March 2010 £3.50 ISSN 0141-0857

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Britain's Best Selling Amateur Radio Magazine

Valve Numbering Systems

Stef Niewiadomski explains valve reference systems and says we don't need to be confused!

Build a Contest Voice Keyer and a Classic Transmitter

Practical Coil Making

With Sam Dick G8OWX

Valve & Vintage

With Phil Cadman G4JCP

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"The feature set is quite awesome -- more features and functions than any other top end radio currently available.....An excellent performer"
Peter Hart, RadCom August 2009

100W from a laptop!

Laptop not included!

100W All-Modes
160m-6m + Auto ATU

The radio that offers more features and performance than almost any other rig - and look at the price!

- *Single FireWire cable*
- *Amazing dynamic Rx range*
- *Continuous selectivity to 25Hz*
- *Live Panoramic display*
- *DSP • Speech processor*

The radio that you can take anywhere - outperforms radios costing three times as much! FlexRadio put their investment inside the radio - not the front panel!

W&S £1395 D

WATSON New Range of Coax Switches

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CX-SW2N	£32.95 A	CX-SW3N	£49.95 C

see www.wsplc.com for more details

ICOM HF Transceivers

IC-7600 FREE USB keyboard!

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.

£3365 D

IC-7800	HF / 50MHz All-Mode 200W. A masterpiece of ham radio engineering.	£6599 D
IC-7700	1.8-54MHz 200W with built-in PSK-31 + keyboard	£4999 D
IC-7400	160m-70cm 100W base station with large easy to read LCD display.	£1329 D
IC-706	160m-70cm 100W HF Classic mobile radio that just goes on and on!	£739 D
IC-7200	HF & 6m DSP 0.005-3335MHz wideband receive with USB port.	£759 D
IC-718	160m-10m 100W transceiver that brings HF to those on a budget.	£449 D

IC-7000

100W 1.8-440MHZ all-mode transceiver with 2.5" colour display. An incredibly small package with a quite amazing performance. Phone for deal on ext. 6" LCD screen.

£939 D

ICOM Receivers & Scanners

IC-R20

IC-R5	Handheld scanner 0.15 - 1310MHz	£172.95 C
IC-R20	Handheld scanner 0.15 - 3305MHz	£314.95 C
IC-R1500	PC scanner 1.01-300MHz	£449.95 C
IC-R8500	Base receiver 1.01MHz - 2GHz	£1379.95 D
IC-R9500	Base receiver 5kHz-3.3GHz	£8899.95 D

YAESU HF Transceivers

FT-2000

The classic HF & 6m 100W transceiver with PEP (performance upgrade) ready installed. Dual receive and fantastic filtering make this an impressive performer. And despite what you may read, we still have the largest, most up-to-date stock of Yaesu in the UK!

£1899 D

FT-2000D	200 Watt version of FT-2000 with built-in PSU.	£2399.95 D
FT-950	100W HF - 6m transceiver with DSP & Auto ATU	£1099.95 D
FT-450AT	100W HF - 6m with automatic ATU and latest updates	£679.95 D
FT-450	100W HF - 6m transceiver - great value.	£589.95 D
FT-DX9000contest	200W HF - 6m "formula one" contest machine	£4599 D
FT-DX9000D	Deluxe fully loaded base station	£7679 D
FT- DX9000MP	Amazing 400W "legal limit" radio	£8543 D
FT-857D	HF to 2m mobile. portable or base - up to 100W	£549.95 D
FT-817BHIDSP	Fitted with DSP module exclusive to W&S	£549.95 D

FT-817ND A great radio, whatever your interest is. With 2.5 watts from battery or 5 watts from ext. 12V, it slips into a brief case or rucksack with ease. Many operators have DX tales to tell with this mighty midget. Offers SSB, CW & FM **+ FREE CSC-83 Case!**

£439 D

bhi RadioMate
New Updated Software Version!

W&S are pleased to endorse this accessory for Yaesu mobile and portable HF radios. Quick & easy band change, Quick & easy modulation selection, Quick memory function, Quick & easy intelligent direct freq. input. PLUS Swap VFO A/B, VFO A=B, Split VFO mode, Tune function. All this for a realistic price.

£79.95 C

YAESU VHF Mobiles & Handhelds

VX-8E Triple Band

Another Yaesu first. APRS and Bluetooth, plus waterproof housing make this a "must have" radio. A barometer is included, plus GPS option and you have dual simultaneous receive.

£379 D

FTM-10SE	50/40W 2m/70cms stereo FM	£269 D
FT-2800	2m Mobile 65W wideband receiver	£124 D
FT-7800	Dualband 50W mobile, AM airband	£189 D
FT-8800	Dualband Mobile 50W / 30W	£289 D
FT-8900	10/6/2m & 70cm Mobile	£334 D
VX-3E	2m / 70cm Handheld Wideband receive	£139 D
VX-7R	Waterproof dualband handy (silver or black)	£259 C
VX-6E	2m/70cms handy, 5W Wideband Receive	£199 C
FT-60E	2m/70cms, 5W handy Wideband Receive	£142 C
VX-170E	2m 5W handheld with 16-key pad	£95 C

KENWOOD HF Transceivers

TS-2000E

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

TS-2000X +23cm £1745 D

£1479 D

TS-480HX This radio is ideal for mobile, portable or base station. Gives a massive 200W on HF and 100W on 6m.

£849 D

TS-480SAT This model gives 100 Watts on all bands up to 6m, but adds a built-in automatic ATU.

£749 D

KENWOOD VHF Transceivers

TM-V71E	2m/70cms mobile w/ EchoLink, remote head	£289.95 D
TM-D710E	Dualband mobile with APRS, TNC etc.	£429.95 D
TM-271E	2m FM 60W mobile at a great price.	£165.95 D
TH-F7E	Dual band handy at SPECIAL PRICE	£229.95 D

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

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£79.95 D

WATSON W-2001 NEW
Worldwide Wireless Weather Station

The W-2001 is a world weather forecaster as well as giving local time, in/out temperature and UV count. A USB transmit dongle plugs into your PC and when you press the control panel, your chosen 5-day forecast is downloaded to the display and permanently stored. There are over 1500 cities to choose from. Check your local forecast or your holiday destination remotely anywhere in the home. 7 languages, 12/24hr clock, 100 year calendar.

- *5-Day world forecast*
- *Internet connected*
- *Date & Time 12/24hr*
- *LCD Control Panel*
- *Panel (170 x 120mm)*
- *Backlight Display*
- *No wires*
- *Remote temp. sensor*
- *PC USB transmitter*
- *PC software (XP or VISTA)*

£49.95 C

Icom
VHF/UHF Mobile/Handy

IC-E208 Dualband Mobile

*Freq range 144-146MHz, 430-440MHz Tx
*55/50W (3 pwr steps each band)
*Wideband Rx 118-173, 230-549 & 810-999MHz

£254 D

IC-910H £1239 D
2m / 70cm 100W Base station all modes with option for 23cm module (UX-910 £359)

IC-910HX £1439 D
As above but with 23cm module ready fitted and a big saving as well.

IC-2200H £199 D
2m 55W FM mobile with rugged construction and with digital option.

IC-2725E £319 D
Dual band 2m/70cm. Easy to operate and install and a lovely detachable head.

IC-E90
6m / 2m / 70cm Handheld Transceiver.

£232 C

ICOM Digital

IC-E2820

The Ideal choice for getting into D-Star. This dualband base or mobile transceiver functions as an advanced FM transceiver or add the D-Star module for world coverage from your car.

Digital Ready **£384 C** D-Star Fitted **£539 C**

IC-E92D *With D-Star Fitted*

This new handheld allows you to communicate cross band over the D-STAR Network. This dual band radio is rugged and waterproof to moderate depths.

D-Star Fitted **£369 C**

Avair
Power SWR Meters

Discount VSWRs

Large Scale meters - 12V backlight and include DC Cable.

AV-201 £49.95 C
1.8-160MHz, 5W, 20W, 200W, 1kW

AV-400 £49.95 C
1.8-160MHz, 5W, 20W, 200W, 1kW

AV-601 £69.95 C
1.8-160MHz(S1), 140-525MHz(S2)

AV-1000 £79.95 C
1.8-160MHz, 430-450MHz, 800-930MHz, 1240-1300MHz. 5W, 20W, 200W, 400W

X-Needle Models - Even Lower Prices!

AV-20 £34.95 C
Cross needle, 0-30W, 0-200W, 3.5-150MHz

AV-40 £34.95 C
Cross needle, 0-15W, 0-150W, 144-470MHz

Last Few!
FT-817 Control Knobs

This is a beautifully engineered replacement main tuning knob, made and designed in Germany. It adds weight and quality to your FT-817. Supplied complete with wrench and fitting instructions. Once they are gone, they are gone!

£19.95 C

WATSON W-184-MX
Audio System

NEW

£129.95 D

A complete station audio system that integrates into your station with ease.
What you get.

- *Combined headset & Boom Mic.*
- *8 input Mixer*
- *AC power supply*
- *CC-1 8 pin mic lad of choice*
- *1/4" jack to XLR adaptor*
- *Receiver audio lead*

The W-184Mx allows you to use the professional supplied mixer with the included headset. This allows you to control the audio level and importantly, adjust the frequency response with the 3 EQ controls. And you can monitor your transmitted audio in the headphones. The necessary leads are included to match any 8-pin equipped radio. (see below for modular input radios). But that's not all. You can also mix the receiver audio into the headphones and again adjust the EQ response for received signals.

For modular mic radios you need to purchase one of the adaptors below:

Yaesu	ADMY-817	£23.95
Icom	OPC-589	£21.95
Kenwood	MJ-88	£22.95

Multi-Ranger-200
10 Bands

NEW

The new 10-Band (inc. WARC) mobile or portable whip. Rated at 200 Watts, it covers 80m - 6m + 2m. PL-259 base and approx 1.6m long.

£59.95 D

With 3-way magnetic base **£99**

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Sole UK Distributors

The microphone that makes your radio sound better!

The ProSet offers a choices of Mic. inserts and gives hands-free operation for your base station. A choice of Mic. inserts of get both in the switchable ProSet Plus.

Pro-Set-4 or **Pro-Set-5** Both models are combined headset & boom mic. The "5" model is designed for normal SSB operation whilst the "4" model is designed for DX work. **£119.95 C**

Pro-Set-Plus This model combines the "4" and "5" inserts into one switch selction version of the ProSet. The best of both worlds! **£189.95 C**

Mic Connection? You will need an AD-1 adaptor lead to match your headset to your radio. There is one for every radio. Call us for the right one. **£16.95 A**

WATSON Dummy Loads

High quality loads that are ideal for hams or commercial use.

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DC-1GHz PL-259 30W cont 100W 90 secs

DM-200N £49.95 C
DC-3GHz N-Type 35W cont. 100W 2 mins

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Superbly Engineered Antennas

Diamond Yagis

A502HBR	6m 2 el beam 6.3dBi 400W	£89.95 D
A144S5R	2m 5 el beam 9.1dBi 50W 95cm l.	£45.95 D
A144S10R	2m 10 element 11.6dBi 50W 2.13m l.	£84.95 D
A430S10R	70cm 10 el. 13.1dBi 50W 119cm l.	£49.95 D
A430S15R	70cm 15 el 14.8dBi 50W 224cm long	£65.95 D

Diamond Verticals

CP-6	HF 5-band 80-10m - loaded radials	£339.95 D
CP-22E	2m 6.5dB 200W 2.7m l	£54.95 D
CP62	6m 5.5dBi gain 500W 6.8m long	£179.95 D
F-2405L	2400-2500MHz 5dBi 10W 60cm l	£94.95 C
F-2407L	2400-2500MHz 7dBi 10W 72cm l	£99.95 C
F-22	2m 6.7dB 200W 3.2m l.	£79.95 D
F-23	2m7.8dB gain 200W 4.6m l	£119.95 D
F-23H	2m 7.8dB gain 350W 5.2m l.	£169.95 D
X-30	2m/70cm fb glass 3/5.5dB 1.3m l.	£72.95 D
X-50	2m/70cm fb glass 4.5/7.2dB 1.7m l.	£72.95 D
X-50N	2m/70cm fb glass 4.5/7.2dB 1.7m l	£75.95 D
X-200N	2m/70cm fb glass 6/8dB 2.5m l.	£114.95 D
X-300	2m/70cm fb glass 6.5/9dB 3.1m l.	£139.95 D
X-5000	2m/70cm/23cm 4.5/8.3/11.7 dB 1.8m l.	£179.95 D
X-510N	2m/70cm fbglass 8.3/11.7dB 5.2m l.	£169.95 D
X-7000	2m/70cm/23cm 8.3/11.7/13.7dB	£225.95 D

Buddipole Portable HF

Man Your Own Mini DXpedition!

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Buddipole Antennas

W3-BP	Dipole kit 40-2m 250W + balun & 25' coax	£209.95 D
W3-BP-DELUXE	Kit plus trpod, brackets etc & Bag	£399.95 D
W3-MBP	Mini kit - as W3-BP but even smaller!	£229.95 D
W3-BS	The compact vertical 40 - 2m	£139.95 D
W3-BPT	Tripod for Buddipole needs W3-BM	£89.95 D
W3-BM	Mast 22" closed 8' open needs W3-CTA	£59.95 D
W3-CTA	Center adaptor for Buddipole to mast	£8.95 A
W3-BML	Long Mast 37" to 16' with guy kit	£109.95 D
W3-VAC-MKII	Clamp for use as inverted-V or vertical	£25.95 A
W3-LBC	Coil 80m 3.5MHz for W3-BP Buddipole	£69.95 C

New Nissei X-Needle Meters

The new Nissei meters make VSWR measurments so easy. A cross needle meter needs no calibration. Just transmit and read, both forward and reflected power.

RX-103	1.6-60MHz 20/200W/2kW	£49.95 C
RX-203	1.8-200MHz 2/20/200W	£49.95 C
RX-403	125-525MHz 2/20/200W	£49.95 C
RX-503	1.8-525MHz 2/20/200W	£69.95 C

WATSON — Official Distributor UK's Lowest Prices

Power-Mite-NF — Noise Offset PSU

22 Amps of continuous power output with variable voltage plus the new Noise Offset Function (NF).

W&S £69.95 C

Power-Max-45NF — Noise Offset PSU

40 Amp (45A Peak) continuous switch mode PSU with Noise Offset Function (NF).

**Output 4-16V DC Variable*
**Input 100- 260V AC*
**Short Circuit & Over Voltage Protection*

W&S £119.95 C

Power-Max-25-NF £89.95 C
22 Amp Continuous (25A Peak) with Noise Offset.

Power-Max-65-NF £209.95 C
60 Amp Continuous (65A Peak) with Noise Offset.

W-3A	Out 3A, 13.8V DC, In 230V AC	£24.95 C
W-5A	Out 5A, 13.8V DC, In 230V AC	£29.95 C
W-10AM	Out 10A, 0-15V DC, In 230V AC	£59.95 D
W-25AM	Out 25A, 0-15V DC, Dual meters	£89.95 C

Bargain Price Antennas

Pre-tuned & Weather Sealed Fibre-glass encapsulation

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**

Mobile Whips Bargain Prices

Watson mobile antennas are made to a high specification and employ stain-less steel whip sections with SO-239 receptors. All models are pre-tuned and will withstand at least 100 Watts RF. ***Watson - the name you know!***

W-2LE	2m 0dBv length 0.48m	£10.95 C
W-285	2m 3.4dBv length 1.33m	£14.95 C
W-77LS	2m/70cm 0/2.4dBv length 0.43m	£14.95 C
W-770HB	2m/70cm 3/5.5dBv length 1.1m	£19.95 C
W-7900	2m/70cm 5/7.5dBv length 1.58m	£31.95 C
W-627	6/2/70cm 2/4.5/7.2dBv 1.6m long	£34.95 C

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W&S £349.95 C

The World's Best Auto ATUs

Low insertion loss, cross-needle metering, end fed, balanced and coax, rapid tuning.
True plug-and-play.

Features vary so check our web site for exact details.

MFJ-929	1.8-30MHz 200W LCD	£209.95 C
MFJ-925	1.8-30MHz 200W no metering	£169.95 C
MFJ-991B	1.8-30MHz 150W X-meter	£209.95 C
MFJ-993B	1.8-30MHz 300W X-meter	£249.95 C
MFJ-994B	1.8-300MHz 600W X-meter	£339.95 C

The World's Best Manual ATUs

There's a model to suit every need and every pocket!

Features & looks vary so check our web site.

MFJ-902	3.5-30MHz travel tuner	£99.95 C
MFJ-904	3.5-30MHz travel tuner + meter	£129.95 C
MFJ-941E	1.8-30MHz 300W x-meter	£139.95 C
MFJ-945E	1.8-54MHz 300W x-meter	£129.95 C
MFJ-976	1.8-30MHz 1.5kWW x-meter	£469.95 C
MFJ-962D	1.8-30MHz 1.5kW	£289.95 C
MFJ-969	1.8-54MHz 300W x meter	£209.95 C
MFJ-936B	Indoor loop tuner 150W	£249.95 C

Black-Box Arrives!

The Air Traffic Flight Monitor That Catches Everything!

No more missed transmissions. No more hunting for frequencies. Even safe inside aircraft cabin. Hear things others miss!

Just switch on, adjust volume and squelch to listen to any VHF airband signal. Great for airshows or where frequencies are not known. Passive non radiating, so safe inside an aircraft cabin. Built-in speaker plus headphone socket. Runs from PP3 battery or external 12V supply. You even get a FREE 12V cigar lead.

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Practical Wireless March 2010

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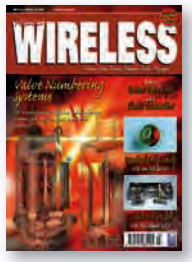

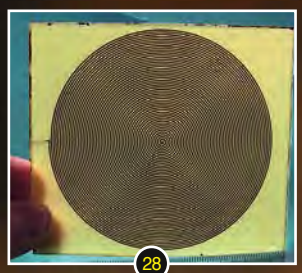

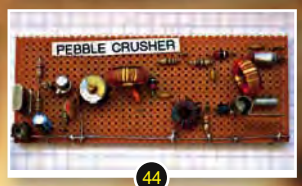

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Rob Mannion's

keylines

Striding into the future together!

As *PW* steps forward firmly and confidently into the second decade of the century – I've set myself a target to reach **before** I celebrate my 25th anniversary (in 2015) as the Editor. That target is to produce even more really superb projects with the help of our specialised author and readers.

In the past five years or so, *PW* has presented a number of remarkable constructional 'firsts'. Included in the list are the truly remarkable *International Beacon Project Clock* by *PW* author and great friend **Phil Cadman G4JCP**. The project caught the attention of the MFJ in the USA who developed their own version. Incidentally, Phil's development work took over two years before he was satisfied enough with the project to present it in *PW* and one of his prototypes is still regularly used at G3XFD.

Another 'pet' project idea of mine was to produce a dedicated 70MHz single sideband (s.s.b.) transceiver project for publication in *PW*, and there was only one person I could turn to for the inception, design, production of the project – **Tony Nailer G4CFY**. The original idea was discussed between Tony, **Tex Swann G1TEX** and myself over very many months.

The result was the Poundbury 70MHz SSB Transceiver, which was presented in a remarkable series of *Doing it By Design* (*DiBD*) where – in his unique 'peeking over the designer's shoulder' style of presentation – Tony guided us through the various stages until they came together as a complete transceiver. Another unique aspect of the project was that readers could purchase a full kit, or the basic boards, or use the magazine articles to produce their own version of the project independently.

Microwave Memories

One of my fondest memories involving my own constructional days with *PW* projects was the truly remarkable Exe 10GHz microwave transceiver. Unfortunately, both my original rigs were sold many years ago. Eventually though, with Tex's help, I managed to get several more Exe parabolic dishes and I'm hoping to get busy on 10GHz again.

Both Tex and I are very keen to get some more microwave projects into *PW* and to this end, **Colin Redwood G6MXL** is planning to include Microwave operations in his popular monthly *What Next?* (*WN?*) series in the future. I'm looking forward to seeing Colin's work and he'll be keeping us up to date, although as yet, his articles are some months in the future.

Despite trying hard, I have found it extremely difficult to contact any group – **or at least get a reply from anyone I've written to over the years** – regarding the commissioning of a modern microwave project for *PW.* No matter, **we will** develop a suitable project that our readers can build for themselves. I state this firmly because I'm very confident that enough of our readers would be interested in joining the exciting world of Amateur Radio on the microwave bands.

If you're keen to 'have a go' please contact Tex G1TEX, Colin G6MXL or myself because by working together we'll prove to our own satisfaction that microwave construction, operation and exploration can be enjoyed by anyone who is interested. A good, practical modern microwave project is one of several of my five year goals for *PW* – and I'm sure that it will be achieved in the same exciting way that brought us the Poundbury 70MHz transceiver and the *PW* IBP Beacon Clock – to many readers' satisfaction!

Your Own Wish-list?

Having provided a brief glimpse at one particular special project I have in mind for *PW* readers worldwide – both Tex G1TEX and I would very much like to hear from readers what pet project **they would like to see** in the magazine. However, I give everyone fair warning – a number of readers who've come up with good ideas in the past have ended up **writing** their very own article for *PW*!

However, don't worry – if you don't think you can write an article – but do have the necessary constructional experience – we are more than prepared to 'work with you'. You do the building and design, we'll concentrate in preparing the article for publication for you. Your *Author's Guide* awaits – we've got a great deal to do together for the next five years and onwards!

Rob Mannion G3XFD/EI5IW

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

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

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

readers' letters

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

My Introduction To Amateur Radio

Dear Rob,
My introduction to Amateur Radio was via a brief scrape with the CB band. As I was always more interested in how it works than operating, I gained a reputation for repairing these CBs, often sorting out problems that other 'screwdriver experts' had created.

The years have passed and many of the less legal CBs have found themselves on 'on-line' auction sites, being bought up by 11m pirates operating on s.s.b., some transmitting well into both the 10 and 12m h.f. bands.

A small number of Amateurs are buying these multi-mode CBs and converting them to dedicated Amateur use. In my view, the more of these export CBs that are converted, the better for all h.f. operators. I would be interested in an article that clarifies the legalities of converted equipment and also shows that CBs can be converted as easily as building from scratch. An example would be **Shawn Baris ZR1EV** CB to 6, where a CB was converted to run on the 50MHz band!

Few of us would have any qualms about taking an ex-fire service radio and converting it to 70MHz, so why should converting CBs be any different?

For reference: CB to 6m conversion. This is a conversion that many Amateurs have used successfully, despite the shock that an h.f. radio can be made to go to v.h.f.

http://malzev.tripod.com/radiodoc/cbtosix.htm

On-line forum with two of the four moderators being UK based **http://groups.yahoo.com/group/CB2HAM**

Further note: A letter received by a yahoo/fourmeter group member from OFCOM, stated that full Amateurs are allowed to modify previously certified equipment but novices are not. Also there was mention of the original certificate plate needing removal once modified.

Derek Ford G7POS
Cottingley
Leeds, West Yorkshire

Editor's comment: *The conversion of illegal CB equipment to legitimate Amateur Radio use is a bone of contention as far as I'm concerned Derek! I see no valid reasons against their conversion. Please join me on the* Topical Talk *page for further discussion.*

Building & Using Receivers For The Young

Dear Rob
I have recently seen on the news-groups quite a few letters on building/using receivers especially for younger members. Do you think it might be a good idea to use the expertise that must exist in the *PW* authors and readers to design a simple receiver kit that can in time be upgraded, by other kits to a superhet, then filters, and other ancillaries added to the builders' needs as the projects expands?
Regards.
Ted Wager G3TPI
New Mills
High Peak
Derbyshire

Editor's comment: *Thanks for your letter Ted! Although PW has to focus on the transmitting and receiving aspect of the Amateur Radio hobby (our sister title* Radio User *concentrates on the receiving side) we do occasionally feature receivers as smaller projects. Some excellent commercially produced kits are also available. However, Tex and I would welcome feedback on the topic Ted G3TPI has raised.*

Weak Signal Propagation Reporting

Dear Rob,
I have been experimenting with Weak Signal Propagation Reporting (WSPR) for a number of weeks now, I did not know it existed until I saw an article about it in the Autumn 2009 edition of the the G QRP club's journal *Sprat*. Not a mention of it in *PW* or in *RadCom* come to that! It's a very fascinating way to study propagation and QRP. It's great fun too, so much can be achieved with it. I've been using low power (5W or less) and simple antennas and yet got reports from all over the world (VK, ZL, JQ). It is very addictive!

