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HF to 23cms Base Transceiver

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

Satellite Mode Operation:
Optional D-Star DV Mode.

£2999 D

ICOM NEW IC-7410 HF - 6m Transceiver

- *100W HF-6m all modes.*
- *Receiver +3-dBm IP3 + 15kHz roofing filter*
- *36kHz DSP IF 32 bit razor ahrp 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.

£1919.95 D

ID-E880

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

£439.95 D

IC-E92D SPECIAL OFFER!

Buy the IC-E92D 2m/70cm handheld and HM-175GPS speaker mic with GPS receive ***together*** and save over £35!

£489 D

IC-T70E

Dual Band 2m/70cm Handy.

£154.95 D

IC-E90

Triple band 6m, 2m, 70cms.

£239.95 D

IC-E80D

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

FREE software on Icom site

In Stock Now **£319.95 D**

IC-E2820

Great dualband mobile.

£489.95 D

Fitted with UT-123 D-Star module. **£699.95 D**

HF Transceivers IC-7600

This HF-6m transceiver is the successor to the IC-756 series. It takes features from the flagship IC-7800 and the more recent IC-7700, putting them into a package that brings the price within reach of many more hams.

£3295 D

IC-7800	Deluxe HF / 50MHz All-Mode 200W Transceiver	**£8995 D**
IC-7700	1.8-54MHz 200W with built-in PSK-31 + keyboard	**£5999 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-718	160m-10m 100W transceiver that brings HF to those on a budget	**£595 D**

Other Radios

IC-910H	**£1295.95 D**	**IC-R6**	**£179.95 C**	**IC-R8500**	**£1399.95 D**
IC-2200H	**£219.95 D**	**IC-R20**	**£394.95 C**	**IC-R9500**	**£10899.95 D**
IC-R3	**£399.95 C**	**IC-R2500**	**£639.95 C**		

YouKits HB-1A-MK3 NEW

In Stock Now!

40m / 20m Model **HB-1A-MK3-40-20**

Completely self-contained ready built 5W CW transceiver with LCD digital readout and great performance - Look at the price! **£199.95**

Specification:

Full band coverage	
Tx: CW	Rx: SSB CW & AM
Filters	Crystal for CW & SSB
Keyer	Built-in
Power Out	3W dry cells
	5W 13.8v
Memories	20 Channels
Volts	9 - 14v
Current	Tx 950mA max on
	Rx 55mA
Internal	8 x AA cells
External	13.8v

Tuning steps 100kHz - 10Hz
Size 140 x 95 x 35 (mm)

YAESU Major Shortages!

The production of Yaesu has been badly hit by the earthquake in Japan and there will be a severe shortage of some models, including FT-950, FT-2000, FT-2000D and FT-817!

FT-950 HF - 6m Transceiver - We have the LAST FEW!

HF transceivers are Yaesu's prime products and their use for contest work & DX is testimony to their quality and performance. The FT-950 represents the optimum in performance versus value. Features include:

Mic parametric 3-band EQ and processor, Tx audio monitor, Easy spot CW netting, Full break-in, SSB audio (rx) pitch control, SSB Tx bandwidth up to 3kHz, Front panel speed control, IF notch – shift and width control, Electronic iambic keyer, Contest 5 ch. memory keyer, CW audio filter, CW beacon keyer, VFO A/B with split select, Quick memory storage, Digital noise reduction, CTCSS, Repeater shift, Memory and VFO scanning, Attenuator, Pre-amp, Wide rx 30kHz – 56MHz, Roofing filters 3 / 6 / 15kHz and of course a built-in Auto ATU.

£1199 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

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 radiom and the crowded bands? The take a careful loo 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.**

PART EXCHANGE WELCOME

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-2000	100W 160 - 6m 12V transceiver ***LAST ONE!***	**£1999.95 D**
FT-2000D	200W 160 - 6m 230v AC PSU trnscvr ***LAST FEW!***	**£2599.95 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	**£529.95 D**

VHF Mobiles & Handhelds

FTM-350E	2m/70cm Mobile Bluetooth GPS APRS	**£479.95 D**
FTM-10SE	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	**£238.95 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	**£179.95 C**

< VX-8DE

WiNRADiO NEW

Two New Radios!

WR-G39DDC **WR-G33DDC**

Developed from the Excalibur, the new **Excalibur Pro (WR-G33DDC)** offers improved dynamic performance, with direct sampling and a recording bandwidth of 4MHz. Range 9kHz - 50MHz.

For even more advanced performance and coverage the 20kHz - 3.5GHz the **WR-39DDC** also feaures wide record and live spectrum display.

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FLEX-1500

The 5 Watt tiny HF-6m transceiver that works great with a laptop.

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High quality, accurate VSWR meters with large, clear X-needle display.

WCN-200 £69.95 C
* 1.8 - 160MHz * 0 - 30 / 300 / 3000W
* 600W max above 30MHz * 2x SO-239

WCN-400 £69.95 C
* 140 - 525MHz * 0 - 30 / 300 / 600W
* 2x SO-239

WCN-600 £89.95 C
* 1.8 - 525MHz * 0 - 30 / 300 / 3000W
* 600W max above 30MHz * 2x SO-239

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 (included)* * *Built-in selectable speaker* * *Squelch control On/Off light* * *12v External power socket* * *Power: 12v car cigar adaptor (supplied) or PP3 battery (not supplied)*

£79.95 D

WATSON NEW W-8681-SOLAR

This is a wireless weather station that requires no connecting cable between the LCD monitor and the remote weather sensors. There is a large LCD control panel, solar transmitter, wind speed & direction sensors, temperature sensor, rain gauge and stub mast. All you need are 3x AA batteries for the "new" LCD panel, the outside transmitters are solar powered! There is even a USB lead & PC software to connect to your PC!

£99.95 C

W-8681-MKII Wireless Weather Station £79.95 C
W-8681-ST1 Solar Transmitter for W-8681-MKII £29.95 A

AOR We are UK Distributors

AR-MINI

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

£159.95 D

AR-8200-MKIII

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

£469.95 D

AR-8600MKII Base or Portable

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

£669.95 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

MFJ Antenna Analyser

NEW MFJ-266

The new model from MFJ that is totally digital. A highly accurate analyser that extends from 1.5 - 490MHz. Fitted with a 10:1 vernier dial for smooth accuracy.

Wide range from 1.5 to 490MHz (with gaps between 65-85MHz and 185-300MHz. As well as VSWR it also measures complex impedance & impedance magnitude, capacitance, inductance, field strength, frequency, and is a frequency generator. Use it for stub adjustment, coax test, baluns, and lots of other RF tests.

£339.95 C

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 at 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-480SAT 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 £289.95 D

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	£165.95 D
TM-D710E	2m/70cms 50/50W mobile. APRS +EchoLink, DTMF Mic	£445.95 D

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

MFJ QRP CW Transceiver

NEW MFJ-9200

£259.95 D

Made in Chuna 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. Okeaase not: as supplied it covers just one band.

Extra Band Modules £29.95 Each

* *Frequency 80m-15m with modules* * *RIT* * *8 memos per band* * *LCD backlighted* * *TX/RX CW* * *RX SSB* * *CW offset 700Hz* * *Full QSK* * *0.1uv sens.* * *600Hz / 2.5kHz bandwidth* * *Iambic or straight key* * *CQ & callsign 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

Power-Max-25-NF

Slightly larger than the Power-Mite and ideal companion for any 100W radio.

£89.95 C

Power-Max-45-NF

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

£129.95 C

Power-Max-65-NF

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

£239.95 D

W-5A 5A Analogue fixed 13.8V £29.95 C
W-10AM 10A Analogue variable £59.95 D
W-10SM 10A Switched fixed £49.95 D
W-25AM 25A Variable PSU £92.95 C

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

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Manson EP-925
25 Amp Continuous Variable PSU

£104.95 D

- *Output voltage 3 - 15V DC*
- *Output Current 25A (30A peak)*
- *Malfunction protected*
- *Dual meters for volts & current*
- *Front panel terminals*
- *Supply 230V AC 50Hz*
- *Weight 9.2kg*

DV-Dongle 2 Models!

DV-DONGLE USB to your PC or Mac and work D-Star by accessing internet open D-Star repeaters worldwide. £169.95 C

NEW DV-ACCESS Access Point, similar to above but able to TX/Rx over short distance so that with 2m D-Star radio you can work through your PC. £229.95 C

Miracle Antennas
Miracle-Whip

A tuneable telescopic whip covering 3.5 to 460MHz. Up to 25 Watts PEP, fitted with PL-259 plug. Great for FT-817 & IC-703 or any other QRP radio.

£122.95 C

Diamond
VHF/UHF Antennas

A144S5R	5el 2m 9.1dbi 0.95m L	£49.95 D
A144S10R	10el 2m 11.6dbi 2.13m L	£94.95 D
A430S10R	10el 70cm 13.1dbi 1.19m L	£59.95 D
A430S15R	15el 70cm 14.8dbi 2.25m L	£75.95 D
SB144	Boom for dual 2m Yagis	£26.95 A
SB430	Boom for dual 70cm Yagis	£21.95 A
SS144	Stack transformer 2-way 2m	£94.95 C
SS430	Stack transformer 2-way 70cm	£81.95 C
KB144	Mast stand-off for vert. polarise	£19.95 A
KB430	Mast stand-off for vert. polarise	£17.95 A

Tonna
VHF/UHF Antennas

220505	6m 5 el. 10.1dBi gain 3.45m	£118.95 D
220809	2m 9 el. 13.1dBi gain 3.47m	£79.95 D
220909	70cm 9 el. 13dBi gain 1.24m	£74.95 D
220919	70cm 19 el. 16.2dBi gain 2.82m	£94.95 D
220623	23cm 23 el. 17.9dBi gain 1.75m	£77.95 D
220725	13cm 25 el. 18.3dBi gain 1.45m	£102.95 D

Create
Rotators

These are hunky Japanese rotators that we recommend for reliability & performance.

RC5-1 £569.95 D
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MFJ
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"The World's Best Auto ATUs Buy with Confidence! Just Press PTT You're TUNED!"

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• 1.5kW SSB & CW • Digital & Analogue X-needle VSWR • 1.8 - 30MHz • 20,000 memories • Radio interfaces optional • Built-in antenna selector • Field upgradeable firmware • Auto bypass protection

W&S £664.95 C

MFJ-929 AUTO TUNER

1.8-30MHz 200W, LCD readout, 20,000 memories, long wire & coax, radio interface.

A great Auto ATU that needs just a single coax feed and 12V DC. Press the PTT & you are tuned! W&S £214.95 C

MFJ-925	Compact auto tuner	£174.95 D
MFJ-927	200W remote auto atu	£254.95 D
MFJ-928	Basic auto atu	£203.95 D
MFJ-991B	Auto atu 150W	£214.95 D
MFJ-993B	Auto atu 300W	£254.95 D
MFJ-994B	Auto atu 600W	£349.95 D
MFJ-931	Artificial ground	£114.95 C
MFJ-932	Mini loop tuner	£143.95 C
MFJ-934	Artificial ground + ATU	£204.95 C
MFJ-935B	Portable loop system	£204.95 C
MFJ-945E	Mobile atu 300W	£134.95 C
MFJ-962D	1.5kW ATU	£299.95 D

MFJ-962D

MFJ-969	160m - 6m 300W	£219.95 D
MFJ-971	Portable ATU	£122.95 C
MFJ-974B	Balanced ATU	£194.95 D
MFJ-986	3kW differential tuner	£359.95 D

Buddipole
HF Portable Antennas

The most respected portable HF antenna system available. Dipole or vertical system - packs down into a carry pack.

The secret of the system is the hi-q coil assemblies.
www.buddipole.com

W3-BP	Dipole 40-2m 250W	£219.95 D
W3-BP-DELUXE	With mast kit	£419.95 D
W3-BS	Vertical 40-2m	£161.95 D
W3-BS-DELUXE	Vertical + clamps	£194.95 D
W3-CTA	Centre T mast clamp	£8.95 A
W3-DKB	Buddipole Carry Bag	£41.95 C
W3-LBVK	Low band vertical kit	£199.95 D
W3-MBP	Mini Buddipole	£239.95 D
W3-MK	Mounting Kit	£36.95 D
W3-MWA-4	Military whips	£102.95 C
W3-RAK	Rotate arm kit	£39.95 C

AMERITRON AL-811XCE

600W of PEP power from a desk top linear that covers 1.8-30MHz. And offered at a great price.

£899.95 D

Tigertronics
SignaLink Interfaces

New Delivery Expected!

Signalink Sound Card Interfaces do not require the use of a com port to trigger PTT on the rig. SignaLink have internal links which make them compatible with most of the rigs on the market. Radio lead is supplied, state which when ordering. Extra mic leads are available.

SL-USB-4R	4-Pin Round	£89.95 C
SL-USB-13PDI	Icom 13-Pin Din	£94.95 C
SL-USB-13PDK	Kenwood 13-Pin	£94.95 C
SL-USB-8R	8-Pin Round	£89.95 C
SL-USB-RJ11	Modular RJ-11	£89.95 C
SL-USB-RJ45	Modular RJ-45	£89.95 C

Uniden Bearcat

UBC-30XLT

A real bargain whilst stocks last.

Frequency Range: 87.5 - 107.9MHz WFM, 108-136.9875MHz AM, 137 - 173.99MHz FM

The radio has 200 memories, LCD display and can scan at 25 channels per sec.

£62.95 C

Check full spec. of these radios @ www.wsplc.com

UBC-3500XLT

FM FMB WFM AM Frequency:
- 25-512MHz
- 806-960MHz
- 1240-1300MHz.

2500 memories, RF near signal capture, Quick keys, Scan 100 channels per sec., CTCSS & DCS, Alpha numeric tags, Data skip, Auto store, Display contrast adjust, AC adaptor/charger included.

This is the Bearcat Flag Ship radio. It pacts an amazing number of features into a small package. If you are looking for a serious VHF/UHF scanner that covers the entire spectrum and resolves all the popular analogue modes, then this is a serious contender. £209.95 C

Watson
VHF/UHF Antennas

VHF-UHF Verticals

W-30	2m/70cms 3/6dB length 1.15m 150W SO-239	£49.95 C
W-50	2m/70cms 4.5/7.2dB length 1.8m 150W SO-239	£54.95 C
W-300	2m/70cms 6.5/9dB length 3.1m 150W SO-239	£74.95 D
W-2000	6m/2m/70cms 2.15/6.2/8.4dB length 2.5m 150W	£89.95 C

VHF-UHF Mobile Whips

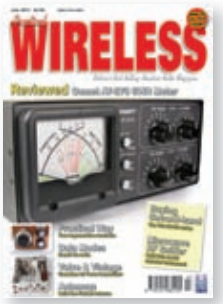
W-2LE	2m 0dBv length 0.48m	£11.95 C
W-285	2m 3.4dBv 1.33m	£14.95 C
W-77LS	2m/70cm 0/2.4dBv 0.43m	£14.95 C
W-770HB	2m/70cm 3/5.5dBv 1.1m	£19.95 C
W-7900	2m/70cm 5/7.5dBv 1.58m	£32.95 C
W-627	6/2/70cm 2/4.5/7.2dBv 1.6m	£34.95 C

MFJ-269

The Antenna Analyser has been refined over the years & the MFJ-993B tells you just about everything you need to know about your antenna system - resonance, impedance, reactance & can even measure coax losses & identify the position of open & short circuits. All in a compact unit that covers 160m to 70cms. Can you afford to be without one? W&S £369.95 C

- *1.8 -170 & 415-450MHz*
- *Frequency Counter*
- *LCD readout*
- *SWR & impedance*
- *N-socket (Ant), BNC (Counter)*
- *AAx10 or ext. 12V DC*
- *Size 103w x 173h x 60d mm*
- *Weight 750g*

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



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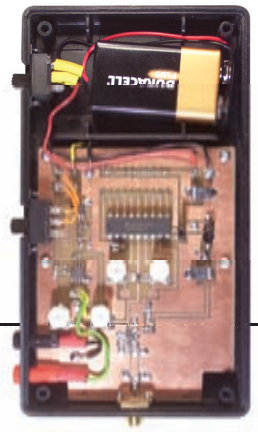
Volume 87. Number 7. Issue 1250. On sale 9 June 2011



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Front Cover
The unusual Comet CAT-273 v.h.f./u.h.f. antenna matcher power/s.w.r. meter features among the subjects this month.

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Published on the second Thursday of each month by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: 0845 803 1979. Printed in England by Holbrooks Printers Ltd., Portsmouth P03 5HX. Distributed by Seymour, 2 East Poultry Avenue, London EC1A 9PT, Tel: 020 7429 4000, Web: http://www.seymour.co.uk. Sole Agents for Australia and New Zealand - Gordon and Gotch (Asia) Ltd.; South Africa - Central News Agency. Subscriptions INLAND £38, EUROPE £47, REST OF WORLD £57, payable to *Practical Wireless*, Subscription Department. PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: 0845 803 1979. *Practical Wireless* is sold subject to the following conditions, namely that it shall not, without written consent of the publishers first having been given, be lent, re-sold, hired out or otherwise disposed of by way of trade at more than the recommended selling price shown on the cover, and that it shall not be lent, re-sold, hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade, or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever. Practical Wireless is Published monthly for $50 per year by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW, Royal Mail International, c/o Yellowstone International, 87 Burlews Court, Hackensack, NJ 07601. UK Second Class Postage paid at South Hackensack. Send USA address changes to Royal Mail International, c/o Yellowstone International, 2375 Pratt Boulevard, Elk Grove Village, IL 60007-5937. The USPS (United States Postal Service) number for Practical Wireless is: 007075.

Rob Mannion G3XFD/EI5IW's

Keylines

Rob discusses security problems for our shacks and also looks forward to a trip to the Moray Firth Amateur Radio Society in Scotland.

Radio Amateurs and anyone else active in the hobby who has an outside workshop – our proverbial 'shacks' – face serious security problems nowadays. Unfortunately, as many readers will know, I speak from experience, as my own shack was broken into several years ago. In my own case, the heavyweight door was forced off it hinges and I lost some much valued equipment together with some items on loan from Kenwood UK.

One of the problems I faced (I urge readers to take this very seriously) was that I didn't have any real idea of exactly what equipment was in my shack at the time of the robbery. Unfortunately, immediately after the theft I thought I'd only lost a few items because some items were out on loan with friends. This caused a bit of confusion for myself and the Police Officers involved. So, I ask everyone to keep an up-to-date list of equipment, complete with serial numbers.

An insurance claim wasn't possible because it was deemed I'd not taken enough security precautions – so I learned my lessons and my shack is as well protected as I can make it. However, bearing in mind that both the Police and myself have evidence (but not enough for a criminal case) that the thief who broke into my shack was certainly a fellow Radio Amateur – I obviously can't go into full details.

Despite this, I'd like to share the basic idea behind my alarm system as I think it will appeal to other Amateurs, especially as it saves quite a bit of money! I eventually ended up using a system based on a pair of PMR446 (Licence free) hand-held transceivers – the (maximum permitted power) Binatone Terrain 550 units. These link my system to the house and the transmitter in the shack can be triggered by various means and – thanks to the built-in tone code squelch system, they're unlikely to be badly affected by co-channel operations by other PMR446 users.

The Binatone units only cost around £35 or so, if you shop around, and they have proved most effective. I had been very disappointed at the cost (anything up to £150) and effectiveness of 'wireless' burglar alarms. These often seem to work either on the 433.92MHz allocation at very low power – 10mW effective radiated power (e.r.p.) seems fairly standard. Unfortunately, this extremely low QRP level compares badly with the maximum 500mW available from the – fully legal – Binatone transceivers.

By working together we can beat the thieves! I would be pleased to discuss full details of how my system with individual readers if they would contact me via (E-mail only please) **rob@pwpublishing.ltd.uk**

Visit To Moray Firth ARS

On Friday July 1st I'm visiting the **Moray Firth Amateur Radio Society** (MFARS) in the Scottish Highlands. The Society first contacted me last year to ask if I would attend to provide a *PW* 'club visit'. Of course, I was delighted to accept and I'm even more delighted to announce that I shall be visiting the club on the Friday. Everyone will be welcome and I'll be delighted to meet *PW* readers who can attend. Please see the MFARS website for full details at **www.benison.co.uk/MFARS/index.htm**

During my 22 years as *PW* Editor, the trip (perhaps surprisingly!) to the MFARS is the first to involve travelling by train! However, as regular readers will appreciate – the overnight trip on the Caledonian Sleeper service from London Euston to Inverness won't be a hardship! Unfortunately though, the return trip on Saturday July 2nd will be much less comfortable – as I'm travelling from Inverness (Dalcross) Airport to Southampton (Eastleigh) Airport on the one return flight of the week!

I've always had an interest in aircraft and enjoying flying very much – but airports and the amount of hassle involved with air travel nowadays have led me to avoid flying wherever possible. However, as the Caledonian Sleeper doesn't run on Saturday nights I'll have to squeeze into a budget airline seat – but it does have the advantage that I'll be home on Saturday evening! I'm really looking forward to the trip and I hope to meet many old friends and make new ones too. See you there!

Rob Mannion G3XFD/EI5IW

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Our 0845 numbers are charged at the BT Standard local Rate. Callers with an appropriate BT inclusive call package can call this number free!

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Readers' Letters

Send your letters to:

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

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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*.

£20 Star Letter

The Letter From Brian Tuffill M0FFS

Dear Rob,

My last letter to *PW* was sent sometime around 1981/2 – so I think it's about time I wrote again don't you? What better subject to exercise my fingers therefore than your Star Letter from **Brian M0FFS** in the May edition of *PW*. Brian made many appropriate comments regarding visual impairment and the difficulties it presents within our hobby, education and life in general.

I'm writing because – through my work for a national dog based charity – where I work as a practitioner with young children and adults within schools and educational establishments, I see and experience those difficulties on a daily basis through the eyes of my clients.

I had not given much thought to how the RAE exams are presented these days to SI or SSI candidates. I assumed that in this day and age all necessary adaptations and protocols for examination preparation and sitting would be in place as they are for SATS, GCSE A Levels, 'Highers' and beyond. If they are not, then I believe the powers that be need to consider an urgent review of their practices and through these columns take note of the need for simple, timely adaptations and procedural practices.

All of the youngsters I work with require me to adapt my work methods to ensure I am able to provide them with theoretical and practical information in a manner which enables them to become independent, mobile socially well adapted and safe.

As Brian says, not all people with a visual impairment need a dog, carry a long cane or enjoy being attached, like a limpet, to another human being. (Many of my Clients enjoy nothing more than a run along the beach without being attached to someone's arm – with correct preparation this is not only possible but also huge fun and sometimes the first time a sight impaired youngster has been totally independent!).

Similarly, not all applicants for the RAE exams need the teaching materials and exams put into Braille. Some do but other just need simple adaptations which make accessing the material and information easier. This does **not** however mean that the exam is made easier nor the standards lowered, it just means that it becomes **accessible** to those applicants.(As I get older, even without a sight impairment, I value larger print, more lighting, larger fonts or higher definition on computers/ TVs, etc.).

Simple adjustments can be so helpful. For example, anyone using a whiteboard should use a dark coloured pen to contrast with a whiteboard or flip-chart as yellows or light green are generally difficult for a person with a vision difficulty to see. Pens that are nearing the end of their life and are faint should also not be used,

Oh! and drivers – please don't flash your lights at a zebra crossing for people who carry a long cane or use a dog, believe me it isn't helpful, yet I see it on a daily basis during training sessions with my clients!

As a former Engineer and having worked as a Training Professional for most of my life, I know that there are normally simples techniques and solutions that can be applied to make most things appropriately accessible for people with a sight impairment. I could list so many helpful hints to make information accessible for people with a visual impairment that it would take up many pages of *PW*. Instead, I would recommend anyone interested to look up a variety of web sites such as Guide Dogs For The Blind, Royal National Institute for the Blind (RNIB), etc. There will also be many Amateurs out there with valuable and personal experiences I am sure, I hope this is put to good use for the benefit of our hobby.

Finally, I would like to wish everyone either just coming into or returning to this absorbing and continually changing and challenging hobby of ours all the very best for the future. Thank you also Rob for your leadership and hard work from your team over many years in preparing and presenting what must be the best hobby magazine in the world.

Noel Graham CMIPD G(R)6ENY
Rothbury
Northumberland

Editor's comment: *Thank you Noel – please join me on the Topical Talk page 77, for further comment.*

Amateur Radio & The Sight Impaired

Dear Rob,

I read with interest the 'Star Letter" from **Brian Tuffill M0FFS** in the May issue of *PW* regarding the problems, in his opinion, faced by the Severely Sight Impaired (SSI) when attempting to obtain an Amateur Radio Licence.

As the RSGB Board Member responsible for the Education and Training Portfolio, and the 'Train the Trainers' scheme, I am pleased to be able to advise that the provisions Brian Tuffill advocates are **already** in place and have been so for some time.

For example, the training books for all three examinations are available in audio form. These have been produced by volunteers and are available via the RAIBC. Likewise, he called for flexibility in training and examination venues. There are no limitations on training venues and, while in examinations normally must be conducted in registered venues, provision can be made in special cases for an alternative venue. Examination papers with no diagrams can be offered, if the RSGB's Headquarters are advised of the need. Likewise a 'reader' can be made available for those with SSI and

additional time allowed. Similarly, the various practical assessments can be conducted with a 'helper' or suitable adjustments made to the procedures.

In addition to above, formal, provision, there is a network of instructors who share training ideas, etc. via the RSGB Tutors' reflector. Here instructors can seek advice, share ideas, etc. to improve their teaching, including the provision for those with SSI. If Brian Tuffill feels he is able to offer further advice on how we can improve provision for SSI candidates, he is welcome to join this reflector to share his ideas with the volunteers who deliver the training.

Amateur Radio has always maintained a tradition of welcoming those with SSI and that has not changed with the introduction of the new examination scheme. On the contrary, as I've traveled across the country to deliver the 'Train the Trainers' sessions, I've been impressed by the enthusiasm shown by instructors to understand the provision which can be made for those with SSI and other impairments.

If any prospective amateur is concerned about accessing the UK Amateur Radio examinations due to visual or other impairment, they are welcome to contact me for advice. There is an E-mail address on my website **www.g8osn.net**

73 Brian Reay G8OSN
Director ARDC/Education & Training
Radio Society of Great Britain
Hempstead
Gillingham, Kent

Abuse From 'Older' Radio Amateurs

Dear Rob,
I'm very upset to read in the June *PW* that **Lawrie Richardson M3UHQ** has suffered abuse from 'older' Radio amateurs. Shame on them! I'm an older Amateur, and enjoy talking to anyone who has a legal callsign. I've had many enjoyable QSOs with M3s and have just finished a contact with a MI3 on 28MHz (10m). In my view M3s are to be admired for getting such big signals out with just 10W. So all you M3s – if you hear me, just call for a friendly QSO. 73 to all.
Ken Grover G3KIP
Tunbridge Wells
Kent

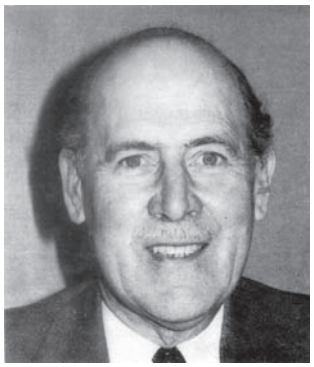
Editor's comments: *I have received a large number of replies commenting on Lawrie Richardson M3UHQ's letter, published in the June issue. I selected Ken G3KIP's letter for publication to represent the other 50 or so supporting E-mails from readers as it sums up the support for Lawrie and other Foundation Licence operators very well. Thank you all for taking time to write in on the subject.*

Gilbert Davey 1913 – 2011

Dear Rob,
Gilbert Davey, the author on radio and electronics for young people, perhaps best known for his book *Fun with Radio*, died at Peterborough on April 6th, aged 97.

Born in North London in 1913, Davey began experimenting with radio as a boy of 14, and continued to follow technical developments as a young man. He served in the Royal Signals during the Second World War, and is believed to have taken part in clandestine operations in France. At the end of the war, he was the first British Amateur to operate a transmitter in the British sector of Berlin, contacting all parts of the world with a mere 10 watts of power.

Davey returned home to take up employment with the Pearl Assurance Company. Quite by chance, his spare-time interest in radio became known to Jack Cox, editor of the *Boy's Own Paper (BOP)*, and he began contributing radio designs and articles. A succession of designs appeared, calculated to appeal to the intelligent boy, and included a beginner's one-valver, a simple three-valve set, a high-fidelity amplifier, a 'holiday' radio set, and a bicycle-mounted radio – not to be used on the move! After initial caution over the cost and unreliability of the early transistors, Davey embraced the new technology with a variety of transistor and hybrid designs until the *BOP* ceased publication in 1967.



Gilbert Davey 1913–2011.

During September – November 1957, Davey made the first of several television appearances with a six-part series on construction of a simple one-valve set. Within a few days of the first programme he received over 26,000 letters!

At around this time, Davey's first book, *Fun with Radio*, was published, and featured past *BOP* designs or updated versions of them. This was edited by *BOP* editor Jack Cox, and boosted his already considerable popularity among young constructors. The collaboration with Jack Cox on his books outlasted the closure of the *Boy's Own Paper*, with five further editions of *Fun with Radio* (the last UK edition appeared in 1978), together with *Fun with Short Waves*, *Fun with Transistors*, *Fun with Hi-Fi* and *Fun with Silicon Chips in Modern Radio*. This last was published in 1981, the year of Jack Cox's death.

As an amateur himself (he remained with Pearl Assurance until retirement), Davey never lost sight of the problems facing the young amateur constructor: lack of experience and skill, lack of expensive tools or test gear, and also the changing availability of components. In the face of criticism by some reviewers, he continued to include simple crystal and valve designs so that young experimenters could use old components and grasp first

Front cover of July 1950 *Boy's Own Paper* (copyright Lutterworth Press), which shows Gilbert Davey's 'Holiday Radio', designed to work satisfactorily with just a short aerial thrown over a tree branch. This picture beautifully sums up the ethos of the *BOP*: a wholesome outdoor life with "the chaps"!

principles. He never pushed theory hard, but encouraged readers to learn the symbols and perhaps take a radio periodical or consult library books. Safety was however dealt with carefully - this was especially important for the mains-powered designs, some of which did not use isolated power supplies.

Reading one of his articles, any schoolboy would think "I could knock that together!", and achieve the deep satisfaction of putting an assortment of lifeless odds and ends together and hearing it *work*. Gilbert Davey's long association with the *Boy's Own Paper*, and with Jack Cox, was a source of great pride to him, as was the fact that he had introduced thousands of young people to a fascinating hobby or a fulfilling career.

I have drawn upon my own prior research for much of this account, but I am indebted to Mr Tom Dougall, a former Pearl colleague, for some points of information relating to Gilbert Davey's wartime role and his career with Pearl Assurance.

