmaster and active member of the **Jersey Amateur Radio Society (JARS)**. Rob operates mainly on 7 to 28MHz bands using Yaesu equipment including the FT-1000MP mark V with HRD for rig control, although he still likes the old FT-707 and FT-101ZD. His antennas include a Hustler 5BTV antenna modified for 18 and 24MHz (ground mounted with an earth rod and several radials) while for his mobile/portable operations he uses a FT-857D with a Buddipole.

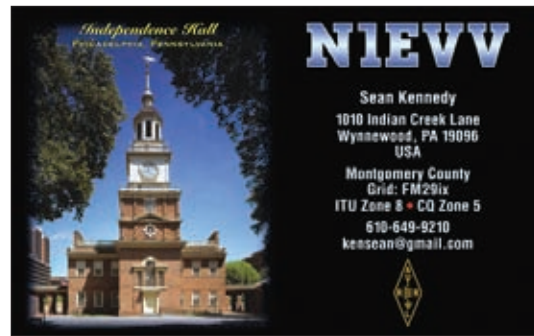
Although Rob has moved to France he still visits Jersey regularly and operates from the club station using the call GJ3DVC. With an FT-1000MP MkV and beam antenna Rob worked s.s.b. stations KD4CMV (USA) in Florida at 1955, IZ0RVI (Italy) 2100SM0FLY (Sweden) 2104, HA6IAY (Hungary) at 2107. They were followed by a string of USA stations in various states including N3XA Virginia 2110, N1MUN New York 2113, WA2TVS New Jersey 2114, N1EVV Philadelphia 2115(whose QSL arrived a few days later!), W4SCT North Carolina 2117, AG4TI Tennessee and HK4EB (Columbia at 2120UTC. His last QSO was with Pat N1YFL who lives in New Hampshire and was 5/7 running just 5W QRP from a Yaesu FT-817 and Steppir antenna! Check out the Jersey ARC at www.radioclubs.net/gj3dvc

In Devon and operating another special event station was **John Wakefield M0XIG**, who operated from Lee near Ivybridge using the call **GB2LST** for Lee Shutter telegraph. Two antennas were used, a Butternut HF6V vertical with 60 10m long radials and a WA2NAN True Talk wire antenna at 10m (30ft). His station included a Yaesu FT-1000MP MkV with an ACOM 1000 amplifier which ran 400W via a Palstar AT2K tuner.

Conditions were fairly good this time and 1089 QSOs made the log including



Rob Luscombe MJO RZD's QSL card.



The N1EVV QSL card received by the Rob Luscombe MJO RZD who worked him while he operating as GJ3DVC at the Jersey Amateur Radio Society.

Roy Walker F/G0TAK's station in Paris

CN8OLA (Morocco) at 0831 QSL via EA7FTR, N3EP (USA) in Pennsylvania at 1105. Then came SK0TM (Sweden) 1238, VE3EXY (Canada) 1238, OK1VNI (Czech republic) 1255, UA9CGL (Asiatic Russia) 1257,. Next into the log were 9A2UI (Croatia) 1305, OH1LR (Finland) 1312, LA4WAA (Norway) 1317, TF3ARI (Iceland) EU-021 at 1312. Finally came ES2TT (Estonia) 1402, HZ1GW (Saudi Arabia) 1726, ZS6PMS (South Africa) 1719 and 4Z5PI (Israel) at 1809UTC.

There were a few more QRP contacts for George G3ICO as K1PUG (USA) in Connecticut at 1120, HG200LST (Hungary) at 1418 with a special call celebrating the life of Hungarian composer Franz Ritter von Liszt, QSL via HA5GY, OY1CT (Faroe Islands) 1508 and VR2UW (Hong Kong) at 1926UTC.

Also active on the band, **Bill Ward 2E0BWX** was in Edwinstowe, Nottinghamshire who with his Icom IC-7400 at 25W to a Pro-Whip antenna had PSK31 contacts with DJ2PW (Germany) 0800, RK3DMV (European Russia) 0828, UT1PA (Ukraine) 0942, ON3LM (Belgium) 0948, OE1RKS (Austria) 0955 with JT65HF and SP3SLO (Poland) at 1656UTC.