I have found this a very interesting and exciting mode, there are many Radio Amateurs world wide experimenting with WSPR, but I believe it isn't generally known about.

One of my main interests is experimenting with home-brew antennas and WSPR is helpful in assessing their performance. I look forward to reading an article in *PW* and I am sure it will raise interest among many readers.

There is also quite a lot of information on the internet, such as **wsprnet**. I know some are a bit sniffy about it, considering it not to be "real Amateur Radio." It would be nice to have an article on WSPR in a future edition of *PW* and to hear from other readers who are using it. Best wishes in 2010 for all at *PW*.

Brian Clarke G4ICB
Pontefract, West Yorkshire

Editor's comments: *An interesting letter Brian – thank you. I'm also very new to WSPR techniques and have only just learned something about it through the very low power activities of* PW *author* ***Roger Lapthorne G3XBM*** *(see* Newsdesk *this issue). We are planning an article on the topic soon.*

Star Letter

Locally Grown QRM

Dear Rob,
After a whole week of no mail deliveries, my *PW* arrived and I was interested to see your February *Keylines* about locally grown QRN. This was because – very recently, I was sorting out some of my own.

My wife had bought a new computer, an HP TouchSmart 810 which is more like a TV, than a traditional PC. The styling is similar to an Apple iMac with all the electronics behind the screen, with only a large power supply unit (p.s.u.) 'brick', wireless keyboard and mouse in addition to it.

Ever since she got the d*****! thing, I have had ridiculous levels of QRN (S7-S9+) on 1.8MHz Topband, 3.5MHz (80) and 7MHz (40m) as soon as it was switched on. Initially, my thoughts were that it was radiating directly from the boards **inside it** thanks to the computer having a plastic case rather than the traditional metal tower box. The reason for this thinking was that my own PC, which is also an HP, but is a tower style, was virtually silent on the same bands.

I made some enquiries through the Yahoo Group **RFI_Registry http://groups.yahoo.com/group/RFI_Registry/** and got some excellent advice, which I eventually put into action just before writing to you. One piece of advice I got was a document on using ferrites for suppressing RFI to and from Amateur Radio. It was well worth reading fully and it refreshed my knowledge on using ferrite chokes to combat RFI. I then downloaded another from the Fair-Rite web site **http://fair-rite.com/newfair/index.htm** The one main thing that I was reminded of by reading the shielding document, was that it is the **cables** that radiate, acting as antennas, rather than the chips and circuit boards in switch mode p.s.u.s etc. I also found as per the part on Ethernet, that yes, I had ethernet birdies at several of the mentioned frequencies.

The TouchSmart PC 1: I tried wrapping the p.s.u. in aluminium foil to see if it was radiating directly. Also tried some additional ferrites on the p.s.u. cabling. No change whatsoever, so I assumed the the p.s.u. brick was not the problem and left in its original state.

2: I then traced the radiation on 7MHz to two external cables connected to the PC. **Cable A** was – by far – the worst, the broadcast TV antenna (the PC is also a DVB-T digital TV receiver) and Cable **B**, which is the ethernet cable.

I left the TV antenna unplugged as it is rarely used as a TV and changed it to use wireless connectivity instead of wired ethernet. I'm also planning to get some more ferrite rings and wind the TV antenna through it a few times at a later date. For now, 7MHz is now very usable with the PC on and in use with greatly reduced QRN!

3: I checked on 3.5MHz and found the same result – greatly reduced QRN!

4: Next, I switched to 1.8MHz to find that I (still) had an S7 noise from the PC. This was traced to the cable coming out of the PC sound card and going to external (powered) speakers. This was cured using a combination of ferrites that I had in the junk box. I found that five turns through a small ferrite ring reduced the noise level very significantly but I couldn't get more turns through it. So I added five turns through a ferrite clamp-on filter in addition to the ring and – Hey presto – Top Band is usable too!

Ethernet Cables: I have now done the following today in addition to silencing the PC. I have removed all ethernet cables and connected all my PCs via wireless rather than wired ethernet. Initially, this would seem the wrong thing to do using wireless instead of cables – but in this case I don't think it is.

The wireless frequencies in use for **802.11b/g** are well over 2GHz and I'm not using anywhere near that frequency in my station. The highest frequency Amateur band I use is 430MHz (70cm) and even that's very rare. I think that if you take the same precautions I've done – you'll be amazed at the amount of ethernet QRN that you get rid of across a wide range of frequencies, just by changing to wireless instead of using UTP cables!

Plug based switch-mode p.s.u.s: These p.s.u.s, such as used for routers, DECT phones, mobile phone chargers, etc. have been filtered. I now have a ferrite ring close to the p.s.u. itself, with several turns of the low voltage cable through it on all plug based switch mode power supplies in the house, regardless of whether they appear to be generating QRN or not. Most of these actually seem to be well filtered but there's no harm in playing safe.

Firewire and USB cables: As part of some investigations today, I found that USB and Firewire cables radiate too – USB far more than Firewire, as the Firewire cables (at least the ones I have) seem to be far better screened. So, instead of having loads of USB & firewire cables on computers all the time, I have minimised them. Now even my printer is connected wirelessly, and I only plug in a USB or Firewire cable when I am actually using the device.

Flat screen TV Our main TV is the usual flat screen with connections via various cables to speakers and sub woofer, Sky+ HD box, DVD player/recorder, etc. Again the wiring was radiating and I could actually hear the sound being broadcast on 7MHz if I set my rig to f.m. receive! This too has been cured by the application of a ferrite ring with a few turns of the sound cable through it just as it exits the TV.

The HDMI cables now have ferrite rings on them too at both ends with 3 turns of the HDMI cable through each of them. Bliss. Yes, I may still hear QRN on several bands, but it rarely seems to move the S meter, or be too intrusive.

Hope this info helps you to clean up your locally grown QRN too!
Best 73
Gordon Hunter G8WWD
Birkinhead
The Wirral

Editor's comment: *Thank you for a fascinating letter Gordon. In fact readers, along with answering some of my questions, Gordon's letter made me realise that if it were expanded, it could form the basis of an even more detailed and helpful article! In fact, in his reply agreeing to prepare an article, Gordon shared the news that members of his club had suggested that he write one. As this topic is incredibly important and topical, I'm hoping to get it into* PW *as soon as possible.*

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Mobile Mountings Again

Dear Rob
I have recently been reading through some recent back numbers of *Practical Wireless*. A feature of many letters that I have read, is that of the problem of mounting radios in modern cars. The solution to that problem is quite simple and that is to select a mount bracket from the excellent Brodit range. This will not provide a solution for mobile units but will be adequate for head units, mobile transceivers and microphones.

One source for Brodit mounts in the United Kingdom is DSL Developments. There may well be others. Their web site is **http://www.dsldevelopments.com/** They are based in York where I have dealt with them as a customer a number of times. I have always found them to be very helpful indeed.

As well as the appropriate mount for the vehicle make, model and position a move clip should also be selected. This is fastened by (very) sticky pads to the rear of the unit requiring mounting. I hope that this is useful. Best regards.
Gareth Hicks M6GWH
Norton
Stockton-on-Tees

Amateur Radio Direction Finding

Dear Rob,
I was very interested to read that **George Beech** asked about DF Hunting in his letter in the January 2010 *PW*. In replying to George, I'm pleased to say that there are two main 'flavours' of DF Hunting – the first on Top Band (1.8 MHz), organised by the **British Top Band DF Association**, and the second on 3.5MHz (80m) or 144MHz (2m) organised by the **Radio Society of Great Britain** (RSGB) under **International Amateur Radio Union** (IARU) rules.

Top Band DF events require a car and you have to find up to three hidden stations which are usually well hidden and can be anywhere on the specified 1:50,000 OS map. The emphasis is on skill, accuracy, and extracting the maximum information from the short transmissions. You do not have to be particularly fit and often age and experience will beat youthful enthusiasm.

You do need a sensitive set, preferably at least showerproof. The Top Band DF Association is affiliated to the RSGB and details can be found at **http://www.topbanddf.org.uk/**

The IARU events are much closer to orienteering, with up to 10 hidden stations, usually on frequently, and with a staggered start system. Most hunts are purely pedestrian and you need to be **very fit** to have any chance of being competitive! You do not need to be able to take very accurate bearings and receiver sensitivity is not normally a problem. The hidden stations are not normally concealed and may be automatic (no operator). More details can be found at **http://www.ardf.btinternet.co.uk/** Both these web sites have information on receivers as well as the competition dates. I hope this helps George and other *PW* readers. Best Wishes.
Colin McEwen G3VKQ
Twyford
Berkshire

Editor's thanks: *A most informative letter Colin – thank you! I've learned a lot myself and although we have an article in the 'pipeline' on DF Hunting under preparation – your letter has proved to be a helpful and interesting 'appetiser' prior to the 'main dish', which I'm looking forward to preparing for readers soon.*

The Haiti Earthquake Disaster

Dear Rob,
Within hours of the Haiti earthquake, Amateur Radio emergency operations could be heard on 7MHz. Although I felt a bit helpless up here in Barrow in Furness, it was good to hear other Amateurs playing their part and thanks to **Richard Brunton G4TUT**'s **Southgate ARC Club** website the 'please avoid' frequencies were notified to anyone visiting his site.

In fact my schoolboy French came in handy when I was listening, although most of the emergency comms seemed to be in English on the frequencies noted by the Southgate website. Richard 'fills the gap' for news as he 'publishes' everyday and at very short notice, something that proves useful for everyone when emergencies occur.

However, despite the fact that everyone in the Amateur Radio hobby knew that we were playing out part – I haven't heard a single mention of it on the BBC, ITV or Sky news! It seems to me that Amateur Radio is taken for granted at times, although the media always seem to know, as you've often commented yourself, where to turn to – Amateur Radio journalists – when they're really hard up for news don't they Rob? Keep flying the flag for us!
John Turner
Walney Island
Barrow
Cumbria

Haitian Earthquake & Amateur Radio

Dear Rob,
I'm writing to inform you of what seems to be the – very different – public profile of Amateur Radio here in the UK and the USA, where my daughter and her family live. Even though my daughter lives so far away nowadays in California, we keep in contact via E-mail and the 'phone. In fact it was on the telephone the other evening when I was told that 'Ham Radio' was being mentioned in literally every TV and radio news bulletin involving the Haitian earthquake. What a difference to here eh? Best wishes.
John Gardner
Barton Mills
Mildenhall
Suffolk

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**

news & products

A comprehensive round-up of what's happening in our hobby.

Norwegian Resistance Hero Radio Amateur – LA3KY – Silent Key

Knut Magne Haugland LA3KY, the Norwegian Second World War Resistance Hero – who took part in the Telemark Raid, died on December 25th 2009, aged 92. Knut Haugland was also one of six men, who successfully crossed the Pacific Ocean with **Thor Heyerdahl** in 1947, on the 12m (45 foot) *Kon-Tiki* raft made of balsa wood and bamboo – to prove that South American people could have settled Polynesia. Called the "most unusual expedition ever to place reliance on Amateur Radio for communication" in the December 1947 issue of the ARRL's *QST*, *Kon-Tiki* departed Peru for Polynesia on April 28, 1947.

Thor Heyerdahl, the Norwegian ethnologist (and former wartime resistance fighter who had first met LA3KY at a Special Forces training camp in England) and leader of the venture, considered that the settlement of the Pacific Islands resulted from a migration of American peoples who had sailed there many of years ago, rather than a trek from Asia as claimed by other scientists.

Heyerdahl decided to attempt the eventually successful trip in a raft of the type recalled in Incan legends and early Spanish historical accounts. He named the expedition on honor of the pre-Incan Sun god.

The *Kon-Tiki* raft was fashioned out of logs of the lightest wood in existence and lashed together with native-made hemp rope. Its only sources of locomotion would be the Pacific trade winds and the Humboldt Current which sweeps northward along the west coast of South America and thence in the direction of the Tuamotu Archipelago. The epic journey finished on August 7th, after 3,770 nautical miles.

Editorial note: The level of respect that Knut Haughland LA3KY was held in the UK was clearly demonstrated in a lengthy obituary in *The Daily Telegraph* (see **http://www.telegraph.co.uk/news/obituaries/military-obituaries/special-forces-obituaries/6901543/Knut-Haugland.html)**. The obituary details his exploits in the Norwegian Resistance during the Second World War (he used the famous *Shetland Bus* clandestine ferry between Shetland and Norway on numerous occasions) where he played a major part in the famous

Copyright Kon-Tiki Museum

Telemark raid to destroy the Norsk Hydro hydroelectric station, where heavy water (it could be used a a moderator in atomic piles) production was being undertaken by the occupying Germans. However, Knut Haughland distanced himself completely from what he considered to be the highly fictionalised film *Heroes of Telemark*, featuring Kirk Douglas. The LA3KY obituary in *The Daily Telegraph* is a fitting tribute to this wonderful man and Norwegian Patriot and is recommended reading to *PW* readers. **G3XFD**.

The ARRL website has an article on Knut Haugland at: **http://www.arrl.org/news/stories/2009/12/28/11269/?nc=1**

Massive Haitian Earthquake & Amateur Radio

The **International Amateur Radio Union (IARU) Region 2** requests frequencies be kept clear after the massive earthquake struck Haiti, in the Caribbean. On Tuesday, January 12 at 4:53 PM Haiti time (2153 UTC), a magnitude 7 earthquake hit 15km (10 miles) west of Port-au-Prince, the island nation's capital. Note: A similar request has been issued for **Region 1** Amateurs – which includes Europe.

The USA's National Society, the **American Amateur Radio Relay League** (ARRL) has already encouraged US Amateurs to be aware of the emergency operations on the following frequencies: 7.045 and 3.720MHz (IARU Region 2 nets), 14.265, 7.265 and 3.977 MHz (SATERN nets), and 14.300MHz (Intercontinental Assistance and Traffic Net).

The **International Radio Emergency Support Coalition** (IRESC) is also active on EchoLink node 278173. The IARU Region 2 Area C Emergency Coordinator, **Arnie Coro CO2KK**, is reported to be co-ordinating a multi-national response by Radio Amateurs. There are organized nets on 7.045 and 3.720 MHz; amateurs are asked to monitor the frequencies, but to also keep them clear of non-essential traffic.

Amateur Radio operators should also be aware that emergency traffic associated with the Haitian earthquake is expected on the SATERN frequencies of 14.265, 7.265 and 3.977MHz, according to SATERN's leader, **Major Pat McPherson**. The Salvation Army is accepting health and welfare traffic requests on its Website.

Stop Press!

At the time of *PW* going to press in late January, the situation in Haiti was still chaotic. Information is being validated and shared between many Amateur groups and news sources as it unfolds. Any UK based Radio Amateur who receive requests from Haiti for emergency assistance are advised to pass the information on to the International Red Cross in Geneva. Their website (In English) can be found at **http://www.icrc.org/eng**

As *PW* was going to press the IARU published the following announcement:
"From 1800UTC January 22nd the h.f. frequencies used to respond to the immediate needs of the Haiti Earthquake, 14.300, 14.265 , 7.045, 7.065, 7.265, 3.720 and 3.977MHz (**out of Band in Region 1**) will return to normal use. The groups who have been passing messages on those frequencies will revert to monitoring mode or their normal operations.

There are still a number of Radio Amateurs in the country attached to various relief groups who may still be heard on the Amateur bands on a number of frequencies according to their particular needs to maintain contact with their home countries.

Please maintain the normal procedures of:

- Listen before transmitting
- If you hear any station passing emergency traffic then leave the frequency clear and avoid causing QRM.

Thanks to everyone for their assistance during this emergency."

The RSGB's Spectrum Defence Fund

Donations to the RSGB **Spectrum Defence Fund** continue to flow in, and the Society has announced that they, "are very grateful to all those Radio Amateurs who have given their support to date".

The Fund is extremely important in ensuring the future of amateur radio and the defence of the spectrum allocations we currently enjoy.

This should be of concern to all radio amateurs so please support your National Society by making a contribution, whether you are an RSGB member or not.

You can now donate online at **www.rsgb.org/defencefund/**

Editorial Note: *PW* fully supports the RSGB initiative to help protect our hobby. Please see the RSGB Advert, page 65, in this issue. **G3XFD**.

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Roger's Lapping Up The 500kHz Milliwatting Miles!

Roger Lapthorn G3XBM provides the latest up-date on his remarkably successful milliwatting exploits on the 501-504kHz band. He's also working on his next article on the subject for *PW*. Watch this space!

Roger G3XBM writes: "Readers may be interested to hear a little more about my efforts on the 501-504kHz band available to UK Amateurs by Special Research Permit (NoV) from OFCOM.

Since my article was published last year, I've made further improvements to the station and these have resulted in an increase in effective radiated power of around 20dB (100 times)."

"Changes have included adding a spiral top hat to the small 5m long vertical antenna, small improvements to the grounding (adding one external ground stake and a few half-hearted attempts at radials no more than 10m long!) and a change to the transverter design. The latter now uses an IRF510 f.e.t. power amplifier and the output from the transverter is now 5W. However, because of other losses in the system the effective radiated power (e.r.p.) is still only around 1mW (it was around 6-10μW). I have also added a receive path in the transverter, so I can operate full transceive on 500kHz. There are details of the transverter on my website, 'blog' and 'YouTube' channel (see links below)."

"Results have been **totally amazing** especially with the Weak Signal Propagation Reporting (WSPR mode). At the time of writing this report (Jan 18th 2010), I've now been received by a total of 72 unique stations on the 500kHz band. Two of these were c.w. QSOs (**G3XIZ** and **G3KEV**) and the rest were WSPR reports. Best DX has now leapt to **990km** (tantalisingly close to my personal target of 1000km on the band) with reports from stations in nine different European countries. I have also heard stations in 13 countries including four transatlantic Amateur stations. Additionally, **RN3AGC** in Moscow thinks he **may** have seen a very weak trace of my signal and he is 2433km away. Remember – this is all with just 1mW e.r.p. signal!"

"My plan was to stop work on 500kHz after Christmas and to re-erect my Homebase-10 halo for 10m on the pole. However, the weather has been bad and 500kHz has been very good so, for now I'm staying on 500kHz a bit longer. When the weather eases up I will try to further improve the antenna and ground in the hope of getting a few more precious dBs from the system."

"Overall, 500kHz operation has been quite magical. I have found lots of support from others on the band via the RSGB's LF reflector. I have learnt a lot about MF propagation on the way. If other readers want to try something quite different, then I

recommend they apply at once for a Notice of Variation for 501-504kHz and get building! It **does not** have to be big or complex as I have found out myself. The NoVs now run until February 29th 2012 and allow use of up to 10W ERP. I'm 40dB **below** that level and still having a ball!"

"If you are a short wave listener (s.w.l.) then there is nothing stopping you taking a listen on the band, especially with WSPR on your PC. Transmitting Amateurs very much welcome reports on their signals and, on WSPR, the more stations that are listening and uploading reports to the internet database the better."

"In all, these last few months on 500kHz have been among the most enjoyable in all my 48 years in the hobby. In the near future my follow-up article for *PW* describing the transverter in more detail will be published. By then I may have made further improvements and leapt over that 1000km distance target I set myself." 73 Roger G3XBM.

http://g3xbm-qrp.blogspot.com/
http://www.g3xbm.co.uk
http://www.youtube.com/user/G3XBM

Stop Press!

Roger G3XBM achieves his goal!

Rogers reports: "This evening, January 20th, my target of exceeding 1000km on 500kHz has been exceeded by a **great** margin. **Lubos OK2BVG** in JN88KS, Czech Republic, managed to hear my tiny 1mW e.r.p. signal at a distance of **1229km**. This is by far my best DX and a new country on the band using WSPR. Lubos even moved to his quieter country QTH in order to hear my weak signal. I am so pleased he has such good ears! This was his E-mail message an hour ago:

Hello Roger, LF!
This moment is just now:
2136 -7 0.2 0.503874 0 G4JNT IO90 23
2142 -29 -0.5 0.503910 1 G3XBM JO02
Congratulation!
Lubos, OK2BVG, JN88KS

A little later my signal was even stronger:
2206 **-24** -0.6 0.503903 0 G3XBM JO02 0
This is quite unbelievable stuff and I am SO over the moon." 73 Roger G3XBM.

Frustrating Cable Fault For QuartSLab

Dave Hayes G4AKY of QuartsSLab apologies to the many *PW* readers who were unable to contact them following the news story on page 12 of the February issue, due to a major cable fault that robbed them of both telephone and Internet services.

Dave G4AKY writes: "Dear *Newsdesk*, I'd be most grateful if you'd publish a letter of explanation and apology to appear in the March issue along the lines your suggest because I really do feel so disappointed that QuartSLab – myself and my wife **Denise** – couldn't let our customers know about the phone/internet problem we had. Because until the service had been reinstated, we were, for example, without internet so, I couldn't access customers' E-mails and therefore couldn't obtain their contact details in order to explain the situation. Obviously, many potential customers became just as frustrated and angry as we were! "

"It would be great if my apology letter could express just how much we appreciate our customers' patronage, whether they're existing or potential customers, and you can be be sure we will not be relying entirely on copper wire connections in the future, thus ensuring readers can place their orders quickly and efficiently!
73".
Dave Hayes G4AKY
QuartSLab
020 7100 6357
Website: **www.quartslab.com/**
E-mail: **quartslab@aol.com**

Eton AN200 Medium Wave Directional Antenna

Many Radio Amateurs enjoy 1.8MHz and Top Band DXing and often use the Medium wave band to assess DX conditions. The new Eton AN200 Directional Medium wave Loop receiving antenna, which could certainly prove of interest to DXers.

Portsmouth based Eton UK Agents Nevada state in their press release, "It is a remarkable unit which can either be plugged directly in to a radio antenna socket, or just placed near (if it has an internal antenna) the radio and tuned to enhance reception. The Eton AN200 tunable indoor loop antenna can really improve the reception of Medium Wave stations on most radios throughout the entire Medium wave band. The AN200 can boost the reception provided by the ferrite antenna that is built in to most portable radios, or it can simply be placed near the radio to boost reception, it doesn't need to be connected or plugged in to your Medium Wave radio to work!"

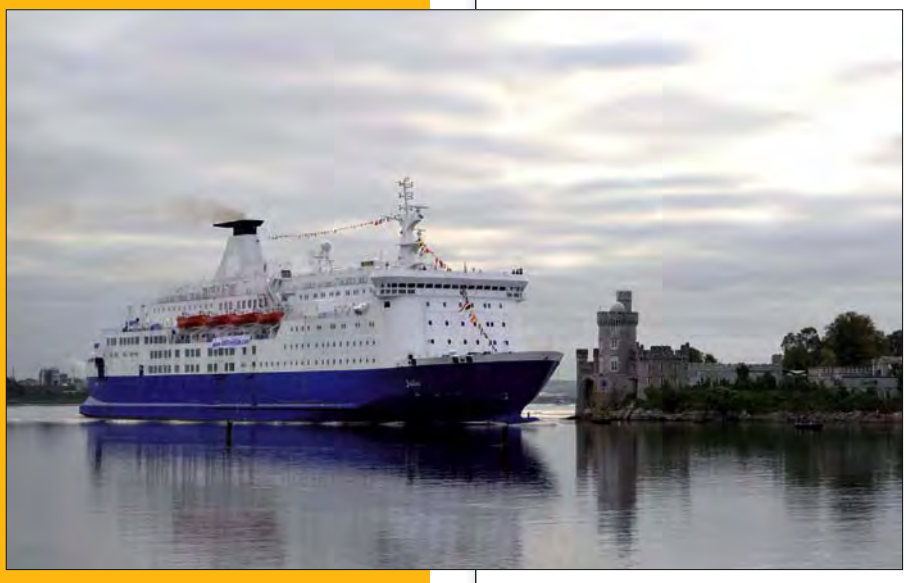
"The Eton AN200 has a built-in tuning dial to peak reception of the desired frequency or station at the same time providing selectivity to reject unwanted stations and noise. The antenna is directional and so can be turned to optimise reception of a specific station. The Eton AN200 Antenna is passive and so does not require a power source."