Les Franklin
Leighton Buzzard
Bedfordshire

***Editor's comment**: Thank you for your excellent tribute Les. I didn't know anything of Gilbert Davey myself, but I'm sure some of our readers will have read his work. Despite much research (thank you **Ian Brothwell G4EAN** of the **Radio Amateur's Old Timers Association** for your help) we've not been able to match a callsign to his name yet. However, I have no doubt that a reader somewhere will have the information!*

Searching For G3GPO Callsign Holder

Dear Rob,
I am trying to trace the holder of the callsign **G3GPO**. My research from a 1950s callbook shows it as being listed as a Post Office Social and Sports club in Bradford Yorkshire. Other than that I do not have any other information to go on – I believe the callsign was relinquished in the mid to late 1950s.

The reason for the research is to get the callsign re-issued for a new club station in Hertfordshire. I ask that any readers that could help, with either the callsign or the club involved, to please E-mail me via **thorpe.319@ntlworld.com** or via post. Thank you.

David Thorpe G4FKI
70 Willow Way
Ampthill
Bedford MK45 2SP

Drop-in Replacements for 7805 Regulator Chips

Dear Rob,
I was interested in the article in May 2011 *Practical Wireless* page 31 by **Mike Bush G3LZM**, concerning the 'Drop-in' replacement for the old 7805 regulator chip. A few years ago, I constructed a small 10GHz transverter using SMD. The design needed a -5V supply for the GaAs f.e.t. devices. While looking for a suitable device, I came across a small plastic module that was available from Farnell at the time. This device took in the +5V supply and produced a -5V regulated output. It seemed to fit the bill in size and price.

So, I incorporated it in the transverter. While testing and aligning the unit I found that I had lots of spurious signals, very unstable and appearing across the bandwidth of the intermediate frequency.

I could also see these signals on the transmitter output on a spectrum analyser. I tracked down the signals to this new regulator module. These units, unlike the 78/7905 linear devices are small SMPS (switched mode power supplies). Sure, they are very efficient devices, and as the author Mike G3LZM mentioned, they don't get hot, but they do produce lots more noise than a 78/7905. According to the Recom R.785.0-0.5 datasheet it's over 30dB more noise than a 7805, even with a 100µF capacitor across the output. The switching frequency is around 300kHz.

If this unit is used to supply a v.f.o., or even worse, a voltage controlled oscillator (v.c.o.). The constructor will probably grow lots of grey hairs trying to puzzle out what is causing the spurious signals.

In my own home-brew transverter, I tried to filter out the noise, to no avail. So in the end I ditched it for a separate linear regulator 79L05+7660 and my problem was solved.

So, efficient, cool running, drop-in replacement items may appear to be useful, but beware! Best regards to all at *PW* 73.

Carl Langley G3XGK
Oulton Broad
Lowestoft
Suffolk

Reader Feed-back on Droitwich 198kHz Reception

Dear Rob,
The 198kHz carrier from Droitwich is detectable throughout the day here in a narrow filter but after dark it is adequate entertainment quality unless thunderstorms are around. I use a Welbrook l.f. loop and Ten-Tec 320 modified for l.f. use. Regards

Bev Ewen-Smith
Algarve, Portugal

Dear Rob,
Droitwich now uses what amounts to 'downward modulation'. The peak power does not increase with speech as with standard a.m. Perhaps this accounts for the reduced coverage? On the other hand, other long wave stations use upward controlled carrier mod. You can quite easily see the envelope of these transmissions on an oscilloscope by using a tuned frame antennal connected to the Y amp.

David Sumner G3PVH
Southwater, West Sussex

Dear Rob,
In response to your request for reception information on BBC radio on long wave.

In 1974 when I was a Cadet Engineer on my first trip to sea we were loading iron ore in Murmansk over Christmas and New Year. The authorities sealed the radio shack during our stay and reception of the BBC World Service was impossible due to continual jamming. (The Soviet naval dockyard for the Soviet Northern Fleet was opposite the commercial harbour).

Fortunately, they forgot about the l.f. d.f. receiver on the bridge which was capable of receiving BBC Radio 4 after about 1800 (local) with good clarity. We spent several hours on the bridge to catch up with news from home – our only link with the 'normal world' in the dark days of the Cold War.

Moving on to March this year, I was able to receive BBC Radio 4 on long wave in Lyon in central France with a good signal from around 2000 GMT. Regards,

Colin Topping GM6HGW
Glenrothes
Fife, Scotland

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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The AMSAT-UK FUNcube Yahoo Group

In less than the six months since it was founded, the AMSAT-UK FUNcube Yahoo group has attracted over a thousand members.

Set up by **Rob Styles M0TFO** the group covers both the FUNcube 70cm/2m Satellite currently under construction and the popular FUNcube Dongle 64-1700MHz Software Defined Receiver (SDR). The Dongle was developed to provide a low cost means of receiving the FUNcube satellite but with its wide frequency range users have found a variety of uses for the dongle. As well the Yahoo group Rob also runs the AMSAT-UK Facebook page.

Thanks to **Adam Brooke M0HKY** FUNcube information is now also available on Twitter which has proved to be a fast and efficient means of getting news out direct to peoples PCs and mobiles. As well as the online presence AMSAT-UK also produce a quarterly colour A4 printed newsletter OSCAR News packed full of information on Amateur satellites.

Further information via FUNcube Yahoo group: **http://groups.yahoo.com/group/FUNcube**
Twitter: **http://twitter.com/FUNcubeUK**
Facebook: **http://facebook.com/pages/FUNcube/166466266717747**
Join AMSAT-UK: **http://tinyurl.com/JoinAMSAT-UK**

Introduction to Amateur Radio the Practical Way!

The Mayo Experimenter's welcome to visitors is as big as their banner!

The Mayo Radio Experimenters Network (MREN) in the Irish Republic are planning a series of practical, 'hands on', open days throughout the summer months, that commenced Sunday May 8th. The events will start at 13.00 local time approx (weather permitting) and will take place on the following dates: The first event on Sunday May 8th. Future dates are Sunday June 12th, Sunday July 10th, Sunday August 14th and Sunday September 11th.

Anyone with an interest in radio related matters, who would like to have the opportunity to participate or observe the operation of an Amateur Radio station, or meet club members, will receive a warm Mayo welcome!

Whatever your level of interest, the club will be pleased to help in taking your interest further, be it a complete novice, shortwave listener or formal assistance in progressing to a full Amateur Radio Licence.

The locations will be chosen in the mid Mayo area in order to encourage attendance from all parts of the County or further afield.

If you would like further details including full details of locations please contact: **Padraic Baynes EI9JA** on 0876957154 or E-mail **pbaynes1@eircom.net** or you can E-mail **David Hatfield EI3ECB** on **ei3ecb@gmail.com** or text or phone the club mobile 'phone number 086 20 89 777. Everyone is welcome!

Software Defined Radio Club

Adrian Lane 2E0SDR contacted *Newsdesk*, "I have just started The Software Defined Radio Club.The website is www.softwaredefinedradio.co.uk The idea is to create a global community dedicated to the technology of Software Defined Radio. Membership is free.

The site is being run as a dedicated Portal with all members being able to add content to the site. Kit suppliers and manufacturers of SDR products are welcome to advertise there products on the site free of charge.

We will also offer **free** hosting to any group or project that wishing to work out of the site, in return for content. The site was officially launched on June 1st 2011.

Adrian Lane 2E0SDR, Administrator SDR Club, 8 Sunny Bank, Coleford, Gloucestershire GL16 8EL
E-mail via **admin@softwaredefinedradio.co.uk**

New Product MFJ-266

Essex-based Waters & Stanton PLC have announced they will soon be importing the new MFJ-266 digital antenna analyser. This unit is an h.f./v.h.f./u.h.f analyser, which, Waters & Stanton say "... is similar to the MFJ-269 but with less features." It doesn't have analogue meters – only digital readout. Retail price is £339.95. Waters & Stanton report they shall have stock towards the end of May.

Contact Sales at **Waters & Stanton PLC**
Tel: (**01702**) **206835/204965**
Fax: (**01702**) **205843** E-mail: **sales@wsplc.com**
Web: **www.wsplc.com**

Bath Buildathon At QRP In The Country!

Tim Walford G3PCJ reports, "The renowned Bath Buildathon team led by Steve Hartley G0FUW will be supervising construction at this year's QRP in the Country event being held at Tim Walford G3PCJ's Upton Bridge Farm, Long Sutton, Somerset TA10 9NJ on Sunday July 17th 2011.

The project will be a Cary Regen receiver (see photo) – in its simplest form the Cary is a single band receiver 1.8, 3.5MHz, or the medium wave band. But there's also a 3-band option for 3.5, 7 and 14MHz (20, 40 and 80m) – see the Walford Electronics' website for more details. Those wishing to take part should send payment by cheque or Paypal to Walford Electronics at Tim's address. The cost is £40 for the 3-band version and construction is expected to take three to four hours, so there will be time for you to see the other attractions! The closing date for entries is July 4th. Places are limited – so book early!

The **Rev. George Dobbs G3RJV** will be attending and commenting on a 'Show & Tell' display – please bring along lots of home-brew things for all to see! **Rob Mannion G3XFD** and **Tex Swann G1TEX** from *PW*, and *PW* authors **Phil Ciotti G3XBZ** and **Colin Redwood G6MXL** will also be attending. The RSGB and other QRP personalities will also be there!

Working Replicas

The G3GC replica 1930s Plank equipment, vintage wartime gear, several club displays and individual stalls with a full range of Walford Electronics kits will be on show. There will also be a construction clinic for those needing advice or a little help to get something working. There is still plenty of space for more club stalls or displays – I am very keen for more of them - let me know please! There is no charge for attendance. Gates open 10am.

Local food and drink from the farm and the next door brewery will help lighten the day! Tim's wife Janet will lead a short farm walk for those wishing to see the Somerset countryside. The radio event will be held outside – but if it's necessary will be moved into the (clean!) farm barns. We're looking forward to seeing you on the day!
Tim Walford G3PCJ.
Further details from:
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Langport
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Tel: (**01458**) 241224
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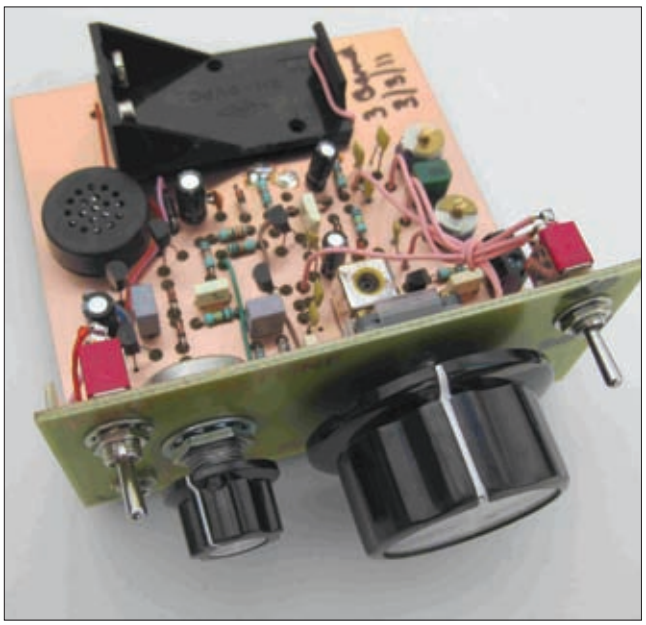
Website:
www.users.globalnet.co.uk/~walfor/



The Cary regenerative receiver. You could build one on Sunday July 17th with the help of the Bath Buildathon team!

Exam Successes At Dorking & District Radio Society

Garth Swanson G3PNC from the **Dorking & District Radio Society** (D&DRS) wrote to *Newsdesk*: "Two of our members recently obtained their call-signs after their success in the Foundation examination tutored by D&DRS chairman **John Kelly G3YGG**.

David Berry, aged 12 and who now has the callsign **M6PIC** (**Fig. 1**) a pupil at **City of London Freemen's School.** The other successful candidate was **Keith Bell (**who is retired) with the callsign **M6BMB**.

A recent talk at Dorking was about design using PIC chips and was given by **Paul Warman G0ODP**. The photo (right) shows David participating in the demonstration helping Paul to enter callsign data into the program for the iambic keyer PIC design. David had passed his Foundation on the day of the talk and appropriately went on to choose M6PIC as his call.

David's entry for the examination was part of an 'agreement' with his father **Colin**, also a DDRS member, that if he passed his father would apply for his callsign too. Colin passed the RAE 29 years ago – without applying for a callsign. He is now **M0GXV**. Could this be a record?

Personal Challenge Evening May 24th: On May 24th, a few of our club members have agreed to talk about some of their radio- related project challenges. This was an opportunity to hear about and discuss the difficulties they faced, if and how they were overcome, and the current status of their projects. The subjects and their presenters included:

Designing & Building A Wide Dynamic Range Field Strength Meter by Garth Swanson G3NPC. Garth described the theoretical and practical difficulties faced in designing and building a field strength meter possessing a wide dynamic range.

Software Defined Radio by George Brind G4CMU. Modern communications is heavily reliant on computer and software-based techniques. George discussed his experiences with Software Defined Radio (SDR).

Building a WSPR Interface by **Walter Blanchard G3JKV**. Walter has been successfully operating a WSPR station for some time. He briefly described the principles of WSPR and will describe how an interface between his rig and computer was developed to establish effective computer control of his station and interface to the Internet – to glean propagation data.

Learning and Using Morse Code by **David Smith M0SXD**. David provided a *PowerPoint* presentation describing his experiences of learning and using Morse code and some of the tools and learning. Further information from:
Garth Swanson G3NPC, Programme Secretary
Dorking and District Radio Society (DDRS)
G3NPC@swansons.org.uk
Website: **www.clubbz.com/club/2158/dorking/dorking-district-radio-society**

Stop Press News!

Note:** A review of this transceiver is under way and will appear in PW soon. Watch this space! **Editor.

New 10 Metre Band SSB/AM & FM Transceiver From Nevada

Just as *PW* was going to press, **Mike Devereux G3SED** of Nevada Radio in Portsmouth contacted *Newsdesk*: "I'm pleased to announce the introduction of a new 28MHz (10 metre) s.s.b. transceiver from Anytone the AT-5555-N. The N suffix version is pre-programmed to cover just the 28 to 30MHz Amateur band with a 6 band 60 channel frequency selection and fine tuning to organise favourite frequencies for fast tuning. The transceiver provides a.m., s.s.b. and f.m. transmissions with a power output of 21W on s.s.b. and 12W on a.m. and f.m .

"Priced at just £149.95 plus p&p and supplied complete with microphone and mounting bracket, this radio is an ideal low cost way to enjoy the current good conditions on 10 metres".

Mike Devereux G3SED
Managing Director
Nevada, **Unit 1 Fitzherbert Spur, Farlington, Portsmouth, Hampshire PO6 1TT**
Tel: (**02392**) **313095** FAX: (**02392**) **313091**
E-mail: **sales@nevada.co.uk** Website: **www.nevada.co.uk**

Caister Marconi Radio station GB0CMS Contacts 24 Countries

Radio Amateurs at the Caister Lifeboat Visitor Centre in Norfolk managed to contact more than 160 other Radio Amateurs in 24 different countries on Saturday April 30th when they took part in the annual **International Marconi Day** to mark the inventor's birthday.

Using the call **GB0CMS**, notable contacts included Amateurs in Louisiana and Virginia, USA, and other Radio Amateurs aboard *HMS Belfast* in London. Other contacts included a special Marconi station in Italy at the Italian Navy Technical Naval Museum in La Spezia. Contacts closer to home included many other Radio Amateurs around the UK, including some of the other Marconi stations in Daventry, Salisbury and Fraserburgh, Scotland.

The Norfolk Amateur Radio Club (NARC) ran the all-day special event station at Caister Lifeboat Visitor Centre to commemorate the village's original Marconi Wireless Station, which was established at Caister in 1900. The station was in a house in the High Street known as Pretoria Villa and its original purpose was to communicate with ships in the North Sea and the Cross Sand lightship.

On Saturday, the closest to Guglielmo Marconi's birthday, stations around the world were set up at sites with historical links to the inventor's work. These include Poldhu in England; Cape Cod Massachusetts; Glace Bay, Nova Scotia; Villa Griffone, Bologna, Italy and many others.

The NARC public relation officer **Steve Nichols G0KYA**, who organised the event, said: "We were very pleased with the way the day went and it just shows what you can do with radio using just 100W – about the same power as an average incandescent light bulb.

"Conditions were far from ideal as a solar flare had disrupted the ionosphere earlier on Saturday. We also had to contend with near gale-force winds coming off the North Sea.

"Considering we set the whole station up on the Saturday morning, including erecting the two antennas, installing the radios and computers, and had it all taken down again by the end of the day that's quite a feat – I think Marconi would have been proud!"

Keith Johnson M0DZB operating GB0CMS.

About Norfolk Amateur Radio Club

The club has more than 100 members, a strong history dating back to the 1950s and has a very active calendar of talks, events, special event stations and courses. It meets at 7.00pm on Wednesdays at the **Sixth Form Common Room**, **City of Norwich School**, **Eaton Road**, **Norwich**, **Norfolk NR4 6PP**, with formal proceedings starting at 7.45pm.

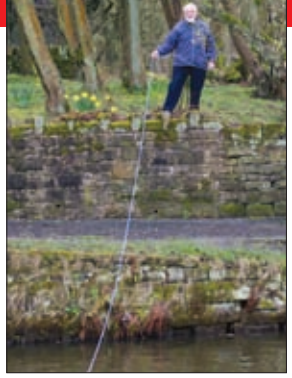
NARC Press Officer
Steve Nichols G0KYA
Tel: (**07899**) **992389**
steve@infotechcomms.co.uk
David Palmer G7URP (NARC Chairman)
radio@dcpmicro.com
Tel: (**01953**) **458844** or (**07768**) **724485**

Top Dealer Award for ML&S

Martin Lynch G4HKS receives the prestigious "Amateur Radio Dealer of the Year 2010/2011" award from Kenwood's Amateur Radio Sales Manager **David Wilkins G5HY**. Martin and his Sales Manager **Richard Atcherley G1GRD**, were welcomed to Kenwood House by Andy Dawson, National PMR Sales Manager, who told them that "the year on year increase in ML&S' sales of our radios, especially in the face of the recession, was achieved by your dedication to service combined with a first class product knowledge amongst all your staff."

Pictured here are Richard, Martin, David and Andy outside the distinctive Kenwood Headquarters building in Watford, Hertfordshire.

Making Radio Waves On The Huddersfield Narrow Canal



It might look like the *Last of the Summer Wine* sketch where Compo Symmonite falls in, but Brian Stocks G0BFJ is actually pulling the antenna across the canal!

Darran Chappell G0BWB and Phil Morley G4FSQ secure the mast.

Richard Blandford M0RBG makes the first QSO on 7MHz.

Richard Blandford M0RBG contacted *Newsdesk*, **"The Denby Dale Amateur Radio Society** (DDARS) were privileged to take part in the **Standedge Canal Tunnel's** 200th birthday party on April 2nd and 3rd by operating **GB200HNC** from Tunnel End, Marsden, near Huddersfield, also famous on TV for locations featuring in the TV series *Last of the Summer Wine*. The celebrations were to mark the opening of the longest, highest and deepest canal tunnel in the UK on April 4th 1811. Ofcom were most helpful in giving the special, special call sign and **British Waterways**, who organised the bicentenary celebrations, made us especially welcome and endorsed the club's licence application.

"Five club members met at the Visitor Centre on Thursday morning thinking it would only take a few hours to set up the station – how wrong could they be! Support for the centre of a trap dipole with our telescopic mast, sat on the first floor balcony, take one leg of the dipole over to the other side of the canal and the other to the railway bridge, how difficult could that be? The mast wasn't high enough so the wire antenna snagged on the roof tiles, right, 'let's lift the whole thing up another floor' someone suggested!

"Saturday morning dawned following many hours' hard work and we were finally ready! and The warm spring sunshine glistened on the suspended trap dipole, all was well with the world as the FT-1000MP roared into life 'calling CQ 40 metres'. That was the first and almost the last 'CQ' of the day as wave after wave of stations came back to us in unrelenting fashion and the pile-up continued until late afternoon.

"We worked over 300 stations and had visits from **Jacqui** of **Pulse FM**, a local Independent Commercial radio station, British Waterways, the local film makers club, who were making a documentary of the event, visiting Amateur **Joop van der Does PA3JD** from Holland and many more members of the public who enjoyed exchanging greetings message with some of our contacts.

"On Sunday conditions were not quite as good as the previous day but overall we still made almost 500 contacts over the weekend, mainly on 7MHz and we had over 900 hits on *QRZ.com GB200HNC*. A local artist who visited the station has agreed to let us use one of his watercolour paintings of the canal basin for our special QSL cards, which will be sent to every station we worked.

"All in all it was a fantastic weekend of Amateur Radio enjoyed in beautiful surroundings where we were made most welcome by our host and the many other organisations taking part in what was a unique event in the history of our local industrial heritage. Such was the success of the event we have been invited back to do it all again on July 23rd and 25th so please listen out for us again!"

"The biggest compliment received by the station came from a group of ladies who were manning a craft stall near to our operating position. "We have really enjoyed having you guys in the room" they said. "You really have created a great atmosphere with your banter and chatter on the airwaves". Now, how many times have you heard your XYL say that?"

Richard M0RBG

Silent Keys

Robin Trebilcock GW3ZCF

The Editor plays tribute to a dedicated Radio Amateur who lived a truly remarkable life.

Many tributes have been paid following the death of a Radio Amateur who helped transform college education in Neath, South Wales. Former college principal **Robin Trebilcock GW3ZCF**, originally trained as a nuclear physicist and undertook research in neutron particle physics and reactor physics at Harwell in Oxford. Robin lectured in a number of higher education institutions before joining Neath Technical College. In 1982 he was appointed to set up the first tertiary college in West Glamorgan. He also led the college into incorporation in 1993. Robin retired in 1998. Robin was a keen bellringer started ringing at the age of 14 at St Andrew's Church, Headington, Oxford. Robin met his wife **Pam** 48 years ago. He died on Friday, March 4th, 2011 at his home in Bishopston, Swansea. My sympathies goes to Pam Trebilcock and their children **Duncan** and **Anna** and the grandchildren. The funeral was held on Monday March 21st, at Swansea Crematorium and was was led by Canon Andrew Knight, Vicar of Sketty. I shall miss hearing Robin's gentle voice on the 'phone at the *PW* offices and his quiet enthusiasm for Amateur Radio and his goodwill to fellow Radio Amateurs. **G3XFD**.

Angus Duncan Taylor G8PG

The Editor writes: For those of us who enjoyed the **Mini QRP Conventions** held at **St. Aidan's Church** in **Sudden**, **Rochdale**, the ever smiling face and helpful nature of Angus 'Gus' Taylor G8PG were an important part of the day – and were certainly an 'institution'. Gus always seemed to be there, to be available and he was always prepared to share his extensive knowledge of Amateur Radio and construction. From the stories he (reluctantly – with the same reticence shown by many survivors from the conflict) shared with me on his Second World War experiences on Atlantic Weather Ships – he was fortunate to have survived this single episode of his long and adventurous life. Gus G8PG, who died peacefully on Saint George's Day, April 23, 2011, was 91 years old.

The life of this totally dedicated Radio Amateur was celebrated at a memorial service held at 11.30am on Thursday April 28 at Greasby Methodist Church in Greasby, Wirral. It was followed by luncheon at Peel Hey. Our sincere condolences to his family. **G3XFD**.

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MR2 POWER ROD	2/70cm, Gain 3.5/6.5dBd, Length 50cm, PL259 fitting (fibreglass colinear)	**£26.95**
MR3 POWER ROD	2/70cm, Gain 2.0/3.5dBd, Length 50cm, PL259 fitting (fibreglass colinear)	**£32.95**
MRQ800	6/2/70cm Gain 3.0dBi/5.0/7.5dBdBd, Length 150cm, PL259 fitting (high quality)	**£39.95**
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SQBM200N	2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, N-Type	**£59.95**
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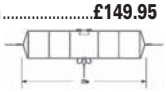
SQBM500N	2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, N-Type	**£79.95**
SQBM800N	2/70cm, Gain 8.5/12.5dBd, RX 25-2000MHz, Length 520cm, N-Type	**£139.95**
SQBM1000P	6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, SO239	**£84.95**
SQBM1000N	6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, 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**

MTD-300 2-30M Broadband wire dipole antenna £149.95



The MTD-300 broadband 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.

HF Verticals

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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**

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John Cooke GM8OTI continues his introduction to microwaves.

Microwave RF Sniffer

As part of his introduction to microwaves John Cooke GM8OTI builds a basic home-built microwave power detector. He says "Why not have a go at surface mount construction?"

Welcome to the latest up-date describing my introduction and adventures on microwaves! When I began my 1.3GHz transverter I knew that some test equipment would be needed – but for my first steps managed with very little.

My shack already contained the usual multi-meter and low frequency oscilloscope, and other tools used by a typical home constructor. The new essentials built were a cavity wavemeter and this 'microwave r.f. sniffer', which is useful on its own and also as a detector for the wavemeter.

Single Circuit Board

The microwave sniffer has been improved by building the whole unit on a single circuit board, adding a buffered signal output and a sound output. The signal output allows a voltmeter to be connected for a more precise reading. The sound output, although not great in range, is useful in a situation where it is not easy to make adjustments and watch the display at the same time.

I make no claims of originality for this device; when looking for a suitable power detector I came across an article in the RSGB/ARRL *International Microwave Handbook (2nd edition)*. This described a design originally by **Paul Wade W1GHZ*** which also included a detector for the high frequency (h.f.) and very high frequency (v.h.f.) bands. What appealed to me was the use of *Linear Technology's* LTC5508 which is an r.f. power detector covering 300MHz to 7GHz and available in the UK for a couple of pounds from both *Farnell* and *RS*.

The LTC5508 is the heart of this microwave sniffer, and is a tiny 6-lead SC70 package. This means soldering on a surface mount board, which requires rather more care and precision than soldering wire ended components or 0.1 inch pitch integrated circuits. Without the optional sound output, only the LTC5508 and three or four capacitors need to be SMD (surface mount devices); more traditional components are used for the display.

This microwave sniffer could be an excellent introduction to surface mount for anyone who has not tried this technology before but is prepared to 'have a go'. It's not too difficult and produces very satisfying results!

John GM8OTI and I contacted Paul Wade W1GHZ to advise him of the* PW *project based on his work. We thank him for the generous way he shares his ideas with the Amateur Radio fraternity.* ***Editor**.*

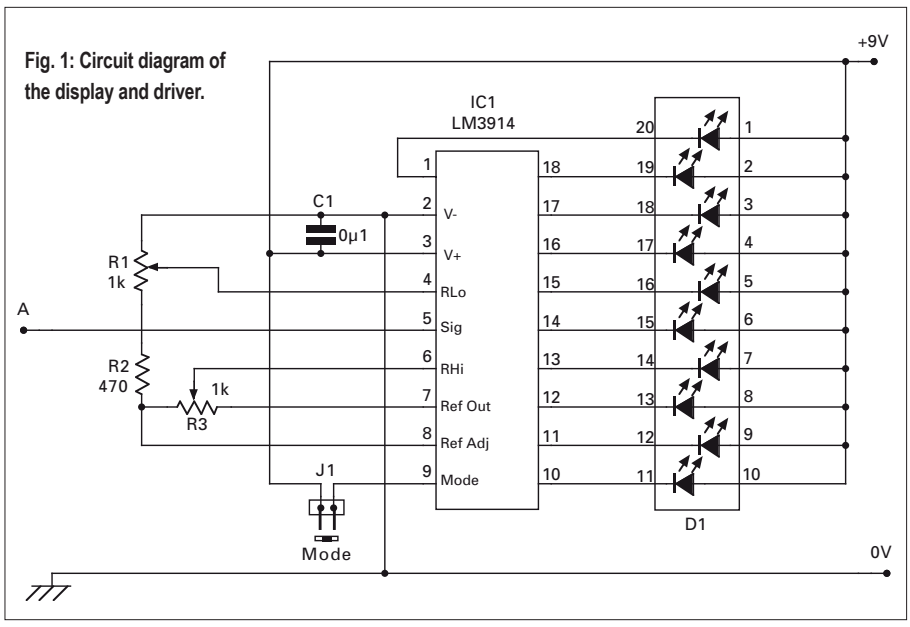

Fig. 1: Circuit diagram of the display and driver.

How It works

The LTC5508 uses Schottky diodes to detect the r.f. signal. It has a non-linear response which is very roughly logarithmic, and has a usable signal input range from about 0.01mW (-20dBm) to 10mW (10dBm), a dynamic range of 1000:1 (30dB). The output is not precise enough for accurate measurements of power – but it gives a very useful indication.

The LM3914 display driver responds linearly, so that each step in the display (the 10 l.e.d. bars) corresponds to an equal increase in voltage at the input. This means, very roughly, that each bar in the display corresponds approximately to a factor of two in input to the LTC5508.

Circuit Description

The 10 segment l.e.d. bar display (D1) is driven by a *National Semiconductor*

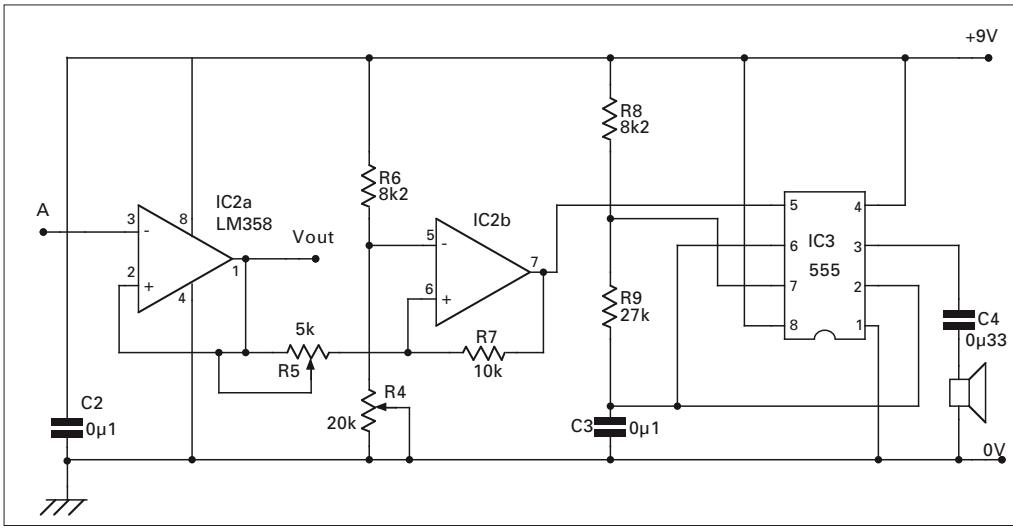

Fig. 2: Circuit diagram of the detector output voltage buffer and sound generator.