The 18 & 21MHz Bands

The 21MHz band was open for a short time and John GB2LST found JM1TWR (Japan) AS-007 in Tokyo at 1105, 9H1DF (Malta) EU-023 at 1132, KK1KW (USA) in New Hampshire at 1159. Then came VP8LP (Falkland Islands) SA-002 at 1228, TK5NJ (Corsica) 1233, RV9WLF (Asiatic Russia) 1432 and VA3FP (Canada) at 1441 using 200W. Meanwhile Bill 2E0BWX who is still "very pleased" with his Pro Whip used s.s.b. at 50W to work W4TJE (USA) in Virginia at 1205UTC.

The 24 & 28MHz Bands

Eric G0KET managed one contact on 24MHz using 100W s.s.b. with 4X4FR (Israel) at 1833 before he found a opening slightly later on 28MHz and using 100W c.w. worked IZ3PYE (Italy)



and with s.s.b. HB10K (Switzerland) at 1909 with a call marking a thousand years of the town of Neuchâtel (QSL via EA7FTR) and finally, IZ5IOT (Italy) at 1914UTC.



The JARC club building with recent visitor Kazu Watanabe JK3GAD/MJ0CFK who was taking part in the Russian DX Contest and made 2137 QSOs. Kazu said he made 650 more than at the same time last year!

In Devon John GB2LST found some brief openings into Europe and managed a few QSOs including EA4FLS (Spain) 1343, IZ0BNR (Italy) 1344, DL6FAN (Germany) 1347 and OK1ET (Czech Republic) at 1356. Meanwhile George G3ICO managed DL0AD/P (Germany) 1121, 3Z6AEF (Poland) 1127, OK1MBZ (Czech Republic) 1432, OH3OJ (Finland) 1712 and SB3W (Sweden) at 1928UTC – all with 5W and the PSK of Bill 2E0BWX found IW5CKO at 0957UTC.

Signing Off

Well that's it once again - time to sign off! It's a pity the bands seem to be in poor shape at the moment and the expected improvement in propagation seems to be delayed somewhat. Maybe it is going to take a little longer to get up from the bottom of solar cycle 24!

However, it is good to see the higher bands are beginning to have more activity on them even though these openings are easily missed. As usual my thanks go to **Maurio Pregliasco I1JQJ/KB2TJM** editor of the **425 DX Newsletter** for all the DX information and to all our reporters for their logs. Until next month I wish you all good DX. 73, Carl GW0VSW.

Radio Spectrum under threat!

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

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

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

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

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



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Measuring and Moving Coils

Harry Leeming G3LLL looks back to his days running Holdings – a well known Amateur Radio shop in the north west of England.

Last time in last month's *In The Shop (ITS)* I mentioned the different ways that analogue test meters quote their accuracy. But however accurate a meter is, it can only measure the voltage that is present when it is connected, it cannot measure the voltage that's there when it's not connected. This may seem obvious, but many people get completely confused and end up chasing non-existent faults because they don't fully appreciate this point.

First let's have a look as to how an analogue test meter – such as the AVO 8 – functions on the direct current (d.c.) voltage ranges.

The moving coil meter movement only measures current and in this case it has a full scale deflection (f.s.d.) of 50µA, (50 millionths of an Amp). To get the test meter to measure voltages on the 100V f.s.d. range, it needs a resistance connecting in series so that with 100V applied 50µA will flow, see **Fig 1**. From Ohms law $R = V/I$, hence the total resistance, including the meter movement's resistance, will be $R = 100 \div (50/1000,000) = 2,000,000\Omega$ (2MΩ).