Features & Specifications:
Frequency coverage: 520kHz - 1710kHz
Size: 9-inch diameter loop
Dimensions: 10 x 9 x 3 inches ;
Weight: approx. 450g (without packing)
Price is £39.95 and available from Eton stockists or direct from Nevada.
Unit 1 Fitzherbert Spur
Farlington
Portsmouth
Hampshire PO6 1TT
Tel: **(012392) 313095**
fax: +44 (0) 2392 313091
E-mail: **sales@nevada.co.uk**
www.nevada.co.uk

Special Event Maritime Mobile Celebrating New Irish Ferry

As part of the Special Event initiative with **EI2GBW** and **GB2EI**, the Maritime Mobile station **G2YC/MM** will be QRV from the cruise ferry MV *Julia* on the Irish Sea during January and March. The stations are celebrating the re-introduction of the Swansea – Cork, Cork – Swansea ferry service, which is now to be operated by **Fastnet Line** (**http://www.fastnetline.com**/), with sailings planned to be up to eight times a week. The first service is due to take place on **Monday March 1st** from Cork.

Dates for activation of G2YC/MM are January 25th, 30th, 31st, March 1st, 4th, 20th, 21st and March 31st – April 1st. The EI2GBW and GB2EI stations, which are not allowed to operate maritime mobile, will continue land-based operations through early April 2010. Stations working the two special event stations and the maritime mobile station will qualify for the *Spirit of Inisfallen Award*. See the **EI2GBW** listing on QRZ.com **(http://www.qrz.com/db/)** for further details.



Further details on the ferry service from **Fastnet Line**, **Ferry Port**, **Ringaskiddy**, **County Cork, Republic of Ireland.**
Tel: **353 021 4378892.**
UK enquiries Tel: **0844 576 8831**
E-mail: **info@fastnetline.com**

Chelmsford ARS Promotes Public Awareness Of Amateur Radio

In 2009 as in previous years the **Chelmsford Amateur Radio Society** (CARS) ran six public demonstration stations during open days at the **Sandford Mill Science and Industry Museum**. However, knowing that most of the general public are completely unaware that Amateur Radio exists, let alone know what it entails, the Society wanted to do even more to raise public awareness.

Richard Beck M3YLB, and **Mark Sanderson M0IEO**, were keen to run demonstration stations on Saturdays in the Chelmsford shopping precinct to get maximum exposure to the public and it was decided to go-ahead with this idea.

Permission was first obtained from the local council and a Method Statement, to explain what was being proposed, as well as a Risk Assessment were prepared. The council officials were very helpful and approval was speedily given. The purpose of these events was not to play radio all day but to help the public understand the many uses of radio and to make them aware that the use of radio is open for all to enjoy.

Katherine Tokley M3HPY visits CARS demonstration Station. Community Support Officer Katherine Tokley M3HPY visiting the station outside Starbucks. On the stand are James Beatwell 2E1GUA, Mark Sanderson M0IEO, Laura Sanderson M3LIQ, Clive Ward G1EUC and Richard Beck M3YLB.

On each day the team on the stand spoke to between 40 and 50 people about the hobby. Most took course application forms and literature away with them, but more importantly, they took a new understanding of the uses of radio and the knowledge that there is a club in their home town, that can offer the training and help they need if they want to take up a hobby that is both exciting and educational!

On one demonstration event station there was a visit from the local constabulary in the person of Community Support Officer **Katherine Tokley M3HPY**, who had taken the foundation course a few years previously.

Running demonstrations in shopping precincts proved to be a success. They raised the profile of both CARS and Amateur Radio in general and produced more candidates for the training courses. CARS run Amateur Radio training courses on Thursday evenings. To find out more about these courses speak to:
Clive Ward G1EUC on
Tel: (**01245) 224577**
Mobile: **07860 418835**
E-mail: **training2010@g0mwt.org.uk**
Web: **http://www.g0mwt.org.uk/training/**

Sandford Mill Science and Industry Museum
http://tinyurl.com/SandfordMill

Richard Beck M3YLB and Mark Sanderson M0IEO outside the demonstration Caravan set up by the Chelmsford market.

Foundation & Intermediate Courses At Angel Of The North

The Angel of The North Amateur Radio Club, based in Gateshead in the North East of England, are enrolling for and starting intermediate and foundation courses on Monday February 8th at 7pm (later enrollments not a problem!). The Club have course books available for both courses. Please pass this information on to anyone you know who may be interested. Please contact **Nancy Bone G7UUR** if you are interested.

The Angel of the North Radio Amateur Radio Club meets every Monday from 7 to 9pm at Whitehall Road Methodist Church, Hall Bensham Gateshead NE8 4LH. The building is located at the corner of Whitehall Road and Coatsworth Road. The entrance to radio club room is through door at the side of building next to the car park. The car park entrance is on Whitehall Road. Public Transport Details: Go-Ahead routes 53 and 54. OS X 425375 OS Y 562088 Lat (WGS84) N54:57:10 (54.952798) Long (WGS84) W1:36:19 (-1.605327)
Club callsign: MX0GGP
Website: **www.anarc.net**
Secretary Nancy Bone G7UUR,
217 Bensham Road, Gateshead NE8 1US.
Tel: (**0191**) **477 0036** (Evening)
07990 760920 (Day)
E-mail:
nancybone2001@yahoo.co.uk

Manufacturers of radio communication antennas and associated products

HF Verticals

Heavy duty design HF verticals, with high power preparation, all with great performance

VR3000	3 Band 10-15-20M, Length 3.8M, Power 2000 Watts (without radials)	~~£149.95~~ **now £99.95**
EVX4000	4 Band 10-15-20-40M, Length 6.5M, Power 2000 Watts (without radials)	~~£159.95~~ **now £119.95**
EVX5000	5 Band 10-15-20-40-80M, Length 7.3M, Power 2000 Watts (without radials)	~~£199.95~~ **now £150.00**
EVX6000	6 Band 10-15-20-30-40-80M, Length 5.0M, Power 2000 Watts (including radials)	~~£349.95~~ **now £275.00**
EVX8000	8 Band 10-12-15-17-20-30-40 (80M Optional), Length 4.9M, Power 2000 Watts (including radials)	~~£349.95~~ **now £275.00**
EVXKIT-80	Radial kit for above to add 80M includes radial plus extension top section	**£129.95**

VHF/UHF Mobiles

GF151	Glass Mount 2/70cm, Gain 2.9/4.3dBd, Length 78cm complete with 4m cable and PL259	**£29.95**
MRM-100	MICRO MAG 2/70cm, Gain 0.5/3.0dBd, Length 55cm, 1" magnetic base with 4m coax and BNC	**£19.95**
MR700	2/70cm, Gain 0/3.0dBd, Length 50cm, 3/8 fitting	**£9.95**
MR777	2/70cm, Gain 2.8/4.8dBd, Length 150cm, 3/8 fitting	**£17.95**
MRQ525	2/70cm, Gain 0.5/3.2dBd, Length 43cm, PL259 fitting (high quality)	**£19.95**
MRQ500	2/70cm, Gain 3.2/5.8dBd, Length 95cm, PL259 fitting (high quality)	**£24.95**
MRQ750	2/70cm, Gain 5.5/8.0dBd, Length 150cm, PL259 fitting (high quality)	**£34.95**
MR2 POWER ROD	2/70cm, Gain 3.5/6.5dBd, Length 50cm, PL259 fitting (fibreglass collinear)	**£24.95**
MR3 POWER ROD	2/70cm, Gain 2.0/3.5dBd, Length 50cm, PL259 fitting (fibreglass collinear)	**£29.95**
MRQ800	6/2/70cm Gain 3.0dBi/5.0/7.5dBdBd, Length 150cm, PL259 fitting (high quality)	**£39.95**
MRQ273	2/70/23cm Gain 3.5/5.5/7.5dBdBd, Length 85cm, PL259 fitting (high quality)	**£49.95**

Mono Band End Fed Verticals

Great single band antennas at great prices!

HV-2	2m ½ wave, Gain 2.5dBd, Length 130cm, SO239	**£29.95**
HV-4	4m ½ wave, Gain 2.5dBd, Length 200cm, SO239	**£44.95**
HV-6	6m ½ wave, Gain 2.5dBd, Length 300cm, SO239	**£49.95**
HV-658	6m 5/8 wave, Gain 4.5dBd, Length 375cm, SO239	**£59.95**

Mono Band Collinear Verticals

Totally encapsulated GRP fibreglass antennas which require no tuning!

BM33	70cm 2 X 5/8, Gain 7.0dBd, Length 100cm, N-Type	**£44.95**
BM45	70cm 3 X 5/8, Gain 8.5dBd, Length 155cm, N-Type	**£54.95**
BM55	70cm 4 X 5/8, Gain 10dBd, Length 250cm, N-Type	**£74.95**
BM60	2m 5/8, Gain 5.5dBd, Length 155cm, N-Type	**£54.95**
BM65	2m 2 X 5/8, Gain 8.0dBd, Length 250cm, N-Type	**£79.95**
BM75	2m 3 X 5/8, Gain 8.0dBd, Length 430cm, N-Type	**£99.95**
BM140	4m 1/2, Gain 2.75dBd, Length 230cm, N-Type	**£69.95**
BM260	6m 1/2, Gain 2.75dBd, Length 285cm, N-Type	**£89.95**

HF Mobiles

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

AMPRO-10	28MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-12	24MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-15	21MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-17	18MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-20	14MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-30	10MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-40	7.0MHz, Length 220cm, 38th fitting (slimline design)	**£17.95**
AMPRO-80	3.5MHz, Length 220cm, 38th fitting (slimline design)	**£19.95**
AMPRO-160	28MHz, Length 220cm, 38th fitting (heavy duty design)	**£49.95**
ATOM-20S	14MHz, Length 130cm, PL259 fitting (compact design)	**£24.95**
ATOM-40S	7.0MHz, Length 165cm, PL259 fitting (compact design)	**£26.95**
ATOM-80S	14MHz, Length 165cm, PL259 fitting (compact design)	**£29.95**

Tarheel Motorised Mobile

The best USA motorised antennas available here from Moonraker the European distributor – All models in stock now!

Little Tarheel II	3.5-54MHz 200W max length 48"	**£349.95**
Tarheel 40A HP	7-34MHz 1.5Kw max length 8ft	**£429.95**
Tarheel 75A	7-34MHz 250W max length 8ft	**£429.95**
Tarheel 100A	3.4-30MHz 1.5Kw max length 10.4ft	**£449.95**
Tarheel 200A HP	3.4-28MHz 1.5Kw max length12ft	**£479.95**
Tarheel 300A	1.7-30MHz 250W max length 11.4ft	**£449.95**
Tarheel 400A	1.7-30MHz 250W max length 12ft	**£479.95**

GP2500

All Band HF Vertical

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

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

All at an amazing £199.95 !

Dual and Triband Collinear Verticals

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

SQBM105P	2/70cm, Gain 2/4.5dBd, RX 25-2000MHz, Length 70cm, SO239 (Radial Free)	**£39.95**
SQBM105N	2/70cm, Gain 2/4.5dBd, RX 25-2000MHz, Length 70cm, N-type (Radial Free)	**£44.95**
SQBM110P	2/70cm, Gain 3/6dBd, RX 25-2000MHz, Length 100cm, SO239 (Radial Free)	**£54.95**
SQBM110N	2/70cm, Gain 3/6dBd, RX 25-2000MHz, Length 100cm, N-Type (Radial Free)	**£59.95**
SQBM200P	2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, SO239	**£54.95**
SQBM200N	2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, N-Type	**£59.95**
SQBM500P	2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, SO239	**£64.95**
SQBM500N	2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, N-Type	**£69.95**
SQBM800N	2/70cm, Gain 8.5/12.5dBd, RX 25-2000MHz, Length 520cm, N-Type	**£129.95**
SQBM1000P	6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, SO239	**£79.95**
SQBM1000N	6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, N-Type	**£84.95**
SQBM223N	2/70/23cm, Gain 4.5/7.5/12.5dBd, RX 25-2000MHz, Length 155cm, N-Type	**£69.95**

Multiband Mobile

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

SPX-100	9 Band plug n' go portable, 6/10/12/15/17/20/30/40/80m, Length 165cm retracted just 0.5m, Power 50W complete with 38th PL259 or BNC fitting to suit all applications, mobile portable or base ... brilliant!	**£44.95**
SPX-200	6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, 3/8th fitting	**£39.95**
SPX-200S	6 Band plug n' go mobile, 6/10/15/20/40/80m, Length 130cm, Power 120W, PL259 fitting	**£44.95**
SPX-300	9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W, 3/8th fitting	**£54.95**
SPX-300S	9 Band plug n' go mobile, 6/10/12/15/17/20/30/40/80m, Length 165cm, High Power 200W,PL259 fitting	**£59.95**
AMPRO-MB6	6 Band mobile 6/10/15/20/40/80m, length 220cm, 200W, 3/8th fitting, (great for static use or even home base – can tune on four bands at once)	**£69.95**
ATOM-AT4	10/6/2/70cm Gain 2m 2.8dBd 70cm 5.5dBd, Length 132cm, PL259 fitting (perfect for FT-8900R)	**£59.95**
ATOM-AT5	5 Band mobile 40/15/6/2/70cm, Length just 130cm, 200W (2/70) 120W (40-6M) PL259 fitting, (great antenna, great price and no band changing, one antenna, five bands)	**£69.95**
ATOM-AT7	7 Band mobile 40/20/15/10/6/2/70cm, Length just 200cm, 200W (2/70) 120W (40-6M) PL259 fitting, (great antenna, great price and no band changing, one antenna, five bands)	**£79.95**





If we advertise it – we stock it!

Yagi Antennas

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

YG27-4	Dual band 2/70 4 Element (Boom 42") (Gain 6.0dBd)	**£49.95**
YG4-2C	2 metre 4 Element (Boom 48") (Gain 7dBd)	**£29.95**
YG5-2	2 metre 5 Element (Boom 63") (Gain 10dBd)	**£49.95**
YG8-2	2 metre 8 Element (Boom 125") (Gain 12dBd)	**£69.95**
YG11-2	2 metre 11 Element (Boom 185") (Gain 13dBd)	**£99.95**
YG3-4	4 metre 3 Element (Boom 45") (Gain 8dBd)	**£59.95**
YG5-4	4 metre 5 Element (Boom 104") (Gain 10dBd)	**£69.95**
YG3-6	6 metre 3 Element (Boom 72") (Gain 7.5dBd)	**£64.95**
YG5-6	6 metre 5 Element (Boom 142") (Gain 9.5dBd)	**£84.95**
YG13-70	70 cm 13 Element (Boom 76") (Gain 12.5dBd)	**£49.95**

ZL Special Yagi Antennas

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

ZL5-2	2 Metre 5 Ele, Boom 95cm, Gain 9.5dBd	**£49.95**
ZL7-2	2 Metre 7 Ele, Boom 150cm, Gain 12dBd	**£59.95**
ZL12-2	2 Metre 12 Ele, Boom 315cm, Gain 9.5dBd	**£99.95**
ZL7-70	70cm 7 Ele, Boom 70cm, Gain 11.5dBd	**£39.95**
ZL12-70	70cm 12 Ele, Boom 120cm, Gain 14dBd	**£49.95**

HB9CV

Brilliant 2 element beams ... ideal for portable use

HB9-70	70cm (Boom 12")	**£24.95**
HB9-2	2 metre (Boom 20")	**£29.95**
HB9-4	4 metre (Boom 23")	**£39.95**
HB9-6	6 metre (Boom 33")	**£49.95**
HB9-10	10 metre (Boom 52")	**£69.95**
HB9-627	6/2/70 Triband (Boom 45")	**£69.95**

Halo Loops

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

HLP-2	2 metre (size approx 300mm square)	**£19.95**
HLP-4	4 metre (size approx 600mm square)	**£29.95**
HLP-6	6 metre (size approx 800mm square)	**£39.95**

G5RV Wire Antennas

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

G5RV-HSS	Standard Half Size Enamelled Version, 51ft Long, 10-40 Metres	**£19.95**
G5RV-FSS	Standard Full Size Enamelled Version, 102ft Long, 10-80 Metres	**£24.95**
G5RV-DSS	Standard Double Size Enamelled Version, 204ft Long, 10-160 Metres	**£49.95**
G5RV-HSH	Half Size Hard Drawn Version, pre-stretched, 51ft Long, 10-40 Metres	**£24.95**
G5RV-FSH	Full Size Hard Drawn Version, pre-stretched, 102ft Long, 10-80 Metres	**£29.95**
G5RV-HSF	Half Size Original High Quality Flexweave Version, 51ft Long, 10-40 Metres	**£29.95**
G5RV-FSF	Full Size Original High Quality Flexweave Version, 102ft Long, 10-80 Metres	**£34.95**
G5RV-HSP	Half Size Original PVC Coated Flexweave Version, 51ft Long, 10-40 Metres	**£34.95**
G5RV-FSP	Full Size Original PVC Coated Flexweave Version, 102ft Long, 10-80 Metres	**£39.95**
G5RV-HSX	Half Size Deluxe Version with 450 Ohm ladder, 51ft Long, 10-40 Metres	**£44.95**
G5RV-FSX	Full Size Deluxe Version with 450 Ohm ladder, 102ft Long, 10-80 Metres	**£49.95**

Accessories

G5RV-IND	Convert any half size G5RV to full with these great inductors, adds 8ft on each leg	**£24.95**
G5RV-CHOKE	inline balun to reduce RF feedback	**£39.95**
TSS-1	Pair of stainless steel springs to take the tension out of a G5RV or similar	**£19.95**

Trapped Wire Dipole Antennas

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

MDT-6 FREQ:40 & 160m LENGTH: 28m POWER: 1000 Watts **£79.95**

MTD-1 (3 BAND) FREQ:10-15-20 Mtrs LENGTH:7.40 Mtrs POWER:1000 Watts **£69.95**

MTD-2 (2 BAND) FREQ:40-80 Mtrs LENGTH: 20Mtrs POWER:1000 Watts **£79.95**

MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts **£129.95**

MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts **£69.95**

MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts **£119.95**

(MTD-5 is a crossed di-pole with 4 legs)

MOONRAKER

Manufacturers of radio communication antennas and associated products

If we advertise it – we stock it!

MFJ Antenna Tuners

New lower prices!

See our website for full details.

AUTOMATIC TUNERS

MFJ-925 Super compact 1.8-30MHz 200W **£169.95**
MFJ-926 remote Mobile ATU 1.6-30MHz 200W **£419.95**
MFJ-927 Compact with Power Injector 1.8-30MHz 200W **£254.95**
MFJ-928 Compact with Power Injector 1.8-30MHz 200W **£199.95**
MFJ-929 Compact with Random Wire Option 1.8-30MHz 200W **£209.95**
MFJ-991B 1.8-30MHz 150W SSB/100W CW ATU **£209.95**
MFJ-993B 1.8-30MHz 300W SSB/150W CW ATU **£249.95**
MFJ-994B 1.8-30MHz 600W SSB/300W CW ATU **£339.95**
MFJ-998 1.8-30MHz 1.5kW **£649.95**

MANUAL TUNERS

MFJ-16010 1.8-30MHz 20W random wire tuner **£69.95**
MFJ-902 3.5-30MHz 150W mini travel tuner **£99.95**
MFJ-902H 3.5-30MHz 150W mini travel tuner with 4:1 balun **£124.95**
MFJ-904 3.5-30MHz 150W mini travel tuner with SWR/PWR **£129.95**
MFJ-904H 3.5-30MHz 150W mini travel tuner with SWR/PWR 4:1 balun **£149.95**
MFJ-901B 1.8-30MHz 200W Versa tuner **£109.95**
MFJ-971 1.8-30MHz 300W portable tuner **£119.95**
MFJ-945E 1.8-54MHz 300W tuner with meter **£129.95**
MFJ-941E 1.8-30MHz 300W Versa tuner 2 ..... **£139.95**
MFJ-948 1.8-30MHz 300W deluxe Versa tuner **£159.95**
MFJ-949E 1.8-30MHz 300W deluxe Versa tuner with DL **£179.95**
MFJ-934 1.8-30MHz 300W tuner complete with artificial GND **£209.95**
MFJ-974B 3.6-54MHz 300W tuner with X-needle SWR/WATT **£189.95**
MFJ-969 1.8-54MHz 300W all band tuner **£209.95**
MFJ-962D 1.8-30MHz 1500W high power tuner **£289.95**
MFJ-986 1.8-30MHz 300W high power differential tuner **£349.95**
MFJ-989D 1.8-30MHz 1500W high power roller tuner **£389.95**
MFJ-976 1.8-30MHz 1500W balanced line tuner with X-needle SWR/WATT **£469.95**

MFJ Analysers

MFJ-229 UHF Digital Analyser 270-480MHz **£219.95**
MFJ-249B Digital Analyser 1.8-170MHz..... **£264.95**
MFJ-259B Digital Analyser 1.8-170MHz..... **£279.95**
MFJ-269 Digital Analyser 1.8-450MHz **£349.95**
MFJ-269PRO Digital Analyser 1.8-170/415-450MHz..... **£399.95**

LDG Tuners

LDG Z-817 1.8-54MHz ideal for the Yaesu FT-817 ..... **£119.95**
LDG Z100 Plus 1.8-54MHz the most popular LDG tuner..... **£139.95**
LDG IT-100 1.8-54MHz ideal for IC-7000..... **£149.95**
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Project

How to Survive VHF Field Day!

A Contester's Voice Keyer

One of the major problems when contesting (in particular v.h.f. and u.h.f. contests) is the need to call "CQ" so often. The solution to this, when I was first licensed, was to use a loop of magnetic tape recorded with my "CQ" call and to play this through a portable reel–to–reel tape recorder.

Nowadays using a PC is an alternative. However, I've designed a 'stand alone' *Voice Keyer* (*VK*) device, which doesn't tie up a PC.