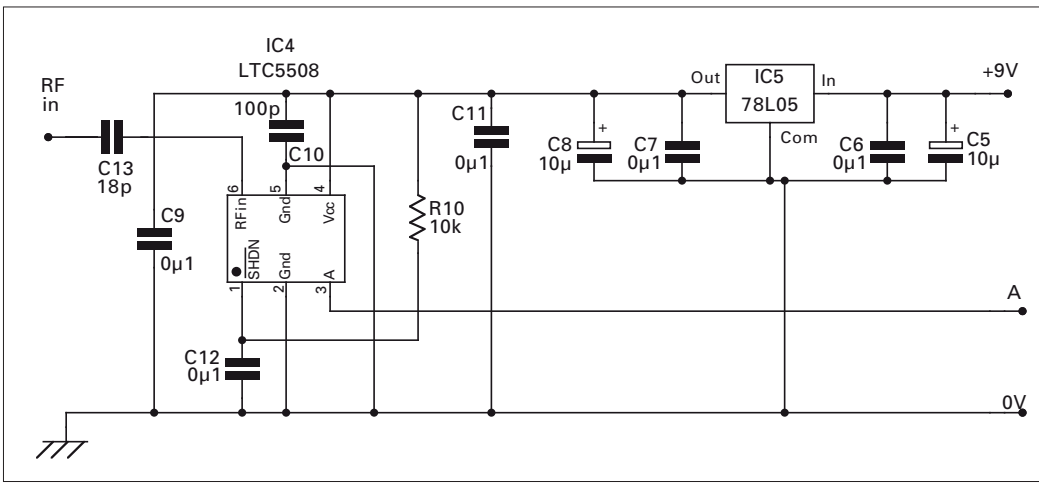

Fig. 3: Circuit diagram of the detector and the voltage regulator.

LM3914 dot/bar display driver (IC1) (**Fig. 1**). This combination is used in many projects found on the web.

The LM3914 has an internal resistor chain and a set of 10 comparators which allow the input on pin 5 (Sig) to be compared with voltages along the chain, the end points of which are set by trimmer resistors R1 (for VLo) and R3 (for VHi). The comparison voltage is provided by circuitry in the LM3914 controlled by the values of R1, R2 and R3. These values also control the current through each l.e.d. in the display which is about 10 times the current drawn from pin 7 (Ref Out).

Pin 9 (Mode) on the LM3914 sets 'dot' or 'bar' mode. The 'dot' mode is preferable for battery operation since only one light emitting diode (l.e.d.) is powered at once, while 'bar' mode provides a varying bar length depending on the input, thus taking more current when more than one l.e.d. is lit. This selection can be hard wired, or a jumper (J1) added to the board to allow the mode to be set as an option.

The (optional) voltage buffer and sound output (**Fig. 2**) use LM358 and NE555 devices. The LM358 provides two operational amplifiers which can be operated using a single power supply rail; one is used to buffer the output voltage from the r.f. detector, and the other to set the control signal level for the NE555 timer.

The NE555 itself is wired in astable mode, with the oscillator frequency determined by R8, R9 and C3, but adjustable by changing the voltage on pin 5 (CONT). The exact zero point and range of frequency produced are set by R4 and 5 respectively. This provides a simple, though limited in range, voltage to frequency converter.

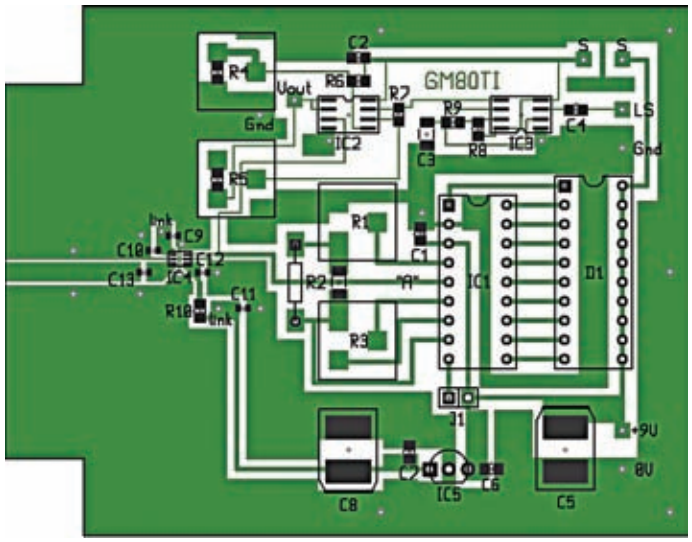

Fig. 4: The circuit board layout provided by John GM8OTI, is on double-sided p.c.b. material with some connections to both sides of the board.

The NE555 output (pin 3) drives a small loudspeaker through a d.c. blocking capacitor C4.

The LTC5508 requires a 5V power supply which is provided using a 78L05 regulator (**Fig. 3**). This is de-coupled for low and high frequencies on both input and output sides by C5 to 8.

De-coupling around the LTC5508 itself has to be carefully designed; microwave signals have a tendency to leak everywhere! Pin 4 (Vcc) is de-coupled to high frequencies by C10 and to lower frequencies by C9, both mounted very close to the device. In addition, there are several connections very close to the LTC5508 between ground on the track side of the board and the ground plane on the other side. **Note:** these are essential at microwave frequencies.

The input to the LTC5508 is via a 50Ω microstrip line (not shown on the circuit diagram) with the input (pin 6) isolated to d.c. by C13. The 'shutdown' function of the device (pin 1) is not used, so this pin is taken high by pull-up resistor R10 and decoupled by C11 and 12. The detector output voltage is taken directly from pin 3 to the buffer, display driver and sound generator circuits.

Sniffer Construction

The sniffer is constructed on a double-sided FR4 (glass/epoxy) printed circuit board (p.c.b.). Components are mounted on the track side of the board, with the exception of the l.e.d. bar display. Use normal precautions for handling static-sensitive semiconductors.

The diagram, **Fig. 4**, shows the layout for track side of the board; the reverse (ground plane) side is completely masked during etching.

The board should be drilled for ground links, connection pins, the display and driver i.c. pins and jumper J1 (if required). The copper is removed around all holes on the ground plane side of the board except those for ground links and grounded connector pins. Any mounting holes and cut-outs to fit the box to be used should be made at this stage, and if you want to fit a board-mounted BNC connector the holes for that should also be drilled.

It's best to build and test the board in stages. First, solder links between the ground plane and ground tracks on the track side of the board. This can be done using off-cuts of wire from wire ended resistors and capacitors, or the wire from single cored connecting wire. The ends should be cut close to the board on both sides.

Next, solder all the connection pins required; ground pins should be soldered on both sides of the board. Then mount the components in Fig. 1 and add the connector for the 9V battery.

Most frame trimmer resistors will need their connections trimmed for surface, as opposed to through-hole, mounting. The board layout allows for R2 to be either a surface mount component or a wired component. The LM3914 pins are soldered on the **track** side of the board; only pin 2 is soldered on the ground plane side.

A test voltage source can be made up (**Fig. 5**) and connected to point 'A' in Fig. 1. With R1 and R3 set to their mid points, varying the input voltage should result in the l.e.d. bar lights running up and down as the voltage is changed.

With the test input set to about

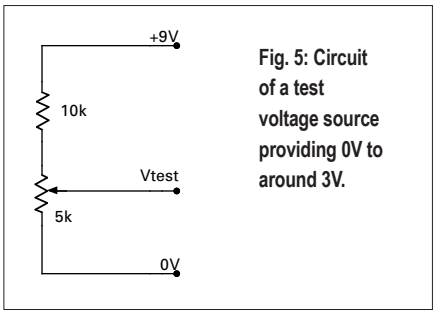

Fig. 5: Circuit of a test voltage source providing 0V to around 3V.

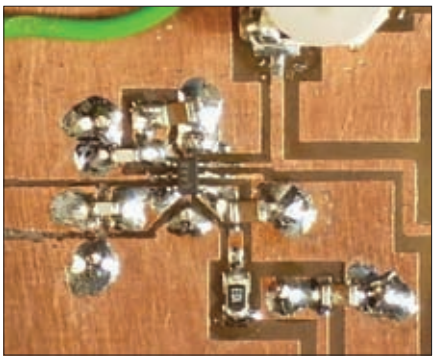

Fig. 6: Close-up of the LTC5508.

0.25V (the expected output level from the LTC5508 with no input signal), R1 is adjusted so that the least significant l.e.d. is lit. With an input of around 2V (maximum output from the LTC5508), R3 is adjusted so that the most significant l.e.d. is lit. These settings can be finalised once the LTC5508 is added.

Voltage Buffer

Then, if required, the voltage buffer and sound generator can be added. The circuit around the NE555 should be built and tested first. With R8, 9, C3 and 4 in place, the loudspeaker can be connected to the 'LS' and 'Gnd' pins, the 'S' pins connected together temporarily to provide a 9V supply, and the battery carefully connected. A low tone should be heard if all is working properly.

Disconnect the battery and add the LM358, C2 and R4 to R7. Please note that the NE555 and LM358 are fitted with their '1' pins in opposite directions!

Once again, connect the test voltage to point 'A'. With the circuit powered, as well as the l.e.d. bar lights running up and down as the test voltage is changed, the frequency of the sound should also go up and down. The exact frequency range can be adjusted with R4 and 5, although not very much. In addition, you should be able to monitor the test voltage on the pin marked 'Vout; on the board layout.

The Most Difficult Part

With the output sections of the microwave sniffer now built, the most difficult part comes next. Add an insulated wire link (holes marked 'link' in the layout) to provide 5V for the LTC5508.

Next, mount the pull-up resistor R10 and the de-coupling capacitors around the LTC5508 pads. Finally, take the LTC5508 out of its packaging and being very careful not to lose it (!) mount it in place. There's a small circle on the package to mark pin 1 – but a magnifier is really needed to see this clearly (**Fig. 6**).

Start by tacking down one corner pin of the device, then solder the pin on the opposite corner. Next comes the most tricky part – solder the middle (ground) pins on each side using the minimum of solder required to get a 'flowed' joint, as it is quite difficult to remove solder bridges across the pins (e.g. with de-solder braid). Finally, solder the remaining pins and return to re-flow the first corner pin.

The input connector must be connected directly on the board edge or surface. For microwave, using an SMA connector is desirable – although I used a board mounted BNC connector successfully for lower microwave frequencies in my first version of the sniffer. **Do not use** wires between the board and the connector as this will cause stray inductive losses at microwave frequencies! That's the board finished!

Testing Time

Now it's testing time! The LTC5508 has some sensitivity at 145MHz although this is below the frequency range specified in the data sheet. Using a short piece of wire as an antenna in the input socket, the microwave sniffer will easily produce a maximum output indication if it's near to the whip antenna of a low power transceiver putting out a carrier (e.g. f.m.) around 145 or 433MHz. With this maximum indication,

the top limit of the display range can be adjusted using R3 so that the most significant l.e.d. is illuminated.

Other test sources likely to be immediately available to the Radio Amateur are wireless computer routers and microwave ovens! Both operate at around 2.4GHz. A wireless router producing its beacon signal will cause the l.e.d. indicator to flash up and down by a few bars with the beacon pulses – if the sniffer antenna is close to the router antenna.

A microwave oven is also likely to leak a detectable signal through its door; the LTC5508 is able to detect signals as low as 0.01mW (-20dBm) input at 2GHz, whereas (I understand) the current safe limit for microwave oven leakage is 5mW/cm^2.

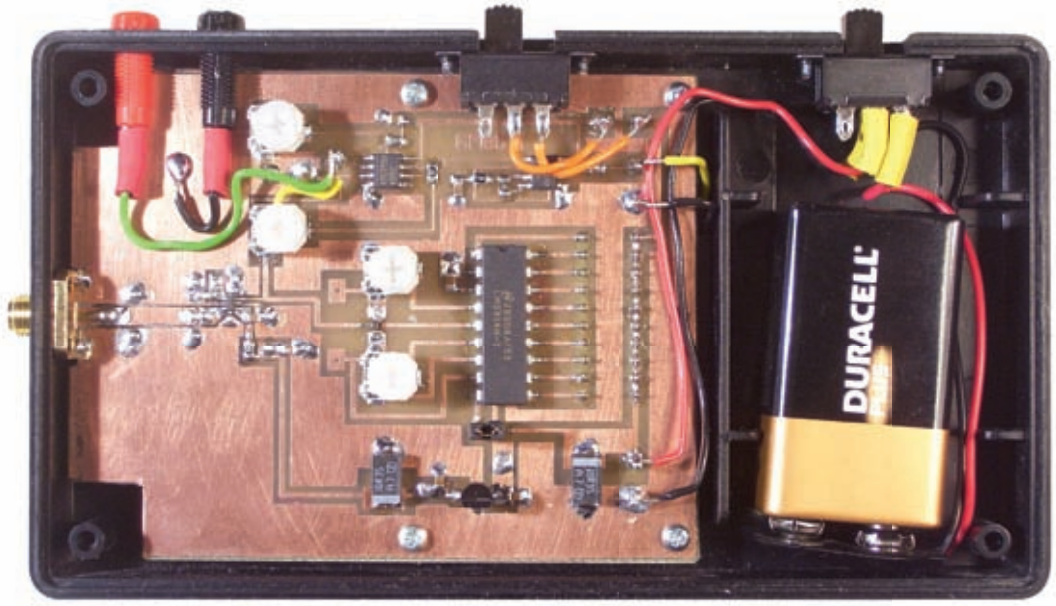

Fig. 7: The circuit board, completed and mounted inside the completed box.

Standard Project Box

The board was designed to fit in a standard size *Maplin* project box, **Fig. 7**, that has a battery compartment. The plastic box is easily drilled to take the input connector, make small holes for the loudspeaker, and cut out an aperture for the l.e.d. bar display. Slide switches are used for battery power and to switch the audio indication if required, and 2mm sockets for the buffered signal output.

Observant readers will notice that the sniffer has a yellow wire under trimmer R5 in This is because I made a minor change to the circuit after etching the board, having discovered that the LTC5508 could not drive the sound generator amplifier without being affected a little by the loading. I moved the input of that amplifier onto the output of the buffer amplifier, which does not overload the LTC5508. This change has been made to the circuit in Fig. 2 and to the layout in Fig. 4.

A small improvement (not on the circuit board) is to add a small power diode (e.g. 1N4001) in series with the positive battery lead; this avoids any possibility of causing damage to the circuit devices by connecting the battery the wrong way round.

Connected Directly

The microwave sniffer can be connected directly to the 'device under test' provided that the signal level is no greater than about 10mW into 50Ω. If an SMA input connector is used, then a BNC to SMA adapter is useful. A short antenna is easily made by using a BNC or SMA connector.

Fig. 8: Accessories – a short antenna and a inductive pick-up loop for sniffing along tracks on a circuit board.

Another useful addition is an inductive pick-up loop, made using a little single turn loop at the end of some coaxial cable. This is useful for tracing signals across a circuit board.

Links & Background Information

Paul Wade W1GHZ describes his *Portable RF sniffer and power meter* on the web at**: www.w1ghz.org/new/portable_powermeter.pdf**

At the time of writing, Down East Microwave in the USA have a kit 'ABPM' (all band power meter) for Paul Wade's design - it's in the 'Accessories' section of their online catalogue at**: www.downeastmicrowave.com**

Surface Mounting Tips

If you are new to surface mount soldering, here are some pointers. You need a fine soldering iron bit and fine solder – to get an idea of the ideal size, look at the pins on the components you'll be soldering! I use fine tin/lead flux cored solder (which is still available with health warnings); I have yet to try flux pens and solder paste.

You will also need sharp pointed tweezers, some wooden cocktail sticks and a firm support to hold the circuit board steady and horizontal. It helps a great deal to have an illuminated magnifier lamp. Ideally, you'll work on a perfectly clean bench with a clean floor – if not you have to be prepared to lose the occasional component in the dust and detritus of the shack!

The basic technique I find works well is as follows: first, tin the board lightly at the pad where one end of a resistor or capacitor, or one pin of an i.c., will be mounted. Then remove the component from its packaging and hold it carefully with the tweezers (using the hand you use to solder with) in the correct place on the board. Be especially careful to get i.c. orientations correct!

Then, take a slightly blunted cocktail stick in the other hand and bring it vertically down on top of the component to hold it in place. You can then let go with the tweezers. Take up the soldering iron and tack the component into place using the already tinned pad on the board.

If this has worked, when you (carefully!) remove the cocktail stick, the component will be held in place. If not, you'll need to try again. Once tacked in place you can solder the other end (or another pin) of the component properly; be careful, using the minimum of solder to "flow" the joint properly. Once this is done you can return to the other end (or other pins) of the component to "flow" the other joint(s).

I hope you'll enjoy making your own 'Sniffer' and that you'll join me – soon – in my next 'microwaves adventures in *PW*! **PW**

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The Fishtail Antenna

Roy Walker G0TAK, writing from his eyrie high in the Lake District, takes a look at a practical antenna developed by John Heys G3BDQ, a long-time *PW* author.

I'll start by looking at the history behind this article. It started a number of years ago when I got hold of a copy of an excellent book written by John Heys G3BDQ entitled *Practical Wire Antennas (PWAs)*, which was published by the Radio Society of Great Britain (RSGB). John Heys G3BDQ is well known to readers of *PW* as he's been one of the magazine's specialist antenna authors for many years.

I have read the *PWAs* from cover to cover many times and it really does give what it tells you on the cover *Effective HF Designs for the Radio Amateur*. What a pity it's no longer published.

One of the small items towards the end of the book, in the chapter *A Gallimaufry of Antennas* fascinated me, it entails a fish-tailed five band antenna made from aluminium foil! I actually made an example of this antenna as a demo at the **Thornton Cleveleys Amateur Radio Society** (TCARS) and it worked – giving an acceptable 'tune up' throughout the stated range.

We didn't have time to run a full set of tests on the antenna, which was pinned up on the Scout hut wall – but we did have a QSO into Moscow on 14MHz. Unfortunately because of its rather flimsy nature of the aluminium foil, it didn't survive for very long.

To be completely fair to John G3BDQ, the item was designed to be used tacked to the inside of the rafters in a house and was never intended to be a 'take it anywhere' multi-band antenna!

Triangular Shaped Radiators

The antenna, **Fig. 1**, consists of two triangular shaped radiators (dipole elements), each 4.5m in length and 450mm wide at the broadest end. Each broad end is 'notched' to a depth of 2.1m giving the distinctive fish tail appearance.

Because of the 'broad' shape of the dipole sections the antenna is itself broad banded and, although it is considerably shorter than a λ/2 on 20m, (10.68m) is useable from 14MHz to 30MHz with a low v.s.w.r. and without the use of an antenna tuning unit.

It's quite possible to make the antenna from rolls of kitchen foil, (at least 450mm in width). Heavy duty rolls up to 20m in length can be obtained. I decided to re-build the Fishtail and mount it in the loft. This time I considered opting for a more durable construction, not because it would need to withstand the weather – but because my triangular loft space 'crawl-way' measures 1.20m across, 610mm high and is 11.5 metres long.

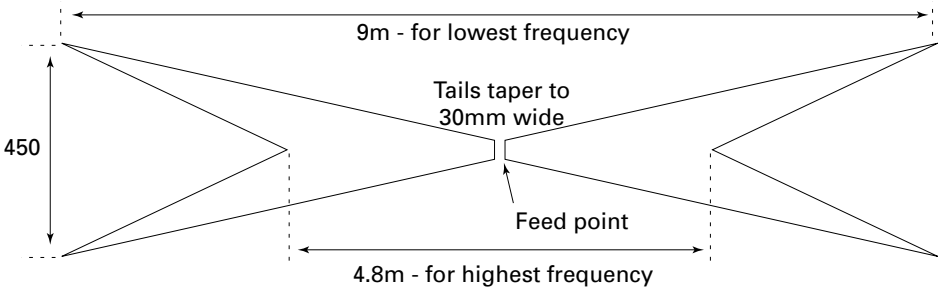

Fig. 1: The original Fishtail antenna as shown in John Heys G3BDQ's book *Practical Wire Antennas*.

The Theory

The theory behind this antenna is not very complicated – it's merely a 'Fat Dipole'. You'll probably have seen designs in this magazine and in other antenna theory books where a 'Nest' (in some books it's called a Spider's Web) of dipoles that are fed from a single coaxial feeder.

Typically, three dipoles are suspended from the same masts with a common feeder. The upper dipole is cut for the lowest of the three frequencies (it's the longest one), the second to the middle frequency and the highest frequency is the lowest of the set (**Fig. 2**)

In this manner, antennas (for example the 7, 14 and 21MHz Amateur bands can occupy the same masts, footprint and feeder. The antennas are 'self switching', so nothing more than a band change and a tweak of the tuner is required to get the lowest v.s.w.r. on one or other of the bands.

However, the Fishtail takes the design one step further. The 'points' of the dipole are cut for the lowest frequency your space can accommodate. The inset 'Vee' point is calculated for the highest frequency of interest.

The clever bit is, of course, that an infinite number of frequencies between those two 'spots on the dial' are included at two points on the Fishtail. The device is therefore, in theory, capable of resonance at any frequency between (in this case) 14 to 30MHz).

Discussed With G3BDQ

I discussed the design of the antenna with G3BDQ and resolved to take things a little further with a view to ease of construction and a reduction in production cost. The final design was, at John's suggestion, to be a 'Half Fishtail', each side of the dipole comprising a triangle of metal, **Fig. 3**, mimicking the overall shape of the elements, in the Nest of dipoles in Fig 2.

My idea was to source the manufacture of the 'tails' from a supplier of aluminium foil or thin sheet. After a discussion with a supplier I modified my requirements to a 5m roll of 0.5mm aluminium foil with a width of 500mm and do the cutting myself but it turned out to be expensive.

The cooking foil option suddenly became interesting again, although I had to be able to 'beef it up' merely to survive the installation process. The fact that a local supplier of kitchen goods advertised 'Turkey Foil at £6.99 a roll helped in the decision process! I opted for a roll of foil at least 450mm wide of a sufficient length

to fabricate the two parts of a Half Fishtail dipole from double thickness foil – with the excess folded over rather than cut off.

The Construction Process

Choose yourself a construction area not too far away from the loft where you are going to place the antenna. Lay out a double layer of the foil just over 4.88m long. From one corner of the sheet measure and lightly indent a folding line to the other edge of the foil sandwich 2.44m away from the top corner. This will give you the dimension of the highest frequency dipole. Fold back the two layers of foil to form the first angle of the triangle.

At this stage you can adopt one of two measures to improve the rigidity of the element. The first is to fold the whole of the spare material back, and where it overlaps the long side of the foil trim it back or simply fold it over. My preferred choice is to trim back the foil a few centimetres and carefully 'Duct Tape' the flap to the main body of the radiating element. This holds the two cut sides together and gives rigidity to the short side. Be careful to leave 200mm at the point of the triangle clear of tape as this is where you will attach the feeder.

Next, measure the lowest frequency dipole dimension (4.88m) along the top edge of the fishtail and fold back to that length. Tape up the top of the element as you have done with the shorter side. Lightly score a line from top of the longest dimension down to the end of the shortest dimension, again trim back, fold over and apply the tape.

You'll end up with a taped up element of the required shape with an element of rigidity but still fairly fragile. To increase the survivability – put a few lengths of tape from top to bottom edges, turn the whole construction over, tape the edges on the other side and staple the two sides together at fairly regular intervals. The tape will ensure that the staples don't tear the foil.

Theoretical Dipole

A theoretical dipole erected in free space is said to have an impedance of 73Ω. A practical wire dipole in the real world will have an impedance of about 65Ω. A dipole made of tubing will have an impedance of between 50 and 60Ω.

A thicker 'wire' will lower the *Q* of an antenna making it less susceptible to changes in frequency. I guess that the fishtail and the Half Fishtail are something like tubing or 'thick wire'.

All impedance characteristics are affected by the height above ground and the amount of 'free space' around the elements. The impedance of the 'half fishtail' dipole erected in your loft will certainly vary from that in my loft space because of their different situations.

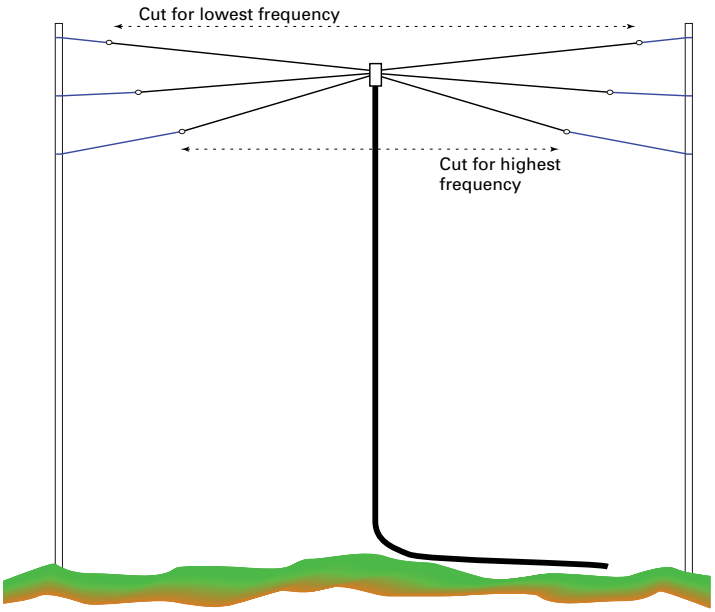

Fig. 2: A 'traditional' nest (or spider's web) of dipoles, that allows coverage of several bands using just one feeder.

Don't forget that the measured impedance of any dipole will vary with the amount of 'droop' in the elements; decreasing the internal angle of the dipole elements from 180° will progressively reduce the impedance. This is one way of optimising the matching of a dipole, enabling it to be used on a selected frequency without additional tuning equipment.

If the Fishtail antenna is erected with both 'long' elements at the top then the impedance will change as you progressively tune h.f., effectively decreasing the angle between the elements. It will probably be beneficial if the 'long' element is at the top on one side and the 'short' element is at the top on the other, maintaining a more regular balance of impedance and less need to use the tuner.

The Installation

The installation is the easy part, once you have the materials almost in place. Start at the end where the longest element is uppermost; holding it horizontal staple-gun the element to the inside of the rafters.

If you have the choice, make sure that the feeder is in a location that will allow it to be secured to something firm. Work along the element, top and bottom, towards the feed point. Position and secure the feeder and, this time with the 'shorter' element uppermost, secure the second half of the dipole. Then install the 50Ω coaxial cable into your shack.

Feeding The Fishtail

Feeding the antenna is simple although I would however recommend that you use a 1:1 balanced-to-unbalanced (balun) at the centre. Try to eliminate copper to aluminium junctions that are exposed to the air.

I prefer punching a hole in the foil and placing the contacts to the balun through those holes. I also recommend that you use stainless steel washers either side of the foil to protect and support it. I also recommend that you don't let the foil support the weight of the balun. If you have no option I suggest that you should then put some of the duct tape on one side of the foil and secure the coaxial cable to the rafters as 'early' as possible.

Tests To Come

The final tests must remain uncompleted for the time being as I's still evaluating the antenna. So, I cannot show you a list of impedance readings and bands to work although what worked for me may not work for you anyway. Despite this the antenna will load (somewhere on the Amateur bands) **and it will work**. But remember it is, at the end of the day, a simple antenna – although it's well worth trying out yourself. **PW**

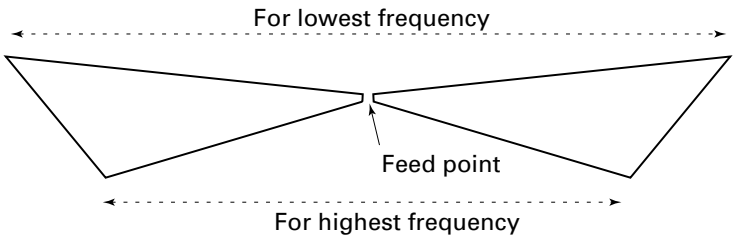

Fig. 3: Roy opted for a rather modified shape for his version of the fishtail antenna to put up in his loft crawl-space.

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Two regenerative receiver ideas from readers

This month the Rev. George Dobbs G3RJV discusses two designs sent in by *PW* readers – after the appropriate quotation!

Each reader needs to bring his or her own mind and heart to the text.
Dean Koontz (American Author)

Welcome to *Carrying on the Practical Way* (*CoTPW*)! I have written this column for a long time although I'm not sure how long. Although I have files on my computer hard drive that go back to 1997, I'm sure it goes further back than then.*

Over the years I have enjoyed the feedback from readers, perhaps because it's usually positive. I particularly enjoy the occasions when, at Amateur Radio events, readers bring along their versions of projects to show to me.

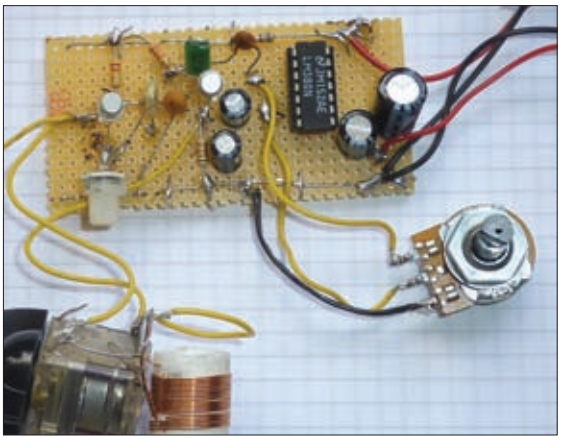
Their versions of the projects I have described are almost always smarter than my prototypes! Best of all is the reader feedback that suggests ideas that I can use in future editions of the column.

The most taxing problem for a long term columnist is stirring a tired old brain to come up with new ideas, or improvements on old ideas. So, this month I'm very pleased to be able to use two useful circuit ideas that were offered to me by other people.

I was much cheered by a letter in which the signature concluded ,"77 years young" and "radio fun makes the brain work". The letter was from **Len Osmond** of Minster-on-Sea in Sheerness. It's always good to hear from the Isle of Sheppey. I remember several visits to **Ted Trowell G2HKU**, in Minster during the 1980s. Ted has been a regular h.f. bands reporter to *PW* over many years.

Len Osmond's letter included pictures of a novel solar powered radio he built in the mid 1980s. Unfortunately the quality of the black and white prints of the solar powered radio precludes their inclusion in *PW*. He also sent me the circuit diagram of a regenerative receiver with an interesting method of feedback. I was unsure about one section of his circuit diagram and wrote back with several questions. His answer came back in the shape of a small package. The package contained a version of the receiver he had built for me to try out.

The Sprite receiver, as suggested by G0EBP.



Len Osmond produced this version of his receiver and sent it to George.

The receiver is built on a piece of perf-board; a method I often advocate in *PW*. Perf-board is an insulated material with a matrix of holes spaced at 0.1in. Component leads are pushed through the holes and interconnected using surplus lead wire or added lengths of copper wire.

The wires connect in the same way as the tracks on the underside of a printed circuit board. Finished perf-boards look rather like printed circuit boards (p.c.b.s), but with extra holes, as can be seen from the photograph of Len's receiver.