If you work this out you'll find that on each range, the total resistance of the meter needs to be 20,000Ω for every volt. Because of this the AVO 8 is quoted in its specification as having a sensitivity on the d.c. voltage ranges of '20,000Ω Per Volt' (20,000 OPV). On the 10V d.c. range (for example) the

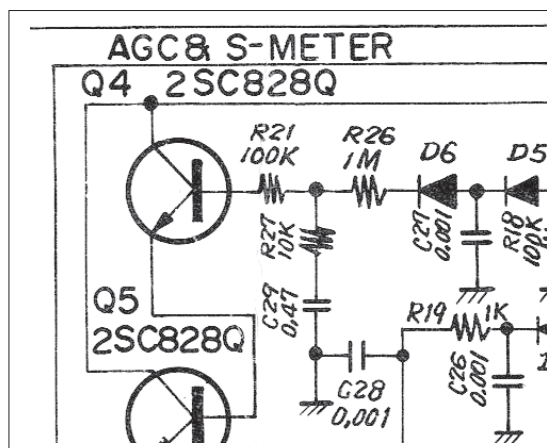


Fig. 2: Part circuit of the FT-101's a.g.c. control circuit.

total resistance, including the meter's coil, will be (20,000x10), which equals 200,000Ω (200kΩ).

Problems With The AGC System?

Next – as part of getting to know how the moving coil meter works – let's imagine we have problems with the automatic gain control (a.g.c.) system on a Yaesu FT-101E and we it's necessary to check the a.g.c. voltage that appears on the base of transistor Q4 in the presence of a signal, see **Fig. 2**.

To start, I've set the AVO on the 3V d.c. range, but get hardly any reading on even the strongest of signal and (if I'm new to the job) I'm wondering what's wrong.

Well, the answer is that on the 3V d.c. range a 20,000Ω OPV meter will present a load of 60kΩ, which is much lower than that of the resistors feeding

the voltage to transistor Q4 – and any voltage at this point will effectively be shorted out by the meter.

To reduce the effect that the meter has on the voltage the answer would be to switch to the 100V range. On this range the resistance of the 20,000 OPV meter will increase to 2MΩ. This would load the circuit less, and if all was well we could expect a reading on a strong signal. **Note:** This would still be only about two thirds of the a.g.c. voltage that would be present when the meter was not connected.

Of course, if we switched to the 1000 volt range the meter's resistance would increase to 20MΩ, and it would hardly load the circuit at all – but as there's likely to be only one or two volts present, the pointer would hardly move.

From this example I hope you now realise that to give an accurate reading a meter must not unduly load the circuit that it is connected to. When using an analogue meter, look up the quoted 'OPV' in the instruction booklet and get into the habit of calculating the meter's resistance on the range you are using. If you want accurate readings, make sure that this is appreciably higher than the resistance values used in any circuit you are testing.

A Testmeter As Variable Resistor?

A test meter as a variable resistor? Yes, a 20,000 OPV analogue meter makes quite a handy resistor and I use this

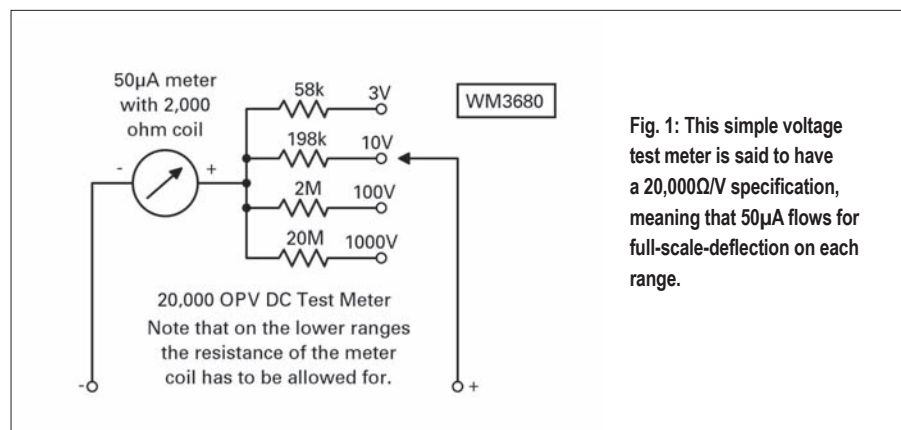


Fig. 1: This simple voltage test meter is said to have a 20,000Ω/V specification, meaning that 50µA flows for full-scale-deflection on each range.

property sometimes. If I set it to 3V I have a resistor of three times $20k\Omega = 60k\Omega$, on the 100V range I have $2M\Omega$. So there's a good selection of values up to a maximum of $60M\Omega$ on the 3,000V range!