Design Base

The design is based on a dedicated voice recorder integrated circuit (i.c.) that can be used in a number of modes emulating a tape recorder or working as a random access memory. This i.c., the APR9600 from **A-plus Inc**, has the ability to store and replay up to eight messages either sequentially (tape recorder mode) or randomly selected by the user. The total message storage time, which may be user-selected, is from 40 to 60 seconds. The pre-recorded message is stored in non-volatile

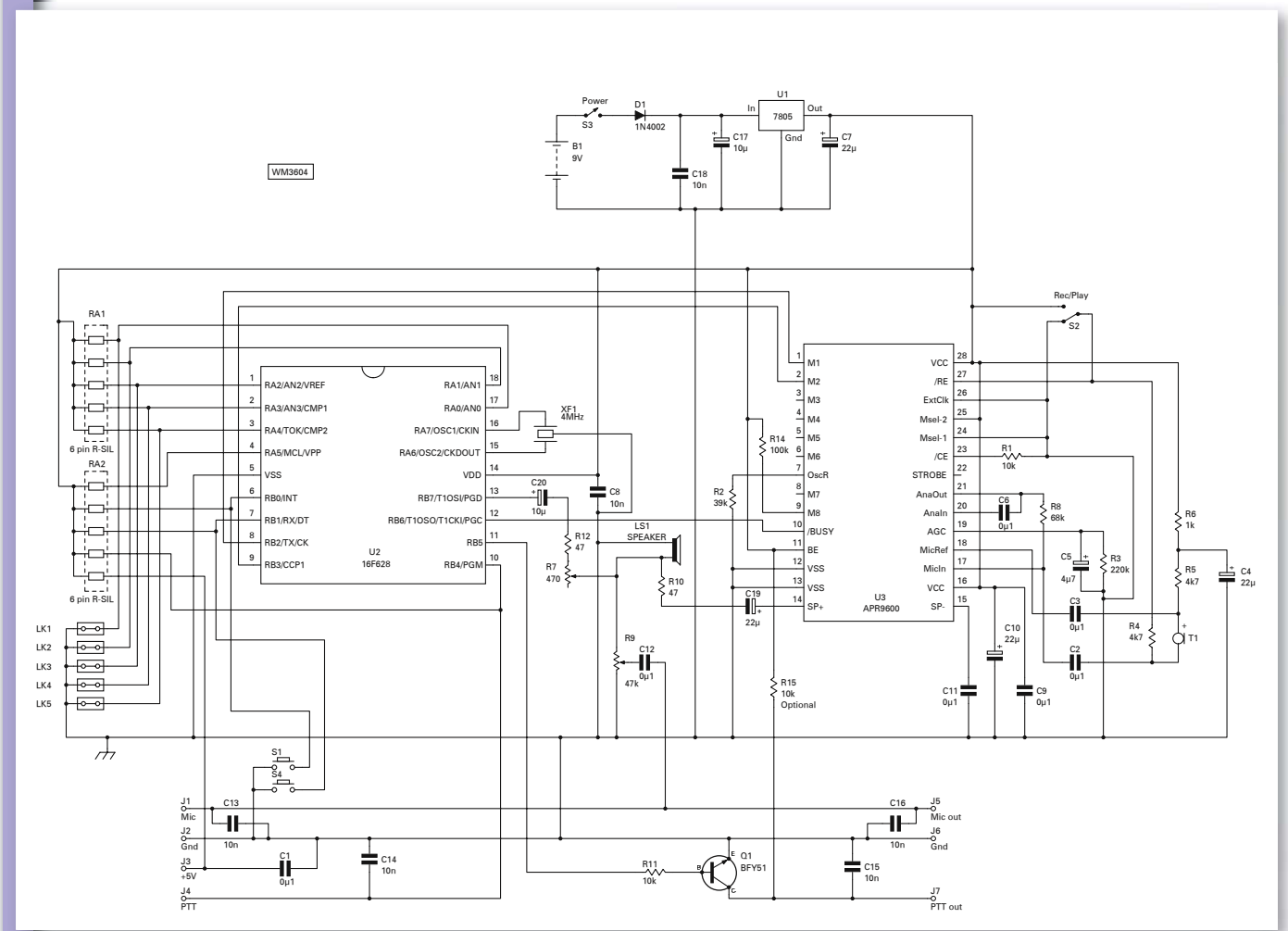


Fig. 1: The final circuit of the Voice Keyer.

Barry Horning GM4TOE – became hoarse calling "CQ" from the Scottish highlands and came up with an idea to save his voice!

Bottom Copper Layer

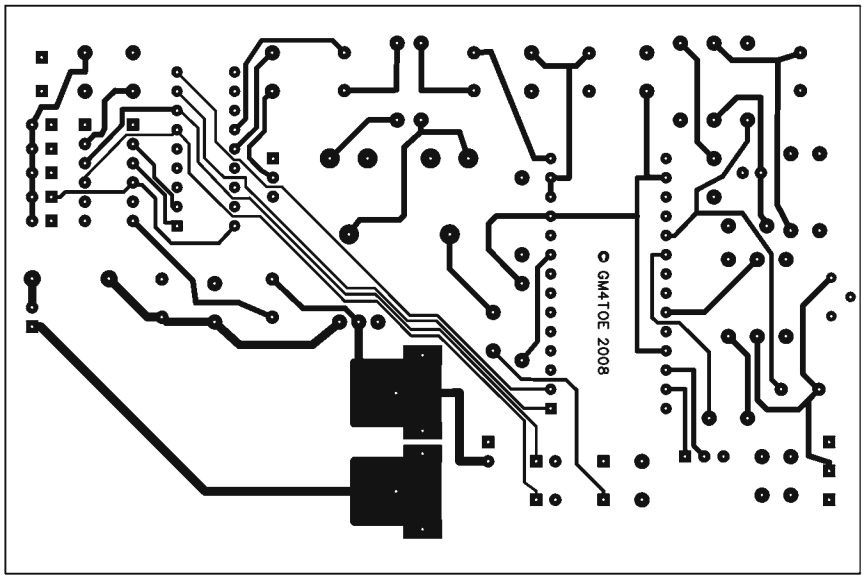
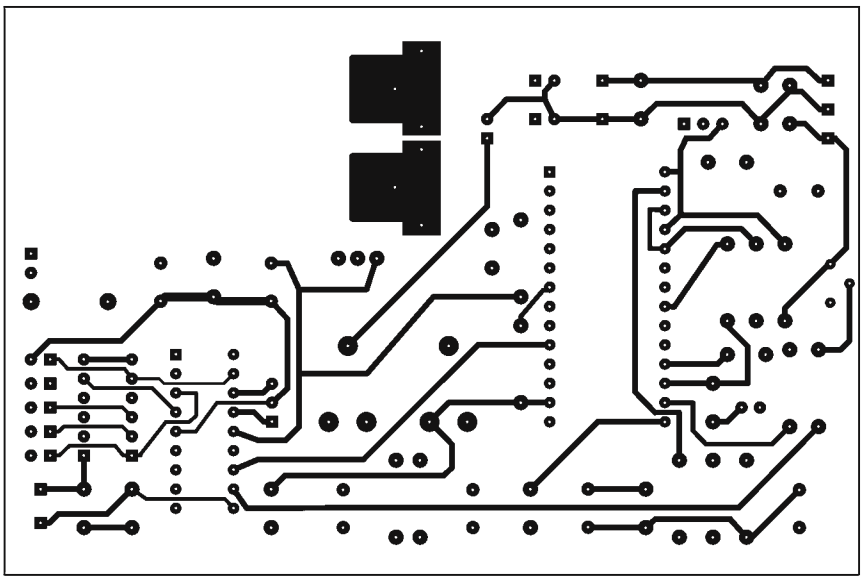
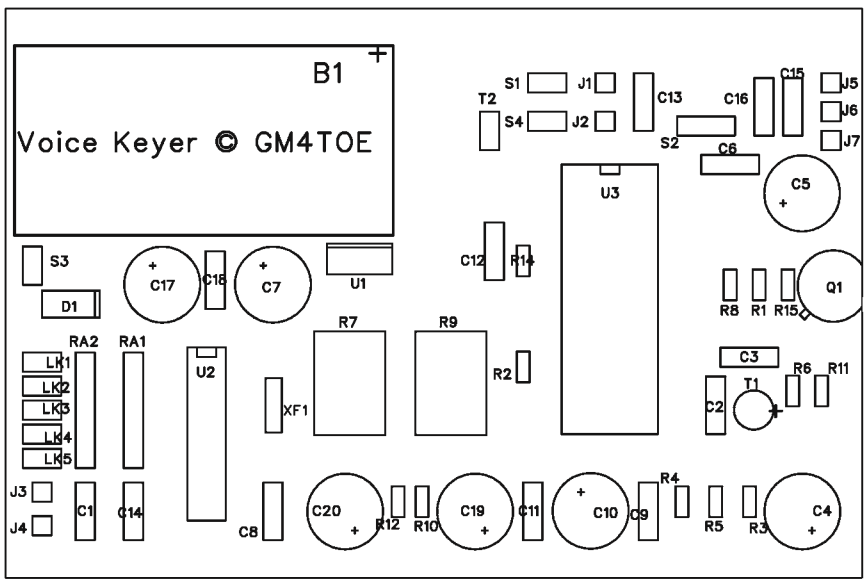


Fig. 2: The underside copper track pattern for the Voice Keyer,



Top Copper Layer

Fig. 3: The track pattern for the upper side of the project.



Top Silkscreen

Fig. 4: Component placing diagram of Barry's project.

memory and is accessed by a single button press.

The design provides just two memories so that either of two operators may store their own message and access it by a simple push button – alternatively a single operator may choose to record two different messages and select which to transmit. The random access mode for the i.c. is used in this particular design.

Ease-of-use was the design criteria for the project. Once set, and the message has been recorded, it just requires one button to be pushed to operate and can be overridden at any time by operating the microphone press to talk (p.t.t.).

All internal control is undertaken by some simple software (firmware) programmed into a programable integrated circuit (PIC©) which handles all control and 'handshaking' between the user and the recorder i.c. Using a PIC for control simplifies the user interface.

The *VK* has a **On**/**Off** switch and a switch to select record or play. There's also a bank of four dual-in-line (d.i.l.) switches (or internal jumpers if preferred) to select whether there's a 'roger' beep (RB) at the end of a transmission and to select how often a "CQ" is repeated. In addition there's a microphone socket for the user's microphone and an output connector to connect to the transceiver.

The *VK* is compatible with most rigs as the only interfaces to the transceiver are the microphone input and the rig's p.t.t. line. There's an internal jumper to select whether the p.t.t. line to the rig is a ground or a positive voltage on transmit.

The connections for the external microphone are provided by the 'industry standard' 8-pin microphone socket – to be wired to suit the operator's microphone. There's a 5V supply via a 4.7kΩ resistor is provided from the board for microphones, which need a positive supply (see separately available shopping list for microphone connections).

Circuit Description

The APR9600, which is U2 on the circuit diagram in **Fig. 1**, is a 28-pin device in a ceramic dual-in-line package. The number of messages available (2), random access mode, the sampling frequency (which defines the input bandwidth and total message duration) and the audio input automatic gain control (a.g.c.) characteristics have been pre-selected during the printed circuit board (p.c.b.) design

Note: A decision can be made during construction to alter the bandwidth and message duration. User inputs are limited to speech input for recording, play/record

select, message select and whether a RB is transmitted and the message repeat options.

Recording input is provided by a built-in electret microphone. I decided to use this, rather than the rig's microphone for ease of construction and to ensure that the audio tailoring and a.g.c. attack times for the recorded message were predictable. The advantage of this is that it's possible to pre-record the messages beforehand.

A small internal speaker allows the recorded speech to be monitored and also enables the APR9600 to send beeps to indicate when to start speaking and to warn when the total message space has been used. The speaker isn't essential for operation but does allow the user to monitor the transmitted speech.

The interface between the user and the APR9600 chip is handled by a programmed PIC (16F628). This device is in an 18-lead dual in line package and the program (written in *PIC Basic*) is loaded into flash memory using a standard PIC programmer.

The PIC takes an input from one or other of the push buttons, operates the rig p.t.t. line, keys the APR9600 and monitors the 'Busy' line of the voice chip to check when it has finished transmitting. When the recorded message is finished the PIC then releases the p.t.t. line.

The PIC can also generate one of three tones, which are transmitted on the completion of the voice message and prior to release of the p.t.t. line (Morse 'K', Morse 'E' or Morse '5'). Also, depending on the state of the DIL switches (or on-board jumpers) the PIC will also wait for a pre-determined period then repeat the "CQ" sequence. It's possible for the sequence to be repeated indefinitely – perhaps for beacon use.

The PIC also monitors the p.t.t. line from the user's microphone. If this is pressed, immediately, any *VK* sequence is terminated and control is returned to the operator.

The Program

The program (firmware) for this project was written in *PICBasic*, a programming language I understand! I've been very successful producing PIC based projects using this compiled language and I created a simplified flowchart for this program, to keep everything clean and work out the sequential logic needed for the project.

When the *VK* is first switched on the program checks for the fixed link at LK1 and this pre-determines whether the p.t.t. goes low or high during transmit. Following this the program enters a loop which checks for either button being pressed and for the microphone p.t.t. being pressed.

Next, when the program detects a button press it's directed to a routine to determine what action to take and then take that action. **Note:** A delay is inserted into the program (about 1 second) so that the system can check whether the button has been pressed and released, or if it's been held.

Once the program has registered the button press it takes action depending on whether the **Play**/**Record** switch is set to **Record** or not. If it is set to record the PIC prompts the recorder chip to enter record mode and the operator is then prompted by the APR9600 to record the message (this is indicated by a beep from the speaker) and the message is recorded into the chip's non volatile memory. If the switch is set to **Play** the button press is actioned but the fact that it is held is ignored.

The PIC then checks the status of the d.i.l. switches to see if a RB is required and whether the *VK* is to run in its semi-automatic repeat mode. The program then sends a pulse to the relevant memory select pin on the APR9600, sets the p.t.t. line to transmit and the *VK* starts transmitting the selected pre-recorded message. The program monitors the 'Busy' line from the APR9600 and, as soon as this re-sets, the PIC generates the selected RB and then resets the p.t.t. line.

If message **Repeat** has been selected, the PIC goes into a waiting loop and re-runs the sequence as often as required and it will then return to the main loop to await another button press. If the microphone p.t.t. is pressed at any time during any transmit sequence (or while waiting in the repeat loop) control is immediately returned to the operator and all selected activity is abandoned.

External Connections

External connections to the *VK* comprise the operator's microphone and a connection to the rig's microphone socket. The microphone is connected through the unit and the output of the APR9600 and the beep from the PIC are mixed in a static mixer on the board and then connected in parallel with the microphone line to the transmitter. Audio level from the VK is adjusted by a pre-set resistor fitted to the p.c.b.

Another pre-set resistor independently adjusts the level of the beep to ensure it doesn't over-modulate the transmission. The microphone's p.t.t. connects to the input of the PIC and this then provides a p.t.t. output to the transmitter.

By selecting a jumper on the printed circuit board the p.t.t. output on transmit can be either a ground or an open circuit with the line – controlled by an *npn* transistor (BFY51) presenting an open collector output. The output of the *VK* is microphone output (mixed with the recorded message) and the p.t.t. to the transmitter.

My prototype p.c.b. has contacts fitted to it to allow connection of a 9V battery (PP3 or equivalent). This means that the unit is independent of any auxiliary supply.

The Assembly

To assemble the project you'll require a good soldering iron (50W minimum recommended), flux cored solder. Incidentally, I recommend the use of lead-tin solder.

A flux pen can also help (they're almost essential for the battery contacts), a good pair of snipe nosed pliers and good side cutters are also needed. The use of a really big iron for the battery contacts is recommended.

When installing the i.c.s you'll need to take static preventative measures. If in doubt get help – don't risk the devices or your health! Crop all component leads reasonably close to the board, this can be done before or after soldering – just make sure they don't make the components too high above the p.c.b.

The following instructions assume that you'll use the board layout shown in The three images of my layout **Fig.s 2**, **3** and **4**. Check all components against the parts list to make sure everything needed is available. Warning: Please don't handle the static sensitive devices until they are to be inserted onto the board and into the circuit.

The battery contacts need to be installed onto the finished p.c.b. **Fig 5**, first. Because of their thermal mass, and the large areas of copper on the p.c.b. that they have to be soldered to, a large (100W) iron with a chisel tip is required. The contacts are positive and negative and the board has a '+' beside the solder pad showing where the positive contact is fitted.

Use a flux pen to flux the negative contact and install the contact onto the board – the decision whether to have the battery on top or under the board is left to the builder, it depends on the enclosure of individual choice.

If you're using the recommended Hammond enclosure, then install the battery on top of the board (silk screen side). Solder the

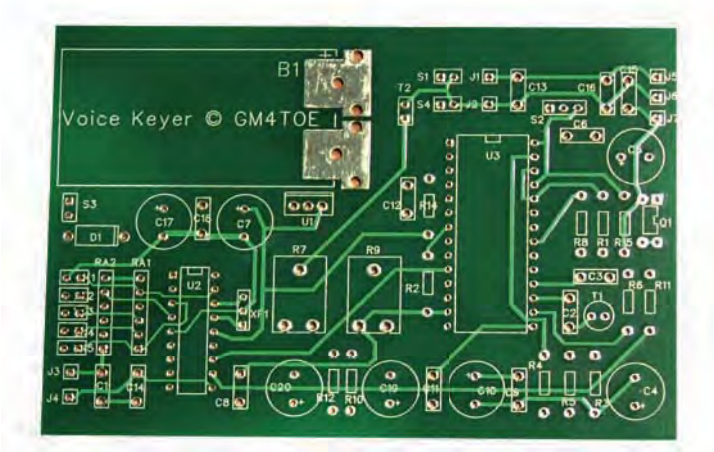


Fig. 5: The final p.c.b. is available from Barry Horning GM4TOE, along with a pre-programmed PIC chip.

contact to the board making sure the plated through holes are filled with solder. Install the positive contact in the same manner. Double check before soldering – trying to remove these contacts once they are soldered could ruin the board

Install the two i.c. sockets, ensuring they are correctly aligned with the silk screen markings – if they are inserted the wrong way round it will not affect the function provided the i.c.s are inserted the correct way round. Solder in place using the minimum of solder

Insert a twin pin connector into the LK1 position (just below D1) and solder into place. The shorting plug should be fitted over this link (see later) to select positive or negative going p.t.t. output to the rig. The remaining four positions are for connection of the dual inline switch (d.i.l. switch).

You can place further two pin connectors into the board in positions LK2 to LK5 or just terminate the connecting wire into the holes when doing the peripheral wiring to the dual in-line switch array. The facility for putting connectors here is to allow the selections to be made semi-permanently rather than being brought out to a switch – shorting links can be installed here to set the number of repeats and select the 'roger' beep.

The next decision will be – how long do you want the maximum message length to be? It's a simple choice and you have the chance to trade message length for speech quality. The resistor, R2 (39kΩ) sets the total message length (two messages) to 40 seconds and a speech bandwidth of 3.2kHz. That provides two messages of 20 seconds or one of 15 seconds and the other 25 seconds, or any other combination to a maximum of 40 seconds.

Note: Change the resistor to 82kΩ for a total speech length of 60 seconds and a bandwidth of 2.1kHz, or 27kΩ for a message length of 30 seconds and bandwidth of 4kHz.

You may want to omit R15 (10kΩ) if you've not yet determined if your rig needs ground or a positive voltage for p.t.t. operation. If this resistor is installed the maximum voltage out is 5V, but the transistor can handle up to 30V if R15 is omitted. If in doubt, leave it out!

Install all fixed resistors making sure that they are flush to the board, crop the leads and solder into place. Next, install the ceramic capacitors with minimum lead length – but don't place excessive strain on the lead to body join. Crop the leads and solder into place

Then install the resonator into position XF. It doesn't matter which way round the component is installed, just let it fit as close to the board as possible before soldering it into place

The resistor arrays, RA1 and RA2, are polarised and **must** be fitted the correct way round. The common end is marked with a dot on the body. This end must be placed next to D1/C17. Solder the arrays into place.

The electrolytic capacitors will need their ends forming to fit the hole spacing. This is best done by placing the leads into their holes and gently pushing the component into the board to splay the leads. Remember that electrolytic capacitors are polarised and ensure the positive lead is inserted into the hole marked with a '+' on the p.c.b. Crop the leads and solder into place

Next, install regulator U1 vertically into the board. The side with the tab is clearly shown on the silk screen – double check and then crop and solder leads.

Bend the leads of D1 at right angles to the body and install D1, the banded end is clearly shown on the silk screen – crop the leads and solder into place Install the BFY51 (Q1), ensuring the correct orientation, and solder into circuit.

Next, decide whether to place the pre-sets on top of the board or underneath, as shown in **Fig. 6**. If installing the board into the enclosure, install R7 and R9 on the non silk screened side of the board which then allows them to be adjusted without having to disturb the board in its enclosure.

The base of the suggested box slides out, or it may be drilled to provide access to the variable resistors. Install the pre-sets (double check the values first) and solder into place. If installed under the board, they can then be soldered from the silk screen side.

Connecting The Controls

At this stage, it will be necessary to connect the board to the peripheral controls, the built-in microphone, microphone input connector and microphone output connector. The way this is done depends on the enclosure and the layout used. **On/Off** switch – this is connected by two wires to position S3. **Play/Record** switch – this is connected by three wires to position S2, the central hole is the common connection and **Play** is the connection adjacent to C16.

The dual in-line switch connects to LK2 through LK5 (adjacent to the resistor arrays). The **Message Select** push-buttons, S1 and S4, connect to the twin connection holes shown on the board. The speaker connects to T2.

The electret microphone connects to T1. This item is polarised and the positive connection (the pad which is **not** joined to the body of the microphone capsule) goes to the hole next to R6. Double check the connections to this component.

The connections for the external microphone are as follows: J1 – **Microphone In**. With this input it's recommended to use either a twisted pair or a screened lead connection along with the connection to J2, which is **Microphone Ground**.

Note: If the external microphone needs a bias supply this is available at J3 giving 5V via a 4.7kΩ resistor, J4 is Microphone p.t.t. in. This contact requires a ground for p.t.t. operation.

Pin J5 is **Microphone Out** to the rig and the ***VK* Output** is superimposed onto this line. J6 is the ground for the microphone output – again, you should use a screened lead for this connection.

Pin J7 is p.t.t. out for the rig. It can provide a ground for p.t.t. with a maximum input voltage of 30V from the rig, or it can supply a 5V positive p.t.t. voltage if resistor R15 is installed. However, if your rig has a voltage on its p.t.t. line greater than 5V **don't install R15** or you may over dissipate this resistor, or load the internal 5V line.

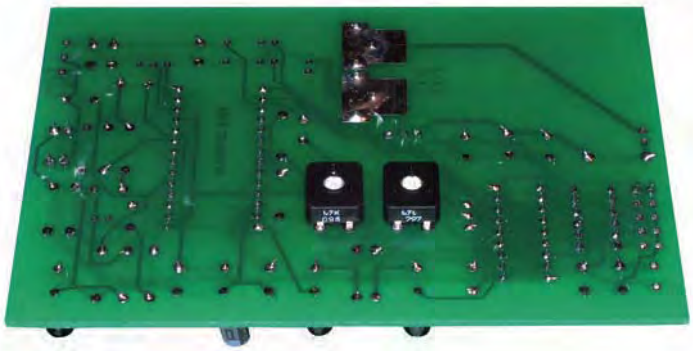


Fig. 6: One option is to fit the adjustable controls on the underside of the board.

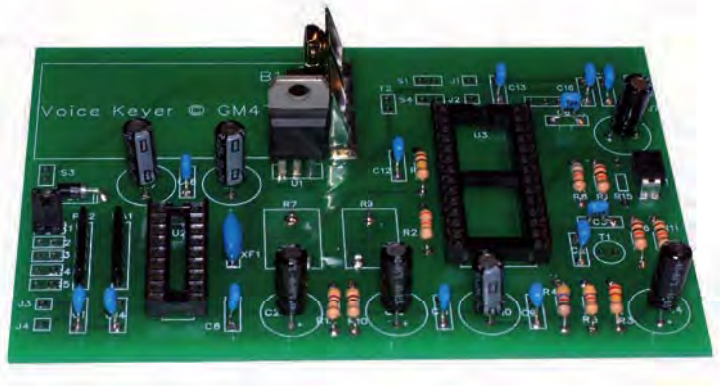


Fig. 7: The completed p.c.b. all populated and ready for testing.

Check the board over for any unsoldered connections, solder bridges and correct component placement, **Fig. 7**. With all connections made and without the two main i.c.s installed this is the time to check all is well.

Connect a PP3 battery (or a 6 to 12V external supply, this is not critical) to the battery terminals and with a voltmeter connected between the output of the voltage regulator (the leg nearer to U3) and the negative terminal of the battery, switch on and check that the output voltage from the regulator is 5V. If all's okay, switch off and disconnect the battery. If there are problems check the board again until it passes this test.

Install the two i.c.s into their sockets making sure they are correctly orientated with the notch indicated on the silk screen. It may be necessary to slightly bend the leads towards the centreline of the i.c. body to allow them to enter the socket correctly. Check that all i.c. legs are correctly installed into the sockets.

The recommended box is a Hammond 1455K1202 available from Maplin (part number N76AL); Maplin parts N84AL and N80AL are equivalent and may be used instead. The p.c.b. is designed to slide into the guides in the box and then the controls may be fitted onto the front or back panels as appropriate. The speaker, the two push buttons and the electret microphone are fitted to the main body of the enclosure.