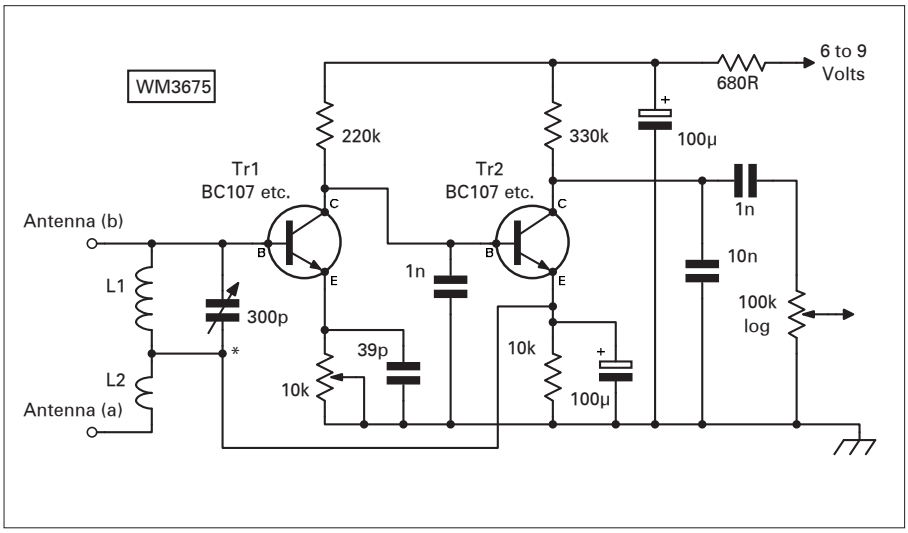


Fig. 1: This is the circuit of the regenerative receiver, suggested by Len Osmond.

The original series entitled Getting Started The Practical Way *was written by one GM3XFD in the mid 1980s. The Rev. George Dobbs G3RJV has written its sequel since August 1996 and we're very proud that George has been able to keep us busy with our soldering irons ever since!* **Editor**.

The Receiver

The circuit of the receiver is shown in **Fig. 1**. The feedback path to achieve regeneration is between the emitter of Tr2 and the tuned circuit. Two BC107 transistors are used in this version although BC108, or any similar transistors, will work.

Regeneration is controlled with a 10kΩ linear track potentiometer in the emitter of Tr1. Although I have not used this configuration before, I found it gave an effective and smooth control of regeneration.

As usual, the control is set just above the point where oscillation occurs for reception of single sideband (s.s.b.) and Morse code (c.w.) signals and just below the point of oscillation for amplitude modulation (a.m.) signals. Like all regenerative receivers, the regeneration control requires adjustment as the receiver is tuned. It also may need retuning sometimes for weaker or stronger signals. The point of oscillation is marked by a rushing sound in the speaker or headphones.

The tuned circuit consists of a two section coil (L1 and 2) and a 300pF variable capacitor. The inductors L1 and 2 are wound on a 16mm coil former; a short piece (about 20mm) of electrical conduit tubing.

In the receiver Len sent, L1 is 36 turns of 26s.w.g. enamelled copper close wound on the former. L2 is a further 6 turns of 26 s.w.g. wire spaced about 2mm from L1. Small holes may be drilled in the former to secure the windings.

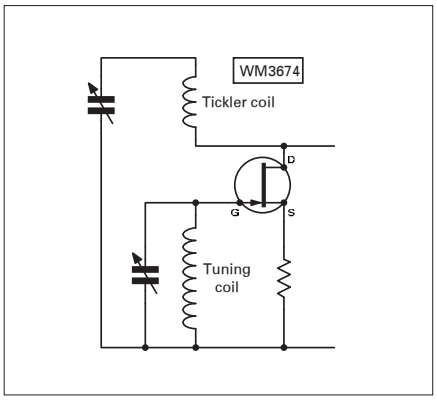


Fig. 2: The skeletal circuit of an Armstrong regenerative circuit, suggested by Tony Bowmaker G0EBP in Morecambe.

The end of L2 furthest away from L1 provides an antenna input connection (Antenna [a]). An alternative antenna connection suitable for short lengths of wire is shown as "Antenna [b]".

A polyvaricon type variable capacitor, with a maximum value of 300pF completes the tuned circuit. I have omitted the LM380 audio amplifier from the circuit diagram. Len had used just the basic circuit for the '380 chip and any other suitable audio amplifier could be used – this column has featured many such amplifier circuits.

Unfortunately, using a 300pF variable capacitor does result in a very coarse tuning rate. Ideally, some form of fine tuning is required but I didn't want to change Len's receiver as I intended to return it to him.

Regenerative receivers can suffer from hand capacitance effects. This is the effect when bringing the hand close to the tuning capacitor causes detuning of the required station. The only real way to solve this problem is to have a metal front panel between the variable capacitor and the hand. Again I decided to use the receiver "as built" without screening in front of the variable capacitor.

In spite of the possible problems I've mentioned the receiver performed well. There was very little hand capacitance effect and it was surprisingly stable. The coarse rate of tuning made it unsuitable for listening to Amateur band signals as this requires a slow tuning rate. When I first built regenerative short wave receivers (many years ago) they were for monitoring shortwave broadcast stations, so that's what I did with this receiver.

In practice Len's project made a very usable short wave broadcast receiver. I tried various antenna combinations via the "Antenna [a]" input. This input works well although large antennas can overload Tr1 and damp the regenerative action.

As I'm typing this article, the receiver is offering a very interesting travelogue programme from Radio Romania at good loudspeaker volume. This is achieved using about one metre of wire attached at the "Antenna [b]" position. Thank you Len for sending me a useful little radio to try!

Tony Bowmaker's Receiver

About the same time that I received the circuit from Len Osmond, I received details of another regenerative receiver from **Tony Bowmaker G0EBP**, in Morecambe. Tony sent the receiver details as a submission for the **G QRP Club**'s journal *Sprat*.

I thought the receiver was interesting and asked Tony if I could experiment with it and report my findings in *PW*. Tony kindly agreed.

The receiver is an implementation of the Armstrong regenerative receiver using a commercial coil. The Armstrong regenerative receiver was **The** original regenerative receiver.

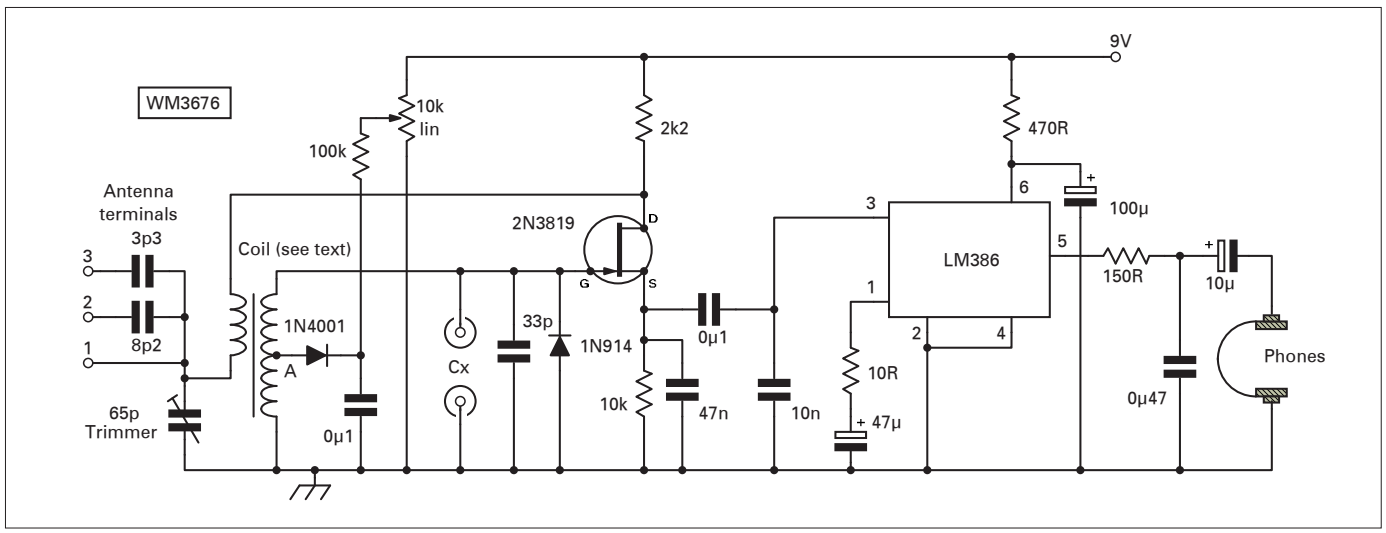


Fig. 3: The full circuit of the receiver, called the Sprite, as suggested by Tony G0EBP.

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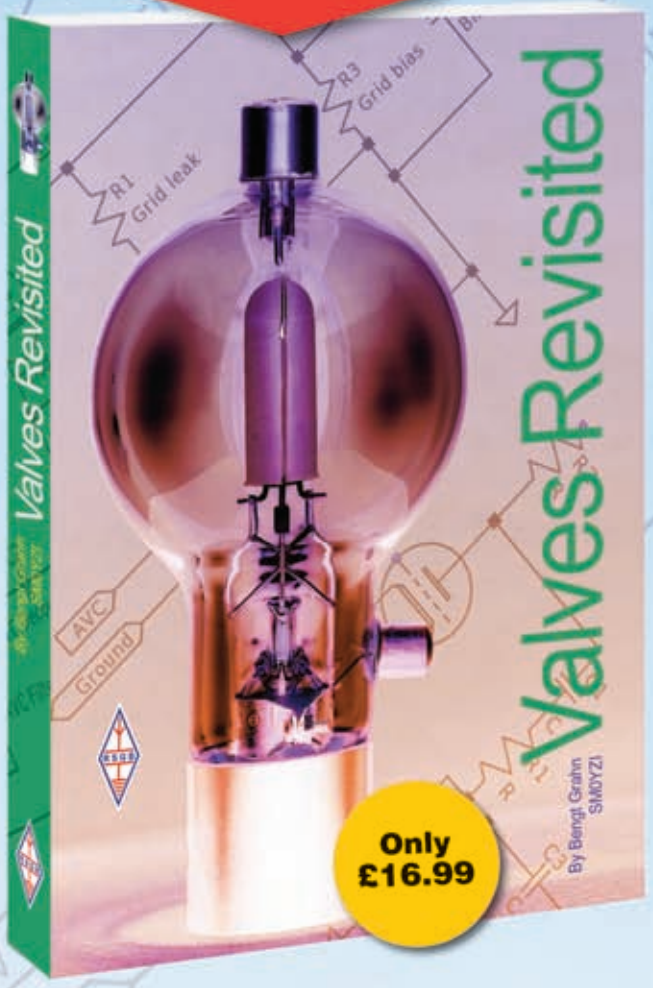

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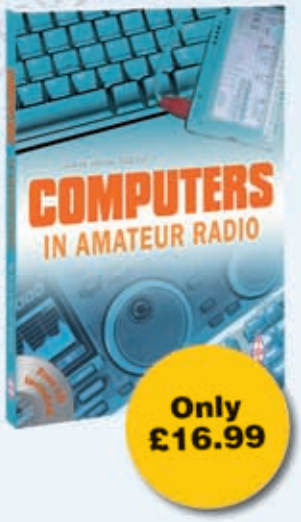

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Steve White, G3ZVW

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Edwin Howard Armstrong (1890 – 1954) was an amazing radio pioneer. He invented the regenerative receiver while he was an undergraduate student at Columbia university and patented it in 1914. Not content with that he went on to invent the superhetrodyne (superhet) receiver and patented that in 1918. Oh….. he also invented and patented frequency modulation (f.m.) in 1933! Armstrong's discoveries revolutionised electronic communications.

I have used several versions of Armstrong's regenerative receivers in this column in the past. The diagram, **Fig. 2**, may serve as a reminder to readers. A coil (sometimes called the 'tickler coil') feeds back some of the signal to the tuning coil on the input.

Feedback is controlled by a variable capacitor in series with the tickler coil. The tickler coil must be connected the correct way round to achieve positive feedback. The original G0EBP receiver, which Tony called *The Sprite* is shown in **Fig. 3**. The Armstrong configuration can be seen by examining the circuitry around the coil.

A commercial Toko KANK3334 coil is used in a rather novel way. The KANK3334 was designed as a short wave input tuning coil with a main winding for the tuned circuit and a smaller input coupling coil. This 'input' coil is used as the tickler coil in the *Sprite* receiver. The tuned circuit is made up from combinations of fixed capacitance; a 33pF capacitor with additional capacitance provided by a plug-in capacitor (Cx).

Fine tuning is facilitated by using a conventional diode as a varicap (variable capacitance diode) offering a small capacitance swing on the centre tap of the main winding. **Note:** All of these capacitors must be stable, low temperature coefficient, types for the sake of stability.

Tony G0EBP suggests values of Cx for various Amateur bands. No capacitance at Cx for the 10MHz (30 metre) band, 68pF for the 7MHz (40m) band and 300pF for the 3.5MHz (80m) band. The insert drawing shows the correct connections on the KANK3334 needed to achieve positive feedback.

Naturally, the fine tuning achievable by the 1N4001 diode will vary according to the band and the tuning range on 3.5MHz is very limited. In fact Tony suggests a polyvaricon variable capacitor may be the best option on that band.

The LM386 audio amplifier is run at a high gain. **Note:** the 10nF capacitor at pin 3 needs to be mounted as close to the pin as possible.

The antenna input is somewhat unusual. Input 1 is for short lengths of wire on the lower bands. Inputs 2 and 3 are for larger antennas and some experimentation with the input capacitors may be required to suit individual antennas.

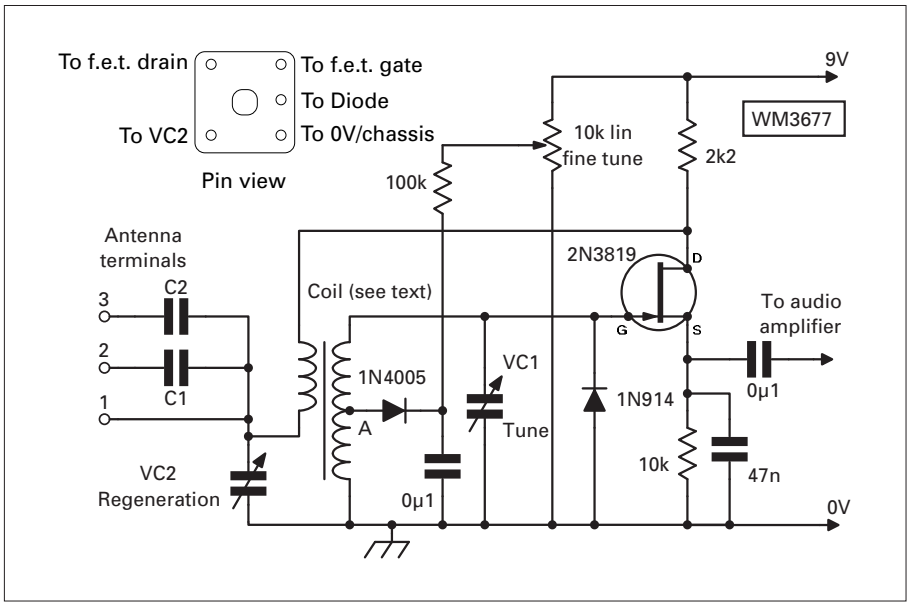

Fig. 4: Adding a fine-tune ability to the Sprite receiver as suggested by George.

The placement of the input at the bottom of the coupling coil is unusual. When I asked Tony about this he said, "Commonsense would suggest that the antenna should be fed at the top of the primary coupling. In reality the position shown gives more sensitivity. Coupling direct to the top of the tuned circuit provides too much signal input – but good for a.m. reception."

I decided to look at Tony's idea of using a variable capacitor for tuning and my modified *Sprite* is shown in **Fig. 4**. I used the commonly available 140 pF polyvaricon variable capacitors for both VC1 and VC2 and retain the varicap fine tuning at the centre tap of the main coil winding.

Coarse Tuning Control

The idea was that I could use VC1 as a coarse tuning control with the varicap as a fine tuning control. The variable capacitor, VC1, which has a venier slow motion drive, could be set to find an Amateur band (or broadcast band) and the varicap would sort out individual stations. I was out of stock of 1N4001 diodes and used a 1N4005 diode.

The Toko range of coils went out of production some time ago and I used a "5u3L" coil; the nearest equivalent in the new Spectrum Communications range of 10mm coils. I discovered a problem!

Although the Spectrum 5u3L coil mimics the Toko KANK3334 coil, there are less turns on the input coupling coil. This gives a better match for its intended purpose but does not help in this application! (See postscript).

Even when using the full 140pF value for VC2, I was unable to obtain enough feedback for regeneration on the lower bands from this smaller winding. Although it did work very well on 14MHz (20m) and 10.1MHz (30m).

The values of VC1 for these bands were 19.5 pF for 14MHz (91 on the vernier scale) and 42.8 pF for 10.1 MHz (74 on the vernier scale). Perhaps some readers might like to take these values as a starting point for fixed capacitors in place of VC1?

In practice the receiver worked very well on those two bands – 10 and 14MHz –, tuning c.w. and s.s.b. stations with ease. It does require a decent antenna and, if using a random length of wire, an earth connection also helps. I was pleasantly surprised at the usefulness of the *Sprite* receiver as an amateur bands receiver and VC1 also allows it to be used as a broadcast station receiver with fine tuning.

Postscript

As I was checking coil types when writing this article I discovered that Spectrum Electronics produce another version of the 5u3L coil called the 5u3H. As the letter 'H' suggests this version has a coupling coil with more turns for higher impedance coupling. Unfortunately, I don't have any of them but I suspect they may offer enough coupling to produce adequate feedback on the lower frequency bands. Something for further investigation after I've checked it out with **Tony Nailer G4CFY at Spectrum Communications**. See you next month!

PW

Mike Richards G3WNC's Data Modes
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E-mail via Radio

In *Data Modes* this month, Mike Richards G4WNC, takes a look at radio E-mail systems, specifically WinLink2000 using the Winmor data mode.

Welcome to *Data Modes* (*DM*) where I'm starting by looking at the WinLink 2000 organisation, which has been in place since 1998 and its prime role is to provide an E-mail by radio service. Work on the project has evolved over a very long time starting back in the 1980s and the network has provided a great service to voluntary organisations and Radio Amateurs alike. By providing high frequency (h.f.) access to Internet E-mails, Amateurs in remote or isolated areas can help co-ordinate emergency relief work or just keep in touch with the family if they are on an extended sailing trip.

The Winlink 2000 organisation is purely voluntary with the main contributors coming from Amateur Radio, Military Auxiliary Radio System (MARS), and other volunteer organisations. Access to the network is available to all Radio Amateurs or members of approved voluntary organisations and there's no charge, so it really is an attractive service.

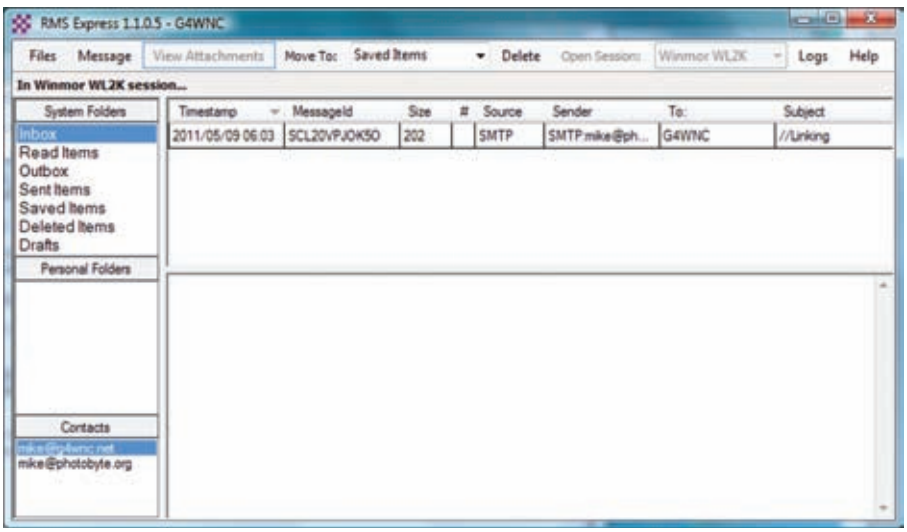
Radio Mail Servers

The Winlink service is based around a number of participating Radio Mail Server (RMS) stations that provide a radio base-station with a link to the WinLink2000 network and thus onto the Internet E-mail system. At the time of writing, there were around 15,000 radio based users of the network with a monthly average traffic of 150,000 messages – so it's pretty busy!

Of course, being radio based, we are not talking about high speed Internet connections – just enough to keep in E-mail contact – which is all you really need from an isolated location or when you're sailing on the open seas. The WinLink servers connect to standard radio gear and support a wide range of data modes from Packet to Pactor and the new Winmor mode. For many users, one of the problems with the system has been the domination of Pactor as the mode of choice for the vast majority of h.f. communications.

Put simply Pactor is an excellent mode for the h.f. bands and the throughput and control is ideally suited to running h.f. E-mail networks. But, the main Pactor protocols are commercially protected by SCS and require the use of hardware modems. The snag with these items – is price – as Pactor 3 modems start at around £700 each. This makes them prohibitively expensive for occasional Amateur use.

In recent years there has been much debate over the cost of the Pactor modems, and the Winlink2000 team have been under pressure to find an alternative – soundcard based – solution. The result has been the development of *Winmor* and its associated software Terminal Node Controller (TNC).



RMS Express Radio E-mail Client in operation.

Winmor By KN6KB

The *Winmor* (**WIN**link **M**essage **O**ver **R**adio) was developed by **Rick Muething KN6KB** from the Winlink development team, and was first announced at the end of 2008. The protocol has been fully documented and is available for all to use without charge. The key purpose of *Winmor* was to provide and h.f. E-mail data link with performance that's better than Pactor 1 and rivals that of Pactor 2 and 3.

Whilst I'm sure there will be much debate as to whether or not it really does rival Pactor 2, or 3 – there's no doubt that *Winmor* is a very effective system that works very well with the Winlink2000 network. So, let's now take a closer look at the new mode.

As we have discussed in previous columns, sending data over h.f. radio is no simple task and the mix of noise and random phase distortions conspire to ruin any attempts at high speed data. The *Winmor* development team have taken the opportunity to stand back from existing systems and take a fresh look at how to manage the challenge of h.f. data. The result is a very powerful and flexible system that I'm sure will have lots of potential for future Amateur modes.

The team decided to go for an Automatic Repeat request (ARQ) based system though the final description is Selective Repeat Automatic Retry Request (SRARQ)! The important point about this system is that data is sent in relatively short bursts and the sending station reverts to receive to await an acknowledgement from the distant station. This handshaking system is very effective and has been used in many systems with AMTOR being the

most well known Amateur mode.

Whereas AMTOR used a very simple data validation test, *Winmor* uses extensive forward error correction to give the receiver the best chance to accurately decode the signal. The handshake is used as a signal to confirm receipt or to indicate a failure. Rather than using a single modulation system like most other digital modes, *Winmor* has a selection of modes available that are automatically selected according on the quality of the current link.

The modes that may be used, are based around Orthogonal Frequency Division Multiplexing (OFDM) using two operating bandwidths of 500 or 1600Hz. The 500Hz option can use 46.875 baud with two carriers and 4FSK (Frequency Shift Keying) or 93.75 baud PSK (Phase Shift Keying) using 4PSK, 8PSK or 16PSK. The 1600Hz bandwidth has a similar range of options, i.e. 8 carrier 4FSK or PSK using 4PSK, 8PSK or 16PSK.

During a contact the *Winmor* software will choose the fastest data rate that can be sustained over the network and will use the number of retries to access the link quality.

Error Correction

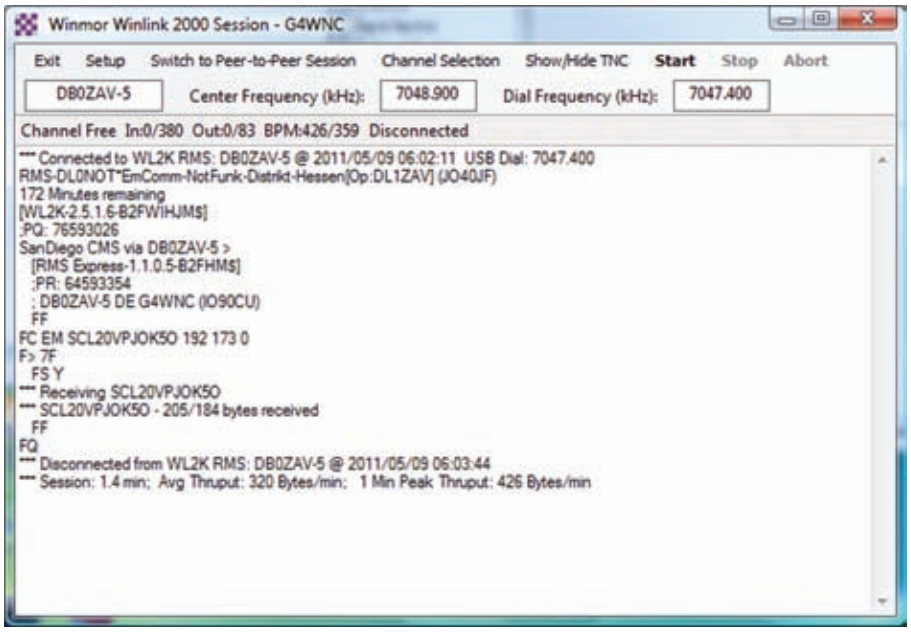
The forward error correction applied to *Winmor* is more extensive than any system I've covered so far in this series. The error correction is arranged in layers as follows. The outer layer employs a CRC (Cyclic Redundancy Check) to add a checksum to each batch of data. This is an overall check to ensure that the corrected data supplied by the decoder is in fact correct.

The next correction layer, is the R-S (Reed-Solomon) layer, where blocks of parity characters are added to the message. These form a pattern that allows the decoder to rebuild the message even if some elements have been damaged in transit. There are two levels of R-S encoding, a 'weak' or basic level of encoding is the norm but this is increased to 'strong' if repeats are requested.

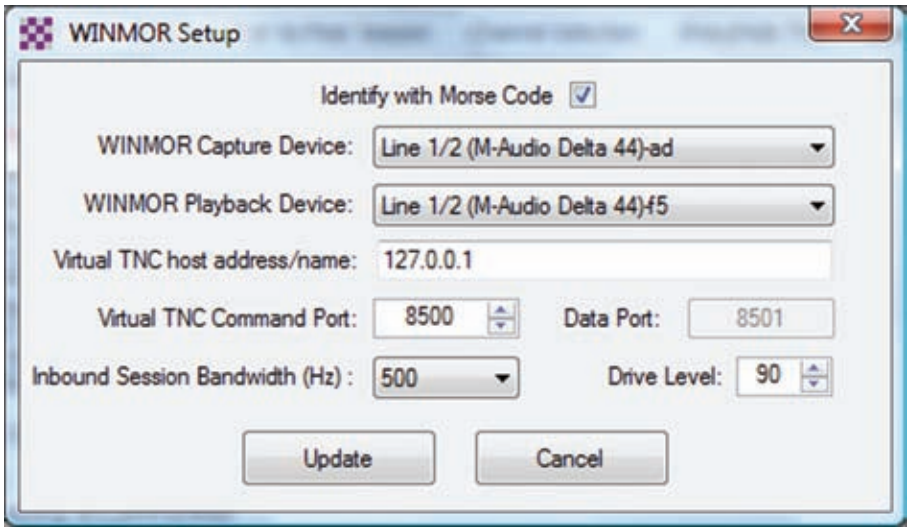
For PSK signals, the next correction layer is Trellis Coded Modulation (TCM) which uses *Viterbi encoded pragmatic trellis coded modulation* – now there's a phrase you can use to impress your friends!! In slightly simpler terms this is basically a convolutional encoder using the standard NASA Voyager R=1/7, K=7 system that we've covered when looking at other modes in this column. The pragmatic bit just means that the system uses standard encoding modules rather than optimised encoders!

The final error correction layer is called memory ARQ and is applied at the decoder. If decoding the data using the other protection layers fails, memory ARQ will average the received symbol values and then reapplies the error correction layers but based on the averaged symbols.

As you can see *Winmor* is a very sophisticated system that makes the most of the available data transmission and correction systems. In **Table 1** I've shown a summary of the available transmission modes and the corresponding data rate in words per minute.



Winlink 2000 Session screen showing my link with DB0ZAV-5.



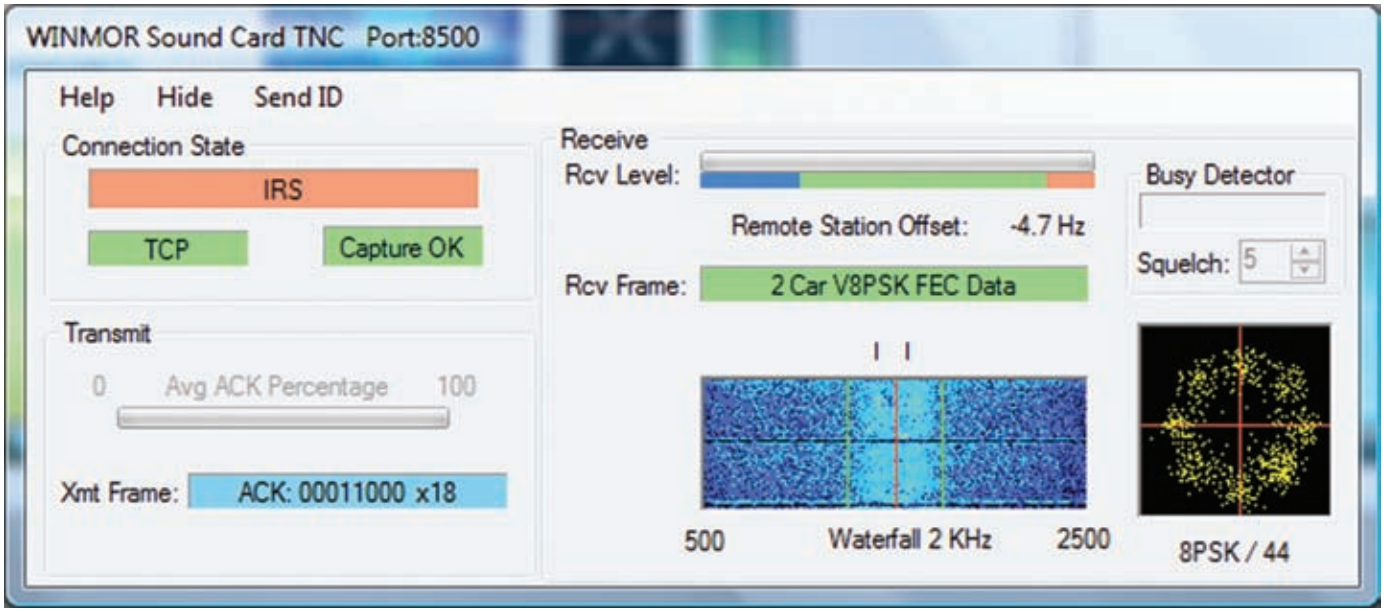
Winmor TNC Set-up screen.