I make sure of course that there's not enough voltage in the circuit to damage the meter. But when I have want to experiment with different values, I quite often use my AVO as a variable resistor.

Surprisingly perhaps, I find that I'm when facing some odd fault, poking around with a test meter can sometimes prove quite fruitful. Several times I have found that the presence of a meter's load has temporally cured and pointed the way to some difficult to find trouble. A classic example being the FT-290 a.g.c. fault I mentioned in the June 2010 issue.

I prefer to use an analogue meter for some service work, as opposed to a modern digital testmeter. First they are not affected by radio frequency (r.f.) or other circuit noises, and next they show clearly whether a voltage is low or high. i.e. if you are expecting 100V, and the meter reads full scale on the 100V range you know it's okay, and you won't be confused and think it's correct if it reads 99.5mV (99.5 millivolts).

Incidentally, although an 'analogue' dip stick may not be as accurate as an electronic digital fuel gauge – I would rather trust one, if I was going to be flown across the Atlantic! Finally, I think that analogue meters are much easier to use if you want to peak a voltage when aligning equipment.

Digital Testmeters

Digital units of course, have their advantages. They can be produced to a high degree of accuracy quite cheaply, and as they normally have an input resistance of around $10M\Omega$ on all ranges, they don't load the circuit much when trying to measure low voltages in transistorised circuits.

Many digital meters also have extra ranges allowing capacitors and transistors to be tested. I tend to use a digital meter when servicing transistorised equipment, and my trusty 40 year-old AVO on valved equipment.

What Voltages Do You Measure?

So, what voltage should we measure? Confronted by a rig that will not receive, or which is dead on transmit, it's often worth measuring a few voltages to check the various stages. After checking the obvious such as the main transmit and receive high tension (h.t.) lines, it comes down to testing the individual stages.

With a valved rig almost any major d.c. fault in the anode, screen or bias supply, or an absence of current due to a faulty valve, will show up as a variation in the voltage across the cathode resistor. So, a quick check of this is my advice!

However, with transistorised equipment it's best to first check the emitter or source voltage, as once again any change in the current taken will be reflected here. The voltages at these points have a low source impedance

practical to swap everyone over on the same day and towns were split into areas, say 'A' 'B' and 'C' and 'D'. They would start with zone 'A', and an inspector would call round to make a list of the equipment that would need replacing.

Most equipment would work on a.c. mains, but some items such as those fitted with unsuitable electric motors, battery type radios with weird d.c. adaptors, would not. The customers were then advised to purchase suitable

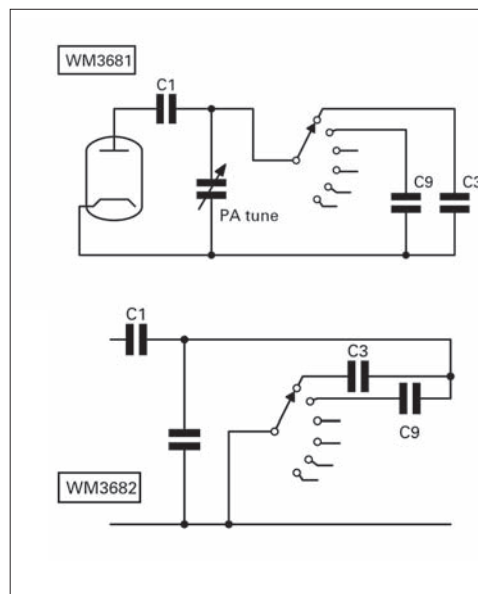


Fig. 3a: Original layout of the FT-101ZD p.a. stage band-compensation capacitors,

Fig. 3b: The circuit of the FT-101ZD after Harry's modification, the same operation, but greater reliability.

and so (as I've already mentioned) are unlikely to be effected by the loading of the meter.

Harry's Apprentice Days

I started my career as an apprentice radio and TV engineer on my 15th birthday, and got the fabulous wage of £1.50 per week. This was about one seventh of an adult Engineer's wage at the time.

In the 1950s there were a few areas in our patch that had just changed over from 220V d.c. to 240V a.c., and stories still circulated about strange happenings.