Fitting the electret microphone is really quite simple but the body of the insert must be insulated from the box. On the prototype this was done using heat-shrink sleeving; it is also possible to use Mylar or similar tape. Drill a hole in the box which is a close fit to the insulated microphone body and then glue the microphone in place using either a small spot of Cyanoacrylate adhesive or a small spot of hot-melt glue.

Testing Time

Next, it will be time for testing the assembled project. Install the battery after making sure **S3** is switched to **Off**.

If your rig needs an earth for p.t.t. make sure Link LK1 is bridged with the shorting link. If it requires a positive voltage for p.t.t. then remove the shorting link. Set the d.i.l. switches to all **Off**.

Switch on, and provided there's no smoke proceed to the next stage! Set S2 to **Record**.

Hold either S1 or S4 down, when you hear a beep speak clearly into the built-in microphone. When you finish speaking release S1 (or S4) and you should be rewarded with a beep from the speaker. Then set switch S2 to **Play**.

Briefly press and release whichever button you used to record your message. You should hear the message played back via the internal speaker. If all's well, try recording a message on the other channel and check as before. If you then set the d.i.l. switch connected to LK2 to **On** and play a recording – you should hear a RB (Morse 'E') after the message.

Next, set LK2 to **Off** and LK3 to **On** and test again – you should end the message with a Morse 'K'. Set LK2 and LK3 to on and re-test. The call should end with a Morse '5'. Set LK4 on (LK 2 and 3 can be in any state), pressing play should mean that the call is transmitted and after a pause of 10 seconds will be repeated. This repeat cycle will occur three times before re-setting to a 'wait' state.

Setting LK4 **Off** and LK5 **On** will do a similar repeat cycle – but with a five second pause between transmissions and six repeats.

Setting both LK4 and LK5 **On** will put the Voice Keyer into a continuous cycle of transmit message, wait 10 seconds and repeat the transmission; this will continue until cancelled by the operator pressing p.t.t.

Plug the rig microphone into the Voice Keyer and check that pressing the p.t.t. overrides the outgoing message.

Connect the Keyer to your rig and run the rig into a dummy load. Check that the transmitter works normally with the rig microphone

Setting all the d.i.l. switches to **Off**, play a pre-recorded message and ensure that the rig p.t.t. is operated by the Voice Keyer.

While playing a pre-recorded message, adjust R9 for correct modulation level for your rig. This is usually checked by monitoring the transmitter automatic level control (ALC) and setting the level so that it just operates on voice peaks.

Set LK2 and LK3 to **On** (should terminate message with a Morse '5'). Adjust R7 for correct modulation level by this tone. You might need to monitor your transmitted signal on another receiver (or get another Amateur to monitor your transmitted output). If all is well – then you'll be ready to use your new 'Voice'.

Component Availability

The full parts list (available from *PW*) gives the component order code from **Rapid Electronics**, except for the box, 8-pin microphone socket, and 4-pin output socket, which are available from **Maplin Electronics**. A double-sided, plated through hole p.c.b. with silk screen component lay-out identification is available from the author. However, production from the board lay-outs is well within the abilities of anybody who makes their own p.c.b.s. The APR 9600, a pre-programmed PIC and the hex source code – if you wish to program your own PIC are – also available from the author.

The original Voice Keyer was designed as a club project for the **Moray Firth Amateur Radio Society** (MFARS) and complete kits were available. If any potential constructor would like a kit – then please contact myself, Barry Horning GM4TOE, **5 Main Street**, **Tomintoul**, **Ballindalloch**, **Scotland AB37 9EX.** Good luck in the contest! ●

Tony Nailer's

doing it by design

Tony completes the modification of his 'Top-Band' receiver with an s.s.b. upgrade and gives it a name. Say 'hello' to the *Upwey* receiver!

In the last *Doing It By Design* (*DIBD*) in November 2009 *PW* we left off the project with the main board having been laid out, but not assembled and tested, the active pre-selector had been reworked from another project, and the beat frequency oscillator (b.f.o.) newly developed and breadboard tested.

Returning to the project after the merriment of the Christmas and New Year, I was ready to build everything and test the complete group of boards. Unfortunately, although the b.f.o. board had been laid out, it had missed the last p.c.b. production run, so I didn't have a board.

The BFO Board

The third day back at work at **Spectrum Communications** was devoted to a p.c.b. production run, which included and a panel of four b.f.o. boards. I assembled the board in accordance with the circuit layout and values given in the November *PW*. The unit worked straight away with a really pure looking sine wave and was easily set to 457.5kHz.

The peak-to-peak (p-p) output level was only 400mV and much lower than I had expected. So, when I looked again at the prototype I realised I'd used a TOKO 11100 coil and not the 11098 as shown in the diagram. When I corrected it, the output was then 1.2V p-p and still exceedingly pure. So far so good!

Active Pre-Selector

I built up the active pre-selector but noticed that the orientation of the m.o.s.f.e.t. shown in the diagram (Fig. 2 on p27 *PW* Jan. '09) **was wrong** and should have been with the tab at five o'clock instead of seven. Sorry folks, but it happens sometimes, when you publish before you have built and fully tested!

When correctly constructed it was connected up and driven with 100mV r.m.s. from my HP8640 signal generator. The frequency swing was quite a bit greater than the required band, so I changed the 68pF capacitors in series with each gang of the variable for 56pF. After re-adjusting the coils, the tuning range now was 1.82 to 2MHz, just perfect!

Gain Adjustments

The gain of the active pre-selector was excessive though, being 28dB at one end of the band and 36dB at the other. It also appeared to be oscillating at one end of the band. By connecting a long wire to the spectrum analyser input, I found that what had appeared as oscillation in the pre-selector was, in reality, high-level signals just above the 2MHz band edge.

I removed the capacitor de-coupling the source resistor, and the gain reduced to 24dB at one band edge and 32dB at the other. I reasoned that the dynamic resistance was increasing considerably at one end of the band, so I fitted 10kΩ resistors across the main windings of each coil. Now the gain was fairly constant across the band, and equal at 18dB at both band edges. The circuit of the modified active pre-selector is shown in **Fig. 1.**

Top Band VFO

The variable frequency oscillator (v.f.o.) used, is the same as used with the original Top Band a.m. receiver project in September and November 2007 *PW*. The oscillator board is housed within a

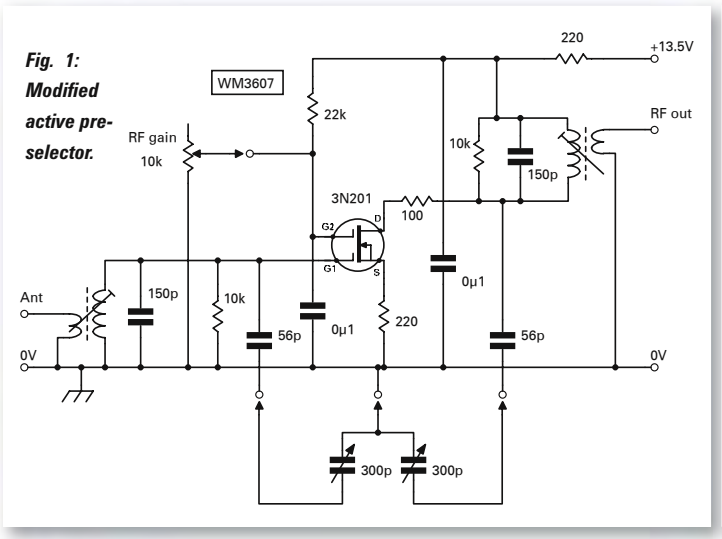


Fig. 1: Modified active pre-selector.

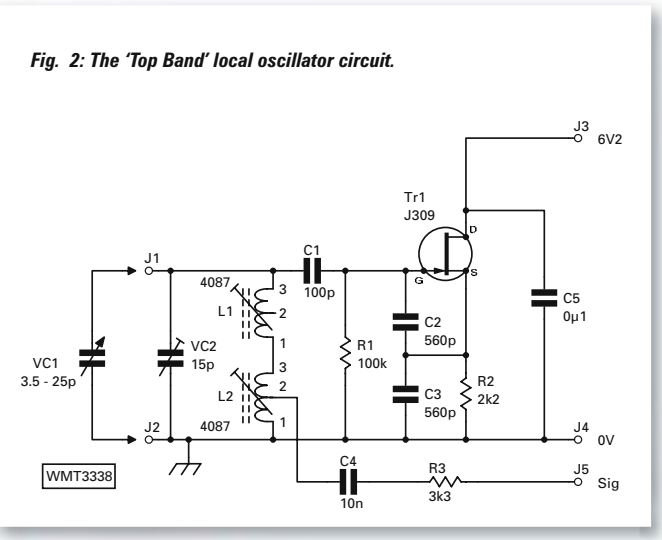


Fig. 2: The 'Top Band' local oscillator circuit.

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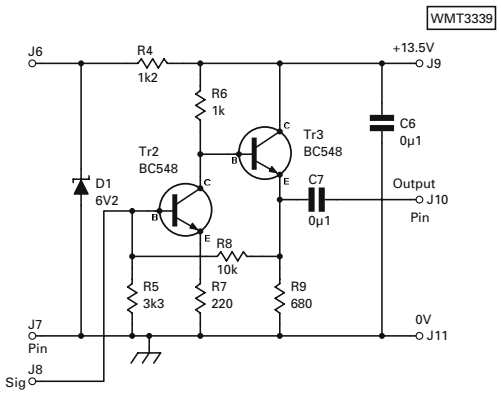


Fig. 3: The local oscillator buffer circuit.

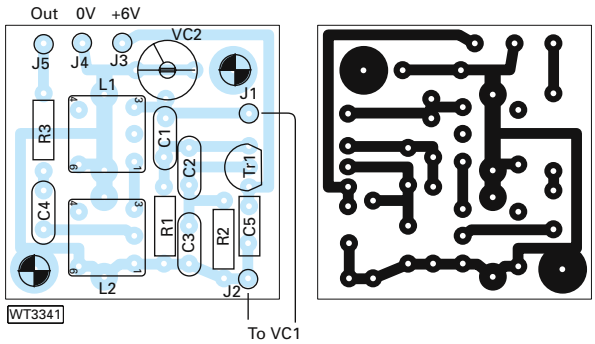


Fig. 4: Oscillator component layout and artwork.

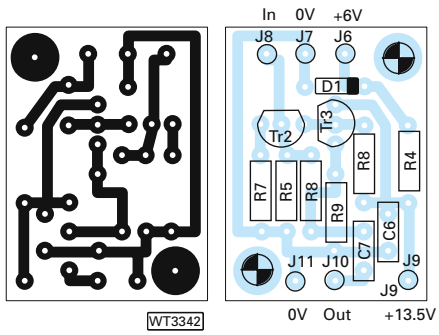


Fig. 5: Buffer component layout and artwork.

r.f. interference-proof plastic box, with the buffer board fitted onto the outside. Connections between the two boards are achieved via p.t.f.e. lead-through connectors.

The circuit of the oscillator is shown in **Fig. 2**, and the buffer in **Fig. 3**. Component positions and artworks for the oscillator are shown in **Fig. 4**, and for the buffer in **Fig. 5**.

Main Receiver Board

The construction of the main board was a joy as the component count wasn't too large. It went together in about 20 minutes and looks really nice. The component density is good, without unnecessary cramping or much wasted board area.

I connected the board to a speaker and to the b.f.o. then to the v.f.o. used with the original receiver. Finally I connected it all to the bench 13.5V supply. Nothing!! There was slight switch-on click in the speaker but otherwise virtually no noise from the speaker.

Careful examination of the board revealed that the supply was connected to the audio amplifier but not to the supply regulator for the other parts of the receiver. For those who may have created their own p.c.b. from the article, the artwork of **Fig. 6** shows the missing connection. When a link was added, the unit came to life.

Initial Tests

A signal of 10µV amplitude modulated to 30% from my HP8640 signal generator was applied directly to the r.f. input of the main board, and the two intermediate frequency (i.f.) coils were peaked. The volume was far too great and the signal generator was backed right off. As the signal was reduced the volume control was adjusted to compensate, and the signal-to-noise ratio was about 3dB at 0.2µV r.m.s.

With the modulation switched off the output to the volume control was then taken from the s.s.b. detector and was much clearer. Recovered audio from the amplitude modulation detector was a lot higher than from the s.s.b. detector, so the audio feed resistor R5 was increased from 22 to 100kΩ. The audio levels were then about equal.

Adding the pre-Selector

With such high sensitivity of the main board it meant that an active pre-selector was probably unnecessary. This proved to be the case when connected in-line, producing a high level of background noise and a high standing reading on the signal meter. Tuning the pre-selector across the band had little effect in respect of signal-to-noise ratio or apparent sensitivity.

I tried a thrown-out length of wire of about 7 metres long as an antenna, and heard a great deal of noise, but no discernible signals on either a.m. or s.s.b. There was no improvement in reception achieved by adding the active pre-selector. Nevertheless the active pre-selector design works really well may be a benefit to those with receivers lacking sensitivity or selectivity.

Pre-Selector Redesign

The active pre-selector had been designed as a discrete board wired to the polyvaricon. I then decided to go the same route as the pre-selector in the Poundbury 20/80m Receiver. That is with the polyvaricon mounted on the p.c.b. and the complete assembly bolted to the receiver front panel.

A new circuit of a passive pre-selector was drawn out using my *ISIS* computer program, and a p.c.b. layout was created from it, (Plan-A). I then walked my dogs, during which time I decided to make provision also for a high impedance long wire connection to the pre-selector. I re-worked the circuit diagram and added another pin, connected to the hot end of the input coil. Then I modified the artwork and component layout diagrams and printed them off, (Plan-B).

Then I thought about it some more and reasoned that my connection point would probably affect the tuning of the first resonant circuit. Consequently I modified the circuit diagram yet again, this time adding a small value of capacitance in series with the high impedance antenna feed-point, to reduce unwanted loading effect. Again the artwork was re-worked to include the changes, and was printed off, (Plan-C).

The circuit diagram is shown in **Fig. 7**, and the printed circuit artwork and component location drawings are in **Fig. 8**. Another printed circuit manufacturing run was undertaken and the new passive pre-selector board was etched, drilled and cropped. It was then assembled and worked first time, being easily set to the required range.

Selecting A Case

I searched through many catalogues

for a suitable painted rigid case for the receiver. I was horrified at the prices for the nice looking cases, and even a painted die-cast box of the right size would have cost me nearly £25 including VAT! Then it would need time spent on it cutting holes for the meter and other hardware. It just wouldn't be cost effective.

Though the case, as used for the *Poundbury* project has rather too much room inside, the front panel is just right for this project and it costs just over half that of a comparable size painted die-cast box. So, it seems that this case may become a standard part for Spectrum receivers!

The VFO Assembly

The v.f.o. boxed unit as built for the original receiver wouldn't fit with the position of the slow motion drive as used with the *Poundbury* receiver. Also the buffer board was on the wrong side. So, I drilled up a new box to accommodate the buffer on the opposite side, and the tuning capacitor mounted on an end wall instead of the floor of the box.

The trickiest part was determining the position of the v.f.o. unit on the base of the case, in relation to the slow motion drive mechanism on the front panel. Pillars 16mm high were required to mount the box at the right height and, of course, I had none this size! On this occasion I used four 4BA full nuts and one 4BA half nut as a composite pillar.

Arranging sub-Assemblies

The various boards for this project were laid out to be compact, but not cramped, but also without a particular box arrangement in mind. The panel hardware required for this project is the same as the *Poundbury*, except this one doesn't have a band switch.

All the panel hardware was placed onto the front panel to determine optimum positions. The re-designed and smaller pre-selector board allowed a slightly nicer positioning of the two switches, the l.e.d. and the **AF Gain** potentiometer. At a glance it looks like a twin of the *Poundbury* receiver.

The boards and v.f.o. were placed into the box and their positions changed around and rotated until I was happy with the expected wiring runs. Fixing holes were marked and positions of rear panel hardware were determined.

Wiring & Testing

During the mechanical assembly I realised that it would be almost impossible to wire to the pre-selector after it was installed. So I fitted it onto its support screws and measured out the two coaxial cables and one length of equipment wire, and prepared the ends. I removed the pre-selector from the box, and soldered the wires to the board. Then fitted it into to case.

All the other wiring was done as shown on the wiring schematic **Fig. 9**. If the project proves popular, it might be worth combining the main and b.f.o. boards, and laying them out to better suit the front panel arrangement.

When all was completed I applied power and the unit came to life. There was a small amount of noise from the speaker with the gain control at maximum. With the signal generator connected, a signal of 0.1uV was clearly discernible on l.s.b. On a.m. The level was about 0.25μV. The signal-to-noise ratio was a lot better on l.s.b. due to the detection method.

The Calibration

When I came to calibrate the unit, first I carefully set the v.f.o. to the calculated range of 1.385 to 1.545MHz. Then on a.m. I peaked the two i.f. coils for maximum noise. I set the tuning to receive 2MHz and adjusted the signal generator to the same. Strangely enough it didn't come through at all well and the generator needed to be adjusted to 2.008MHz for best amplitude and minimum distortion.

I checked the calibration of the v.f.o. with my frequency counter again, and then checked it using the frequency counter facility of the signal generator. The v.f.o. tuning was spot on.

Trying to set the signal to 2MHz and peaking the two i.f. transformers didn't achieve best performance.

Problem Solution

I concluded that the LT455HTW i.f. filter had an 8kHz higher centre frequency than it should have. It couldn't be wrongly terminated, as the TCA440 i.c. was designed to work with these types of filters. I was tempted to replace the filter but decided simply to offset

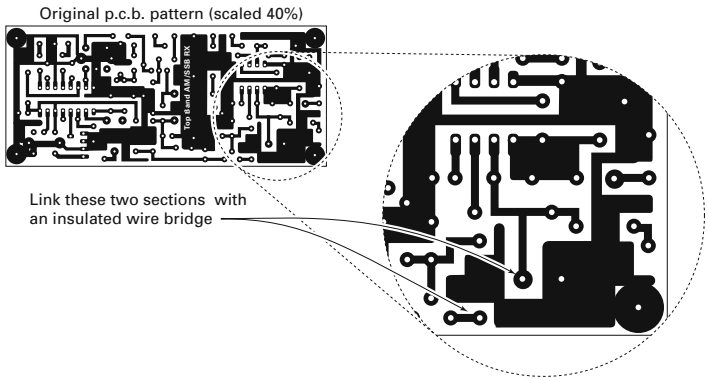


Fig. 6: Partial layout of main board showing missing link to make the original p.c.b. work.

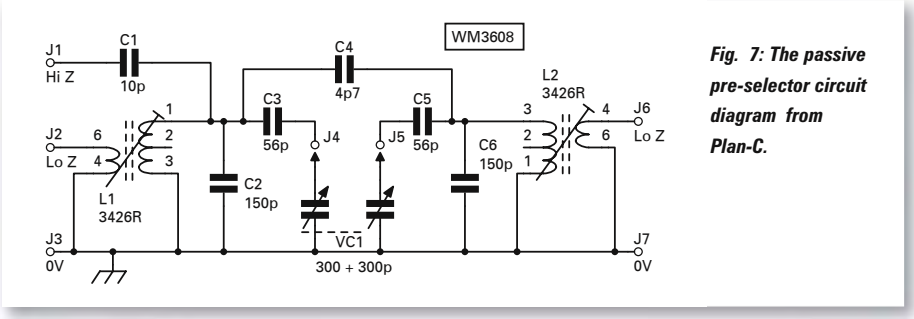


Fig. 7: The passive pre-selector circuit diagram from Plan-C.

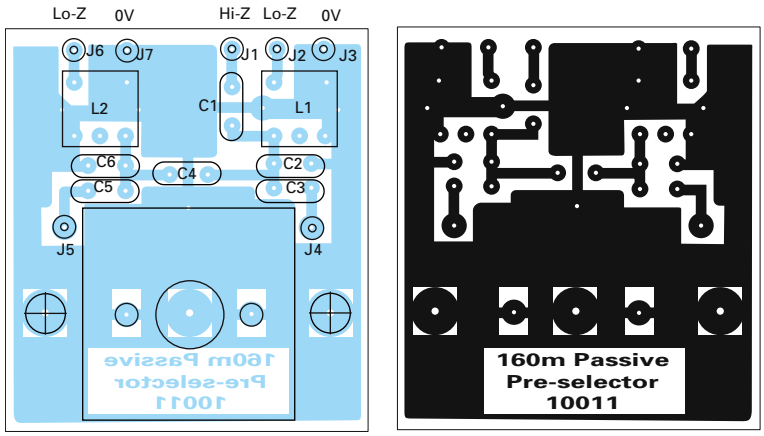


Fig. 8: The pre-selector component layout and track pattern.

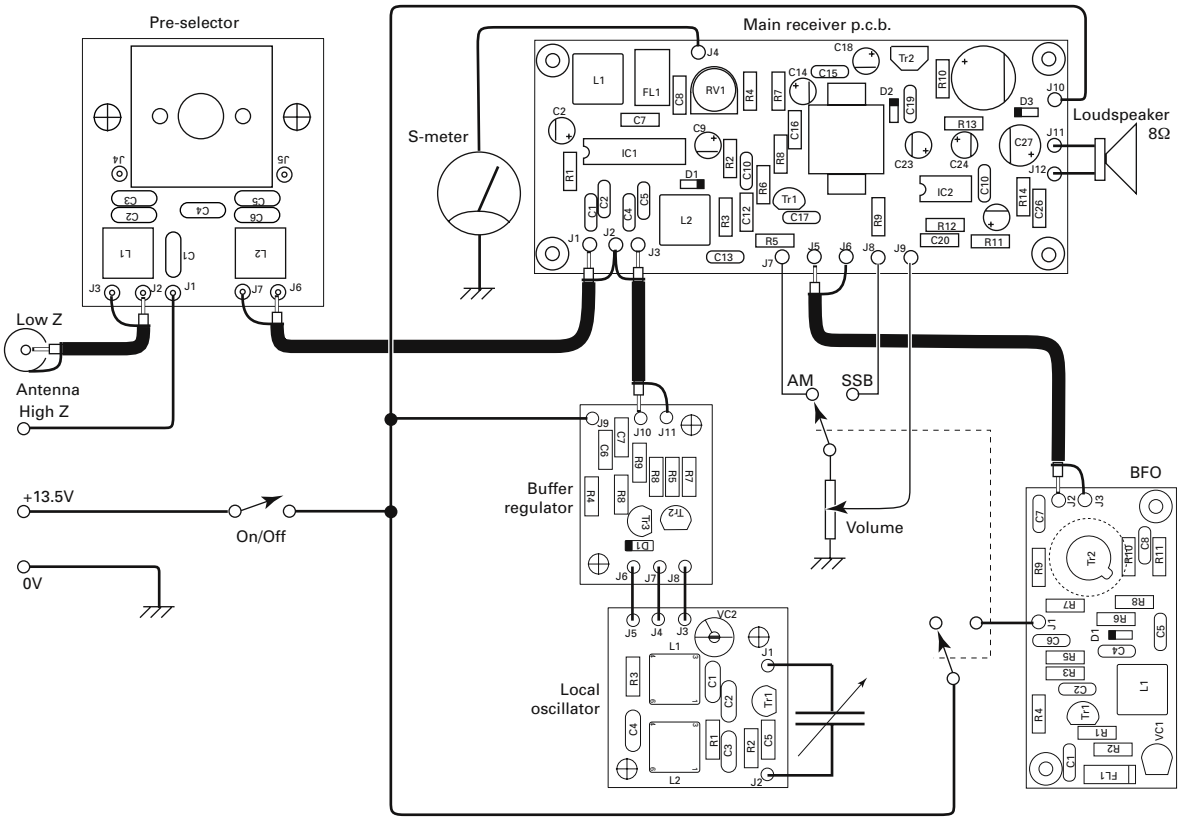
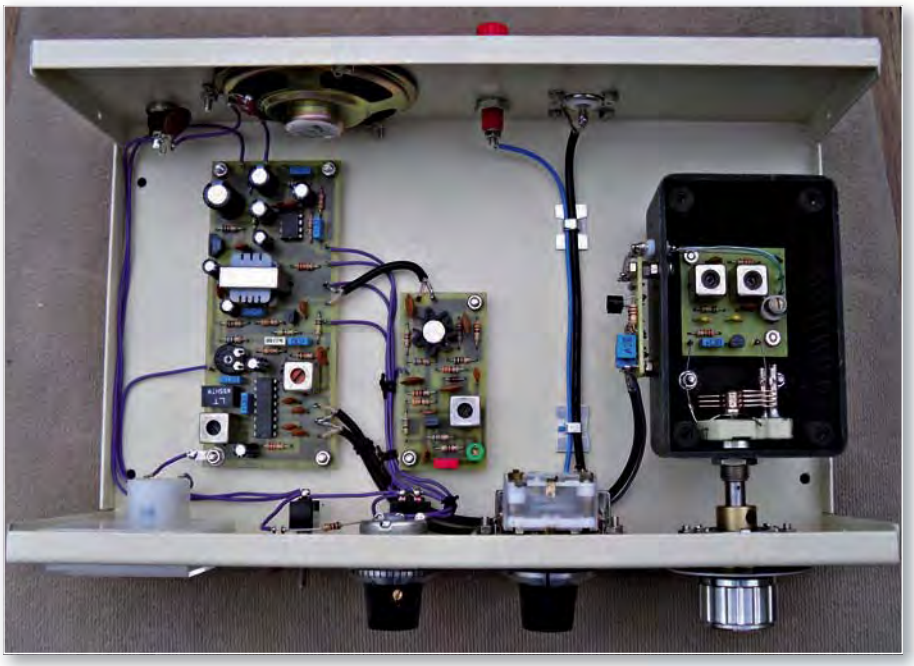


Fig. 9: The Receiver boards interconnection wiring diagram.