Practical *Winmor*

The main output of the *Winmor* project has been the development of a software Terminal Node Controller (TNC) that accepts a data input and implements the *Winmor* protocol. However, the final implementation of the *Winmor* TNC includes much more than that, with a very useful interface that includes a waterfall tuning display along with a constellation diagram to show how well the PSK modes are being received.

The TNC has been developed as a helper application, i.e. it's not intended to be used as a standalone program. but to provide the *Winmor* function for a host program. For use with *Winlink2000* the best software available is *RMS Express* which is a complete radio E-mail package with *Winmor* built-in. The *RMS Express* software is available from the Winlink site at: **www.winlink.org/ClientSoftware**

Once you've downloaded and installed the software you can start



Winmor TNC in action – note the 8-PSK constellation diagram.

Table 1 – Winmor Message Speeds

Winmor Mode	Words per minute
500Hz Bandwidth	
2 Carrier 4FSK	168
2 Carrier 4PSK	254
2 Carrier 8PSK	548
2 Carrier 16PSK	821
1600Hz Bandwidth	
2 Carrier 4FSK	168
2 Carrier 4PSK	254
8 Carrier 4FSK	671
8 Carrier 4PSK	1018
8 Carrier 8PSK	2190
8 Carrier 16PSK	3285

getting ready to send your first E-mail via *Winlink2000*. There are some very good tutorials available on the Winlink site and a good place to start is **Phil Sherrod W4PHS**'s *Getting Started with Winlink 2000*. This provides a useful overview of the system and takes you through all the essential set-up steps.

An alternative is to join the *Winmor* Yahoo group where you will find lots of information and help. In particular '*A Winmor Primer*' by **Fred Hambrecht W4JLE,** is packed with useful info and troubleshooting. You can find the user group at this address: **http://groups.yahoo.com/group/WINMOR/**

One of the many impressive features of *RMS Express* is its integration with the ITS h.f. propagation predictor. ITS h.f. needs to be downloaded and installed separately but it is available from the same site as *RMS Express*. There's no set-up to follow as *RMS Express* automatically finds the software and uses it to filter the list of available servers. When you open the **Channel Selection** option the available stations are sorted to put those having the most favourable propagation at the top of the list.

As I mentioned at the beginning, *Winlink 2000* is available to all licensed Radio Amateurs free of charge. Registering is very easy – you just have to send an E-mail from *RMS Express* to an existing Internet E-mail address and the system will automatically generate your account and allocate you the E-mail address: **yourcall@winlink.org**

Hints & Tips

Some hints and tips next. Whilst all the tutorials are fine, I hit a couple of snags whilst setting-up so I thought I'd run through them here so you don't have to make the same mistakes! Although the list of available servers is very helpful they are not all active so you need to be prepared to try a few before you get a successful link-up.

When you start calling make sure you turn-up the volume on the receiver so you can hear the response from the server. If you have a feasible link you should be able to hear the server chirping back in response to each of your transmissions. If you don't hear anything, the chances are the server is unavailable – so move on.

My second problem with setting the system up, is related to transmit-receive switching times. The *Winlink* system requires a changeover of 100ms or better which should be fine for most rigs less than 20 years old. However, on my first transmissions I was hearing a response from the server but it sounded too short, as if it had been cut off.

The problem turned-out to be **my setup** – I had the interface and rig set-up for VOX transmit/receive switching and that had a minimum delay of 100ms which when added to the actual rig changeover time was slowing things down. The solution was to change over to direct push-to-talk (p.t.t.) switching and all was well.

Once you've sent your first E-mail from *RMS Express* to an Internet E-mail you will need to wait a few hours for the system to generate your account and for that information to permeate through the *Winlink* system. Finally, don't forget to make sure that the subject of your E-mail always begins with "//" or the message will be rejected as 'spam'.

Next Month

In the next Data Modes I'll be running through a new variant of *Winmor* that promises keyboard-to-keyboard contacts using the *Winmor* TNC. If you want to take a sneak preview you can find out more here: **http://groups.yahoo.com/group/V4Protocol/**

PW

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.

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 6meters. 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**.

TRANSMIT AMPLIFIERS, for 2 or 4 or 6 metres, single stage RF switched, class AB linear. Diecast box with heatsink and SO239 connectors. **TA6SA** 2W in 25W out, **TA4SA** 2.5W in 25W out, **TA2SA** 5W in 25W out. **Complete kit £63.00, ready built £82.00**.

TA6SB 5W in 50W out, **TA4SB** 7W in 50W out, **Complete kit £70.00, ready built £89.00**.

TRANSMIT AMPLIFIER & RECEIVE PREAMP, for 2 or 4 or 6 metres. Receive gain adjustable 0-20dB. Switching for either part or straight through. RF switched on transmit. Diecast box with suitable heatsink and SO239 connectors. RF input and output as detailed in paragraph above. **TARP6SA, TRRP4SA, or TARP2SA complete kit £89.00, ready built £123.00. TARP6SB, and TARP4SB complete kit £92.00, ready built £126.00**.

NEW PRODUCT
DUAL GANG BROADCAST VARIABLE CAPACITOR
330+330pF with 3:1 reduction drive.
£8.50 each plus £1.50 P&P.

COMPONENTS

See our web-site or send SAE for list.

CAPACITORS, ceramic, poly block, electrolytic, mica, trimcaps.
RESISTORS, ¼ W carbon film, 10Ω to 1MΩ, and trimpots.
DIODES, small signal, zener, rectifier, Shottky, & varicap.
TRANSISTORS, small signal AF and RF bipolar and FET, medium and high power VHF.
INTEGRATED CIRCUITS, linear & logic.
VALVES, tested good, B7G, B8A, Octal, and older.
QUARTZ CRYSTALS, HC18U, HC25U, & HC49U, new and used.

DUAL GATE MOSFETS
BF964S £1.50, 3SK45 £2.00, 3N201 £2.25, 40673 £2.50.

SPECTRUM 10mm COILS, pin compatible with TOKO types. Coil values 1.2, 2.6, 5.3, 11, 23, 45, and 90uH. Some types have the primary tapped at ¼ turns and a low impedance secondary winding. Others have centre tapped primary and relatively high impedance secondary winding. Full details of turns ratios, etc. can be found on the components page of the website.
1-24 qty 75p each plus £1 P&P. 25-99 qty 55p each plus £2.50 P&P.

CERAMIC WAFER SWITCH 4 pole 5 way with silver plated contacts. Rated at 2kV and 10A for use in ATU's and Power amplifiers. **£8.50 each plus £1.50 P&P**.

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

NEW PRODUCT

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.

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.**

SPEECH PROCESSOR

An analogue low noise unit, which includes high pass filtering, clipping, and low pass filtering to enhance the higher voice tones that carry most of the intelligibility. It sounds nice too. Panel controls are included for clip level and output level. Hardware and wiring can be supplied to suit a wide range of circular mic connectors.
SP1000E, Boxed Kit £42.50, Boxed Built £60.00.

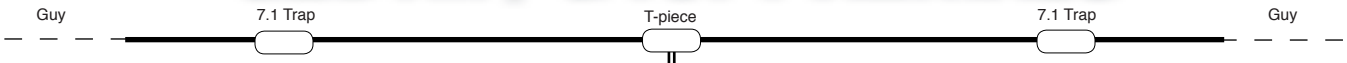
DUAL PEAK/NOTCH FILTER & AUDIO AMPLIFIER

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

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.**

G2DYM / G4CFY AERIALS



TRAP DIPOLE for 80/40/20/15//&10m. 106 feet long. Supplied with 70 feet of low impedance twin feeder. Low TVI and low noise. 2S points quieter than a G5RV with same feeder length. PVC covered wires with lugs. Light duty 150W rated £157.00, 600W rated. £164.50, medium duty 600W rated £182.50, inc. carriage.

1:1 BALUN 160-10m, 1kW rated. Loss under 1dB from 1.8 to 40MHz. Ideal for use with the G4CFY trapped dipole, or any other aerial fed with low impedance twin feeder. £43.00 inc P&P. Version with Marconi-T switching. £53.00 including P&P.

TWIN FEEDER 100 Ohm, 2kW rated, 24/0.2 in individual polyethylene sheaths with an outer cover of polyethylene. Solid construction to avoid water ingress. Good flexibility to overcome work hardening and fracture. Typically 0.5dB/m quieter than wide spaced 300 and 450 Ohm feeder and coax. Loss 0.04dB/m at 10MHz. 75p/metre plus £3 P&P. 100m drum. £70 inc P&P.

TRAPPED INVERTED L AERIAL 80/40/20/15 & 10m, for a small garden. Coax driven from far end of garden and tuned against ground. A good all round aerial with 6dB more gain than a 24 foot trapped HF vertical. That's 4 times power on TX and one S point extra on RX. Regular duty £80.00, strong £95.00, inc. carriage..

E-mail: tony@spectrumcomms.co.uk

Prices inclusive of postage unless stated. Payment by Credit/Debit card, Cheque or Postal Order. Cheques or Postal Orders payable to Spectrum Communications.

Web site: www.spectrumcomms.co.uk
Web site: http://spectrumcomms.eu5.org

Review

Tim Kirby G4VXE takes a break from preparing The *World of VHF* to try out an unusual antenna tuner.

Comet CAT-273

144 & 430MHz Antenna Tuner

Antenna tuners for v.h.f, and u.h.f. are quite unusual, so I was intrigued to find out what the unit offers. Here's what Comet say about the unit in the documentation: The CAT-273 covers a frequency range 144/430MHz. It handles up to 250W. It has separate 144/430MHz connectors so that two different antennas can be connected at the same time. The cross needle display shows FWD, REF and SWR simultaneously. It also has an Illuminated meter

First Impressions?

My first impression of the unit is that it's solid and well built. The front panel is well laid out and consists of a cross-needle meter, which I found quite easy to read – particularly once I had connected the meter to a 13.8V power supply with the lead supplied.

There are three push button controls; the meter switches between 144 and 430MHz, power range switches between 60 and 300W and it has the ability to switch between **AVG** (average) and **PEP** (peak envelope power). There are also independent **TR** (transmit) **Tune** and **X TUNE** controls for 144 and 430MHz.

The rear panel is simple, well laid out and labelled. There is a socket to accept 13.8V, which illuminates the meter (although the meter and antenna tuning unit – a.t.u. – functions without d.c. being applied). The sockets for each band are SO-239 connectors.

Power and s.w.r. measurement worked well and gave the expected results. I was able to use the a.t.u.s successfully on both bands to tweak the s.w.r. of my resonant 144 and 433MHz antennas down to 1:1.

I was also able to connect my Butternut HF6V vertical to the antenna socket on 144MHz and tune it up so that an s.w.r. of 1:1 was obtained. With 5W from the 145MHz transmitter, I was able to access the GB3WH repeater over a distance of about 24km (15 miles), whilst receiving a signal of S6 or so from the repeater. So, although results were not as good as a resonant antenna – they were certainly acceptable!

Acceptable, but bear in mind too, that the HF6V antenna is ground mounted, so the path to the repeater is more obstructed than with an antenna at roof height. I tried the same experiment on 433MHz. Once again the Butternut HF6V was tuned up quite easily using the 430MHz a.t.u. However, the antenna's signals was clearly struggling over the path to the GB3TD repeater, once again, a path of about 24km. Having said this, good results were experienced on 433MHz for local QSOs.

The Main Question?

Perhaps the main question is – why you would want an a.t.u. for 144 and 433MHz? The unit is comparatively pricey, so you might be better spending your money on resonant antennas. However, if for some reason you are unable to erect resonant v.h.f. and u.h.f. antennas and want to try tuning up some bits of wire or other antennas – this could be a good way of doing it. I can also see that it would be fun and useful to use as part of antenna experiments.

The only other question mark I had regarded the use of SO-239 connectors on 430MHz in particular. I would have preferred to see N-type sockets used to reduce losses, but having said that there was no noticeable loss of signal when I inserted the meter into circuit. In spite of my reservations, the unit works well and performs to its specifications.

Many thanks to Nevada Radio for supplying the unit for review, which costs £179.95 plus p&p. **PW**

Product
Comet CAT-273 144 & 430MHz Antenna Tuner

Supplier
Nevada Radio
Unit 1, Fitzherbert Spur
Farlington
Portsmouth
Hampshire PO6 1TT
Tel: **(023) 92 313090**
Website:
www.nevadaradio.co.uk/
E-mail:
sales@nevada.co.uk

Pros
Can match a wide range of impedances.

Cons
I'd like it to be cheaper and have N-type sockets fitted.

Price
£179.95 + P&P

Specifications

Frequency range:	120-150MHz/340-450MHz
Input impedance:	50Ω
Output impedance:	15 to 200Ω
Maximum input power:	250W (f.m)
Minimum power for s.w.r. measurement:	Approx. 6W
Tolerance:	±10% at full scale
Connector:	SO-239
Power for illumination:	11-15V d.c. approx 250mA
Dimensions:	W 218 x H 98 x D 152 mm
Weight:	Approx 1.4kg

Buying Second-hand

Chris Lorek G4HCL takes a look an economic receiver for the h.f. bands which has stood the test of time in popularity

The Trio 9R-59 series of receivers, with the matching speaker alongside (partly obscured in this view), can still hold its own again some more modern sets. The dual concentric tuning controls. The rear section for the main tuning (left-hand scale), the front knob controls the band-spread (fine tune) of the right-hand dial.

At the beginning of this regular series, I promised that I'd be looking at a variety of equipment, giving hints and tips on what to look out for, what to possibly avoid, and overall to hopefully get you going on the air without breaking the bank.

I also promised to detail some collectable equipment. So, this month I'm combining this with what – in my opinion and that of many others – would also be a high frequency (h.f.) receiver with good performance suitable for both Amateur band use and general h.f. listening at a very reasonable price.

Young Teenager Chris!

Many years ago when I was a young teenager in Preston, Lancashire, I saved hard to buy my first dedicated h.f. receiver. I'd sold my stamp collection and my push-bike, I'd done paper rounds, and finally had saved just enough for a second-hand Trio h.f. receiver advertised by an Amateur Radio dealer in Huddersfield, Yorkshire.

On a Friday afternoon I 'phoned them and was told it was still available, in good condition, so I gave them my name, address and phone number, and said I'd be round there the next day at around 12pm with the cash with me, travelling by train and bus.

On arrival just before noon – via three bus trips and two train journeys – I was greeted by the shop owner telling me he'd sold it half an hour earlier to another customer! So here's my first tip, if you're travelling any distance to buy a second-hand piece of equipment, ensure as far as possible that it'll be there for you and in today's electronic age a confirmatory E-mail should give both parties confidence.

Alternatively, if you're buying via an on-line auction site there's usually a binding contract between the two of you if you're the 'winning bidder'. You must pay the winning bid price and the goods are yours, unless of course the goods have been grossly inaccurately described etc.

Popular HF Receiver

This month I'm detailing a very popular h.f. receiver that has performed in a manner which very few other receivers have managed to do; firstly having stood the test of time in popularity, and secondly carried on working reliably for owners after several decades of use. It's the Trio 9R-59DE/DS short wave receiver which I initially wanted to own as a teenager.

However, after almost 40 years I've finally managed to own one! My excuse for buying it was I needed it for this feature (of course!) but it naturally brought back childhood memories!

My thanks go to **Ken Purser** on the Isle of Wight for his help in this; I bought the receiver from Ken and he was kind enough to meet me at the Ryde hovercraft terminal with the receiver for my collection. I could of course also have had the option of postage, but, as you'll read later, a personal collection – if possible – is very worthwhile with a piece of equipment of this type.

Literally every week I've seen there are at least a two or three 9R-59DE/DS receivers advertised by sellers on the UK Ebay auction site. And, of course, there are plenty of other second-hand sale outlets such as Amateur Radio rallies, car boot sales, club 'Bring and Buy' sales, second-hand adverts and so on. So, there's no shortage of, nor any 'rare' aspect for this model of receiver.

The typical selling price for a 9R-59' as I write has been £30-40 plus any carriage costs. Absolutely 'mint' condition receivers, which would be of interest to collectors sell for a higher price of up to £60 – although I saw one in this condition at a dealer's stand at a radio rally for £35, it was still unsold at the end of the day.

Those examples that need attention such as having a noisy volume control and/or an intermittent position on the band change knob (a spray of switch cleaner usually does the trick here in both cases) reduces the typical selling price to around £20-25.

Valved Receiver

As you'll undoubtedly have noticed from the internal photos, the receiver is a valved unit. Don't let this put you off! In fact valved receivers are far, far better at strong signal handling than early vintage transistor receivers. As a result you'll typically be able to hear far more signals with a receiver like this without the problems of overload than with a transistor-based receiver that's far more expensive.

The receiver covers the h.f. spectrum between 550kHz – 30MHz in four bands; 550kHz to 1.60MHz, 1.6 to 4.8MHz, 4.8 to 14.5MHz and 10.5 to 30MHz. In addition to these, there's a useful bandspread capability of the non-WARC amateur radio bands of 3.5MHz (80m), 7MHz (40m), 14MHz (20m), 21MHz (15m) and 28MHz (10m).

Unlike many general coverage receivers of the same era, the 9R-59' uses a pair of mechanical intermediate

frequency (i.f.) filters. These provide far better close-in signal selectivity than a receiver equipped with just ordinary tuned i.f. transformers. The receiver is also equipped with a product detector for c.w (Morse) and single sideband (s.s.b.) reception.

It was probably because of the innovative features that the receiver was very poplar at the time, and of course has held its popularity over the years. For broadcast reception, there's a very effective Automatic Noise Limiter (ANL) that can be switched in to reduce or even totally eliminate pulse-type interference. This can be rather useful in today's age of broadband Internet distribution over domestic house wiring.

Different Models?

The 9R-59D 'series' comes in a couple of different guises; the 9R-59DE which is marked as 9R59D' on the front panel, and the 9R-59DS which is marked as 9R59DS on the front panel. What's the difference? Well the internal circuit diagrams of the two sets are exactly the same, however the 9R-59DS comes equipped ready-fitted with an internal OA2/VR15MT (150V) voltage stabiliser valve.

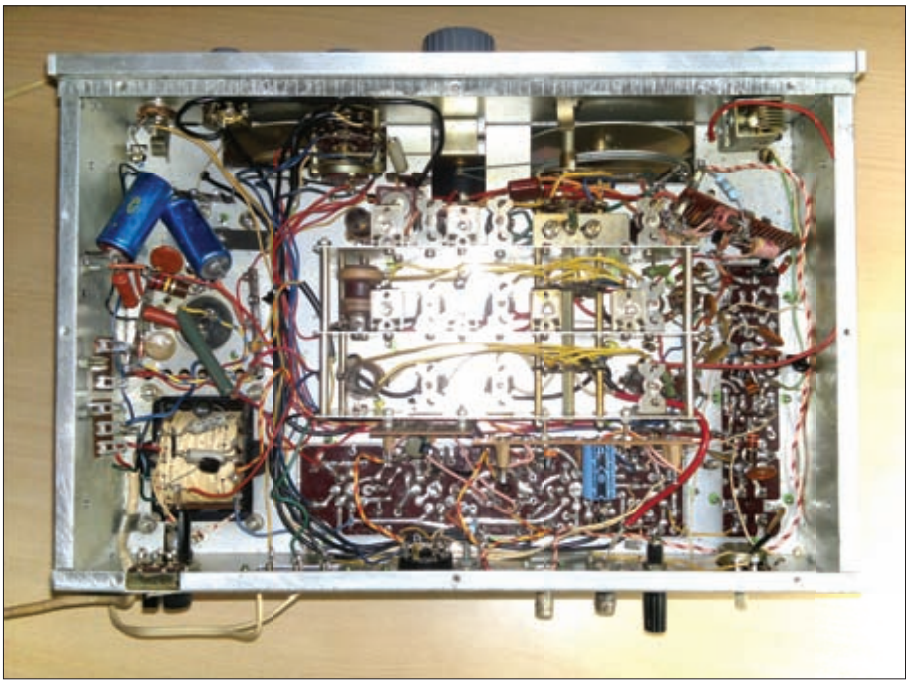
However, the 9R-59DE can also be fitted with one of these as an option, you simply plug one into the ready-fitted socket next to the electrolytic capacitor block on the chassis side. When the voltage regulator is fitted, you can tell it's operating as it will light up with a faint purplish glow. If it doesn't, check for a defective valve, although if there's not enough mains voltage present at the 'B Plate' (anode), i.e. less than 150V, this will also cause it not to operate correctly.

The advantage of having this voltage stabiliser is that you'll get better frequency stability with the receiver, i.e. it won't 'drift' as much with changes in the incoming mains voltage. Beside this the circuit line-up is otherwise identical between models, with a 6BA6 radio frequency (r.f.) amplifier, 6BE6 Mixer, two 6BA6s in the i.f. amplifier, four solid-state IN60 diodes for amplitude modulation (a.m.) detection, automatic volume control (a.v.c.), or the more modern term of automatic gain control (a.g.c.) and noise limiter, a 6BE6 product detector, a 6AQ8 as beat frequency oscillator (b.f.o.) and audio frequency (a.f.) amplification. And finally a 6AQ5 as the a.f. audio output amplifier.

The Controls

As you'll see there are two analogue tuning dials, the main dial and a bandspread dial, these are tuned using a central dual concentric tuning knob.

This rear-panel has been modified slightly – by one or more – owners.



The underside of the chassis, showing typical wiring for its day.

Between these dials is a large S-meter, with other controls being a band switch, mode switch, separate r.f. gain and a.f. gain (volume) controls, an **Antenna Trim** control, which is useful in matching your antenna to the receiver's input impedance, and finally a b.f.o. control frequency knob to adjust for lower sideband (l.s.b.) or upper sideband (u.s.b.).

If you're careful, you can use the latter controls together with the bandspread tuning as a fine-tuning control to reduce adjacent frequency interference. This is useful when you're listening to an s.s.b. or c.w. station with a stronger unwanted signal just to one side of your wanted signal. **Note:** The receiver in the photo here has been modified and fitted with a further front panel rotary i.f. gain control, you'll read more of modifications later.

Rear Panel

On the rear panel of the receiver you'll find insulated screw terminals for antenna and earth, and next to these on an unmodified receiver is a small blanked-off section, which can be fitted with an SO-239 coaxial socket. You'll often find it has been fitted.

On the receiver I have, one previous owner has fitted a BNC socket here, and a further BNC socket where the original antenna terminal was, leaving the earth terminal fitted for connection of a receiver ground.

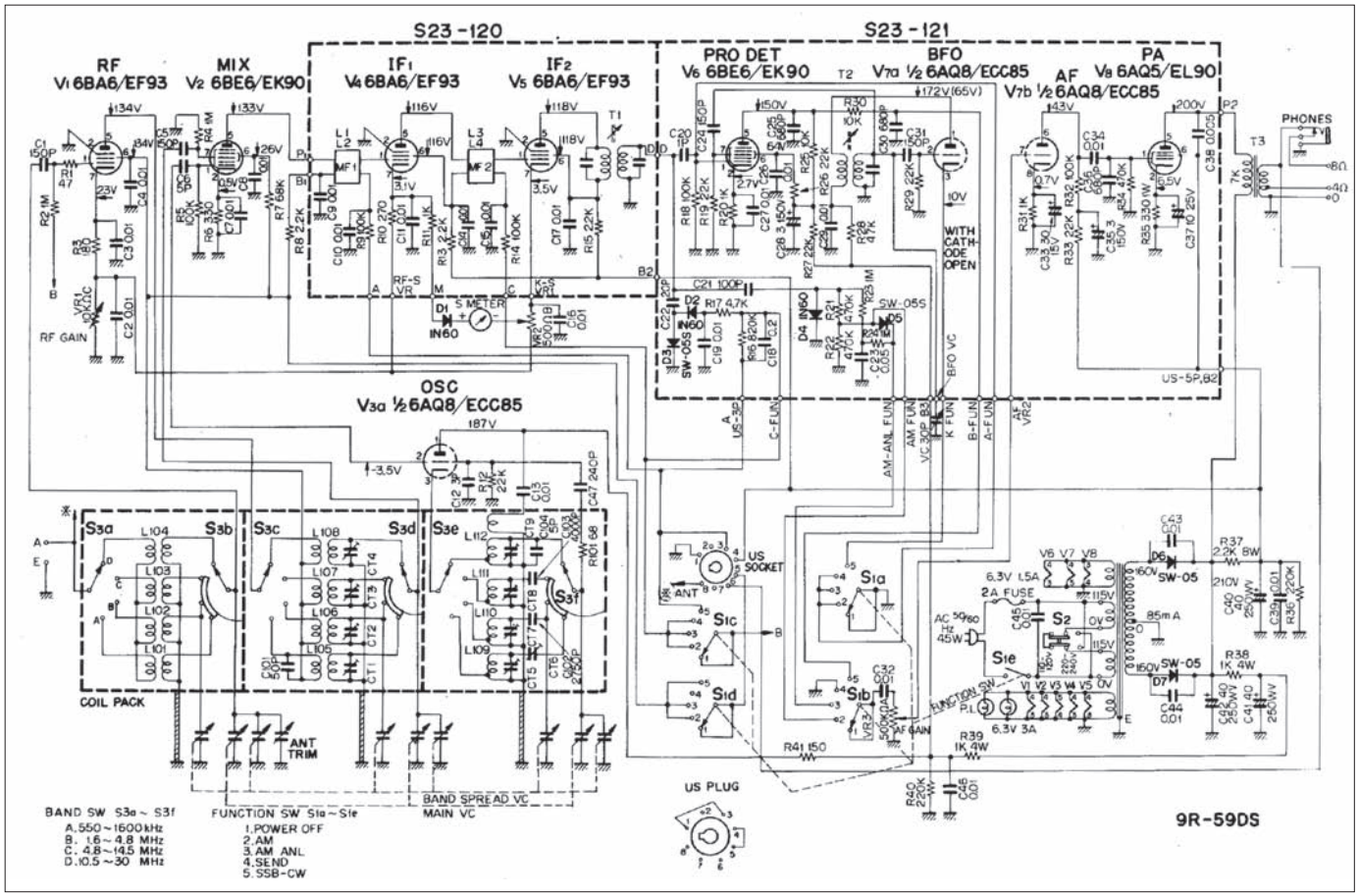
Further terminals are fitted to allow you to connect an external speaker of either 4 or 8Ω impedance. There's no internal speaker fitted so you'll need to connect a speaker to these terminals.

Trio produced a matching speaker for the receiver as an optional extra – the SP-5DS. If you manage to acquire one of these with your receiver, it will provide a nice cosmetic match and also good communications quality for received signals.

An 'S Meter Zero' pre-set control lets you set the front panel S-meter to indicate zero with no received signal, to subsequently give an accurate readout when you use the receiver on air. Finally, on the rear panel there's a circular 8-pin 'remote' connector which can be used with a separate transmitter if required.

Modifications & Improvements

The most common improvement to be made on the 9R-59DE is, of course, the addition of a plug-in voltage stabiliser valve as previously detailed. The October 1970 issue of *The Radio Constructor (RC)* magazine featured a four-page article detailing several performance-improving modifications to the 9R-59DE receiver. However, as the author quite correctly stated in the article, the receiver



The circuit diagram of the 9R-59 series of receivers.

already gave acceptable performance as it was both sensitive and selective.

It's beyond the scope of this short article to details all the *RC* modifications here, but they consisted of changes to the power supply section to reduce mains hum, screen grid resistors for the i.f. and r.f. valves. It also describes separating the r.f. gain and i.f. gain with individual controls, improving oscillator stability and adding a crystal calibrator. In fact Trio had already allowed space in the receiver for a crystal calibrator to be fitted by users and you may find yours already has one fitted.

Buying Tips & Alignment

Hopefully, by now you'll have an idea of what the receiver does and what it's capable of. And, of course, there will be a variety of differing receivers available on the second-hand market in similarly differing states of modifications, cosmetic appearance and accompanying options such as a matching external speaker, crystal calibrator, internal stabiliser and accompanying documentation.

Receivers are often advertised with the 'could do with alignment' but don't worry – this is a simple matter. The bottom panel has a number of holes for adjustments with a label showing which are which. This label may have been removed or lost over time; it's not detailed in the manual so it's shown here in close-up. Front panel potentiometer controls such as the r.f. gain and a.f. gain can go intermittent and be described as such by sellers.

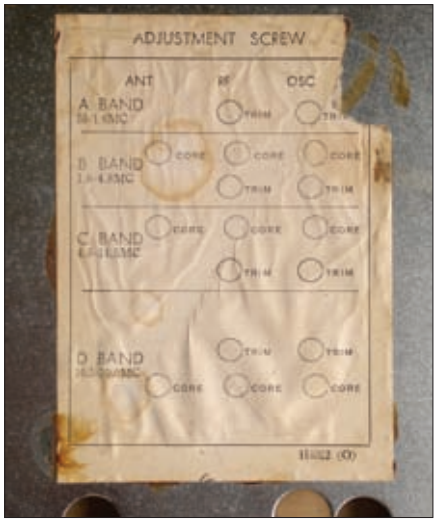
Again don't let the 'scratchy' controls put you off – a spray of electronic contact switch cleaner onto the potentiometer resistive track. If this fails just a simple replacement of the internal potentiometer control itself, can save you much on the buying price.

The receiver itself weighs just over 8.5kg and measures 180mm H x 390mm W x 250mm D, so carriage costs from the buyer are likely to add a reasonable amount to the overall price. Also, due to the nature of the receiver, damage can occur in transit unless it's well packed. Even so, I've known courier parcel delivery drivers to drop a packed receiver over my 1.8m high rear wooden fence onto a concrete path in my back garden for delivery!

Hence, if at all possible, I suggest that you try to arrange personal collection, or a suitable meeting place between yourself and the seller.

More Information

If readers would like a copy of the receiver manual and/or a copy of the modification details, I'd be pleased to supply these. Either send an E-mail to **g4hcl@rsgb.org.uk** for an electronic copy, or for a paper copy send an A5 or A4 sized self-addressed envelope stamped for 100g 'large letter' size (currently 75p for 1st class, 58p for 2nd class) to Chris Lorek G4HCL, PO Box 400, Eastleigh SO53 4ZF. Please allow up to a few weeks for a reply in case I'm away.



Alignment point for each of the four bands, feature both coil and trimmer capacitor adjustment for the three higher bands.