The changeover from d.c. to a.c. and the voltage increase had been on the cards for a few years and so most people had gradually replaced their lamp bulbs with the 240V variety. These should have been okay on the a.c. mains but shortly after the changeover they started popping! Apparently, rather like us older people, the filaments had got set in their ways and objected to being shaken about by the new alternating current mains!

Of course, some electrical equipment was not suitable for d.c. operation and the electricity supplier agreed to stand the cost of replacements. It wasn't

replacement equipment and send the bill to the electricity supplier.

The new equipment had not, of course, to be plugged in until after the switch over, unless it was designed for a.c./d.c. operation but then the electricity supplier paid up and did not bother to collect the old equipment. By this time the more canny customers had either passed their old items on to a friend in another zone, or had taken them to a second hand shop, who then sold them on to a customer in one of the zones that had yet to be converted!

So, the same equipment often ended up being inspected, approved, and replaced two or three times – all at the expense of the electricity board. It's hard to think of any law that had been broken but certainly the electricity companies were rather naïve in the way they handled the matter!

One Radio Amateur was credited with bending the rules even more than some Members of Parliament. Shortly before the switch-over he built a rack-mounted 1.8MHz (160m) transmitter using Government surplus parts. Both the power amplifier (p.a.) stage and the modulator ran straight from the d.c. mains and so it could not be converted.

The Amateur demonstrated it to the

inspector, got it approved, and sent in a bill for a new Heathkit all-band rig. He explained that he was doing them a favour by building it himself and received full payment.

A Stitch In Time

If – as you tune up a valved rig – you hear something fizzing in the p.a. stage, it's tempting to ignore it. However, sometimes early intervention and 'a stitch in time' will save your rig from the scrap heap.

It must be remembered that there's high voltage and power involved and that once switch contacts or some specialised piece of insulation is badly burnt, with older equipment when no spares are available – that will be the end of story. If flashing occurs have a look at the p.a. stage and the switching in a darkened room to ascertain its location, then unplug the rig from the mains, wait five minutes, and then short out the high voltage supply before proceeding.

It may only even be a matter of moving two leads further apart to cure the trouble. Even when switches are involved (providing that they're not badly damaged) it's sometimes possible to alter the wiring so that the contacts that are causing the trouble are moved to the earthy end of the circuit. In fact, I've cured quite a few FT-101ZDs that have been brought to me with such problems – when they've arrived before irreparable damage had occurred.

A 'Switch' In Time FT-101ZD Style

For mechanical convenience the extra capacitors that are needed to resonate the p.a. stage on 1.8 and 3.5MHz were wired by Yaesu as per Fig. 3a. Unfortunately, the insulation on the slider section of the switch tends to fail after many years of use, especially if it gets damp and dirty, or the rig is operated too soon after cleaning operations while moisture is still present.

If the problem is spotted early enough, before the switch is irreparably damaged, the high r.f. voltage can be removed from the switch slider by rewiring it as per Fig 3b, and then the rig will be as good as new.

An FT-401 problem

When testing the voltages on valved equipment, at times I think it's worth checking valve pins on which you don't expect there to be a voltage – including the FT-401. The FT-401 is getting a bit old by now but I still get E-mails about of these rigs suddenly going dead on receive. In this case I always suggest

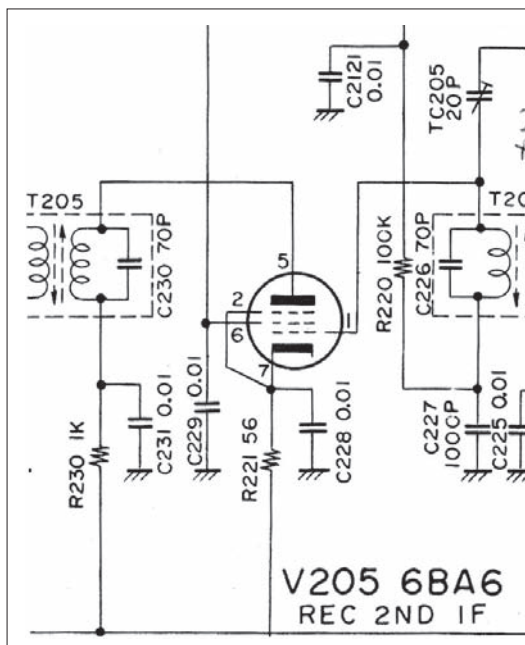


Fig. 4: Part of the FT-401 circuit, where Harry says unexpected voltages on some pins can indicate failure of a component elsewhere in the circuit.