Parts availability

Passive Pre-selector p.c.b. £3.10, p.c.b. & components & polyvaricon £9.50, P&P £1.00, the 457kHz b.f.o. p.c.b. £2.60, p.c.b. & components £10.00, P&P £1.00. Top Band v.f.o. and buffer PCB's £3.20, P&P £1.00. Boxed kit £44.00 P&P £3.00.
Receiver main p.c.b. £5.25, P&P £1.00. p.c.b. & components £26.00, P&P £3.00. A complete receiver kit with hardware including special delivery, costs £161.50. And as a ready built unit, £227.50.

the v.f.o. and b.f.o. to accommodate a centre frequency of 463kHz.

Next, a step at a time I tuned the signal generator from one end of the band to the other and marked the tuning dial with a Lumicolour pen at fairly even intervals. Numerical labels were made in 6 point 'Arial' font (that's topical isn't it), and were fitted to the dial. A similar procedure was carried out with the pre-selector, peaking it at various frequencies to produce a fairly evenly spaced scale. Finally, the other controls and hardware were labelled, and the name *Upwey Receiver* was chosen.

Final Test

When the receiver was driven with the signal generator it had a quiet background and good sensitivity. When a 7m length of wire was connected, the receiver was pretty much saturated with noise, generated by the numerous switch mode small power units dotted all around the place. Unfortunately, no actual Amateur Top Band signals, either a.m. or l.s.b. could be heard.

Nevertheless, for anyone with a half decent antenna situated well away from the noise emitters in the house, I am confident that this receiver will work really well. During my tests with l.s.b., there was never any instance of noticeable drift. Both the b.f.o. and the v.f.o. are exceedingly stable, even from switch-on, with them both settling within a few minutes to within 100Hz.

The noise problem has been increasing quite rapidly in the last few years, as my family and I have been getting more gadgets, each with their own transformer supplies. Maybe the solution to this is to wire up the house with an unstabilised d.c. mains system, and attach the various gadgets to it with in-line series regulators to suit?

If any reader wishes to contact me regarding this article, please E-mail on **tony@pwpublishing.ltd.uk** ●

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NISSEI HAVE BECOME RENOWNED FOR PUTTING QUALITY FIRST, YET MAINTAINING A GOOD PRICING STRUCTURE. A TRULY SUPERB POWER SUPPLY UNIT
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Includes free remote mic
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Truly remarkable audio on both SSB & FM/AM
SALE PRICE **£79.99**

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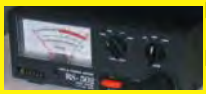

RS-502 1.8-525MHz (200W) .....£79.95 P&P £6.50
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RS-402 125-525MHz (200W) .....£49.95 P&P £6.50
RS-3000 1.8-60MHz (3kW) Incls mod meter £59.95 P&P £6.50
RS-40 144/430MHz Pocket PWR/SWR.....£29.95 P&P £4
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ACCS

MFJ-993B INTELLITUNER

Fully automatic (1.8-30MHz). 300W SSB.
Easy to use ATU. SALE PRICE **£239.99**

MFJ-949E

SALE PRICE **£174.99**
● 1.8-30MHz 300W ATU ● Large cross needle meter ● 30/300W PEP power meter ● VSWR ● 3-way antenna selector ● Internal balun + dummy load.

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£199.99

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

Japanees quality made product

WOW **£199.99**

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MA5B	Mini beam 10, 12, 15, 17, 20m.....	WOW £399.99
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A3S	3 ele beam (10-20m).....	WOW £539.99
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Q-TEK PENETRATOR

"We've sold 100s all over Europe"

★ 1.8 - 60MHz HF vertical ★ 15 foot high ★ No ATU or ground radials required ★ (200W PEP).

£199.99

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W-8010 DIAMOND SHORTENED DIPOLE

80-10m & only 19.2m long! (Up to 1.2kW) Includes 1:1 Balun. Bargain. Superb Japanese quality antenna system.

£159.99

Standard & Deluxe G5RV

P&P on either full/half size £7.50

Half size 51ft (now includes heavy duty 300Ω ribbon).....£24.95
Full size - 102ft (now includes heavy duty 300Ω ribbon) ...£28.95
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In-line choke balun £39.99

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Baluns 1:1 or 4:1 or 6:1 .....£34.99 each P&P £4
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A superb quaility ferrite ring with incredible properties. Ideal for "R.F.I". Width 12mm/ OD35mm. 6 for £12.00 P&P £4.00
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True military spec real UK coax

RG-58 Military spec x 100m.

£49.99 or 2 for £90.00

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

W-8681 PROFESSIONAL WEATHER STATION

● No cable connection needed ● Touch LCD screen ● Atomic locked Date & Time ● Indoor/ Outdoor Temperature (C or F) ● Wind Speed & Direction (mph or kmph) ● Rain gauge (inches or mm) self emptying ● Indoor/Outdoor Humidity ● Barometer Pressure with trends ● Forecaster & Weather Alarm ● USB connection to PC ● PC "EASYWEATHER" software programme ● Historic data storage & display ● LCD panel wall mounts or desk mounts ● Batteries last over 12 months

Professional version SALE PRICE **£69.99**

NEW NOISE FILTER!

A superb TDK 'snap fix' ferrite clamp for use in Radio/TV/ Mains/PC/Phone etc.

Simply close shut over cables and notice the difference! Will fit cables up to 13mm diameter. Ideal on power supply leads/mic leads/audio leads/phone leads.

2 for £10.00 or 6 for £25.00 (P&P £4.00)

HEAVY DUTY SWAGED MAST SET

New extra heavy duty 2" mast set. 4 sections x 5½ foot slot together.

£69.99 each. TWO FOR £130.00 DEL £15.00

NEW SWAGED MAST SETS

20 foot mast. 1½" – 4 x 5 foot sections. (Swaged) **£43.99**

20 foot mast. 1¼" – 4 x 5 foot sections. (Swaged) **£41.99**

H/DUTY CAR BOOT MAST SET

18 foot (1½" dia).
18 foot – 6 x 3 foot (1½") slot together ally sections.

£43.99 each. TWO FOR £79.99 DEL DEL £13.00

NEW CAR BOOT MAST SET

Superb 18 foot (6 x 3 foot sections) that slot together.
Dia: 1¼" ideal to take anywhere. **£43.99**

2 for £69.99 del £13.00

HANGING PULLY

Heavy duty die-cast hanging pulley. Hook and go!

£24.99

MAST HEAD PULLEY

A simple to fit but very handy mast pulley with rope guides to avoid tangling.

(Fits up to 2" mast) **£12.99** + P&P £4.50

30m pack (4.4mm) nylon guy rope £12.50
132m roll 4.4m nylon guy (480Kg b/f) ..... £40.00 Del £7.50

NEW EASY FIT WALL PULLEY

Pulley will hang freely and take most rope up to 6mm. (Wall bracket not supplied).

£12.99 + P&P £4.50

Wall bracket, screws not supplied. Simply screw to outside wall and hang pulley on WALL BRACKET £2.99 P&P £1.00

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132m (4.4mm) nylon guy (480Kg) £40.00

BARGAIN WINCH

500kg brake winch. BARGAIN PRICE **£79.99** Del £10.00

(Now includes cable grip)

Winch wall bracket..... £22.99

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Connectors	Length	Price
PL-259 - PL-259	0.6m	£9.99
PL-259 - PL-259	1m	£11.99
PL-259 - PL-259	4m	£14.99
PL-259 - PL-259	20m	£49.99
BNC - BNC	1m	£9.99

EP-300

Over the ear earpiece. **£9.95** P&P £3.00

DB-770H (BNC)

2m/70cm Tx + wide Rx. High gain up to 5.5dB.

£54.99 P&P £5.00

MT-3302

Heavy duty universal mount.

Includes 5m cable **£29.99**

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Adjustable roof rack/window bar mount **£19.99**

RH-9000 BNC

40cm flexible whip for the ultimate in gain. **£29.99** P&P £4.00

Tx:- 2m + 70cm (Rx:- 25MHz-2.9GHz).

RH-9090 SMA

40cm flexible whip that is ideal as replacement. Tx:- 2m + 70cm.

Rx:- 25MHz-2.9GHz **£34.99** P&P £4.00

YAESU G-450C

Heavy duty rotator for HF beams, etc. Supplied with circular display control box and 25m of rotator cable.

WOW **£299.00**

G-650C extra heavy duty rotator + 25m cable..... £339.99
G-1000DXC extra heavy duty rotator + 25m cable £399.00
G-2800DXC The goliath of rotators..... £749.99
GS-065 thrust bearing..... £54.99
GC-038 lower mast clamps £32.99
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AR788

Quality rotator for VHF/UHF. Superb for most VHF-UHF yagis, 3 core cable required. 3 core cable 50p per mtr.

OUR PRICE **£79.99**

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No tuning required

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Q-TEK COLINEARS (VHF/UHF) Del £12.50

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X-300 GF 144/70,6.5/9dB (3m)..... £79.99
X-510H GF 144/70, 8.5/11dB (5.4m) £139.99
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MX-2000 50/144/430MHz Triplexer £59.99
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MX-72 144/430MHz..... £34.99
MX-72 "N" 144/430..... £35.99

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DB-7900 2m/70cm (5.5/7.2dB) 1.6m (PL-259)..... £39.99
DB-770M 2m/70cm (3.5/5.5dB) 1m (PL-259)..... £24.99
Diamond HV-7CX 7/14/21/28/50/144/430..... £129.99
Diamond CR-8900 10/6/2m/70cm (1.26m) £99.99
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DC-1000MHz (400W through power). SO-239 fitting. **£24.95** P&P £3.00

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12" T & K brackets (pair) £18.99
18" T & K brackets (pair) £22.99
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All bracket measurements are from wall to end of bracket

U-bolts (1.5" or 2") each..... £1.50
8mm screw bolt wall fixings..... £1.70
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2" crossover plate with U-bolts..... £14.99
15" long (2") sleeve joiner..... £18.99
3-way guy ring..... £5.99
4-way guy ring..... £6.99
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Set of 3 powder coated heavy duty fixing spikes (~0.7m long)..... £29.99
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Roll of self-amalgamating tape..... £7.99

MFJ-1117

DC High current distribution unit..... £59.99

MFJ-1118 metered

High current distribution unit £99.99

Feature

Done to a Turn Part 1

Winding those coils needn't be tiresome!

Inductors, capacitors, and resistors are the three fundamental passive electronic components. You probably feel at home with the last two because . . . well, come to think about it, why should this be? I expect it's because when we're beginners so many of the circuits we encounter have lots of resistors and capacitors (mixed in with some semiconductors) but few inductors. Familiarity from the start means that you probably feel comfortable working out values for resistors and capacitors, too.

Inductors, on the other hand, seem more difficult altogether. After you have established the inductance needed, it can be hard to find a supplier that offers the right kind of inductor – especially if you want a non-standard value or multiple windings.

Thankfully, a major difference with inductors is that it's feasible to build your own – whereas it would be very difficult and costly to build your own 1kΩ carbon-film resistor or 10nF capacitor. Yet many beginners are put off making their own coils because it seems to be a 'Black Art'.

Looking at some text book formulae, there seem to be so many flexible parameters. Diameter, number of turns, what kind of former to use, shape, and length (if it has one!) are all up for discussion – and that is before any thought is given to the type of wire to use. And all that can seem very daunting.

There are advantages to winding your own, however. First, the cost and performance of a home-built inductor is not so different to commercial units. Then there's the satisfaction when the job is done. And last – but not least – some inductors are things of amazing visual impact which can make them a spectacular talking point at your local club meeting!

Inductors Well Used

Despite their less-familiar status, inductors are, of course, much in amateur radio equipment – although less now than in the valve era with all the interstage coupling circuits, etc. Thumbing back through old editions of *Practical Wireless* or *Radio Constructor*, in some designs the inductors seem to out-number the resistors!

Looking at the signal path through a valve-based

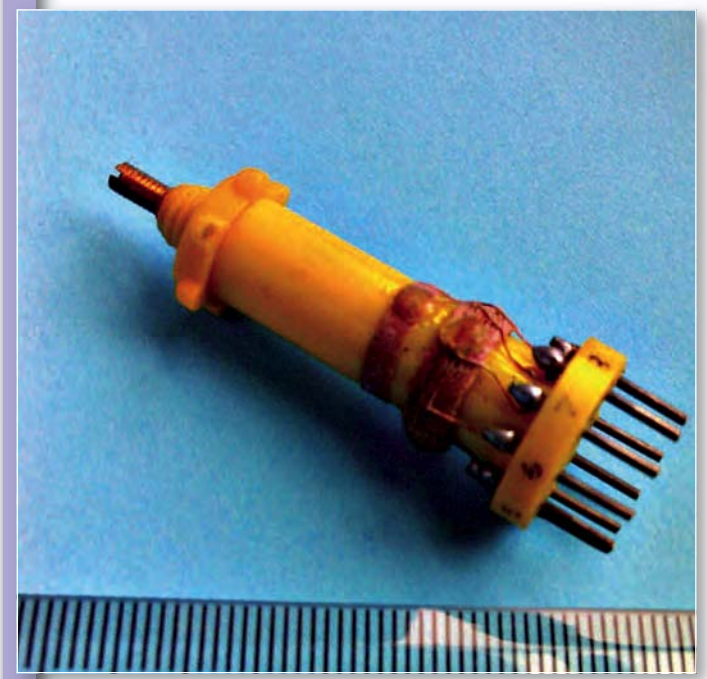

Fig. 1: A typical Denco coil, originally they were identified by type number and former colour.

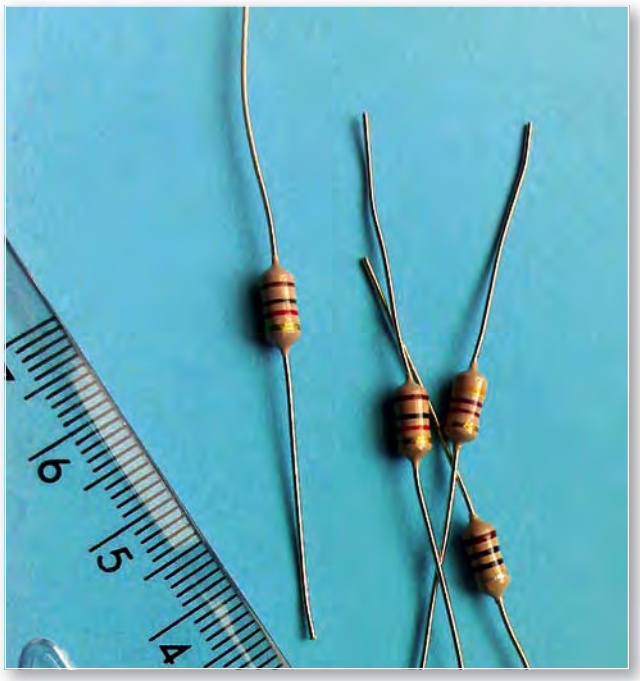

Fig. 2: A few radio frequency chokes (r.f.c.).

Sam Dick G8OWX provides a gentle introduction to practical coil making – based on his many years in the hobby.

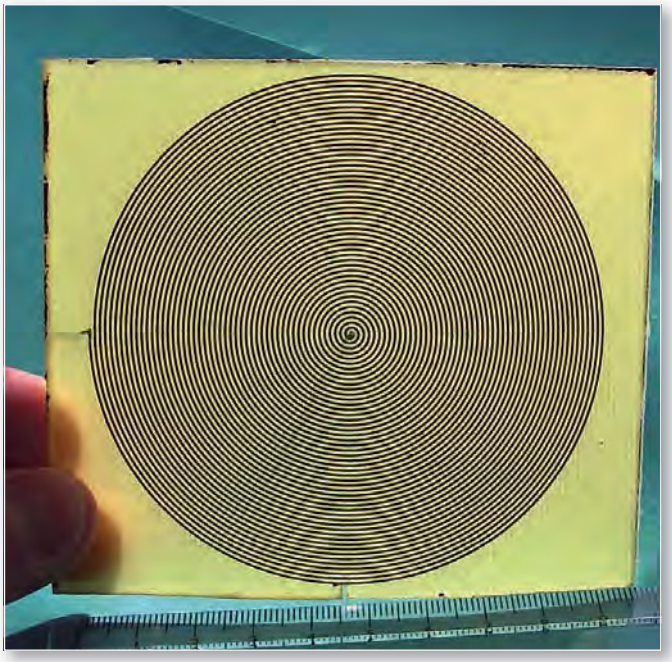

Fig. 3: A rather pretty spiral inductor created on p.c.b. material, though I'm not dealing with this type in this article!

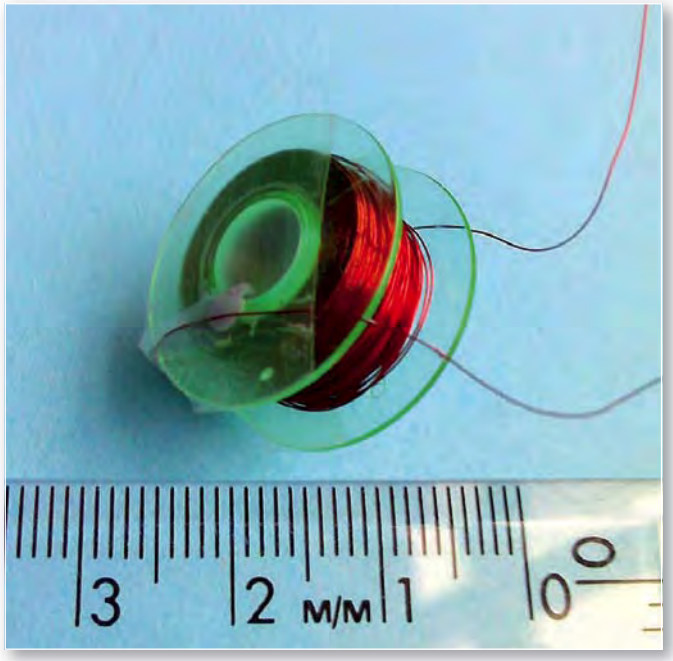

Fig. 4: A coil that has been wound with multiple layers. It has been wound on a sewing-machine feeder bobbin.

high frequency (h.f.) receiver, you will see inductors in the front-end tuned circuits and local oscillator (l.o.). Then more in the mixer and in the intermediate frequency (i.f.) amplifier, where they provided selectivity in the form of tuned couplings between each of the two or three stages of the amplifier. Then finally in the audio amplifier, where an audio transformer would have buffered the high output impedance of the valve amplifier to the low impedance of the loudspeaker.

Today, the mixer will be an efficient all solid-state design. Selectivity in the i.f. amplifier is usually provided by a crystal or ceramic filters which have vastly better selectivity and stop-band performance than the old ranks of i.f. transformers could achieve. The low output impedance of semiconductor audio amplifiers has removed the need for that final audio transformer, too.

So if you are intent on building, let's say, a simple h.f. receiver your inductor requirements can be restricted to those two front-end subsystems – the primary tuned circuit and the l.o.

However, where there used to be off-the-shelf inductors for all the stages of a valved superhet receiver available from companies like Denco, **Fig. 1**. and Repanco, commercial inductors now are usually limited to simple single inductors and radio frequency chokes (r.f.c.s), **Fig. 2**. These aren't suited to designs that require tapped or multiple-coupled inductors, such as those used in Armstrong/Meissner or Hartley oscillators, let alone the front-end tuned circuit with its antenna and (for a regenerative detector) feedback couplings.

Making A Coil

To focus on building a coil, what issues do we need to think about? Clearly we need to know the inductance required. But there are other questions, too: what is an acceptable size, what former can the inductor be wound on, what will the core material be, and how is the inductor going to be mounted on the printed circuit board (p.c.b.) or breadboard?

To know what inductor (L) and tuning capacitor (C) values will be needed in a resonant circuit, you need to solve the equation $f=1/(2\pi\sqrt{(LC)}$ which has its derivation in handbooks, physics texts, and on Web sites. If the inductor is part of a more complicated filter (for example, T or Pi configurations) then you will need to find an appropriate formula in a text book – the scope of possibilities is just too huge to cover here.

However, it's important to get a **feel** for what the end answer will be because knowing an approximate value helps you to focus on the design issues – there's no point in getting obsessed with accuracy because the practicalities of winding the inductor (±10%?) and the circuit's stray capacitances (many pF?) will alter the LC value achieved.

Although you can use paper and pencil to work out a solution for L and C, a simple hand-held programmable calculator, a spreadsheet, or one of the ever-so-easy-to-use Web-based calculators (use the Google search engine using the terms 'resonant' and 'calculator') will make the arithmetic easier.

There are two key advantages to making the arithmetic easy. First, the ease of calculation allows you to play with the parameters to get a design which (especially for coil construction) meets practical limits. Second, by changing the parameters a little (such as adjusting by 10%) you can get a feel for how sensitive the design will be to the (inevitable) tolerances in the actual construction process.

To take an example, for an 3.5MHz (80m) h.f. receiver with a 450kHz i.f. filter, the l.o. needs to operate around 3.2MHz. Playing around with the tuned-circuit equation, we can settle on values of $L=25\mu H$ and C=100pF. The choice of values is, by and large, a free one but (as in all areas of life) terms and conditions apply!

Keeping C large compared with the omnipresent stray capacitances is useful. But you also need to be aware of three factors: the quality factor of the coil *Q*, its dynamic resistance R_D, and its pure resistance, R.