Final Words

As readers may have guessed, I've never ever bought anything from that earlier Huddersfield dealer again nor from the shop's owner. But the event did have a good conclusion because a little later I bought my first h.f. receiver (this time new rather than second-hand) from a shop in Blackburn with their Amateur Radio division ably run by fellow *PW* columnist **Harry Leeming G3LLL**. I've never looked back since, thanks Harry! **PW**

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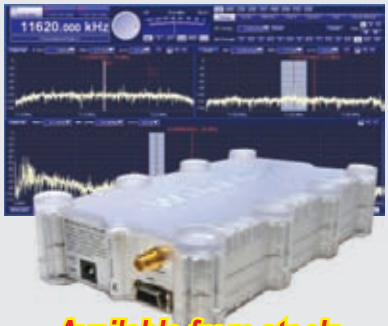

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Willowside, Bow Bank, Longworth, Oxfordshire OX13 5ER
E-mail: tim@g4vxe.com Twitter id: G4VXE

Tropospheric Ducting! (Again!)

Tim Kirby G4VXE discusses the fascinating subject of v.h.f. ducting again.

Welcome to the *World of VHF* (*WoVHF*)! It was good to hear again from Richard Gosnell G4MUF who added a little more to his interesting letter last month, when he said: "The other point is that mountain-top v.h.f./u.h.f. DXing is strongly influenced by whether both stations potentially in contact are on the same side of the duct or not. A strong duct traps signals only if they start out within-duct, so there may be little or nothing heard from an in-duct station, on a mountain top above the duct.

"Transmitters for u.h.f. TV from a tall mast on a high mountain will sometimes be above the duct, so reception from a station in-duct may be attenuated or lost all together".

Thanks for that Richard! Certainly, I think what you've said is very true and I have definitely experienced occasions when on top of a mountain, I have been above the duct and on others when in a valley I have been below the duct! You can't win!

Richard adds some advice for those on top of a mountain in search of DX (or even walkers), "very dry air above ducts could carry a health warning. Mountain walkers don't always know how much body fluid they lose when the relative humidity is only a few percent. Therefore, you should always have plenty of water with you, even though it might be cold and foggy or cloudy at lower levels where you start out." Always a good idea Richard, sounds if you may have found out the hard way!

The 50MHz Band

Plenty of reports of activity on the 50MHz band this month, including some tantalising DX from some of our Mediterranean correspondents. **Ronald Pincho ZB3B** reports an excellent opening on April 9th, when he worked LU4FW (FF97), CT1FFU (IM59), EA3GP (IN01), CT1APE (IM59), V51KC (JG88), LU5FF (FF99), PY5HOT (GG46), PY5EW (GG46), 5F6SIA (IM64).

Ronald has heard the Ascension Island beacon, ZD8VHF and says that there are some trans-equitorial propagation (TEP) openings most days and the band is becoming alive with signals from South America and Africa. He runs 50W to a 4-element Yagi.

Russ Scully M0WYB (Bath) wrote with details of QSOs around midday on April 10th. He worked EA7/G0WHX (IM87) and EA7/G1WUU (IM87) Both stations were good and readable on the 5/8 wavelength vertical but were better (59) on the beam (Home-brew G0KSC dual-band yagi 6/4/9d). Russ comments that this was the first Es opening that he, or the other stations had noted this year. It's my impression that the Es season has got off to an earlier start this year than recently, can anyone confirm that?

Mark Marment CT1FJC in Portugal (IM57) kindly sent a very impressive list of DX worked. On April 7th, he worked 5M2TT (IJ46), V51KC (JG88), PY2XB (GG66), and PY2WBC (GG67). On April 9th, he worked LU4FW and LU4FPF (FF97). On April 10th Mark found an Es opening, working IW1AZJ (JN35), DJ7UD (JN48) and OE9ICI (JN47) and then later in the day, TEP/F2 with VP8NO (GD18), FG4NN (FK96), 9Y4D (FK90), PP5XX (GG53) and PP5JD (GG52).

On April 11th, 9L5MS (IJ48) and 9J2BO (KH44) were worked via TEP and HB9RXC (JN45) by Es. April 17th saw QSOs with C5YK (IK13) and our very own ZB3B (IM76) – sometimes those 'close' squares are quite tough to work! April 19th was another interesting TEP day with PY2HN (GG66), PY5QW (GG54), PY1RO (GG87), TJ3AY (JJ53) and PU1SHF (GG98) worked. CE4WJK (FF45) and LU5FF (FF99) were worked on April 20th.

Mark caught an Es opening, which was presumably quite intense to EA6SA (JM19) on April 25th. 5V7CC (JJ06) was a nice one via TEP on April 26th. As well as a TEP QSO with TZ6TR (IK84) on May 1st, Mark caught an Es opening and worked ON4TA/P (JO20), S59ACP (JN75), F4AZF (JN39), ON7KC (JO20) and G4CZP (IO90).

Des Kiely G0RBD (Chippenham) has started to work some Es. April 24th was a good day and Des worked EA9IB (IM85) and EA7RZ (IM86) with quite a number of other EA stations heard. On May 1st, Des worked IK7UXY (JN90), IZ7JXJ (JN80), IK7XLW (JN80). IZ8GFK (JN70) and IZ8RSO (JN70). In addition – Des recently celebrated his birthday. His birthday cake had a real Amateur Radio theme as you'll see!

Graham Boor G8NWC (Spalding) reports that he's working on a 50MHz dipole to go up on the chimney in the hope of working some Es during the summer. If you haven't enjoyed what 50MHz can be like during the summer, do exactly as Graham is doing – put a dipole or a vertical up – it really doesn't have to be very high and listen in the late afternoons and early evenings (as well as just before midday, if you can) and you should soon be hearing and hopefully making some interesting contacts.

At G4VXE (Oxfordshire) I caught my first Es opening of the season on April 24th and worked EA7HG (IM87) and EA7/G1WUU (IM87). A week later, when I was using the special callsign GR4VXE to celebrate the Royal Wedding, I worked I0JX (JN61) and I0WTD (JN61) during a brief opening. I've also just put up a new V2000 vertical which covers 50, 144 and 432MHz.

I haven't had a chance to try it very much on 50MHz as yet, but initial signs are very promising. The first benefit is that it is quieter than the other vertical which I can use on 50MHz, so hopefully weak signals should be much easier to hear. The GB3RAL (50.050MHz) and GB3BAA (50.016MHz) beacons are louder than before and the GB3FX (Farnham) on 50.810MHz and GB3ZY (Dundry) on 50.800MHz repeaters are much better copy.

Now this is a shack! Russ M0WYB in his element.

What a birthday cake – served up for the birthday of Des G0RBD.

Tracking the GS3PYE/P team via APRS, on their way to Arran.

The 70MHz Band

It was good to hear from **Leo Fiskas SV2DCD** (Argos Orestiko Kastoria in Greece) again, who kindly sent some more details of his record breaking 70MHz QSO with **ZS6WAB,** which we reported last month. Leo says, "At around 1700 on March 28th, I was able to copy Z21SIX and ZS6TWB beacons on the 6m band with a report 599 – very strong TEP! After that I asked Willem ZS6WAB, who was in ON4KST chat (**http://on4kst.com**) to try with me on the 70MHz band. I knew about Willem's nice set-up on the band so he was the first station I had asked to try. We'd had a couple of tries previously, but with no results.

"Willem is very active on the WSJT digital modes so he asked me to run ISCAT mode on 70.200. When I tuned to the frequency, I was very surprised! Willem had already started transmitting and I could hear his signal on my speaker! The signal was so strong I could hardly believe it. You can see a video of the QSO here **www.youtube.com/watch?v=LmYZtQifl6M**

"You will see that I was waiting for the software to decode the signal to be sure that it was from ZS6WAB. The software didn't decode anything, possibly for two reasons; one is the strength of the signal which was very strong and the second is the frequency shift from the TEP (*TEP signals often exhibit Doppler shift – I have heard some 50MHz signals which sound almost like an aurora,* G4VXE). After Willem's transmission, it was my turn to transmit in the next period. But after I had finished my transmit period, Willem started to call me on s.s.b.

"Bingo! I unplugged the digital interface from my FT-847 and put the microphone back in. Willem was 52 here in KN00PL. I got back 53 in KG46RC. After that Paul ZS6NK asked me to turn c.w. on 7.020MHz and give a try for him. His signal was 519! The tone was a little bit like Aurora and I got back 519. Next day on 29th I worked Willem ZS6WAB this time with big signal 59 report on s.s.b.!"

Leo went on to discuss his 70MHz set-up, which I found very interesting. He uses an FT-847. Here at G4VXE, like Leo I have an FT-847 which I can use on 70MHz, but the receive performance is quite poor and the transmit power is around 8W, so I was keen to find out what Leo had done to improve matters!

Leo said: "One month before the QSOs, I got CT1FFU's pre-amplifier kit for the YAESU FT-847. My good friend Tasos SV8YM made an excellent job installing the kit and also great job making the transmitter modification on FT-847. Following that, my FT-847 after that has better receiver sensitivity which is <0.1µV for a 10db S/N and also output power from 21W to 72W. My antenna is home-made, to a DK7ZB 9-element design, on a 10m boom. I've used it for four years now with good results with the unmodified FT-847, including QSOs with CU8AO and D44TD"

Thanks Leo for all the interesting information and congratulations to everyone involved in these record-breaking and fascinating QSOs.

From **Brian Justin WA1ZMS**, comes news, via **Dave Robinson WW2R,** about a 70MHz beacon in Virginia, beaming at Europe. "As of 1230 on May 2nd, a 4m band radio science E-skip Trans-Atlantic (TA) propagation beacon is QRV from the East Coast of the USA. The QRG is 70.005MHz, the c.w. emissions. e.r.p. is 3kW aimed at 60° true towards Europe. This year's parameters are identical to the previous 2010 operations but with a new call sign, **WE9XUP**, for 2011.

"The beacon is scheduled to run 24 hours a day until September 1st, 2011 but must go QRT sooner, if there are technical or **any** QRM, issues. This is a Non-Amateur beacon (just like 2010 operations) and two-way QSOs **are not** permitted. Any and all QSL/SWL reports via E-mail to: **WA1ZMS@arrl.net** All reports will be welcome.

"This beacon has been licensed solely with the gracious co-operation of the Society of Broadcast Engineers here in the USA – and the FCC's Office of Engineering Technology. Although there is no possibility of an Amateur Allocation on the 4m Band in the USA in the foreseeable future (the TV Broadcast Service is the sole allocated radio service), as the transmitter licensee I am ever grateful that this beacon could be QRV again in 2011 for propagation research – exploring Trans- Atlantic E-Skip propagation, with the dream of a TA QSO taking place someday on the 2 metre band!" Thanks for the up-date Brian! It's well worth listening for the beacon

Chris Clarke G0AQL reports a QSO with SV1BGR (KM18) on April 7th – very early in the season for Es on 70MHz – well done!

As usual there have been a good number of simplex contacts for G4VXE to make on 70MHz f.m. over distances of up to 80-100km. I worked Steve Richardson 2E0SRR operating as 2R0SRR on the Tring 'parrot', MB7FM and was interested to hear that Steve was working on a dual-band 50/70MHz antenna which was showing promising results – we look forward to hearing more!

The 144MHz Band

Gavin Nesbitt M1BXF (Trumpington) sent a quick report of his home station activity whilst he was operating as part of the team on the Cambridge Amateurs DXpedition to the Isle of Arran, GS3PYE/P. Gavin has been making some Meteor Scatter QSOs using the FSK441 mode (provided by the *WSJT* software) and worked DJ9EV on April 17th and YU7TRI and IV3NDC on April 22nd. We'll look forward to hearing more on the results of GS3PYE/P next month.

However, it was fun to track the GS3PYE/P team on their way to Arran, which was easy to do as they were active on APRS. I took a screen-shot showing the last leg of the journey from Glasgow to Arran. The APRS technology really is great for this sort of application!

The 430MHz Band

No reports from anyone other than me this month! During the RSGB 432MHz Activity Contest on April 12th my best DX was G3PYE/P (JO02) and G0XDI/P (JO01). I took my dual-band handheld transceiver for 144/432MHz when I went to Broadway Tower Country Park in Worcestershire

Well, I seem to have run out of space for this month. Please let me have your v.h.f./u.h.f. news ready for next month and very many thanks to everyone who has taken the trouble to get in touch.

PW

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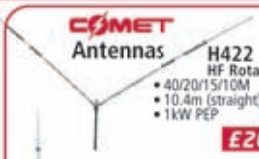

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Welcome to a Canadian Exhibit!

The Canadian Maple Leaf is much in evidence as Ben Nock G4BXD welcomes an interesting Canadian transmitter to his ever-growing museum.

A very warm welcome once again as its my turn to manage the *V&V* shop and bring you more from the 'Kidderminster Kollection'. Hopefully, you have all had a good year so far with plenty of rallies and radio related events. It's been a busy few months here – but more about that next time.

Canadian Airforce Transmitter

The transmitter I'm introducing this month has been in the 'Kollection' for some time and while I gave it the usual 'once over' when it arrived its still awaiting a proper 'test firing'. The set is the Canadian Air Force Transmitter Model AT1 and was produced early on in the Second World War by the Canadian Marconi factory. The transmitter was used in conjunction with the AR2 receiver, an example of which is still needed in the 'Kollection' if anyone has one available?

The transmitter, **Fig. 1**, is a 1.5 to 20MHz set with addition coverage of the 375 and 500kHz spot frequencies and is capable of around 15W of radio frequency (r.f.) output running amplitude modulation (a.m.), Morse code (c.w.) or modulated Morse code (m.c.w.).

The AT1 and AR2 sets were designed to be operated from a 12V supply but there was another version, the AT7 and AR6 which were powered from a 24V supply. The transmitter uses three Raytheon RK-38 valves for oscillator, power output and modulator stages and a 6J5 as tone oscillator for m.c.w. and a 6H6 as the antenna current metering diode.

There are two sets of tuning coils, A and B, which can each be switched to master oscillator (m.o.) or crystal controlled with unit A tuning 1.5 to 5MHz and also covering the 375 and 500kHz frequencies. Unit B tunes 5 to 20MHz. The frequency tuning and the output stage tuning, **Fig. 2**, use roller coaster type inductors with turns counter on the front of the set for reference and logging data.

Power for the transmitter comes from an internally fitted dynamotor which, running off the 12V d.c. supply generates around 500V high tension (h.t.) for the set. The antenna output of the set was designed for the short wire antenna fitted to aircraft and apparently needs a load of around 10Ω with a series capacitance of 100 to 500pF. This could make feeding the transmitter

Fig 1: The AT1 transmitter.

into the usual 50Ω antenna system a little problematic – but more on this when I can get around to trying the set on air!

Unfortunately the transmitter – and also the receiver – are controlled externally from a remote control box. The microphone, Morse key, etc., cannot be plugged directly into the transmitter so I shall need to fabricate a suitable box, unless of course I can find one 'out there'! I think it would be very interesting to get the set into operation once more and I will be looking out for the matching receiver and control boxes – so watch this space!

An Early Walky-Talky

On to a pair of unusual and interesting little sets now, the USA made AN/PRT4 transmitter and the AN/PRR9 receiver. These sets were designed from around 1964 onwards but it was not until 1967 that the first batches arrived with the USA troops in Vietnam.

However, the way these sets were used was rather odd! The crystal controlled single channel receiver unit, **Fig. 3**, was actually fitted to the soldier's **helmet**, two clips on the rear of the receiver case slip over the rim of the helmet, **Fig. 4**, and hold it close to the soldier's ear. A specially shaped speaker tube or horn feeds the audio out of the set so that the soldier can hear it.

The receiver's antenna, a very flexible 450mm (18in) whip, that works best when using the helmet as the ground plane although the set can be used off the helmet in normal hand-held use or inserted into the pocket of a battledress tunic. In this role a small earpiece can be plugged into the receiver and mounted in the user's ear.

The receiver is a fairly standard double conversion superhet design, with 10.7MHz and 455 kHz intermediate frequencies (i.f.) stages, using integrated circuits (i.c.) and discrete components. The first i.c. is the radio amplifier, mixer and crystal oscillator with an output of 10.7MHz. The second i.c. converts to 455kHz while a third i.c. and components deal with the audio and squelch options.

A rotary control on the bottom edge of the receiver is used as On/Off and volume and if rotated all the way disengages the squelch function. The whip antenna can be swivelled on a small mount so that in helmet or pocket use and the whip can be positioned vertically. The battery for the receiver is mounted externally in a small tube. The original batteries were not rechargeable but it's possible – with a little engineering – to replace these with rechargeable types.

Fig 2: Internals of the AT1, the space in the centre is where the dynamotor, changing the incoming 12V up to 500V, is normally located.

Fig 3: The PRR9 and PRT4 radio set, the original receiver battery is held in the small tube (top of photo).

The transmitter is a 2-channel voice or tone set which is crystal controlled and can operate between 47 and 57MHz delivering 500mW watt on one channel and 250mW on the other. The set has a 15V rechargeable battery clipped to the bottom of the set and uses a telescopic whip as the antenna.

The sets were designed before the

Fig 4: The receiver in use, helmet mounted.

USA introduced the 150Hz tone squelch into their later sets, so a second version, designated PRT-4A was introduced with the 150Hz tone fitted making the transmitter compatible with subsequent sets. It appears the sets weren't a great success with troops though – and I would imagine the helmet mount would have given rise to some comments!

The receiver and transmitter examples illustrated for this article have crystals on 51MHz and work very well. The receiver came with a second home-made battery case in which AA cells can be used but I intend to fit new rechargeable cells into the original tube in the future.

The GR-345 Man-pack

Back in August 2008 I mentioned the USA-made PRC-74 man-pack transceiver. At the time I said: "This man-pack has a really exciting history, it was widely used in Vietnam during the conflict there and I have found some interesting information and pictures on the web detailing its use. Basically the set tunes 2 to 18MHz and puts out a good 15W of upper sideband (u.s.b.) or c.w. signal from a 12 to 15V battery supply."

I further stated: "The series started with the PRC-74 tuning 2 to 12MHz, the 74A had a similar range while the 74B and 74C tuned to 18MHz. Various battery boxes were available and allowed for different battery combinations, one box even taking several wet cells. Other boxes used NiCads and various pre-packed units."

Recently I acquired a British Redifon set which in all respects is either a copy of the PRC-74 or, the PRC-74 is a copy of this set. The Redifon GR-345 is a single sideband (s.s.b.), c.w. and a.m. high frequency manpack delivering 15W into the antenna and covering 2 to 12.999MHz tuning range.

As can be seen in the photograph, **Fig. 5**, the upper GR-345 is a close copy of the lower PRC-74. Differences in the On/Off Mode switch are evident, the 345 being Off, SSB-CW, AM while the 74 is Off, On, Tune, there being no a.m. option on the PRC-74. The other differences are audio and antenna connectors.

The battery pack for the PRC-74 has a round multi pin connecting socket while the GR-345 is a two pin arrangement. The battery packs are therefore not interchangeable.

The '345 was actually being sold as faulty. I figured I would be able to repair any faults it had – so took a risk and went ahead and bought the set. After it arrived here I tried it out on the bench and to my delight I found the set was in fact working fine, delivering its full output into an antenna on all frequencies and modes. (I contacted the seller to point this out – and he was very pleased at the outcome).

I already had the GR-345D version, which is the low power driver type, delivering just 100mW of output. This is used in conjunction with the GR-480 100W amplifier to make the GR-479 Radio Station along with the ACU-9 antenna tuner and a 24V power supply.

I understand from comments I have recently been given over the web that the set was indeed derived from the Hughes made PRC-74 and licensed to Redifon who made a copy as the GR-345. It didn't apparently curry favour with the British Armed forces though and most of the production was sent to foreign countries, including Germany and the Indian army. It seems though that the Germans liked the set and bought the design, renaming it the Fug.15. So, as I'm in need the battery box for the 345 I'm hoping one of my German 'agents' can help me out!

And finally

Well that's about all I have space for now, I hope you have enjoyed this latest visit. I hope to have more news about the 'Kidderminster Kollection' next time. More pictures on my web site at: ***www.qsl.net/g4bxd*** and you can contact me, address on qrz.com or ***military1944@aol.com***. Cheerio for now. **PW**

Fig 5: The GR-345 on top, with the PRC-74 below.

The Tone-encoder Revisited

Ken Ginn G8NDL updates the CTCSS tone encoder, originally published back in the July 2010 issue of *PW*.

I created a prototype CTCSS encoder that has been working successfully for over two years in a Pye MX296 and details were published in *Practical Wireless* in July 2010. While waiting for the article to be published I approached Tony Nailer G4CFY of Spectrum Communications with a view to him making the unit available in either kit or ready-built form.

Tony was keen to do this but on starting to produce the p.c.b. suggested several modifications to the circuit. The suggestions were based on his experience with interfacing Piptone and Kaytone boards into transceivers.

Tony suggested that wiring of any tone unit directly to the microphone audio pin of a rig may significantly damp the microphone audio. To overcome this requires the tone unit to have a high output impedance relative to the microphone. The effect of adding a high value resistor in series with the output of the tone unit then requires a much higher tone amplitude feeding that resistor.

Unfortunately, the output amplitude of the prototype CTCSS unit wasn't high enough. To overcome this, the output trimmer potentiometer (RV1) was moved from the emitter to the collector of the output transistor Tr1, and a 22uF capacitor (C13) in parallel with a 470Ω resistor (R15) was wired in the emitter circuit of Tr1.

The Changes

The changes around the output transistor turned it from an emitter follower into a common emitter amplifier. And adopting this arrangement doubled

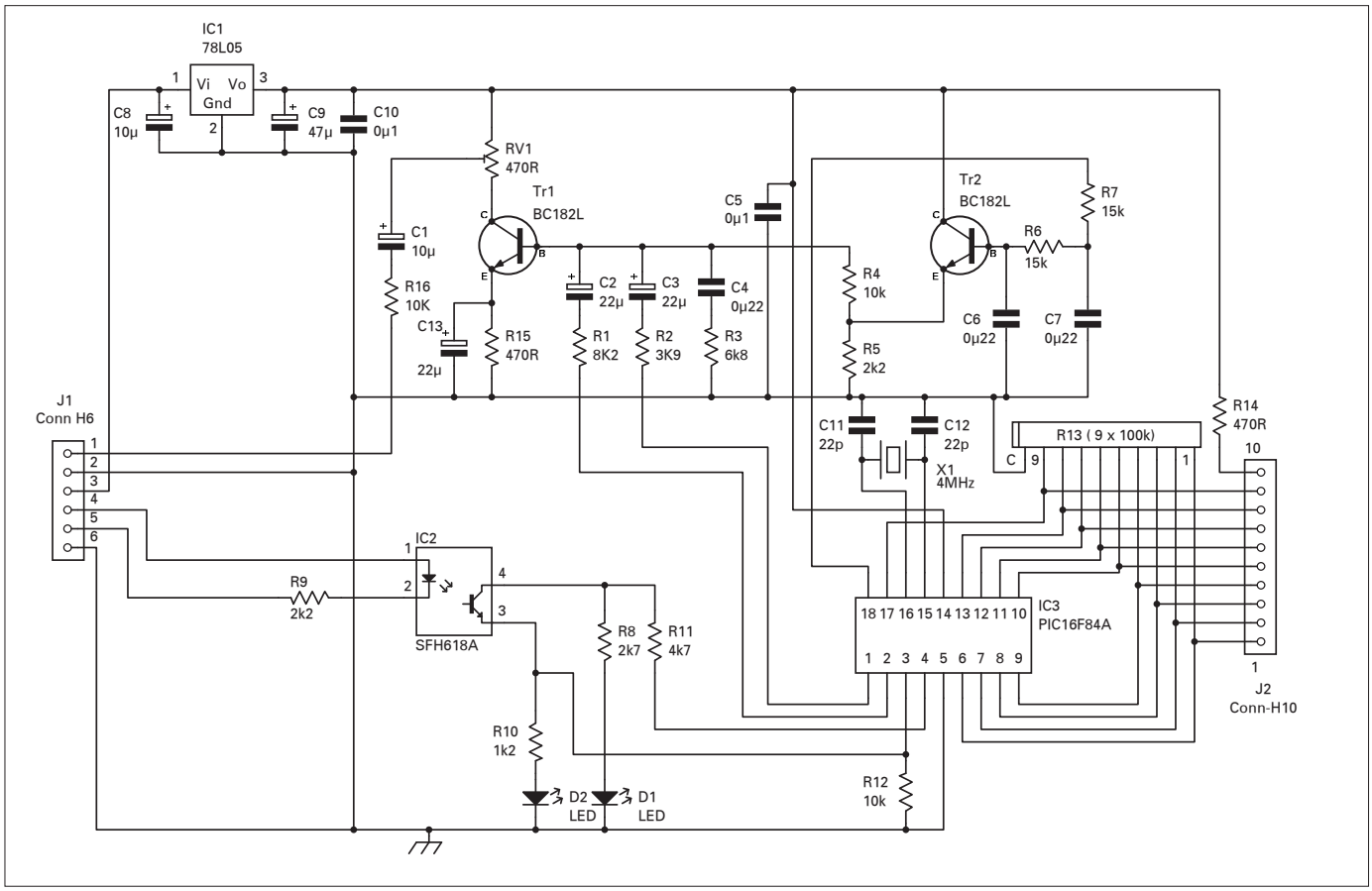

Fig. 1: The updated circuit of the CTCSS unit that Ken originally showed us in *PW* July 2010.

the amplitude of the tone's output. Essentially the rest of the circuit remained the same but the components were re-annotated from the prototype. The updated circuit is shown in **Fig. 1**.

From the slider of RV1 to the output pin on connector J1 there is a series capacitor and resistor. The capacitor provides d.c. isolation whilst the resistor works in conjunction with the low impedance of rig microphone to attenuate the CTCSS tones to the correct level.

The value of series resistor R16 can be increased if on adjustment, RV1 is close to its minimum setting. Alternatively R16 can be reduced slightly if there's insufficient tone level amplitude when feeding a dedicated tone input on the transmitter.

The changes required a rather radical redesign of the printed circuit board (p.c.b) and fortunately resulted in a reduction in board size. Cutting down the board size also makes it easier to fit it into a variety of rigs.

The new circuit board now measures 66 x 55mm. The p.c.b. and artwork are shown in **Fig. 2**. The original PIC programming and board layout had put the tones out of sequence. With the new layout with all PIC outputs in straight sequence, the programming codes were changed to make the tones also in correct sequence.

The PCB Connections

External connections to the p.c.b. for audio out, p.t.t. switching and power supply remain as in the prototype. This can still be used for grounding the p.t.t. to transmit, or, as in the case of Pye PMR, equipment taking the p.t.t. line to the +10V line. The unit with its external wiring is shown in **Fig. 3**.

The unit can be fitted into a box with a single pole 9-way switch but in the majority of cases it will be used hard-wired with a single tone to access a specific repeater. **PW**

Kits & Bits

A p.c.b. and component parts in kit form excluding the single pole 9-way switch costs £20 plus £1 p&p. Ready built unit, but excluding switch £29 plus £1 p&p. All these are available from **Spectrum Communications**, **12 Weatherbury Way**, **Dorchester**, **Dorset DT1 2EF**, quoting the CTCSS project from *PW*. Or you can telephone, or FAX Spectrum on: **(01305) 262250**.

Note: Programmed PICs are available from Ken Ginn G8NDL. Further information via **ken.ginn@btinternet.com**

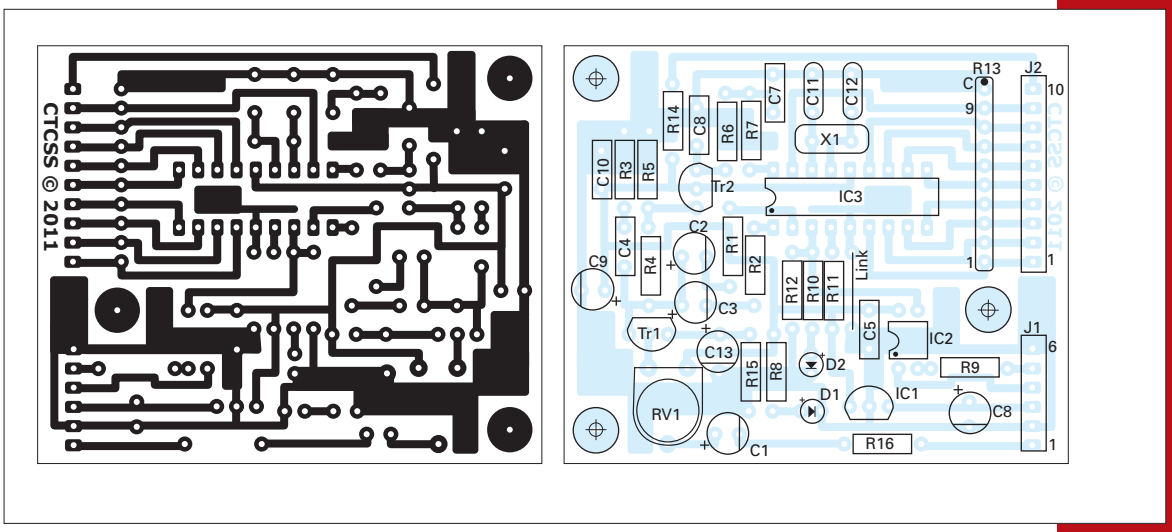

Fig. 2: The track pattern and overlay of the updated CTCSS encoder kit that's now available from Spectrum Communications.

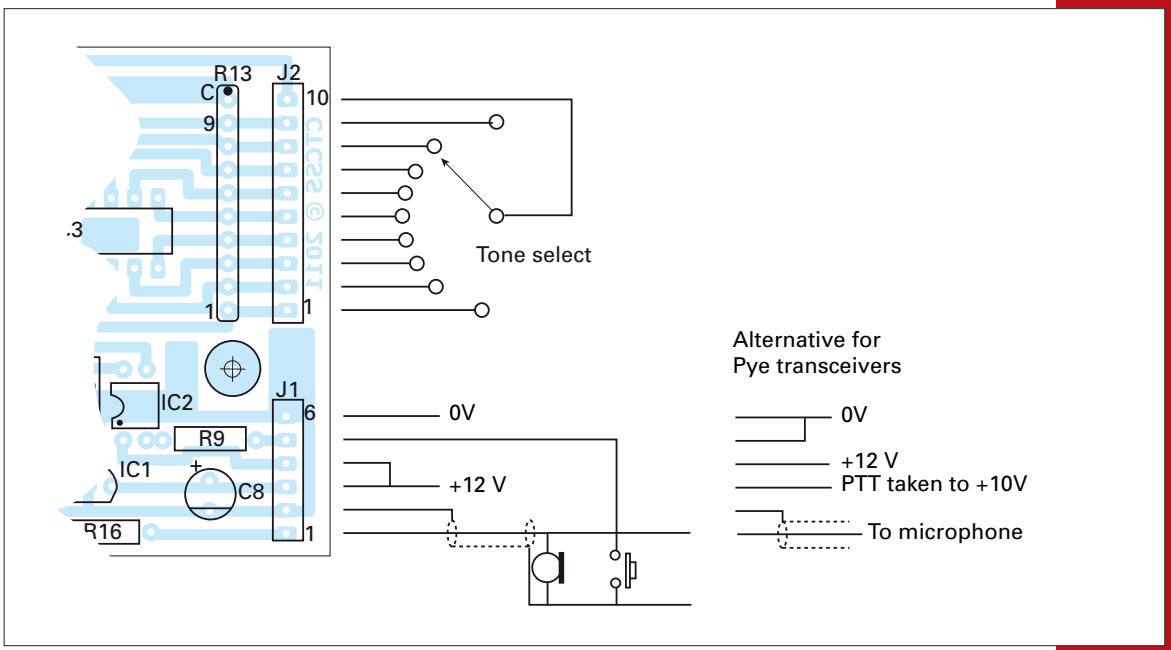

Fig. 3. Wiring up the new unit.