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 while it is plugged into the mains. (Switching off at the wall socket does not necessarily make equipment safe).



If you were expecting around 100V, at a glance you may think this is correct. But it's only 99.5mV – one thousandth of the desired reading!



This AVO meter is over 40 years old, and still within original specification, though what Health & Safety would think about the leads is open to speculation!

that the user checks the voltage on pin 1 of V205, as in Fig. 4.

There should of course be no voltage on the control grid pin in the receive mode, but quite often the trimmer capacitor TC205 becomes leaky, or goes dead short, and applies the negative voltage that is being used to

'bias off' valves in the transmitter signal path to the receiver, turning them off. Rotating the trimmer a few times will often temporally cure the short and bring the rig back to life,. But, of course, in the long term it should of be replaced.

Recycling Number Plates!

Peter Lewis G4VFG dropped me an E-mail from his home in delightful Devon, that made me chuckle. After damaging his key paddle, he was cycling along when he spotted a broken car number plate. He took this home, and used the Perspex to execute a repair. He asks, "How's that for recycling?"

I also received an E-mail from Dave Brabants, referring to my comments regarding 13A sockets and seemingly pointless 'Safety Plugs' in the April issue. It was pointed out that whilst an inquisitive 5 year-old cannot open the shutters on a mains socket to get their fingers in without a tool, many so-called 'Safety Plugs' provide just such a tool, and so are potentially dangerous. See: www.childalert.co.uk/article.php?articles_id=28

See you next month! Harry G3LLL

J. BIRKETT

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The Ultimate Charger Analyser
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AA/AAA batteries, it's like having
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- Battery forming – restore old batteries
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- Large backlit display to give comprehensive battery information

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- Charge AA/AAA/C/D NiMH batteries
- 8 independent charging circuits
- Ultra fast recharge time
- Built in battery conditioning system
- Worldwide mains adaptor

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MH-204W

Intelligent battery Charger

- 1-2 hour charge for AA and AAA batteries
- Revive old batteries
- Revive dead batteries

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- Charge one to four 9V batteries independently
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The equipment for sale on this page is secondhand or ex-demonstration

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ALINCO DJ596 DUALBAND H/HELD	£89
ALINCO DJC7 DUALBAND H/HELD	£84
ALINCO DJV17 VHF/FM H/HELD	£99
ICOM 207 MOBILE TRANSCEIVER	£225
ICOM 7000 TRANSCEIVER	£899
ICOM 756PRO III WITH DSP/ATU	£1795
ICOM 7800 HF & 6M FLAGSHIP TX	£5495
YAESU FTC740A 4M TRANSCEIVER	£69
YAESU FT450AT TX WITH ATU	£499

HANDHELD SCANNERS

ALINCO DJX2 AM/FM/WFM RADIO	£79
GRE PSR282 SCANNER	£59
ICOM R5 HANDHELD SCANNER	£145

BASE SCANNERS

BEARCAT 785XT DESKTOP SCANNER	£199
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CB RADIO

MIDLAND 98PLUS MOBILE CB	£45
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RECEIVERS

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ETON MINI 300 PORTABLE	£13
FAIRHAVEN RD500 RECEIVER	£449
ICOM R72 COMMS RECEIVER	£349
ICOM R75 RECEIVER WITH UT106	£499
SANGEAN ATS909 WORLDBAND RX	£109
MIDLAND BASECAMP	£79
YAESU FRG100	£329

ACCESSORIES

ALINCO EJ47U DIGITAL BOARD	£46
BHI NOISE ELIMINATING SPKR	£49
UNIROSS CHARGER & BATTERIES	£12
INTELLIGENT DIGITAL MULTIMETER	£25
CLAMP ON DIGITAL MULTIMETER	£10
PALSTAR PS15 POWER SUPPLY	£99
TOKYO HY-POWER HL1K LINEAR	£799
ZETAGI P27M PREAMPLIFIER	£15