The *Q* factor ($2\pi fL/R$) is important because for a tuned

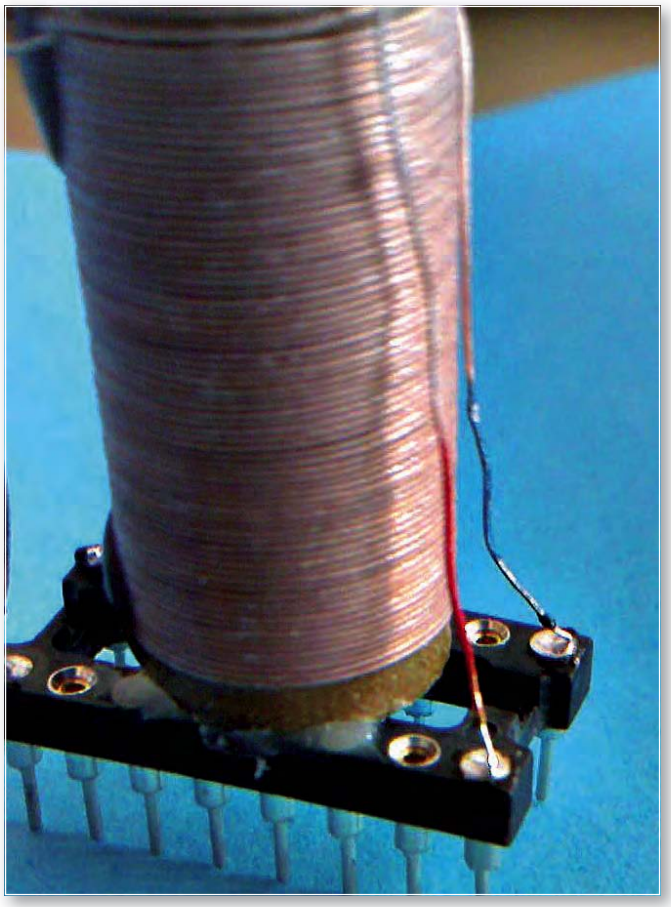

Fig. 5: Mounting an inductor, wound on a former, onto a 'turned-pin' i.c. socket

circuit, *Q* is the ratio of the central resonant frequency f_0 to the –3dB width. So *Q* is synonymous with a tuned circuit's selectivity; at f_0=3MHz, a *Q* of 100 would mean that signals at the edges of a 30kHz band centred on f_0 would be attenuated 3dB by the tuned circuit. Typical *Q* values can be quite low (<50) for r.f.c.s and values greater than 200 are quite hard to achieve.

For oscillators, the higher the *Q* the better the frequency stability and the less likely the frequency is to being pulled-off by variations in other circuit components. If you were to replace a crystal with an LC tuned circuit, the *Q* would need to be greater than 10,000 for the same performance!

The dynamic resistance (R_D =L/CR) is the impedance of the tuned circuit as measured at the resonant frequency (not with your ohm-meter, which measures the direct current (d.c.) resistance!). The circuit's dynamic resistance is important because it affects how the tuned circuit will interact with the rest of the circuit. In the circuit design, at the resonant frequency you can think of the tuned circuit as an impedance of R_D.

You can estimate the d.c. resistance of the inductor by multiplying the length of wire used in making it by the Ω/m figure in the wire table. For a coil, the length of wire used will approximate to the product of the number of turns and the length of each turn ($2\pi r$, where *r* is the radius of the coil).

Getting Physical!

The next question is what physical parameters to use when constructing the coil? Tackling a purely practical problem first, what are you going to wind the coil on? Pre-made coil formers from companies like Aladdin were widely available from hobby suppliers but now they are hard to find.

You can easily make your own former by winding a short strip of paper on a convenient cylindrical object such as a marker pen (as **Rob G3XFD** used to demonstrate in his *Radio Basics* series) – apply a small amount of paper glue every few turns to bond the paper layers together; typically, a few layers will be sufficient. Alternatively, short lengths of plastic pipe make good formers.

When you have decided how you intend to build the former (which may be limited by what marker pens you have in the shack), the diameter of the coil is set. To calculate the coil length and the number of turns, there are many sources of help both in books and on the Web. The publisher Babani's *Coil designs and construction manual* is a standard reference book (available from the *PW* Bookstore); on the Web, *Wikipedia*'s inductor entry is a good source of on-line information.

There are some interesting flat spiral inductors, **Fig. 3**, that may be found in some commercial designs. I shall not be dealing with these at this time as calculating their inductance can become rather complex. But for those 'adventurous' readers with internet access, try using Google to look up "spiral inductors" and follow up the links that are suggested.

Standard Formula

The standard formula for single-layer coils wound on a cylindrical former is Wheeler's formula:

$$L = 2r^2 N^2/(45r + 50l)$$

where *r* is the coil radius, *l* is its length, both in centimetres (cm), N is the number of turns, and L is the coil's inductance in μH. Note that the formula is valid for a single-layer close-wound (no spaces between turns) coil whose length is half to three times the diameter and where the coil's diameter is at least 10 times that of the wire used.

Some websites (Google on the terms 'inductor' and 'calculator') provide a Web-based calculator into which you can feed various parameters to get a quick answer for the number of turns.

For the 3.2MHz l.o. example, Wheeler's formula gives N as about 80 turns for *r*=0.5cm (5mm – 10mm diameter) and *l*=2.2cm (22mm). But other combinations of *r* and *l* could be used, of course.

The next step is to work out the wire gauge required because Wheeler's formula assumes that you are making a single-layer coil with no spaces between the windings. This restriction means that for a given N and *l*, you have to choose a wire size which will comfortably fill the whole coil length, one layer deep.

Most suppliers of enamel covered wire indicate the wire diameter in mm along with its standard (s.w.g.) or American wire gauge (a.w.g.). If only the gauge is supplied then you need to consult a table in an engineering handbook or on the Web to determine the diameter – the *Wikipedia* wire gauge entry is useful. For example, 80 turns covering 22mm implies you need to use wire of 0.275mm diameter, so you could use 32s.w.g. wire.

But if your shack stock has other wire sizes, you can

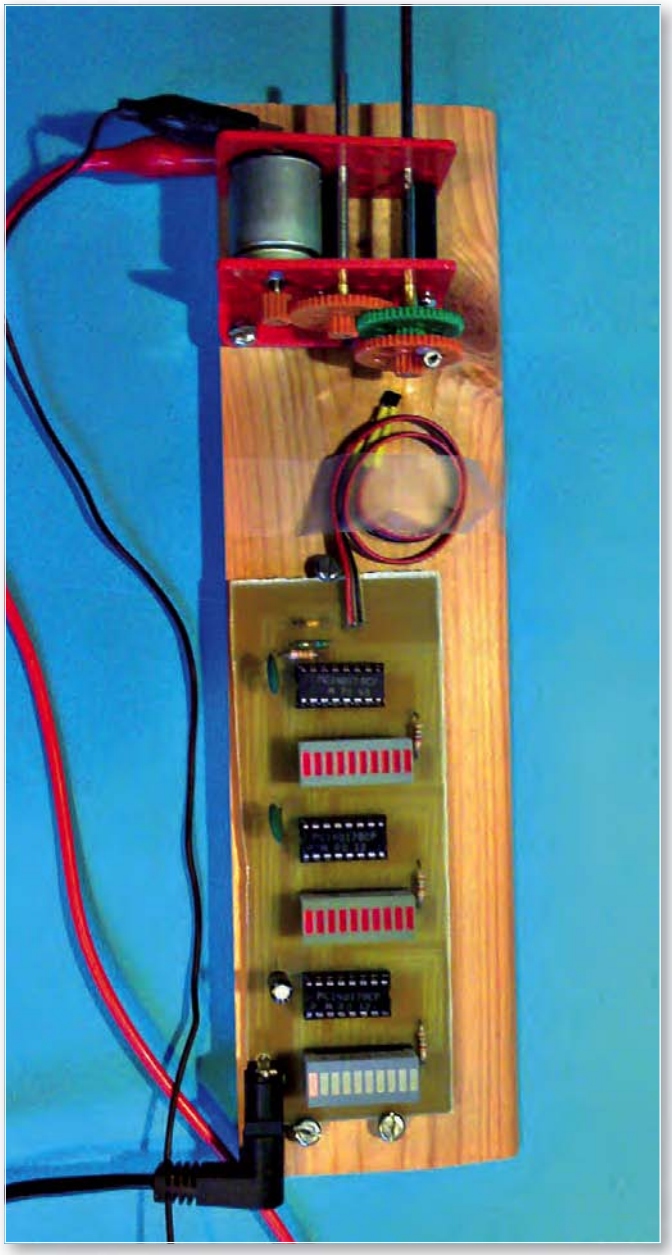

Fig. 6: Just as a 'taster', this is the turns-counting coil winder that I'll be describing in detail in Part 2.

choose to iterate on your design to see if you can get a better match with a wire you have. For example, other parameter combinations for a 25μH inductor include r=1.2cm (12mm), l=2.5cm (25mm), N=38 with 23s.w.g. wire or r=25mm, l=75mm, N=31 with 13s.w.g. wire.

Remember that there is no single right answer (the physical space into which you have to fit the coil may be a more important design driver than any electrical factor!). And that it's not worthwhile getting hung-up on accuracy because the final in-circuit performance will vary slightly and it's better to think ahead and (say) incorporate into your design appropriate trimmer capacitors to allow you to adjust performance back to your specification.

Large Inductors

Where you require a coil with a large inductance (L > 1mH, let's say), a single-layer coil becomes impractical and bank winding – like a bobbin of thread – can be used instead. Here, the coil is wound several layers deep (**Fig. 4**) and the inductance is given by

$$L = 2\,d^2\,N^2/(75\,d + 225\,l + 250\,h)$$

where d is the coil mean diameter, l is its length, h is the height of the winding (all in cm), N is the number of turns, and L is in μH.

In cross-section, the coil has an area hl (in cm^2) and your choice of wire gauge has to take into account the need to fill that cross-section area with the N turns of wire. Wire tables list, for a particular gauge, the number of turns per cm^2, so you need to choose a gauge which comes close.

For example, if you had a design with a 1cm long bobbin which was wound to a depth of 0.5cm with 800 turns then the turns per cm^2 would be 800/(1cm x 0.5cm) = 1600t/cm^2. From a table, 35s.w.g. wire with a diameter of 0.22mm comes close. The bobbin would then have 5mm/0.22mm or 25 layers and each layer would have 10mm/0.22mm or 50 turns.

Using Your Former

If you have made your own former by winding a strip of paper several times around a mould such as a marker pen, applied glue to bond the layers of the paper together to stop it unravelling. Don't glue the former to the mould and wait until the glue is dry before you wind the wire on the former!

To avoid the winding tension distorting the shape of the former, only remove the former from the mould after the coil is wound. Wires with s.w.g. or a.w.g. gauges less than about 24 have diameters more than 0.5mm and bending these into shape around a former requires some force so you need to use a very rigid mould.

When you wind the coil, be careful to keep the axis of the coil parallel with the axis of the spool of wire because this prevents the wire kinking (which will almost certainly damage the insulation).

If you need help visualising the arrangement, think of tape in a video cassette spooling from one reel to the other. I find it useful to clamp a small metal rod in a bench vice and to use the rod as the axel for holding the spool of wire – you can then use both your hands to manipulate the former.

To mount the inductor on the breadboard or p.c.b., you can glue smaller diameter formers on top of integrated circuit (i.c.) sockets (the turned-pin types are best). Then insert the tinned ends of the coil into holes in the i.c. socket, **Fig. 5**. Finally, you need to solder the wire ends in place by carefully applying the iron and solder to the top opening of each socket hole used; a quick dab with the iron should work – any longer than absolutely necessary and you risk melting the plastic of the i.c. socket and making a nasty smell in the shack!

Coil Winding Machine

Next time, in Part 2, I'll be describing a very simple coil winding machine (shown in **Fig. 6**) that's designed to make the job much easier. The device uses easy-to-get components and it's extremely simple to make one for yourself. So, I look forward to meeting you for the final stage of *Done to a turn!* ●

Please check with the organisers that the rally is 'on' before leaving home.

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 *.

Send all your rally info to

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Arrowsmith Court,
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E-mail: newsdesk@pwpublishing.ltd.uk

February

February 13th

The Official SBS Open Day
The Official SBS Open Day will be held in the Martin Lynch & Sons store at Outline House, 73 Guildford Street, Chertsey, Surrey KT16 9AS. You will be able to meet the team behind the creation of the famous SBS-1 series and there will be full demonstrations along with lectures on how to get the most from your SBS virtual radar unit.
Chris Taylor
Tel: 0845 2300 599
E-mail: Chris@mlands.co.uk

February 14th

The Harwell Rally
The Harwell Radio and Computing Rally will be held at the Didcot Leisure Centre, Mereland Road, Didcot OX11 8AY. Admission will be £2.00 (under 12s free) and the doors will open at 10.30am (10.15am for the disabled).There will be talk-in on S22 and V44, a free car park, trade stands, special interest groups, catering with a licensed bar and facilities for the disabled.
Ann Stevens
Tel: 01235 816379
E-mail: rally@ g3pia.org.uk
www.g3pia.org.uk

February 14th

The Northern Cross Rally
The Wakefield & District Radio Society will be running the 19th Northern Cross Rally at the same location as last year – Ossett School and Sixth Form College, Storrs Hill Road, Ossett WF5 0DG. Talk-in will be available under the callsign GB0NCR via the local repeater GB3YW on 145.7875MHz (CTCSS 82.5Hz). Doors will open at 10.30am (10.15am for the disabled) and the entry price will be £3.00. All the usual facilities will be available and visitors who attended last year's rally should rest assured that action has been taken to ensure that the difficulties that were experienced with both the toilet facilities and the electrics should not recur.
Ken Quinn 2E0SSQ
Tel: 07900 563117
E-mail: kquinn27@o2.co.uk
www.northerncrossrally.org

February 21st

The RadioActive Rally
The Mid Cheshire Amateur Radio Society RadioActive Show will be held at the Civic Hall, Nantwich, Cheshire CW5 5DG. The doors will open at 10.30am and admission will cost £3.00. There will be car parking, trade stands, catering and a Bring & Buy.
Simon Chettle G8ATB
Tel: 01270 841506
E-mail: info@radioactiveshow.co.uk
www.midcars.org

February 21st

The Swansea Rally (New Venue)
Following a major fire at the Afan Lido on December 16th, the Swansea Amateur Radio Society Amateur Radio and Computer Rally will now be held at the Court Herbert Sports Centre, Neath Abbey, SA10 7BE. This is 2 miles from J43 on the M4. The doors will be open at 10.30am and admission will be £2.00 (50p for juniors). There will be a free car park, trade stands, a Bring & Buy, special interest groups and catering with a licensed bar.
Roger Williams GW4HSH
Tel: 01792 404422

February 28th

The Rainham Radio Rally
The Bredhurst Receiving And Transmitting Society (BRATS) Rainham Radio Rally will be held at 10.00am in the Rainham School for Girls, Derwent Way, Rainham, Gillingham, Kent ME8 0BX. This is just off the A2 and J4 of the M2.
Trevor Cannon G6YLW
Tel: 0771 7678795
E-mail: trev@wig1.co.uk
www.wig1.co.uk

March

March 7th

The Bournemouth RS Sale
The Bournemouth Radio Society's 22nd Annual Sale will be held in the Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth BH10 7LH. The doors will open at 9.30am and admission will be £1.50. There will be car parking, trade stands, special interest groups, a junk sale, catering and facilities for the disabled.
John G0HAT
Tel: 07719 700 771
www.brswebsite.org.uk

March 7th

The Cambridge Rally
The Cambridge and District Amateur Radio Club Rally will take place in the Wood Green Animal Shelter, King's Bush Farm, A1198 London Road, Godmanchester, Cambridgeshire PE29 2NH. The doors will open at 10.00am (9.45am for the disabled), admission will £3.00 and there will be talk-in, trade stands, a Bring & Buy, catering with a licensed bar, special interest groups, a raffle lectures, facilities for the disabled and attractions for the family.
David M0GUM
Tel: 01954 203080
E-mail: rally2010@cdarc.co.uk
www.cdarc.co.uk

March 7th

The Exeter Rally
The fifth Exeter Radio & Electronics Rally will be held at the America Hall, De la Rue Way, Pinhoe, Exeter, EX4 8PW. The hall is well equipped and offers easy access as it's only a few minutes from the M5 and other main roads. Doors will open at 10.30am (Bring & Buy booking in and disabled 10.15am) and admission will be £2.00. There will be talk-in, traders, a Bring & Buy and refreshments (in-house inexpensive catering by the XYLs, including their celebrated bacon rolls). All profits from the event will be shared between GB3SW, GB3EW and GB3EX, the local 2m and 70cm repeaters.
Pete G3ZVI
Tel: 07714 198374
E-mail: g3zvi@yahoo.co.uk

March 20th

The Lagan Valley Rally
The Lagan Valley Amateur Radio Society Rally will be held in The Village Centre, 7 Ballynahinch Road, Hillsborough. Doors will open at 11.30am and there will be car parking, catering and trade stands.
Jim GI0DVU
Tel: 02892 662270
E-mail: jim.henry@ntlworld.com

March 21st

The Wythall Rally
The Wythall Radio Club's 25th Annual Radio and Computer Rally will be held in The Woodrush Sports Centre, Shawhurst Lane, Hollywood, Nr Wythall, Birmingham B47 5JW (two miles from junction 3 of the M42). Doors will be open between 10.00am and 3.00pm and admission will be £1.50. There will be talk-in on S22, car parking, radio and computer traders, a massive Bring & Buy and catering.
Chris G0EYO
Tel: 07710 412 819
E-mail: g0eyo@blueyonder.co.uk
www.wrcrally.co.uk

March 21st

The Callington Rally*
The Callington Amateur Radio Society Rally will be held in the Callington Community College, Launceston Road, Callington, Cornwall PL17 7DR. The doors will open at 10.00am, admission will be £2.00 and there will be talk-in, car parking, trade stands, catering and facilities for the disabled.
Chris G7UDX
Tel: 0797 3418371
E-mail: g7udz@mac.com

March 28th

The S. Gloucestershire Rally*
The Thornbury and South Gloucestershire Amateur Radio Club along with the Avon Scouts Amateur Radio Club will be holding their second rally for the West Country at the Avon Scouts Activity Centre, Woodhouse Park, Almondsbury, South Gloucestershire BS32 4LX. This is 1.4 miles North on the A38 from the M4/5 junction. The doors will open at 10.00 am and entry will cost £2.00. There will be a talk-in, free parking, a car boot sale, catering, a Bring & Buy and facilities for the disabled. Please note, no dogs other than those providing assistance to the disabled will be allowed in.
Peter Cabban
Tel: 01454 612689
www.avonscouts.org.uk/woodhousepark/location.htm

March 28th

The Spring Hangar Sale
The Spring Militaria, Electronics and Radio Amateur Hangar Sale will take place at the Hack Green Secret Nuclear Bunker, French Lane, Nantwich, Cheshire CW5 8AL. The Bunker is situated just off the A530 Whitchurch Road, a few miles outside Nantwich, 30 minutes from Chester. From Junction 16 on the M6 motorway, follow the signs to Nantwich, then Whitchurch on the A530 (follow the brown Secret Bunker signs). The doors will open at 10.00am and admission will be £2.50.
Rod Siebert
Tel: 01270 623353
E-mail: coldwar@hackgreen.co.uk
www.hackgreen.co.uk

April

April 11th

The NARSA Exhibition*
The Northern Amateur Radio Societies Association Exhibition will be held at the Norbreck Castle Exhibition Centre, Queen's Promenade, Blackpool FY2 9AA. The doors will open at 11.00am (10.45am for the disabled) and there will be talk-in, car parking, trade stands, a Bring & Buy, special interest groups, catering with a licensed bar, Morse tests and facilities for the disabled.
Dave M0OBW
Tel: 01270 761608
E-mail: dwilson@btinternet.com
www.g1gyc.demon.co.uk/narsa

April 11th

The Lough Erne Rally
The Lough Erne Amateur Radio Club Annual Rally will be held at The Share Holiday Village, Lisnaskea, Co. Fermanagh BT92 0EQ N. Ireland – there is access from the Erne/Shannon Waterway. The doors will open at 12 noon and there will be car parking, trade stands, a Bring & Buy, catering with a licensed bar, Morse tests and facilities for the disabled.
Iain
Tel: 02866 326693
E-mail: gibbjgbb@aol.com
www.loughterneradioclub.co.uk

April 18th

The West London Radio & Electronics Show*
The West London Radio & Electronics Show will take place at Kempton Park Racecourse, Sunbury-on-Thames, Surrey. The will be free car parking, the doors will open at 10.00am and there will be talk-in on S22 & V44, trade stands, a Bring & Buy, a flea market, catering, special interest groups and facilities for the disabled.
Paul
Tel: 0845 1650351
E-mail: paul@radiofairs.co.uk
www.radiofairs.co.uk

April 24th

The Chesterfield Amateur Radio Rally
The fourth Chesterfield Amateur Radio Rally will be held in the Hasland Village Hall, Eastwood Park, Hasland S41 0AY (M1 junction 29/30). Doors will open at 10.00am and there will be talk-in on S22, V44 and GB3EE along with catering and trade stands.
E-mail: rally@chesterfieldrally.com
www.chesterfieldrally.com

April 25th

The Andover Boot Sale
The Andover Radio Club's Spring Boot sale will be held in the Village Hall at Wildhern, which is just north of Andover (postcode SP11 0JE). The doors will open at 10.00am for buyers (9.00am for sellers) and admission will be £1.50. There will be talk-in on S22, catering and facilities for the disabled.
Martin
Tel: 01980 612070
E-mail: martinsmith@kukltd.co.uk
www.arac.org.uk

April 25th

The Yeovil QRP Convention
The 26th Yeovil QRP Convention will be held in the Digby Hall, Hound St, Sherborne, Dorset, DT9 3AA (adjoining the central shopping car park). The doors will open at 9.30am and there will be talk-in on S22 and V44, car parking, trade stands, lectures, a Bring & Buy, catering and facilities for the disabled.
Robert
Tel: 01935 706715
E-mail: robert.farey@btinternet.com
www.yeovil-arc.com

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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**.

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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**.

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Feature

Valve Numbering Systems Part 1

Editorial note: *Because of the length and depth of Stef's coverage, the article is being presented in two parts. Wherever possible all references to items mentioned in Part 1 are presented this month. However, the author's comprehensive general reference notes on this complex and fascinating subject will be presented with Part 2.*

Way back in the mists of time when I had just entered my teens, I used to attend the radio club in Stoke-on-Trent in the English north west Midlands. I remember one visit, rummaging through an old chest of drawers where various members had abandoned unwanted 'junk' and finding lots of valves knocking around at the bottom of one drawer. I was fascinated by the different sizes and shapes and wondered how the heck you knew which valve could do what?

Not the best way to store valves perhaps, but the point of my story is that an 'old timer' at the club came over and took me through all the valves, explaining how the number on each one was a code, and not just a random serial number, and what the code meant. Much of what he explained stayed with me, though I must admit as I started researching this article I was amazed at the variety of the numbering systems. I now realise that he'd just scratched the surface of this complex, and sometimes – seemingly illogical– business!

But, before I get to grips with the subject – I must be honest and say that I can make no claim of originality for the information presented here. All of this data is available on the internet, in magazine past articles (most recently, as far as I can tell, in references 1-4), in older magazines (for example, in references 5 and 6), and in books. So, all I've done is to try to bring it together in one place.

Hopefully this article will encourage readers to rummage through your junk box, take a look through the boxes of valves at radio rallies and meetings, and test your knowledge. You might even decide to buy a few valves and build a valve-based project. While you are looking for the valves, also look for reference books and catalogues, which can typically be bought for a few pounds, to build up a small library on the subject.

Looking For Information

When I'm looking for information on valves I tend to use two main on-line sources. The first is the **Tube Data Sheet Locator** (TDSL) at: **http://tdsl.duncanamps.com/tubesearch.php** and the second is the National Valve Museum (see reference 7), to which TDSL often links so that a high quality photograph of the valve in question can be seen. The TDSL displays a short form data sheet of the valve, a list of equivalents, and very usefully, references often to several scanned manufacturers' original data sheets for that particular valve.

You may already be of the opinion that there are many anomalies with the various numbering systems. Why, for example can the 6.3V heater ECC83 be an exact equivalent to the 12.6V heater 12AX7? Hopefully, if you read on you will see that this is simply a matter of definition and isn't too misleading in practice.

I've had to limit the amount of information presented because the Editor, and the readers, would not thank me for producing an encyclopedia on the subject! However, where I've not included detailed information I have tried to include references where more detail can be found for those interested.

I've tried to use the word 'valve' consistently rather than use the American term 'tube', even when I'm dealing with devices that are of US origin. Also I have used the word 'heater', which is interchangeable with the American term 'filament'.

Note: The term filament often seems to be be reserved for the combined 'heater'/cathode of battery valves (with d.c. applied to the filament, where the cathode layer is deposited directly onto the filament). The term 'heater' is usually used with 'indirectly heated' valves using a separate cathode.