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PLEASE PRINT ALL

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Postcode Date of Birth / /

Tel No

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First Name

Last Name

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Card Expiry M M Y Y Valid from M M Y Y ISSUE No (Switch etc)

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You should state clearly in your advert whether equipment is professionally built, home-brewed or modified.

The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

Bargain Basement adverts will now cost £5 per advert (subscribers still free) and will also be published in *RadioUser*, our sister magazine, unless requested otherwise.

FOR SALE

AR-3030 RX including PSU, handbook, ATU, long wire antenna and 25ft coax. Not used for three years. Ill health forces sale. £200. Tel: Bill (01432) 279641(Hereford).

DISCONE AERIALS Icom AH-7000, £45. Diamond D-130N, £50. Yagis four element band 2 FM, £25. Six element 143.148MHz. C & S antennas, £35. Co-Linear 430-470MHz J-beam 7533, £30. V9 10-160m Sandpiper, £40. Tel: Tony G3KAG 01335 324393 (Derbys).

COLLECTORS ITEM EDDYSTONE 840C with feet, original manual and receipt. v.g.c. £450. FT101ZD mic with boxed spare valves. £250. Roberts receiver model R9918. £50. All items v.g.c. and f.w.o. Buyer collects. Tel: Chris (01244) 675908 (Manchester).

EDDYSTONE 2237A RECEIVER £50. Kenwood TS-440S with auto atu, £325. Target HF3 receiver, £70. LDG AT-200PRO as new, £130. MFJ-949E Versatuner II, £85. Tel: John G4XYY (01937) 844197 (Bramham)

ICOM IC-R7000 excellent all-round v.h.f./u.h.f. receiver with handbook. £895 inc. p&p. YUPITERU MVT 7100 hand-held scanner excluding PSU, handbook, L/case. £165 inc. p&p. Tel: George (01443) 437345 anytime (Mid-Glamorgan)

LOWE 150 Rx rare, black. Not SMC with key pad, original PSU, original handbook and sales brochure, etc. Everything works as it should. Good all round condition, £240 + P&P or collect. Tel: 01903 859712 anytime (W. Sussex).

MOTORISED SATELLITE DISH Elliptical dish 90 x 80cm. Wall mounting. Free, ready to collect. Tel: 07980 968755. Leave message (Nr. Chippenham, Wiltshire).

REALISTIC 2006 400 channels, 25-1300MHz, £45. Realistic PRO-39 66-980MHz, £20.
Tel: Tom M3EHA 01606 597342 (Cheshire).

YAESU FT-857 LDG tuner 100, £450. Tel: 07756 146314 (Manchester).

WANTED

OLD HALF INCH FERRITE RODS must be half inch, 12.7mm, in diameter and be six inches long or more. Will pay very good money for the ferrite rods. Tel: Peter Tankard 0114 2316321 between 9am and 9pm (Sheffield).

TRIO 0-30MHz RECEIVER if possible but not with keypad. Must have built-in frequencies and simple to use with instructions if possible.
Tel: Jim Nadin 01274 547219 (Bradford).

EXCHANGE

YAESU FT-60 DUAL BAND HANDHELD (not used) plus mic. Exchange for HF general coverage comms receiver. Tel: David G7GZC (0208) 894 5520 (Twickenham).
E-mail: dhecoles@gmail.com

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B.B. July '11

Rallies

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

Send your rally info to:

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

JUNE

June 12th
The Ipswich Radio Rally
The East Suffolk Wireless Revival (Ipswich Radio Rally) will take place in the Orwell Crossing Lorry Park, A14 Eastbound, Nacton, Ipswich IP10 0DD. The doors will open at 9.30am, admission will cost £1.00 and there will be talk-in on S22, car parking, a Bring & Buy, a car boot sale, special interest groups, the GB4SWR HF station and catering.
Steve M1ACB
Tel: 07711 329624
www.eswr.org.uk

June 12th
The Junction 28 QRP Rally
The 10th Junction 28 QRP Rally organised by the South Normanton, Alfreton and District Amateur Radio Club in association with the G-QRP Club will take place in the Alfreton Leisure Centre, Church Street, Alfreton, Derbyshire DB55 7BD. This is ten minutes from J28 on the M1 and the A38. The doors will open at 10.00am and there will be trade stands, a Bring & Buy, special interest groups and catering.
Russell Bradley G0OKD
Tel: 01773 783658
E-mail: Russell.bradleyg0okd@ntlworld.com
www.snadarc.com

June 19th
The Newbury Rally
The Newbury Radio Rally and Boot Sale will take place in the Newbury Showground, which is next to J13 of the M4. It will open at 9.00am and admission will be £2.00. Sellers will have access from 8.00am and pitches will cost £10. There will be talk-in on S22 (V44), free car parking, trade stands, catering, a flea market, special interest groups and facilities for the disabled.
E-mail: rallynadars.org.uk
www.nadars.org.uk

June 25th
Amateur Radio Jumble
The Amateur Radio Jumble event will take place at the Kilham Village Hall, near Driffield, East Yorkshire YO25 4RG. The doors will open at 9.30am and admission will cost £1.00, which includes tea or coffee.
John G3XYF
Tel: 01377 254441
E-mail g3xyf@btconnect.com

June 26th
The West of England Radio Rally*
The West of England Radio Rally will be held at the Cheese & Grain, Bridge Street, Frome, Somerset BA11 1BE. There will be car parking, trade stands, catering and facilities for the disabled.
Shaun G8VPG
Tel: 01225 873 098
E-mail: rallymanager@westrally.org.uk
www.westrally.org.uk

JULY

July 2nd
The Bangor Rally
The Bangor and District Amateur Radio Society Rally will be held in the Donaghadee Community Centre, County Down BT21 0HB. The doors will open at 12 noon and admission will cost £2.00. There will be trade stands, a Bring & Buy and special interest groups and **Ian White GM3SEK** will be giving a presentation on Ferrite Cores and Baluns.
Bill GI4AAM
Tel: 028 9181 6707
E-mail: bill.langtry@btinternet.com
www.bdars.com

July 2nd
The Stockport Rally
The second Stockport Rally (formerly REDDISH RALLY) will take place at Walthew House, Shaw Heath, Stockport SK2 6QS. The doors will open at 10.00am, admission will cost £1.00 and there will be car parking, trade stands, catering and facilities for the disabled. Tables will be available £10 each.
Bernard G3SHF
Tel: 01625 850088 (daytime & weekends)
Nigel G0RXA
Tel: 07973 312699 (evenings & weekends)
E-mail: info@stockportrally.co.uk
http://stockportrally.co.uk

July 3rd
The Barford Rally
The Barford Norfolk Radio Rally will be held at Barford Village Hall & Green, Barford, Norwich NR9 4AB (9 miles southwest of Norwich, close to A11 and A47). The doors will open at 9.00am and admission will be £1.50 (children free). There will be talk-in on S22, car parking, trade stands, a Bring & Buy, car boot sale, a prize draw, catering and facilities for the disabled.
E-mail: radio@dcpmicro.com
www.norfolkamateurradio.org

July 10th
The Cornish Rally
The 48th Cornish Radio Amateur Club Rally will be held at Penair School, St Clements, Truro TR1 1TN. The doors will open at 10.30am and admission will be £2.00. There will be talk-in, a car park, trade stands, a Bring & Buy and catering.
Steve
Tel: 01209 844939
E-mail: g7voh@btinternet.com
www.cornishradioamateurclub.org.uk

Roger Cooke G3LDI's Morse Mode
PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-mail: roger@g3ldi.co.uk Packet: g3ldi@gb7ldi.#35.gbr.eu

The Morse Mode

Roger Cooke G3LDI remembers a 'fist that will be missed', a Morse certificate, and Morse above 30MHz.

Welcome to the *Morse Mode* (*MM*)! It's always sad to hear of the passing of another Radio Amateur, even more so when the amateur concerned has had a long time in Amateur Radio and helped so many people alo ng the way. Such a person is Dave Ingram K4TWJ. The following piece was written by his wife Sandy WB4OEE and is on Dave's web site: www.k4twj.com/

"Dave, **Fig 1,** started in Amateur Radio at a very young age and learned electronics 'hands-on' style. He enjoyed all areas of amateur radio – especially c.w., QRP, DXing and satellites. Dave worked in radio, TV and microwave engineering, and designed several unique circuits and mini-rigs. He taught college electronics and held three degrees in Applied Electronic Technology plus an Amateur EXTRA class license and Radar Endorsed FCC First Phone/GROL license.

"Dave was also a pioneer in SSTV and assisted several world areas in becoming operational in video communications. As of 2010, he had written over 1,000 articles/columns and 29 books on all aspects of amateur radio as well as writing three columns in *CQ Magazine* plus articles for *RadCom* of the UK, *100 Watts* of Thailand, *SARL* of South Africa and other international ham magazines. His most recent book (*The World of Keys*) featured c.w. instruments such as few have ever seen.

"In addition to Amateur Radio, Dave was researching Quantum Physics and Radio Astronomy, and developing several definitive theories on electronic time travel based on matter transducers, light speed accelerators and Einstein's theory of relativity. A book revised by myself.

"I mention this here because Dave, a prolific author, wrote one last book, free to the globe's Amateur Radio fraternity and obviously Morse oriented. It can be downloaded here: **www.k4twj.com/books.htm**

"It is a superb PDF book for

Fig. 1: Dave Ingram K4TWJ was very active in Amateur Radio and a well known 'Morse Man'.

advanced c.w. operators as well as the new beginner and has a lovely selection of Morse keys, some of which I have not seen before. As well as being a well-known author, Dave was very active on the air – on c.w. of course – and his was a 'fist' that will be missed."

Thank you and I can echo that Sandy, and we wish you and your family all the best.

Morse Certificate

Martyn Jones GW6ITJ recently managed to acquire his Morse certificate at 15w.p.m. and he was really pleased to have it presented to him by no less than the President of the RSGB, **Dave Wilson M0OBW**, see **Fig 2.** Martyn is proposing carrying on to increase his speed and also to pass on some of his skill to others by volunteering for the GB2CW scheme.

I look forward to receiving your application Martyn!

Morse Above 30MHz

I received a note from **Dave Ackrill G0DJA**, who would like to see more Morse being actively used on the v.h.f. bands and up. Interested? Let Dave know via E-mail at: **dave.g0dja@tiscali.co.uk**

"I've been considering how to encourage the use of c.w. on the bands above 30MHz. I know that c.w. is already a very popular mode on the v.h.f./u.h.f./s.h.f. bands as most of my 'best DX' on these bands has been achieved using the mode. However, it can sometimes appear to be a bigger challenge to work a station in your own IARU square using c.w. than someone over 1000km away!

"So, here's a suggestion that I'm prepared to administer, if there's support for the idea. If people send me their lists, while using c.w. of course, of squares worked per band per month I will put together a table of numbers of squares worked per person per band and will rank them per band and as a total for all bands. These totals would then reset to zero at the start of every new month for all contributors.

"I will then attempt to keep a score of different squares worked, month by month, quarter by quarter and then per year as well. I don't propose to keep a year by year score, as that would favour those who will have been licensed for a longer period than others. Those getting licensed in the mid part of a year I won't be able to help, other than the fact that they will start each new month at the same score as everyone else anyway and might be more enthusiastic when they start out on the bands.

"The only administrative issue I would raise at this point is that I would not be prepared to filter out stations between reports. By this I mean that I would not, let's say, want to try to filter out contributors of one magazine over another."

Thanks Dave! What do you all think of these ideas *Morse Moders*? Contact Dave directly, if you'd like to participate. 73 and may the Morse be with you!
Roger G3LDI.

PW

Fig. 2: Martyn Jones GW6ITJ on presentation of his 15w.p.m. Morse certificate by the President of the RSGB, Dave Wilson M0OBW (right).

Colin Redwood G6MXL's What Next?
PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-Mail: what.next@pwpublishing.ltd.uk

Powering the Portables

In this month's *What Next?* Colin Redwood G6MXL delves into batteries for portable operations – aiming to solve some of the problems you may come across.

Welcome to *What Next?* (*WN?*) where this month I'm looking at batteries for portable operations. I'm also suggesting that they need to have a much higher capacity than might initially be thought.

I'm also aiming to encourages readers to take advantage of Sporadic E propagation that can often be found during the summer on the 28, 50, 70 and 144MHz bands. Finally, I'm taking a look at a new leaflet from the RSGB aimed at those new to Amateur Radio.

Portable Operations

With the coming of the summer months in the UK, I'll start by looking at batteries for portable operations. I was approached by an Amateur who had recently obtained his Foundation licence. He had bought a second-hand 144/430MHz (2m/70cm) mobile transceiver, wanting to participate in the local club net – but unfortunately he lives on the 'wrong' side of a high range of hills.

The hills prevented his signal from being heard by others in the net. So, to keep in contact with other club members, he planned to travel to the top of the hill and operate using a battery supply. He was looking for a suitable battery to power his transceiver for an hour or so operation and asked me, "What battery would be suitable?"

Let's take a look at the problems involved. The transceiver in question can run up to 10W when transmitting, and needs a nominal 12V d.c. power supply. You may think it would simply be a case of calculating the current drawn from the formula I=P/V, so in this case I = 10/12 = 0.833A (833mA). So a battery that could supply 833mA for one hour would do the job – or would it?

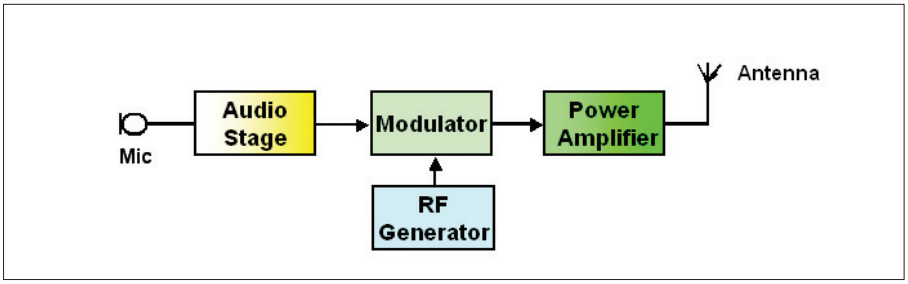

Fig. 1: Block diagram of a simple transmitter as used on the Foundation Course. The colour indicates the type of signal output from each stage, yellow for audio frequencies, blue for radio frequency carrier, green for radio frequency modulated with audio.

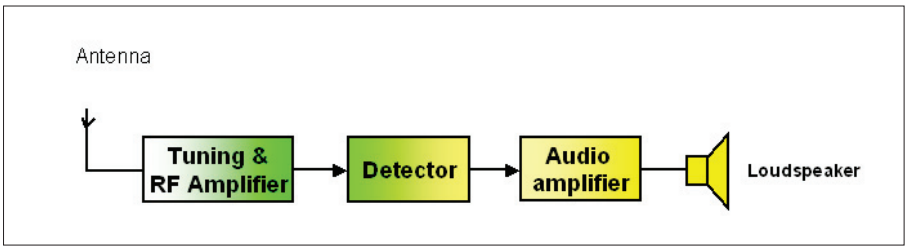

Fig. 2: Block diagram of a simple receiver as used on the Foundation Course. The colour indicates the type of signal output from each, green for radio frequency modulated with audio, yellow for audio frequencies.

Battery Capacities

Battery capacities are measured in Ampere-Hours. A one-amp-hour battery will (in theory) deliver one amp for one hour. Alternatively it will deliver half-an-amp (500mA) for two hours, etc.

Transmitter Efficiency

Transmitters, like everything in the real world, are not 100% efficient, in other words they need a greater power supply than is suggested from the simple radio frequency output power. Let me explain, starting with the basic block diagram (**Fig. 1**) of a frequency modulation (f.m.) transmitter, which will be familiar to Foundation Licence students. Each of the four boxes in the block diagram needs some power to work.

When calculating the supply capacity, as above, to the Power Amplifier section, I'd suggest that you assume only a 33-50% efficiency. This means to produce the 10W of r.f. output around 20-30W of power needs to be supplied from the battery. You may ask, "what happens to the 'missing' power"? The simple answer is that it essentially appears as waste heat. That's where the power goes!

I'll go back to the start now and look briefly at the Audio stage. The amount of current needed by the audio stage will be quite small, typically a few milliamps. But even this is in addition to the 833mA we've established. The same will apply to the radio frequency generator or radio frequency oscillator, and to the mixer.

Receiver Power Requirements

So far I have only considered power requirements of the transmit side of the transceiver – but what about the receiver? Here again there is a similar story. Each of the three stages of the receiver (**Fig. 2**) will draw current when switched on.

However, in the receiver it's the audio amplifier stage that will draw most current, which will vary depending on how loud the signal is. Turning the volume up will certainly increase the current consumption.

Even More To Consider!

Even having considered all the current needed to power the four sections that make up the transmitter block diagram, and the three sections that make up the receiver on the block diagrams, there's

Fig. 3: A charger for size AA batteries. There's a switch to select between Ni-Cad (constant current charging) and Lithium Metal Hydride (constant voltage charging) batteries.

Fig. 4: A 12V Gel Cell battery. This one has a capacity of 17Ah.

still more to consider.

Most modern transceivers have numerous features which are not shown on the simple block diagrams. Chief amongst these are the displays on the front, showing the frequency to which they are tuned. This display needs current to operate and to be lit up so we can see it clearly.

Additionally, most transceivers will have a light emitting diode (l.e.d.) that comes on when transmitting, and perhaps another when receiving. This alone will need another 15 to 20mA. And don't forget all the other circuitry that allows offset frequencies, 1750Hz tone-burst and continuous tone coded squelch system (CTCSS) for repeaters, memories, and switching between transmit and receive.

For some h.f. transceivers with a built-in antenna tuning unit (a.t.u.), there will be additional circuits that may draw surprisingly large amounts of current while it's carrying out the matching process. Higher specification transceivers may also have a digital signal processor (DSP), dual receivers and pre-amplifiers. All of these will add to the current drawn by the transceiver.

Total Current

By now, I hope it is clear to readers that the current needed by a modern transceiver is significantly more than that going up the coaxial feeder on transmit. So, how much current does a typical transceiver need in practice?

For a typical 100W h.f. transceiver, not less than 20A will be needed at 13.8V d.c. (some need even more). For example, Yaesu's popular FT-817 5W transceiver needs 2A at 13.8 Volts according to Yaesu's specification.

Operating Style

Your operating style (the amount of time you spend talking and listening) will also affect power consumption. The current drawn on transmit is much higher than on receive. Therefore the time spent transmitting in comparison with receiving will make a big difference to the requirements on the battery. I'll take three examples that will illustrate this.

1 Club net: Unless you are the net controller, in a club net, you may be transmitting for a few minutes, and then be receiving for perhaps 10 minutes or more whilst the other participants are taking their turn to transmit. So you may be transmitting for less than a quarter of the time.

2 Standard QSO: With a standard QSO, particularly if you have replied to another station's CQ call, you will be spending roughly half the time transmitting and half the time receiving. So this will put a greater demand on the battery than a club net.

3 Contests: If you are operating in a contest, and you are calling CQ and then briefly listening before calling CQ again until you get a contact, you are likely to be transmitting more than you are receiving. So this style of operation can put a greater demand on the battery than a standard QSO.

The Mode

The mode of modulation you're using will also affect the current drawn from the battery. For example, operating on f.m. will draw maximum current at all times when you are transmitting.

Operating on single sideband (s.s.b.) will draw maximum current only on speech peaks, although using a speech processor will increase the average current drawn on s.s.b. by making the quieter parts louder.

Data modes can also draw a lot of current even when using a transceiver set to s.s.b. However, it's usual to reduce the power to under half of the transmitters rated output power to protect the transmitter when using these modes, which obviously helps reduce the current taken from the battery.

Rechargeable Batteries

Almost without exception, Radio Amateurs use rechargeable batteries, rather than one-use batteries. There are three main reasons for this. The first is the high capacity of rechargeable batteries. The second is that rechargeable batteries tend to have a lower internal resistance (the apparent resistance within the battery itself) than equivalent one-use batteries, which means that they can provide higher currents – an important factor when transmitting.

Finally, and for most Amateurs this is the main consideration – rechargeable batteries are much cheaper over a period of time. Batteries of this type fall into two camps when it comes to charging: constant current and constant voltage.

Nickel Cadmium

The nickel cadmium ("NiCad") types of rechargeable batteries require a constant current during charging. This means that as the batteries charge, the voltage will slowly change from low to high, but the current will remain the same. These type of battery used to be very popular, being the first types of small rechargeable batteries on the mass market.

NiCads keep their operational voltage right up to a short time before they 'go flat'. They need to be charged for about 14 to 16 hours at a current of one-tenth of the capacity in Amp-Hours. So a 2Ah (2000mAh) battery needs to be charged at 200mA for 14 to 16 hours. Commercial chargers are readily available for these types of batteries.

Nickel Metal Hydride

Over the last 10 years, nickel metal hydride (NiMH) batteries have taken over from nickel cadmium types. For a given physical size, NiMH batteries have a higher capacity (typically three to five times) of the equivalent NiCad. Unlike the NiCad, NiMH batteries

Fig. 5: A commercial charger for 12V gel cell batteries.

Good Amateur Radio Operating Practices

Showing consideration for others

- Remember that radio contacts are not private – the amateur radio community is a public place
- Use language that is clear and will not offend
- Leave music to the broadcast stations
- Keep a copy of the band plans to hand and follow them
- Use amateur codes and abbreviations on amateur bands when they are appropriate (e.g. Two Echo Zero, QSY, 73, 5&9) and avoid codes or jargon from other radio users (e.g. CB, PMR, military, marine)

The phonetic alphabet

A	Alpha	N	November
B	Bravo	O	Oscar
C	Charlie	P	Papa
D	Delta	Q	Quebec
E	Echo	R	Romeo
F	Foxtrot	S	Sierra
G	Golf	T	Tango
H	Hotel	U	Uniform
I	India	V	Victor
J	Juliet	W	Whisky
K	Kilo	X	X-ray
L	Lima	Y	Yankee
M	Mike	Z	Zulu

- Keep overs short as you would in a conversation – new friends might want to join in or conditions might change such that your signals fade away
- If you find another station on 'your' frequency politely ask them to move, or move your QSO to a clear frequency – propagation may have changed and they may have been there all the time
- Find a clear frequency to tune up on and keep a note of your ATU settings for quick retuning next time you use the band
- Reduce power to minimum whilst tuning – it's safer for your radio and less interference to others

Calling other stations

- Listen carefully to the CQ call – is it a general call to all or a specific call to one continent or country?
- Only call if the CQ is general or for your area (e.g. 'CQ UK' or 'CQ Europe') or your callsign group (e.g. 'calls with zero only') your turn will come – be patient
- Always give your callsign in full and remember to send the other station's call first (e.g. 'Delta Six Eight Charlie from Golf Zero Alpha Bravo Charlie')
- Answer CQ calls once then listen; only call again if no other station has been identified – be patient
- If the station you are calling is not working anyone near you wait a while and try again later – be patient
- Try calling CQ on bands that sound dead – others may be waiting for a call
- Remember, there is no need for 'CQ' on a repeater just 'M6XYZ listening through GB3UB' is enough

Helping others

- Keep the hobby growing and help newcomers to get started
- Offer friendly advice to help others improve their skills
- If you can hear someone calling CQ and no one is answering, give them a call, even if it is just to let them know their signals are getting out
- Always give accurate signal reports – if you need 3 repeats, they cannot be 5&9
- Inspire others to be good operators by being one yourself
- If someone needs help (e.g. with putting up an antenna) lend a hand – you may need help next time

Being active

- Use the bands without abusing the privileges that your Licence gives you
- Join in club activities (local, national or both) – they provide an excellent opportunity to help others and to learn more about the hobby.

Learning more

- Familiarise yourself with your own radio equipment (e.g. Know how to work 'split')
- Read through the whole of your Licence – the training doesn't cover all of it but you must comply with the parts that apply to you
- Read up on topics of interest (the RSGB operating manual is a mine of information)
- Try new ways of operating (e.g. back-packing, data modes, satellites, gaining awards, taking part in contests)
- Experiment with different antennas, bands, modes – learn by doing
- If you don't know something, try to find the answer, search the web, read some books or ask for help
- Set yourself some goals (e.g. To upgrade your licence by the end of the year, to work 100 countries in a year/monthly weekend, to learn Morse and get a proficiency certificate)

Fig. 6: The new one-page leaflet from the RSGB for newcomers.

require constant voltage charging.

With constant voltage charging, the voltage stays the same, but the charging current drops as the battery charges. Commercial chargers are readily available for these types of batteries. Sometimes commercial chargers can be switched between constant current and constant voltage to cater NiCad and NiMH batteries (**Fig. 3**).

Gel Cell

Another type of battery which is very popular with portable operators is the gel-cell (**Fig. 4**). These are essentially sealed lead-acid batteries. These are bigger and heavier than typical NiCad and NiMH batteries.

Gel cells are available in a range of voltages, though most commonly 6 and 12V. They are available in a range of capacities (and hence physical size and weight). I have found this range of batteries ideal for portable operation using reasonably low power (up to 25 Watts or so). These batteries need a constant voltage charger (**Fig. 5**).

Car Battery

Another common type of battery in the constant voltage camp is the lead-acid car battery. These can be quite heavy, but their high capacity can make them worthwhile considering.

However, it's important to remember that these batteries give off gas when being charged, so it is important to provide adequate ventilation if this is done indoors. Incidentally, I know that some Amateurs use car batteries to power their station even when at home, often trickle charging them continually.

Safety Considerations

I've already mentioned that many rechargeable batteries have high capacity and low internal resistance, meaning that they can deliver very high currents. This means that under fault conditions or short circuits, the batteries can deliver several tens of amps (much more in the case of car batteries). This can be enough to cause wiring to melt.

So, it's important that the battery terminals are never shorted out, in use or in transit.

Flat Battery

After operating for some time, the battery will start to 'go flat'. As the voltage drops, a transceiver's performance starts to drop. This can manifest in a number of different ways. I have known some s.s.b. transmitters that produced what sounds like an f.m. signal. On receive, signals may appear to drift, squelch can appear to open intermittently, and other peculiar results can occur.

I suggest that readers conduct some controlled experiments before going portable, so that they know the characteristics to look for with their particular transceiver when the voltage starts to fall, prompting a change of battery. Because of this, I think it makes sense to monitor battery voltage when transmitting.

One Amateur I know takes a very pragmatic approach and using one very large capacity battery so that he knows he will not have to worry during a few hours operating.

I hope that readers will be able to choose suitable batteries for their portable operations during the summer. Hopefully fewer entrants in the *PW* 144MHz QRP Contest will have to pack up early due to a flat battery this year!

Sporadic E

In the northern hemisphere, during the period from May to August, and in particular during June and July, Sporadic E propagation can make the 28 and 50MHz come alive. Sometimes this can also include the 70MHz band and even the Band II (88 to 108MHz broadcast band). If you are really lucky, you may encounter an opening on the 144MHz band.

When these bands are open, you can find really strong signals on the bands from a 1000km or more away. I suggest that *WN?* readers who may not have explored these bands give them a try during the summer period.

Good Operating Practice Leaflet

I've just enough room this month to mention a new one-page leaflet that the Radio Society of Great Britain (RSGB) published at the end of 2010. It is intended to provide some key pointers for those new to Amateur Radio. I would suggest that all newly licensed Amateurs download a copy from **www.rsgb.org/tutors/pdf/good_operating_practices.pdf** (**Fig. 6).** Cheerio until next month! **PW**

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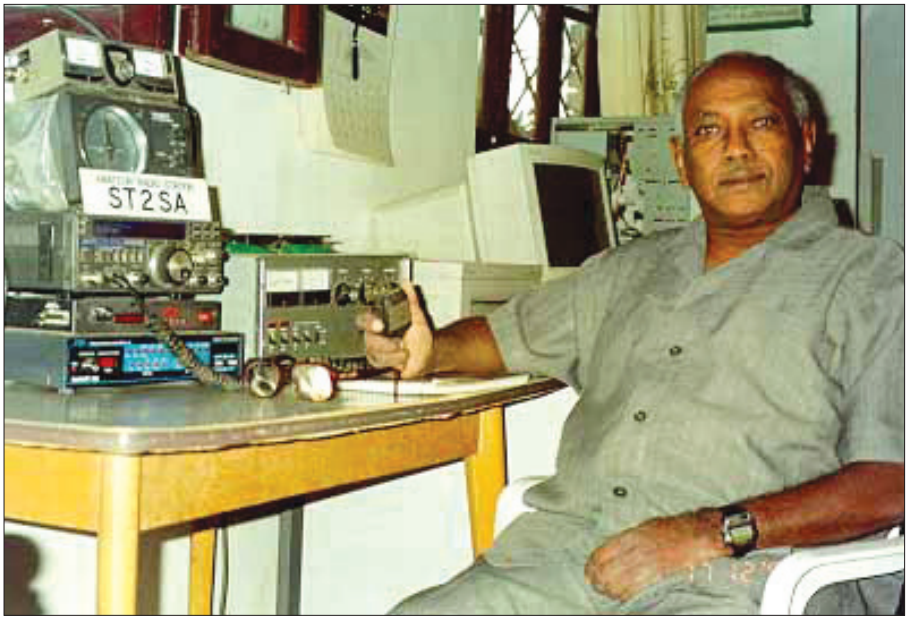
HF Highlights

Carl Mason GW0VSW hears from Tom Hutton G0HUT who tried desperately to get a Sudanese Amateur Radio Licence and rounds off with news and your reports. As usual please – all reports to Carl by the 15th of each month!



Tom Hutton G0HUT and Don Radley G4AGI met ST2SA in Sudan while they were working there – but didn't manage to get local licences!

Welcome to this month's *HF Highlights* (*HfH*) column where I'll begin with some information from Tom Hutton G0HUT who dropped me a line to say, "I have just read the May column and was interested in the write up on Southern Sudan and the ST0DX DXpedition. Way back in 1982 I was in Khartoum, the capital of Sudan, working hard for the British Embassy there and had only just received my amateur callsign GW1TMG.

"I was keen to operate on h.f. and met up with a chap called **Don Radley G4AGI** who is now 5B4AGQ and we both tried very hard to get a 'local' operating licence without success. The only Amateur operating from Sudan at that time was **Dr Sid Ahmed ST2SA** who we were both fortunate to meet. It's a small world!"