B-GRADE ITEMS

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BEARCAT UBC92XLT H/HELD SCANNER	£99
ETON E100 PORTABLE SHORTWAVE RADIO	£35
ETON G3 PORTABLE SHORTWAVE RADIO	£69
ETON G6 PORTABLE SHORTWAVE RADIO	£69
ETON SAT750 RECEIVER	£269
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MIDLAND 42 HANDHELD CB RADIO	£89
MOONRAKER M8 RADIO	£25

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TRANSCIVERS

KENWOOD TS-450S	£455
ICOM IC-706MKII	£399
YAESU VX-150	£99
YAESU FT-60	£120
ALINCO DJ-V5	£200
ALINCO DJ-195	£100
ALINCO DJ-S11	£75
ALINCO DR-430 70cms	£85
ICOM PMR 446x2Water Resist/w.charg	£200
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MIDLAND CB 77-805UK	£55
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JRC NRD 535	£795
RADIO SHACK DX-394	£85
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AKD TARGET HF3S	£225
YAESU FRG-9600	£99
YUPITERU MVT-7100	£99
YUPITERU MVT 7300	£99
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UNIDEN UBC-860XLT Desktop	£65
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YAESU XF-110CN Filter	£55
YAESU XF-110S Filter	£55
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Nevada	PSDL	50ohms Dummy load Dc-3000MHz max 15W.....	£30
Heil	AD-1-Y4	Cable for pro set and yaesu 4 pin round.....	£10
Optoelectronics	Model-2810	10Hz-3GHz Frequency Counter.....	£145
Academy	CB-34	3-way SWR Bridge and Field Strength Meter 25W (3.5MHz) 15W (7MHz).....	£15
Microset	PM-110	10Amp 13.5V PSU with inbuilt Speaker and Transceiver Frame.....	£110
Microset	PR-430A	70cms 100 Watt Version 15db Gain -1.2db NF.....	£130
Microset	RU-45	70cm 3-15W in, 45W out Linear + GaAsFET Preamp 12V.....	£149
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MFJ	MFJ-940A	28-30MHz 10m Mobile ATU + meter 150W.....	£39
Uniden	UBC-60XLT	66-512MHz (with gaps) FM Hand Held Receiver 80Ch. 4 x AA cells.....	£59
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Icom	IC-F4SR	SRBR Hand Held Transceiver Programmed for PMR-446 24ch.....	£149
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Alinco	DJ-191E	2m FM H/Held Transceiver + CTCSS & DTMF keypad.....	£119
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Icom	IC-756 pro III	HF + 6m All Mode Base Transceiver + ATU, DSP & Gen.Cov. 12V.....	£1,590
Icom	IC-910HX	2m, 70cm & 23cm All Mode Base Transceiver 100W, 75W 12V inc UX-910.....	£1,079
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Alinco	DR-135E	2m FM Mobile Transceiver + TNC 50W (includes optional EJ-41U).....	£169
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Icom	IC-R5	150kHz-1300MHz AM, FM & WFM Hand Held Receiver 1000Ch. + Nicads.....	£119
Icom	IC-R5	150kHz-1300MHz AM, FM & WFM Hand Held Receiver 1000Ch. + Nicads.....	£119
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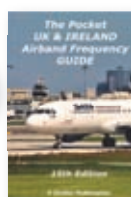
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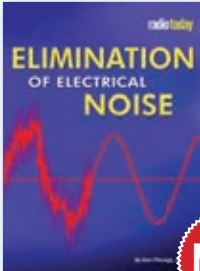
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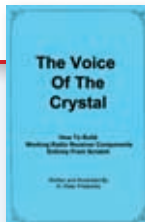
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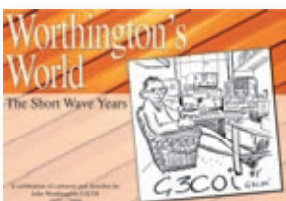
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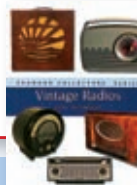
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Topical Talk

The Editor discusses earthing problems raised in the *Letters* pages and then mentions unsigned letters that have arrived in the office.

Earthing – or ‘grounding’ as the Americans call it (both terms are self explanatory as far as I’m concerned) can cause many problems for Radio Amateurs and a great deal of discussion! Indeed, the letter – published this month from my friend Tony Tuite GW0NSR who lives in North Wales, clearly indicates just how confusing the topic can be.

However, before venturing further I would suggest to everyone who uses the Internet that they should have a healthy suspicion! Never (unless it’s from a reliable source) take everything you see as being absolute, undeniable fact. There are some very strongly held opinions to be found on the Internet – whereas we (especially in this example) require sound technically proven advice.

Having said that – I must admit that my approach to earthing may seem a little odd! As most radio enthusiasts will know nowadays the Protective Multiple Earthing System (PMES) is widely used in the UK. The advice with this type of earthing is that only the earthing socket on the plug socket is used by consumers.

However, whenever possible I use a separate r.f. earth at my shack – being of the opinion that my supply is separate and isolated radio frequency (r.f.) wise as it’s powered from a supply using a double wound transformer. Additionally, I often work with equipment that’s totally independent

from the mains because it’s powered by a heavy duty accumulator. This approach reduces incoming EMC problems from the mains very effectively.

Is my approach to earthing wrong? Having discussed it with various power supply professionals (Chartered Engineers) – they advise me that it’s an ‘iffy’ area – especially as r.f. is involved! So, readers – over to you – what do you think?

Unsigned Letters

The recently – fairly brisk – debate in the *PW Letters* section regarding Foundation Licences has generated quite a bit of feed-back. Not all of the feed-back was for publication, with some readers just letting me know what they thought of the situation.

However, I have been left in no doubt whatsoever that there are some rather strongly held opinions out there in *PW* land!

Despite the vitriol dripping off some of the letters and E-mails that come my way – I always very much appreciate it when the person venting their spleen has done the decent thing and told me who they are. Sometime, I’ve ended up in a series of E-mail discussions – but whether or not we have to ‘beg to differ’ at the end of the correspondence – I’m left feeling that I’ve been chatting to a friend – even if we don’t agree!

Unfortunately however, a number of unsigned letters have arrived in the post. They’ve not been read because the first thing I do is

to check who has sent me a letter and whether or not it’s signed. If there’s no address or signature – the letter is consigned to what **Tex Swann G1TEX** calls ‘File 13’ (My wastepaper bin) unread.

Personally, I must admit that I can’t understand why anyone would send me an unsigned and anonymous letter! All I can do is either agree with the comments, disagree or ignore the opinions expressed. We only publish letters where the writer is identifiable. Additionally, anything coming my way that could cause legal problems or is far too provocative would be very unlikely to be published.

So, bearing in mind what I’ve just firmly stated – why don’t the writers of unsigned letters identify themselves?

In closing on this rather unfortunate topic – I offer this advice to anyone who has written to me (and not provided an address or name) to write to me again. Please have the courage of your convictions and let me know who you are. When I write my opinions in *PW* they’re present for all to see – whether the individual agrees or disagrees with them!

My office is not the ‘back of the bike shed wall’ from our schooldays. Instead it’s busy little den where I’m at the receiving end of some remarkable ideas, opinions and suggestions. Make sure yours joins the pile on my desk – sign that letter. After all, the worst I can do is to disagree with you!

Rob Mannion G3XFD/EI5IW

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Antenna Workshop

This month’s guest author is **Ray Howes G4OWY**. Ray describes the straightforward approach he adopts when he’s building practical ground-plane antennas.

Technical For The Terrified

Tony Nailer G4CFY takes a look at some technical ideas and topics he’s chatted about over the past year and discusses those that have brought the most feed-back from readers. And there’s still time for you to E-mail your technical problem to Tony!

Valve & Vintage

Ben Nock G4BXD takes his turn in *PW*’s vintage ‘shop’ this month and – having moved the Kidderminster Kollektion to a new home recently – we’ll find out if Ben’s discovered long lost equipment during the move – or if he’s gained something new!

Plus all your regular favourites – *Data Modes*, *the World of VHF*, *Carrying on the Practical Way* and much, much more!

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