"The ST0DX team will begin its operations on July 9th using c.w., s.s.b. and RTTY with at least 10 stations operational at the same time working on all h.f. bands including WARC".

Thanks for that Tom and I hope you get to work them!"

The DX News

On to some DX News now and to the West Indies and the island of St. Kitts NA-104 where John Abbruscatto W5JON will be active as **V47JA** from July 12th to August 2nd operating s.s.b. on all h.f. bands and in the RSGB IOTA contest, which runs from 1200 on July 30th to 1200 on the 31st. His wife Cathy W5HAM will occasionally operate as **V47HAM**.

The website for the **JX7VPA** DX operation to Jan Mayen Island EU-022 from July 6th-14th, is now up and running at **http://janmayen2011.org/** This volcanic island which lies in the Arctic Ocean and belongs to Norway is mountainous where the highest summit is the Beerenberg volcano in the north. Stan Strzyzewski SQ8X and seven other operators will focus on 10MHz and up using c.w. and RTTY/PSK and some s.s.b. if conditions are good enough.

The team will also check conditions on 7MHz regularly but the propagation may not be that great at this time of the year. There will be three stations running all day so there should be plenty of opportunities to work them.

The team will also have a professional TV crew onboard the yacht that's taking them to the island – planning to record a documentary about the project and the island. All details, an operators list, QSL route and their active bands will be announced via their website. Due to it being the polar summer season with daylight for almost 24 hours – no activity will take place on the 1.8 or 3.5MHz bands as they will be totally dead at this time.

Tiengemeten island EU-146 part of the municipality of Korendijk and lies about 25km south of Rotterdam and on May 10th 2007 the island was officially given back to nature and a reserve was founded. It's only accessible by water via a small pedestrian ferry which runs regularly – taking just ten minute to complete the crossing from the small port at Nieuwendijk.

Dutch operators Gerard Molengraaff PD2GCM and Bertus PD2GJS will be active from this nature reserve as **PD04ISLE** throughout the year using a Kenwood TS-570DG and vertical antennas on the 7 and 14MHz bands only using s.s.b. and possibly some RTTY/PSK. A QSL is good via Gerard's home call and further information with an online log can be found at **http://pd04isle.webklik.nl**

Your Reports

On to our first log next, which is from **Eric Masters G0KRT** in Worcester Park, Surrey who used his Kenwood TS-570 and a modified home brew W3EDP antenna 26m (84ft) long with counterpoises tuned with an SGC-211 auto tuner. On 7MHz he worked LY4BR (Lithuania) at 1950 using 5W QRP while 100W s.s.b. found TB9EE (Turkey) at 2136UTC.

Also on the band was **Bill Ward**

The QSL card from CU1EZ after he was worked by Nick Phillips 2E0BPU on 24MHz using s.s.b.

The QSL card from MD2C after he was worked by Peter Leng ZL4TE on 14MHz s.s.b.

2E0BWX in Edwinstowe, Nottinghamshire who had a 50W s.s.b. QSO with ON7TQ (Belgium) 0800 followed by a 25W PSK31 QSO with PE1MPA (Netherlands) at 1834UTC using a Icom IC-7400 at 50W and a SRC X65 wire antenna.

In Cambridge, New Zealand **Peter Leng ZL4TE** was off to work in Christchurch for a few weeks after the earthquake so had very little times to operate. He had hoped to pack a Yaesu FT-817 into his luggage for some portable work if time allowed, but managed to send a short message from his iPad to say "band conditions are great here at the moment and I managed to operate on 7MHz for a time and was very pleased with the results. I even copied two US stations chatting together at 0030 for a good 10 minutes but unfortunately no callsigns were given so I have no idea what part of the States they were from."

On to **George Davis G3ICO** in Yeovil, Somerset who tried the 10MHz band working c.w. stations SP100MSC (Poland) 0838 with a special call celebrating the life of Maria Sklodowska Curie (1867 – 1934) a Polish–French physicist and chemist famous for her pioneering research on radioactivity and the first person to be honored with two Nobel Prizes. All QSLs – please – to go via SP2JMR.

Later TC8IM (Turkey) was worked at 1411, JT5DX (Mongolia) at 1538 QSL via JT1CO, EK6RL (Armenia) 1852, VE2PID (Canada) 1947 and W1MK (USA) 2123UTC in Boxford, Massachusetts. All were achieved using his Elecraft K2 at 5W to a 40m long doublet antenna.

The QSL card from SP9BCH following a QSO with Bill Ward 2E0BWX using 14MHz PSK31.

The 14MHz Band

The 14MHz band has seen its fair share of activity again and remains the most reliable h.f. band at the moment according to your reports. **Mike Hall M0MGH** in Worksop, Nottinghamshire, has been experimenting with WSPR or Weak Signal Propagation Reports using a Kenwood TS-2000 and 5W into a trap dipole tuned for 1.8 and 7MHz mounted in his loft. The s.w.r. on 14MHz is 5-1 which means that he is transmitting no more that a couple of watts at best.

However, Mike's signal has been reported by a good number of listening stations including A45SWL (Oman) 1238, RA9CUA (Asiatic Russia) 1346, VK2KRR (Australia) in The Rock, NSW 1416. He's been heard also OX3XR (Greenland) NA-018 at 1436, HS0ZGW (Thailand) 1538 and 9V1AL (Singapore) AS-019 at 1634 which at more than 10800km is a fair distance with such low power and restricted antenna.

If you've not heard of WSPR before it is a group of Amateur Radio operators that use **Joseph Taylor Jr K1JT's** digital modes, *WSJT*, *MAP65*, and *WSPR* which are open-source programs designed for weak-signal digital communication using Amateur Radio. In Normal use the software requires a standard s.s.b. transceiver and a personal computer with a soundcard to work.

Another programme available is called *SimJT* which is a utility that generates simulated signals for test purposes. Further information can be found on **www.physics.princeton.edu/pulsar/K1JT/index.html** and **wsprnet.org/** where ready to run *Windows* versions of all four programs are available for free download. Give it a try. You may be surprised at the results!

It was nice to hear from **John Taylor G1STQ** in Newcastle, Staffordshire who is a motorcycle instructor by profession and owns his own training school. He has been licenced since 1986 and is active on h.f. including digimodes especially with BPSK31. John recommends the Signalink USB Sound Card which he has found to be very reliable and works a treat with *Windows 7*!

John has rather limited space at the home QTH means and has very few options regarding antenna choice (rather like me!) and simply uses a vertical Diamond CP-6 mounted at 6m a.g.l. and a selection of random wires for his h.f. activities. John is especially pleased with his SRC random wire fed with coaxial cable via an unbalanced to unbalanced transformer, which has been mentioned in this column before. His main station radio is a Yaesu FT-950 but he also uses a FT-817 for portable work.

Activating his local SOTA hill 'The Gun' (G-SP-013), John made the following 5W s.s.b. contacts, OK7PJ (Czech Republic) 1004, EA1LQ (Spain) 1006, HA7UG (Hungary) 1010, SM3GBA (Sweden) 1016, HB9CKV (Switzerland) 1017, OE6WIG (Austria) 1018UTC using an inverted 'V' dipole showing that a simple station does work.

The band also provided Bill 2E0BWX with several PSK QSOs including UR4PWC (Ukraine) 0847, 9A4KW (Croatia) 0852, OH1WW (Finland) 0947,

ES0IC (Estonia) on Kassari Island EU-034 at 0959, SP9BCH (Poland) 1010. And later he worked OK2BMC (Czech Republic) 1613UTC.

The 18 & 21MHz Bands

On to the 18MHz band now and the log of **Elgin Mackinlay M0ELG** near Kidderminster who has been using a rotatable dipole with great success. His 100W s.s.b. list included ZF2AH (Cayman Islands) NA-016 at 0027, JF1KFR (Japan) Kanagawa, Honshu's Coastal Islands AS-117 at 0852. Then came TC7TC (Turkey) Tirebolu Lighthouse and Castle 0948 (QSL via TA1HZ).

Next came VK4BX (Australia) OC-001 in Queensland at 1053, V73D (Marshall Islands) OC-028 at 1207, PJ7E (Sint Maarten) NA-105 at 1434 QSL via Sint Maarten 2010, Box 333, Bethleham, GA 30620-9989 USA. Then Elgin worked FG4NN (Guadeloupe) NA-102 at 1554, TI8II (Costa Rica) 1632, K6YRA (USA) in Encino, California at 1640, TJ3AY (Cameroon) 1653UTC (QSL via F5LGE).

The log from **Peter Lowrie MI5JYK** in Newtownabbey, Northern Ireland continues to grow as he added a few hundred QSOs over the CQ WPX contest weekend. He replaced his 18MHz ground plane with a version cut for 21MHz and it worked rather well.

Logged stations included CN2R (Morocco) 1111 QSL via W7EJ, VP2EH (Anguilla) NA-022 at 1113, LZ0LZ (Bulgaria) 1135, KD4D (USA) 1153 in Huntingtown, Maryland. Then came 3V8SS (Tunisia) 1158, EB8AH (Canary Islands) AF-004 at 1202, VA3DX (Canada) 1235, 9K2HN (Kuwait) 1301, RW3XZ (European Russia) 1447, P33W (Cyprus) AS-004 at 1606. Next came 8P5A (Barbados) NA-021 at 1513 QSL via NN1N, P40L (Aruba) SA-036 at 1441, EV25D (Belarus) 1446. Then Peter worked CT3HF (Madeira Islands) AF-014 at 1600 and ZX2B (Brazil) 1617 (QSL via PY2MNL) all worked using Peter's Yaesu FT-817 at 5W.

The QSL card sent by SP100MSC after he was worked by George G3ICO on 10MHz c.w.

There was some great portable QRP DX for John G1STQ on the band who was very pleased to get calls from both JS6DMT (Japan) on Okinawa Island AS-017 at 1115 and CO6LC (Cuba) NA-015 at 1152UTC with just 5 watts s.s.b. and a dipole during his SOTA operation while Eric G0KRT found s.s.b. stations RA3QPY (European Russia) 0934, VE2XAA (Canada) 1450, P40M (Aruba) SA-036 at 1452 QSL via W3HNK, 5D5A (Morocco) 1834 QSL via I2WIJ and KY5R (USA) at 1838UTC in Rogersville, Alabama using 100 watts.

The 24 & 28MHz Bands

On to the 24MHZ band and the log of **Nick Phillips 2E0BPU** in Croydon who used an Icom IC-703, KW e-zee match and a 30m(100 ft) doublet antenna to work s.s.b. stations RV3GS (European Russia) 1059, UN7MM (Kazakhstan) at 1237 QSL via RW6HS, OD5HN (Lebanon) 1324, SV1JG (Greece) 1432, VE2AWX (Canada) 1453, SV9GPV (Crete) EU-015 at 1605, PZ5RA (Suriname) 1717 and CU1EZ (Azores) EU-003 at 1718 and PY2ADR (Brazil) at 1807, 4X4FR (Israel) 1815, 5B4AIX (Cyprus) AS-004 at 1817 and LU4FPZ (Argentina) at 2028UTC all with under 10W!

Also on the band for a short time was Elgin M0ELG who listed s.s.b. contacts with YB0MWM (Indonesia) 1624 (QSL direct to IK2DUW). Then came SV9GPY (Crete) 1635, W8FHF (USA) in Norwich, Ohio at 1758 and 5B4AIF (Cyprus) 1815UTC once again with 100W.

The 28MHz band open up for a time and gave Peter MI5JYK the chance to make a few contacts. The stations of: C4W (Cyprus) 1018 (QSL via 5B4WN), EA8TX (Canary Islands) 1030, D4C (Cape Verde) AF-005 at 1243 and LT1F (Argentina) at 1403 (QSL via) AC7DX all made his log.

Eric G0KRT operated on the band for a short time running 100W to work OD5WPX (Lebanon) at 1103 using s.s.b. and LU4DX (Argentina) at 1527 using c.w. Meanwhile 5W QRP found NR5M (USA) at 1535 in Huston, Texas. George G3ICO managed QRP contacts with 5Z4FM (Kenya) at 1338, P4/W1HEO (Aruba) 1330 and PY2IAX (Brazil) at 1506UTC – all on the key.

The QSL card sent by YB0MWM after he worked Elgin Mackinlay M0ELG on 24MHz s.s.b.

Signing Off

Well that's it for this month. 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. **PW**

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The Yaesu FT-747 – a mystery rig?

Harry Leeming G3LLL remembers his time running Holdings, a well known north west of England Amateur Radio dealers. This time he discusses the Yaesu FT-747.

Welcome to *In The Shop* (*ITS*) where I look back to my days in the Amateur Radio trade and the Yaesu FT-747 comes into focus this time. A few readers have asked questions about the origins of this unit and I wonder – does anyone have any more information?

The FT-747 economy rig is a bit of a mystery, as to my eyes it does not look internally or externally like it was made by Yaesu, especially as it has a plastic cabinet. An almost identical rig was marketed in the USA as the 'Heathkit SB-1400' and I'm advised that there was also a professional version, the FT-80C h.f. land mobile transceiver.

I was reminded of this question when one of my old customers from Blackburn, dropped his FT-747 with an intermittent fault. He had a problem with the rig jumping in frequency by a few hundred Hertz for no apparent reason. It only did this in the upper sideband (u.s.b.) and c.w. (Morse) modes, but like many intermittent faults it wouldn't do it to order!

As the same crystal is used on c.w. as on s.s.b. in the '747, this seemed the obvious culprit, but warming the crystal with a soldering iron had no effect. I soldered every joint in sight around the u.s.b./l.s.b. circuitry, and left it running for a few days, when it seemed okay he took it back. The rig behaved itself for a for a while and then once again it was up to its old tricks, so he brought it to me again, could the u.s.b. crystal be faulty after all?

To test this I swapped over the u.s.b. and l.s.b. crystals as this being a very good way to test sideband crystals. When the rig was switched to indicate l.s.b. it was then using the u.s.b. crystal but with the l.s.b. components. (Also of course when switched to u.s.b. it was receiving l.s.b.).

After some considerable time switched to indicate u.s.b., it at last started to waver, but as it was then using the lower sideband crystal, this proved that the crystal was okay. I then refitted the crystals in their correct positions; but what was the trouble?

Attempts to trace the fault got me nowhere – even warming up parts with a soldering iron produced no conclusive results. Rather than waste more time on the job I decided to swap most of the parts around the u.s.b. circuit including the trimmer capacitors, the fixed capacitors and Q06. As I type this the rig is running tuned to my crystal frequency standard, emitting a steady beat note; by the time I am ready to send this completed column to *PW*, I hope it will still be on frequency (see later!).

Although labelled as an FT-747 by Yaesu, Harry feels that this rig may share some ancestry with the Heathkit SB-1400. Does anyone know any more details or information?

Removing Components

Having got rid of the shop and much of its test gear, I'm now restricted to using the equipment of a normal Amateur workshop. When I want to remove a component such as a transistor from a circuit board, I normally use a 'solder sucker' or 'solder wick', to get rid of the old solder. This is easier said than done – but once it has been achieved, there remains the problem of clearing the holes in the printed circuit board (p.c.b.), to enable a new part to be fitted.

The easy way to fit the new part is to use a very fine drill – but here lurks a hidden danger. Some of the solder holes into which parts have been fitted, are 'plated through', in other words the surround of the hole is conductive and so connects the p.c.b. track on one side of the board to the circuit track to the other.

If the drill is a fraction on the large side this removes the connection and leaves the two sides of the p.c.b. disconnected from each other. In the case of any mysterious faults you have after doing such work, do check that you have not fallen into this trap, and if you have, solder the component to the remaining track on both sides of the board.

Radio Frequency Clipping & Yaesu

I have discussed radio frequency (r.f.) clipping in the last two issues and how this can be accomplished. So, let's now have a look as to how this works out in practice on a few popular Yaesu rigs. The FT-101E was the first transceiver into which Yaesu built this feature – and on the initial batch how they got it wrong.

To function correctly r.f. processing requires that the signal input to the clipping circuit should be adjustable. This is done to enable it to be experimentally altered to fit in with radio conditions and the characteristics of the operator's voice. When the speech processor is switched in on the FT-101E, this is accomplished by adjusting the microphone gain control (No problem here).

The output from the clipping diodes or integrated circuit (i.c.), is then at a fixed level, whether you speak normally or get excited and shout. So, because of this it is essential that the output of the processing unit is adjustable to allow for the rig's different gain on different bands.

Unfortunately, on early examples of the FT-101E, the processor's output control consisted of a pre-set potentiometer mounted internally on the circuit board. Yaesu's service instructions advised setting this for the correct amount of drive on the 14MHz (20m) band. This was great when you switched the processor on – the rig would then put out a punchy clean signal on 14MHz, but on most of the other bands it either overdrove the power amplifier (p.a.) stage, or the rig failed to produce its full output once the processor was switched in.

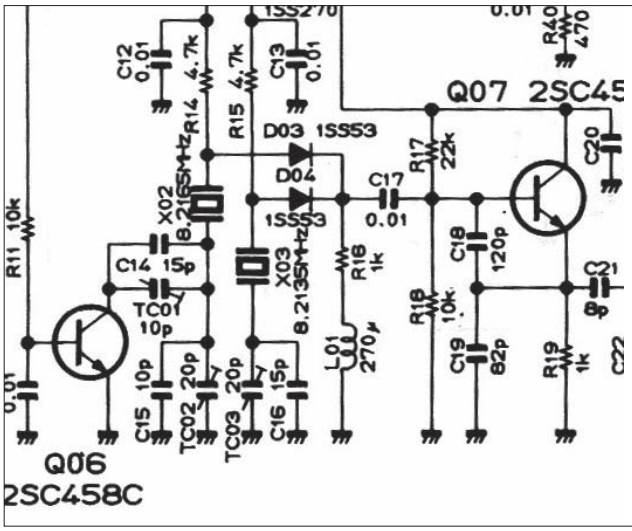
The owner could, of course, open the lid and re-set the potentiometer but this was hardly convenient. So the FT Club in the USA brought out a modification kit, which included a processor output level control that could be mounted on the front panel. Yaesu weren't slow to catch on, and so later versions of the FT-101E have a dual gang potentiometer fitted in the clarifier position, the rear section of which controls the output of the processor.

Operation of all later versions of the FT-101E is quite straightforward:

1: Tune up the rig as normal with the processor switched off, and then adjust the '**Mic Gain**' control until the **ALC** (automatic level control) meter is kicking back about half way within the green band when you speak.

2: Next, switch on the processor, leave the microphone gain set, and adjust the processor output '**Level**' control until the ALC meter is moving a little less than in stage 1.

3: Then adjust the '**Mic Gain**' control so that the average r.f. power output indicated on your antenna tuner unit's (a.t.u.) power meter is a little larger than in operation 1.



The area around the selection of the sideband crystals from the FT-747 circuit diagram.

Other Yaesu Rigs

Let's look at setting up other rigs. The FT-901/902 models should be set up as I've mentioned, using the '**Mic Gain**' as the input control and '**Proc Level**' as the output control.

The FT-101ZD, FT-107, FT-102 and most later models fitted with r.f. speech processing have rather more controls. In these the processor output level control is labelled '**Drive**' and also serves as the c.w. drive control. **Note:** If, out of years of habit, you tune up in the c.w. or '**Tune**' position, and then turn this control to zero, the rig will not transmit in the s.s.b. mode, if you switch the processor on.

In the case of these rigs operation is as follows.

1: Tune up the rig as normal with the processor switched off, and then adjust the '**Mic Gain**' until the meter is kicking about half way within the ALC markings when you speak.

2: Set the processor's input control '**Comp**' or '**Comp Level**' about half way, switch the compressor on, and advance the '**Drive**' control until the ALC meter is just moving when you speak.

3: Experiment with the setting of the '**Comp**' or '**Comp Level**' control for the best results – leaving the microphone gain control set.

And that's it – the processor will then be (approximately) set. Try it on the air, experiment with the '**Mic Gain'** or '**Comp**' control to adjust the amount off clipping, and get some reports. In operation the processor takes over some of the work of the ALC network. So you should expect the ALC meter to be less active once the processor is switched in – if it's too active adjust the **output control** of the processor, (Not the '**Mic Gain**' or '**Comp**' control).

Note that with the processor in, you can easily run QRP, or reduce the drive to a linear. Whistle loudly into the microphone, and set the compressor's output control (' **Level**' on the FT-101E and FT-901/2, '**Drive**' on the other rigs) to give the output you want, this level of power will now not be exceeded – however loud you speak.

Note: It can still be quite confusing, especially if you have more than one Yaesu rig as the processor's controls names are in somewhat of a mix-up. The **output** control on the processor of the FT-902 (for example) is labelled '**Proc Level**' whilst the **input** to the processor on the FT-101ZD is also labelled '**Comp Level**'. (I presume the designers sat in opposite corners of their workshop and never spoke to each other!). But if all else fails – remember to read the correct instruction book.

Impressive Test Equipment

When we had the shop we had quite an impressive looking line up of test equipment such as audio frequency (a.f.) and r.f. signal generators, oscilloscopes and a spectrum analyser. Most of the items had been obtained second hand and cost me very little – but they looked impressive. Customers used to make comments such as, "I can't do my own repairs, I like to bring my equipment to someone who is really well equipped!"

To be truthful, I hardly ever used many items – because in Amateur Radio transceivers, most of the test equipment needed is built in to the

This is an early version of the FT-101. How can we tell? In later models, the Clarifier control (bottom right) has become a dual-concentric control with the speech compressor control on the rearward portion.

equipment being serviced. For example, if you want to peak up the receiver the built-in crystal calibrator is extremely useful and nearly all the tuned circuits will be 'spot on' if peaked by using the crystal calibrator.

On transmit most of the alignment adjustments can be done using a power or standing wave ratio (s.w.r.) meter, whilst transmitting c.w. at very low power into a dummy load. However, there may be some circuits, such as those in the speech processor, or in the s.s.b. generator stages, through which the c.w. signal does not pass. Additionally, with rigs like the FT-290, on which the c.w. drive can't be turned down.

In these cases you can of course find a microphone plug, and wire this up to an audio generator – but this is making hard work of it. One crude way to trim these circuits is to place the microphone near to something that makes a steady noise.

In fact, I must confess that when I've needed to trim just one circuit in a hurry, I have on occasions used the fan on an FT-101 for the noise source – but this isn't really satisfactory. The best way I find is to slightly offset the carrier balance potentiometer, so that just a couple of watts appears on the power meter and then to align the circuits using this signal. (But don't forget to re-set it afterwards though!).

A spectrum analyser makes a very nice toy, but I think it's seldom really needed. However, if you're in doubt about the purity of your transmission, feed the signal into a dummy load and speak into the microphone. Poke just enough wire into the antenna socket of a good quality receiver to give you a signal of about S9+10 and have a listen to yourself on headphones.

If the transmission sounds okay and it's not splattering – get a fairly local Amateur to have a listen over the air – but make sure that he isn't too near or using an efficient antenna. Normally, under these conditions you would expect that your carrier and any other unwanted emissions such as key clicks or 'splatter' should be 40dB or more weaker than your main signal. But be aware that if your signal is '40 over nine' the splatter and 'noises off 'could then be S9 – without there being anything wrong with your transmission.

Radio Blackburn

Radio Blackburn (now Radio Lancashire) went on the air for the first time just over 40 years ago, and the recent celebration of its 'birthday' started me reminiscing. Prior to the station opening, members of the photographic side of our business, together with one of our engineers, took a load of photographs and made a slide show. This was shown at the 'Windsor Hall' Blackburn, at the station's promotional event.

I got to know the station's chief engineer **Bernard Shields** and his assistant engineer **James Rose** quite well and they would often drop in the shop for a chat. As the station was established and run very much on a limited budget, the equipment wasn't all brand new and Bernard and James were expected to 'make do and mend'.

If at first they needed any specialised test gear such as a frequency counter, their only official way of obtaining it was to arrange to book it out from the IBA and BBC TV transmitter on the top of Winter Hill, which to say the least, wasn't very convenient, so on the odd occasion they borrowed ours.

Bernard then decided that Radio Blackburn should run an occasional technical program and several local people who were involved with electronics were asked to appear, including the local Post Office Interference Service Inspector and myself. Thinking about the trace on an oscilloscope and the breadth of subjects covered by the program Bernard called it 'Sweep', but this name rather backfired. Someone with a sense of humour at the station started to refer to Bernard and James as 'Sooty and Sweep' and these names rather stuck!

That's It!

That's it this month! And, as I typing this the FT-747 is still on frequency after a week – so back it goes to its owner and I will hope for the best. Finally, try to remember not to fill in your log with a broken pencil – it's pointless! I've also got a sense of humour! **PW**

Problems

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

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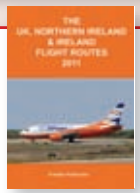

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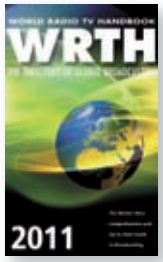

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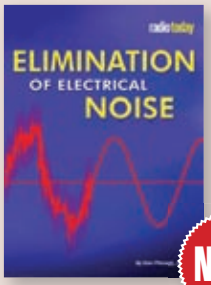

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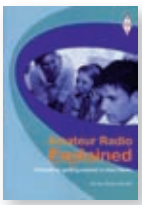

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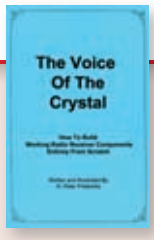

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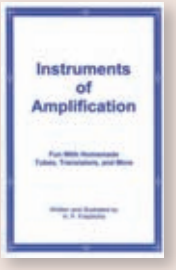

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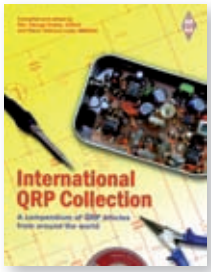

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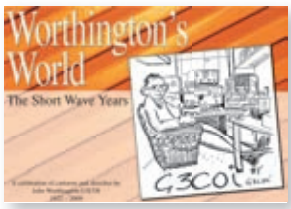

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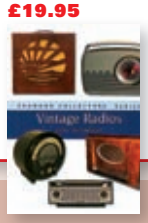

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Rob Mannion G3XFD/EI5IW's

Topical Talk

This month the Editor comments on a letter published this month, feedback from readers on discrimination against Foundation Amateurs and discusses audio recording the present for the future.

The letter from Noel Graham G6ENY published in *Letters* this month page 7 (I hope he enjoyed using the R prefix during the time of the Royal wedding!) fascinated and encouraged me very much because it clearly demonstrates the tremendous variety of skills that Amateur Radio enthusiasts bring to the hobby. Although I should not be – I must say that I am being continually pleasantly surprised at the skills I find amongst my friends and those who I meet in my work as Editor of *PW*.

I think that a particular holiday visit I enjoyed on the Talyllyn narrow gauge railway (TR) some years ago demonstrated two clear facts to me. The first was that many Radio Amateurs are keen on railways (something adequately backed up by much further evidence from club visits). The second was that the Amateurs I met came from widely different working backgrounds.

My luck was in on the day I visited the TR – my train seemed to be manned almost entirely by Radio Amateurs! The Guard was a G8 on a working holiday from the Midlands. He was a Veterinary Surgeon! The Ticket Collector was a G6, enjoying a 'busman's holiday' from his full time work on London's commuter railways. The driver was a GW3 who lived locally and the General Manager (who was 'keeping his hand in' firing and driving that day) – although not an Amateur – used to read and build *PW* projects when he was a youngster!

The same wide range of skills demonstrated by Amateurs is also apparent with the members of my own club in Poole. We seem to have every trade and profession from Chefs to retired College Admin staff, retired Engineers and an incredibly enthusiastic TV antenna installation Engineer! Indeed, I think every club club should have one of these – and this particular young man is a keen DXer!

The cross-section of humanity we have in my own club – and what I observe when I visit other clubs where we mix freely – prove to me that the discrimination shown to newly licenced Amateurs must (surely) only be coming from a tiny minority in our wonderful hobby. I was a new Amateur myself once, and I made some embarrassing mistakes on the air and learned the hard way!

Indeed, my late father (he thought I made far too many mistakes) told me on several occasions, "Rob, if you learn from your mistakes – you'll end up a very wise man!" However, like the 'newbies' we're meeting on the bands – I'm still making mistakes after 55 years in the hobby and 43 years after becoming G3XFD. So, surely we can allow our new friends to learn from the amazing and versatile fraternity that surrounds them? I'm sure we can!

Recording The Present For The Future

Recently I visited my friend and *PW* author **Phil Cadman G4JCP** in Dudley in the West Midlands, while on the way back from a thoroughly enjoyable visit at the **Chester & District Radio Society**. I was a guest at their Annual Dinner and was made most welcome.

Phil G4JCP has recently made it very clear to everyone in his *Valve & Vintage* column that we should start recording the present for the future. In particular, Phil is urging everyone to record the voices of our friends now – for posterity. Both **Tex Swann G1TEX** and I fully support the G4JCP initiative and – having been equipped (thanks to Phil) with Tascam Linear PCM hand-held audio recorders – we're already on our way!

One of the things I most regret in the past is that although I have many happy memories of QSOs on the air with friends including the late **Tom Martin G3CTM**, **Jack Watts G2DSW** and countless others – even though I had tape recorders, I never recorded their voices. But nowadays, with modern recording facilities – and small machines – there's no reason why we can't record discussions with our friends.

So, in congratulating Phil G4JCP for his initiative – I encourage everyone in the hobby to join him and ensure that we record the present for the future. That keen young M6 we recorded at our club, alongside a very senior club member, may then look back in 50 years time and listen, enthralled at the young voice that was once theirs. Start recording now!

Rob Mannion G3XFD/EI5IW

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The HB-1A-MK3-40-20 YouKits QRP Transceiver
Phil Ciotti G3XBZ breaks off from building his various constructional projects to try out the latest – and most unusual – low power transceiver from China. Phil had the enthusiastic assistance of **Colin Davis G0JII** who was keen to try this miniscule rig on c.w. – even taking it on a mini 'DXpedition' and the pair found the rig had several surprises up its Chinese silken sleeves!

A Valved & Vintage type Integrated Circuit!
Rod Burman says that nowadays we think of integrated circuits as being the domain of semiconductors. However, over 75 years ago the German company Loewe produced the Multi-valve, a valve fitted with internal components to make a complete circuit. They worked and proved successful! Don't miss this fascinating article!

Technical For The Terrified
This month **Tony Nailer G4CFY** will look at the way we carry out our hobby of Amateur Radio, the reports we give, and what measurements we should undertake to make our efforts more meaningful. There'll be plenty of 'food for thought'!

Book Review – *The Secret Life of Bletchley Park* by Sinclair McKay
The *PW* Editor reviews a truly fascinating and recently published book featuring the decoding and ancillary work that took place at Blechley Park during the Second World War. It's a major new work, of extremely high quality dealing with this fascinating subject, which will certainly appeal to *PW* readers.

Plus *The World of VHF*, *Carrying on The Practical Way*, *What Next*? and many more favourites!

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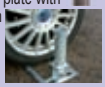

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