Very Early Valve Numbering

If you are a collector of very early valves, my guess is you will know what you are looking for, and for identification purposes, the shape of the valve's envelope (and its base) will be just as important as any number it may carry. Before the First World War, there were relatively few valve types and as far as I can tell no real attempt was made to form a unified coding system.

The best book I could find on early (and later) valves is *70 Years of Radio Tubes and Valves* by John W Stokes (reference 8). I have the 1982 edition, but I believe there is a 1997 version available now. The book traces the history of the vacuum valve from 1880, with the earliest shown photo of a valve being taken in 1905.

In his latest article Stef Niewiadomski aims to fully explain valve reference systems and says we don't need to be confused!

Table 1: British Armed Services Valve Codes

Royal Navy

First element: Construction

NGT	Gas triode
NR	Receiving
NS	Stabilising / regulating
NT	Transmitting
NU	Rectifier
NC	Cathode Ray Tube

Second element: Serial number

*	Serial number, starting from 1

Example

NU13	Royal Navy half-wave rectifier

Army

First element: Construction

ACR	Cathode Ray Tube
AR	Triode or triode with diode(s)
ARD	Diode
ARDD	Double diode
ARH	Hexode or heptode
ARP	Pentode
ARS	Screen grid (tetrode)
ARTH	Triode hexode
ARTP	Triode pentode
AT	Transmitting triode
ATP	Transmitting pentode
ATS	Transmitting tetrode
AU	Rectifier
AW	Stabiliser or tuning indicator

Second element: Serial number

*	Serial number, starting from 1

Example

ARP1	Army output pentode

RAF

First element: Construction

VCR	Cathode Ray Tube
VGT	Gas triode
VI	Neon or tuning indicator
VR	Receiving
VS	Stabiliser
VT	Transmitting
VU	Rectifier
VW	Wavemeter (?)

Second element: Serial number

*	Serial number, starting from 1

Table 1: Explaining the British Armed Services Valve Codes in use before (about) 1944.

Early UK Military Numbering Systems

Warfare accelerates the development and use of technology and the First World War was a great accelerator for vacuum valves. Many valves were developed for military use, including the 'Q' (a detector) and the 'V.24' (an amplifier) by the Marconi Company.

Other notable valves were the 'R'-types, manufactured by several companies and the 'A', 'B', 'C' and 'D' types. As you can see there doesn't seem to have been any attempt at a true coding system to identify their purpose and the valve codes used were rather more of a serial numbering system.

Table 2: Early British Codes

Various letter groups were allocated to the construction and/or heater rating of the valve. Typically, these are combined in the overall valve code

AC	4V heater
D	Single or double diode
DD	Double diode
DDT	Double diode, triode
FC	Frequency changer
H	High impedance triode
M	4V heater
ME	Magic eye tuning indicator
Pen	Output pentode
PM	Philips / Mullard
PP	Power (output) pentode
PT	Output pentode
R	Full-wave rectifier
SP	Straight RF pentode
SG	Screen grid
TH	Triode-heptode or triode-hexode
TP	Triode-pentode
U	Rectifier (usually half wave)
UU	Full wave rectifier
VP	Variable-mu RF pentode

Examples

Note that spaces, 'forward slashes' and/or dots may appear between the elements of the code

AC/PEN.DD	4V AC heater double diode output pentode
UU.7	4V heater AC mains full wave rectifier
SP13C	HF pentode with 200mA heater
PM12A	Mullard screen grid RF tetrode
AC/ME	4V heater cathode ray tuning indicator
DDT16	Double diode triode 16V heater (Cossor valve)

Table 2: Early British Codes, where various letter groups were allocated to the construction and/or heater rating of the valve.

Probably the first attempt at systematically numbering valves began towards the end of the First World War by the UK military. Rather than agreeing on a single coding scheme, the three services each invented its own ("of course!", I hear you groan), though there was clearly some co-operation as some of the construction codes are similar, and all three use the abbreviated identification of 'construction' plus 'serial number' elements to make up the complete code. **Table 1** shows how these three schemes work.

The RAF, of course, didn't exist as a separate entity until 1 April 1918, and it's not clear whether there was a mixture of the Army and RAF schemes in use in its early days! This scheme stayed in place until 1944 and therefore many valves were produced with these numbers and they are quite common today, either in pieces of military equipment or 'floating free'. Today they are a very good source of low-cost valves for projects, as long as you can identify the function and rating of the valve in question.

The examples shown in Table 1 were found in the on-line 'virtual' **National Valve Museum**. The NU13 is the Navy's 120mA half-wave rectifier. The Army's ARP1 was equivalent to the Navy's NR39 (and a few other 'aliases') and the manufacturer conveniently printed both numbers

Table 3: Equivalents of some early radio valves

2V heater types for battery operation

Mullard	Marconi-Osram	Triotron	Cossor	Mazda
PM12	S21	S207	215SG	SG215
PM12A	S24	S215	220SG	S215A
PM12M	VS24	S208	220VSG	S215VM
-	H2	WD2	210RC	H210
PM1HL	H210	HD2	210HF	HL2
PM2DX	HL210	SD2	210DET	HL2
-	L210	TD2	210LF	L2
PM2A	P215	ZD2	215P	P22A
PM2A	LP2	YD2	220P	P220
-	P2	UD2N	230XP	P240
PM202	-	E235	-	-
PM22A	PT2	P225	220PT	Pen220A
PM2B	B21	E220B	240B	220B

4V heater types for battery operation

Mullard	Marconi-Osram	Triotron	Cossor	Mazda
PM14	S410	S409	41SG	-
PM3A	H410	W420	410RC	-
PM3	-	H412	410HF	-
PM4DX	HL410	A430	410LF	-
PM4	P410	E414	410P	-
PM254	-	E425	425XP	P425
PM24A	PT425	P425		-

Power amplifiers

Mullard	Marconi-Osram	Triotron	Cossor	Mazda
AC044	PX4	K435/10	4XP	PP3/250
DO24	PX25	K480	-	PP5/400
DO60	DA60	K450/50	-	-
PM24M	-	P435	PT41B	-
PM24B	PT25	P440	-	-

4V heater AC types

Mullard	Marconi-Osram	Triotron	Cossor	Mazda
-	-	S415N	-	-
-	MS4B	S410N	MSG/LA	AC/SG
VP4	VMP4	S434N	MVSPen	-
SP4	MSP4	S435N	MSPen	-
904V	MH41	A440N	41MH	AC2/HL
104V	ML4	E430N	-	ACP
-	-	B430N	-	-
Pen/4V	PT4	P440N	MP/Pen	AC/Pen

20V heater DC types

Mullard	Marconi-Osram	Triotron	Cossor	Mazda
SP20	-	S2035N	-	-
VP20	-	S2034N	-	-
HL20	-	A2040N	-	-
-	-	E2020N	-	-
-	-	B2030N	-	-
-	-	P2020N	-	-

Rectifiers

Mullard	Marconi-Osram	Triotron	Cossor	Mazda
DW2	U10	G470	506BU	UU60/250
DW3 or DW4	U14	G4120	460BU	UU120/500
-	-	G4100	-	-
-	-	G4150	-	-

Table 3: Equivalents of some early radio valves with 2V filaments for 2V Lead-Acid battery operation.

Table 4: GEC / Osram / Marconi / EMI / MOV valves

First element: Functional type

A	Industrial valve
B	Double diode
D	Diode or double diode
GU	Gass-filled rectifier
GT	Gas triode (thyratron)
H	Signal triode (high impedance)
HL	Signal triode (medium impedance)
KT	Kinkless tetrode (beam tetrode)
KTW	Variable-mu kinkless tetrode
KTZ	Sharp cut-off RF kinkless tetrode
L	Signal triode (low impedance)
MU	Indirectly heated rectifier
N	Output pentode
P	Output triode
PX	Output triode
QP	Quiescent push-pull double pentode
S	Tetrode (screen grid valve)
U	Rectifier
VS	Variable mu pentode
W	Variable mu pentode
X	Frequency changer
Y	Tuning indicator
Z	Sharp cut-off RF pentode

Second element: Sequence code

*	One figure for early valves
**	Two or three figures for later valves
***	Note: Suffix 'M' indicates external metalising

Examples

KT66	Beam tetrode for AF amplifier
X77	Heptode frequency changer
MU14	Indirectly heated full wave rectifier

Table 4: the GEC/Osram/Marconi/EMI/MOV valves, where the first element is a functional type.

on the adequately large glass envelope. The much used EF50 was the Air Force's VR91 and also the Army's ARP35.

Some Standardisation

In **Table 2** I've shown the coding system used by many UK manufacturers in the late-1920s and into the 1930s, covering valves that were being designed into 'straight' (that is, tuned radio frequency or t.r.f.) receivers, by both professionals and Amateurs. The codes shown are the main consistently-used ones, and these elements could be mixed, typically along with a serial number, to produce an overall code for a particular valve, as shown in the examples at the bottom of the table.

As you can see from the examples, the coding system is very loose, but definitely decipherable in most cases.

To show how manufacturers made an attempt at using the code, mixed in with their own variations, I've shown in **Table 3** a transcription of a leaflet (reference 9), published by Triotron, the brand name for valves manufactured by **Radiowerk E. Schrac**k of Vienna. During the mid and late-1920s they made and marketed a wide range of cut-price valves, achieving significant market penetration in the UK. By the late 1930s they had settled down, mostly copying

Table 5: Mazda / Ediswan Receiving and Rectifier Valves

First element: Heater voltage or current rating

1	1.4V
6	6.3V
10	0.1A
20	0.2A
30	0.3A

Second element: Construction

C	Frequency changer with special oscillator section
CRM	Television cathode ray tube
D	Diode or double diode
F	Tetrode or pentode voltage amplifier
K	Small gas triode (thyratron) or tetrode
L	Triode, pentode or tetrode voltage amplifier.
M	Tuning indicator
P	Power amplifier tetrode or pentode
U	Half wave rectifier (heater rating usually omitted)
UU	Full wave rectifier (heater rating usually omitted)

Note: two letters, eg FL, can be used for multiple valves

Final element: Sequence number

Examples

6M40	6.3V filament, 'magic eye' valve
1L4	1.4V filament, pentode voltage amplifier (equivalent to the Mullard DF92)
UU5	Full wave rectifier with 4V 2.3A heater

Table 5: The Mazda/Ediswan receiving and rectifier valves, where the first element is the heater voltage or current rating.

Table 6. Brimar (STC) Codes

For export US RTMA code is used, sometimes with a prefix SV

For the home market

First element: Function

1	Half wave rectifier
8	RF pentode
9	Variable-mu pentode
20	Triode hexode

Second element: Heater voltage

A	4V
B	2V
D	Indirectly heated, other than 2V or 4V, followed by a serial number

Third element: Sequence number

Special valves

First element: Function

2	Diode
3	Triode
4	Tetrode
5	Pentode
22	Double diode, etc

Second element: Maximum anode dissipation

Third element: Serial number

Fourth element: Base type and special features

Example

8D2	RF pentode with 13V 200mA heater

Table 6: These are Brimar (STC) codes. For export US RTMA code is used, sometimes with the prefix SV.

common European domestic valves of the day.

The leaflet was produced by Triotron to indicate that their valves could replace those of several manufacturers and today it provides a useful cross-reference for collectors of 1920s/30s radios. It shows well how the various manufacturers numbered valves of identical, or very similar, characteristics in different ways. Some of the elements of the coding scheme in Table 2 are evident, but it's clear that the scheme wasn't universal by any means, and the recognisable elements could appear almost anywhere in a valve's code number.

It's also clear that Triotron itself had its own numbering system, which didn't seem to correspond to any of the valves its products were compatible with.

Main Coding Scheme Tables

In **Tables 4** to **7** show the main valve numbering systems that were in effect in the UK from about the mid-1930s onwards, so they should cover most of the UK-produced, and many foreign, valves you will come across. Hopefully the tables are self-explanatory.

The likes of Sylvania, Zaerix, Pinnacle, Trunix, Tungsram, Elpico (to name just a few of the hundreds of valve manufacturers or their 'aliases' over the years) tended to follow either the main European or US system (see later), and so their valve codes should be easy to decipher.

Minding Ps & Us!

You may have noticed in the 'heater voltage or current' section of Table 7 that there are valves codes that begin with 'P' (300mA heater current) and 'U' (100mA heater current). These prefixes refer to a vast range of valves designed mainly for TVs, a.c./d.c. domestic radios and other consumer items, such as record players, where the heaters are typically strung in series across the mains, with or without a series resistor included.

What we can't tell from the valve's number is the heater voltage that produces the 300mA or 100mA current. So for example, the PL84 needs 15V across its heater, whereas the PCC84 needs only 7V, in both cases to produce a current of 300mA.

You will see many of these valves for sale at radio rallies and on the internet – but be careful to make sure that you can supply the correct heater voltage/current before you buy such a valve for use in a project. In TVs and low cost domestic radios these valves had their heaters connected in series, supplied either directly from the mains, via a ballast resistor (which normally ran very hot) or in some sets from an autotransformer (for example, in the Marconiphone model T70A), which eliminated the generation of wasted heat.

The arrangement usually saved a relatively expensive mains transformer, especially in TVs where cost was very important, which would need to supply many Amperes of

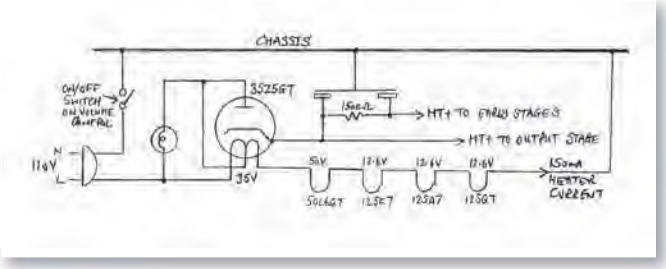

Fig. 1: Typical circuit of an American-designed a.c.-d.c. receiver.

current if 6.3V or 12.6V valves were used, because of the large number of valves that were used in a typical TV set.

Versatile Valves

Just to show how versatile these valves with various heater voltages and currents can be, **Fig. 1** shows a typical power supply on a US-designed a.c./d.c. receiver of the 1940s. This is included so you can see just how simple this kind of power supply can ultimately get, if you use valves with the right heater voltage/current combinations. This is designed to work from the USA's 110V a.c. (or d.c.) mains only (that is, it doesn't have to be capable of running from 240V mains).

The 35V heater of the 35Z5GT rectifier valve, the 50V heater of the 50L6GT audio output valve and the three 12.6V heaters of the remaining valves neatly add up to the mains voltage and so no mains dropper resistor is needed. 150mA of heater current flows down the heater chain. This didn't just happen by accident – the valves were designed to have these heater voltages so that they neatly added up to the US mains voltage. See the USA tables later (in Part 2), to see how the codes of these valves are constructed.

Also note that the mains on/off switch is in the **Neutral** lead, presumably leading to a slightly lower cost, but giving the risk of the set's chassis being connected to the mains 'Live' side if the mains is connected the wrong way round. At 110V mains this is slightly less risky than it is with a 240V mains supply – but the set would have been designed to have no exposed metal parts. The main danger would have been to any service engineer who had to fix a broken set!

Another application of U-valves was in low cost record players where use of a single audio valve such as the UL84 (45V, 100mA heater), plus a rectifier like the UY85 (38V, 100mA heater), and a series ballast resistor (which got pretty hot), eliminated the need for a mains transformer. Don't sneer to much at this technique: even the well-respected manufacturer Stratton & Co used similar techniques in many of their famous *Eddystone* radios! See you next time. ●

Comprehensive general reference notes on this complex and fascinating subject will be presented with Part 2.

Table 7: Receiving Valves Pro-Electron / European scheme (Mullard/ Philips)

First element: Heater voltage or current	
A	4V
B	0.18A DC series connection
C	0.2A AC/DC series connection
D	<= 1.4V DC
E	6.3V, normally parallel AC connected
F	12.6V, normally parallel AC connected
G	Miscellaneous, previously 5V
H	0.15A series connection
K	2V DC
L	0.45A series connection
O	0V heater ie semiconductor device
P	0.3A AC/DC series connection
T	7.4V
U	0.1A AC/DC series connection
V	0.05A AC/DC series connection
X	0.6A series connection
Y	0.45A series connection
Second and subsequent elements: Construction	
A	Diode (excluding rectifier)
B	Double diode (excluding rectifier)
C	Triode (signal, not power)
D	Power output triode
E	Tetrode (signal, not power)
F	Pentode (signal, not power)
H	Hexode or heptode (of the hexode type)
K	Octode or heptode (of the octode type)
L	Power output tetrode or pentode
M	Magic eye tuning indicator
N	Thyratron
P	Secondary emission tube
Q	Nonode
S	Scanning valve for television
T	Miscellaneous (including thyratrons)
X	Full wave rectifier or double diode (gas-filled)
Y	Half wave rectifier
Z	Full wave rectifier
Third element: Base type	
1-10	Side contact
11-20	Footless 8-pin Telefunken
21-30	Loctal (B8G)
31-39 and 300 series	International Octal
40-49 and 140-149	8-pin miniature Rimlock (B8A)
50-59	Magnoval (B9D) and noval (B9G)
60	Various sub-miniature
70	Miscellaneous
80-89, 180 and 800 series	Noval (B9A)
90-99	Miniature 7-pin (B7G)
200 series	B10B
500 series	B9D
Remaining elements: Sequence number	
*	One digit for early valves
**	Two digits for later valves
***	Three or four digits for later professional valves
Examples	
EF86	6.3V heater, signal pentode, Noval base
GZ34	5V heater, full wave rectifier, International Octal base
UCF80	0.1A series heater, signal triode + signal pentode, Noval base
E88CC	Special quality version of the ECC88: swapping of the second and third fields denotes an "SQ" valve

Table 7: The receiving valve Pro-Electron/European scheme (Mullard/Philips), where the first element is heater voltage or current rating.

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Three models will be available later this year and prices are to be announced. See web for further details.

Yaesu FT-450 HF Base Transceiver with & without ATU. HF & 6m Full DSP

FT-450 shown with optional Bail Stand.

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AS REVIEWED IN PW December Issue 2009

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Mini VNA PC Controlled Antenna Analyser

The mRS miniVNA is a compact 100kHz to 180MHz antenna analyser interface that is operated via a PC powered by a single USB connection. You can see at a glance where the antenna is resonant, what the SWR and the return loss is. The best (minimal) SWR frequency is automatically found and displayed. An optional internal RS232 connection is also available.

ML&S: £259.95

VAT may have increased but many of our prices haven't!

The Rev. George Dobbs'

carrying on the practical way

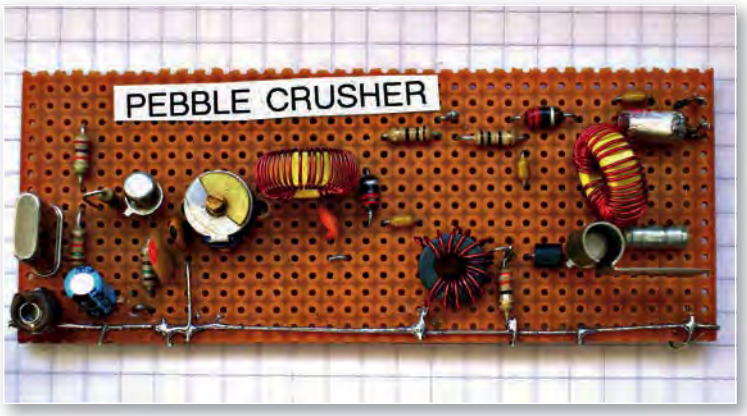
Top This month the Rev. George Dobbs G3RJV says that he's got a 'classic' transmitter from Doug DeMaw W1BB's design desk.

"A pint can't hold a quart – if it holds a pint it is doing all that can be expected of it."
Margaret Deland (1857-1945)

In my last *Carrying on The Practical Way* (*COTPW*) I looked back on the first Direct Conversion (DC) receiver circuit I encountered in 1968 and discovered that it had passed the test of time. Forty years later it was still a buildable and viable receiver.

I also mentioned that around that time the American *QST* magazine had published some excellent articles by authors such as **Wes Hayward W7ZOI** and **Doug DeMaw W1FB** (then W1CER) and they were articles that introduced me to solid state construction and set the scene for many years of Amateur Radio construction. However, of all the Amateur Radio writers of that period – my greatest hero was Doug W1FB.

***W1FB's original prototype* Pebble Crusher.**



The Anglicised version of the* Pebble Crusher *created by George G3RJV.

Passing Of An Era

Sadly, W1FB died of leukaemia in September 1997 and I think that his death marked the passing of an era in Amateur Radio literature. I had been inspired by his work for many years. It's a lucky man who can come to know a hero as friend and I'm glad to say that this happened with Doug. As I've mentioned before, when I began my writing for Amateur Radio magazines Doug DeMaw was my model. In fact, the *QST* staff used to say of Doug, "he wrote it once and it was done!"

In the 1980s I was more than pleased when Doug subscribed to ***Sprat***, the journal of the G QRP Club that I've edited for 30 years. Then I was absolutely delighted when he began to write to me about *Sprat* and even about the articles I wrote for UK radio magazines and he also contributed several articles to *Sprat*.

We exchanged mail for several years and I first visited Doug at the end of a trip to the Dayton Hamvention in 1992. My friend **Dick Pascoe G0BPS** and I did the day's drive from central Ohio to northern Michigan to visit the Oak Hills Farm. Doug had retired to the family farm following the death of his father. The farmhouse lies just outside the tiny village of Luther, among the lakes and forests of north Michigan.

The house is beautifully restored though and much of the surrounding land has been left to return to the wild and I enjoy remembering this with *COTPW* readers again, Doug followed his other great loves, black powder shooting, hunting and cooking with natural ingredients.

We were served wild deer with wild onions gathered from the local forest. His wife Jean was a lovely hostess as well as being a keen shot with muzzle-loaded rifle. I still have a photograph of me shooting a muzzle-loaded rifle at tin cans in the middle of Doug's 160 metre loop antenna!

On my next visit to the Oak Hills Farm, I was presented with a wooden plaque (shown on Photograph 1) which had my callsign burned on a deer jawbone. It had the inscription, *"Primitive Man Endorsement. In recognition of the accomplishments of Rev. George Dobbs, G3RJV, who has demonstrated at Luther, Michigan, his skill and deadly marksmanship with primitive muzzle-loading weapons, for having eaten wild deer meat and for quaffing native grog at the Luther tavern Rev. Dobbs has earned the title of Mountain Man and Buckskinner. By the hand of Doug DeMaw, W1FB, May 3rd 1994".* I also cherish a small cup fashioned from deer horn by Doug and presented to me on condition that it would only ever contain spirits.

The Pebble Crusher

Another memento of that visit in 1994 is a small circuit board holding the prototype of the *Pebble Crusher,* a 7MHz (40 metre) QRP transmitter designed by Doug. When moving from my large vicarage to my small retirement home much of my Amateur Radio paraphernalia had to go – but

The presentation made by Doug DeMaw W1FB to George G3RJV.

Rev. George Dobbs G3RJV
PW Publishing Ltd.,
Arrowsmith Court,
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E-mail: pracway@pwpublishing.ltd.uk

not the *Pebble Crusher* – it still holds pride of place within my collection.

The original W1FB transmitter is shown the photograph. Having resurrected the 1968 DC receiver from W7ZOI, I wondered if the little *Pebble Crusher* transmitter could be revived as a project for *PW* readers. It was one of the projects that Doug submitted to *Sprat* and it also appeared in several other publications. So, I set about an Anglicised version of the transmitter and the result is shown in the circuit of **Fig. 1**.

The circuit in Fig. 1, is based upon the *Sprat* version of the *Pebble Crusher*. As can be seen from the circuit, it's a two transistor transmitter using 2N2222A devices. These are small signal devices so the transmitter output is only about half a watt. What might surprise the reader is the number of inductors (coils) in the design and the circuit is good both in impedance matching and harmonic reduction.

A careful design ensures a clean output waveform, low in harmonic and other spurious content. Doug W1FB also produced a very low power transmitter circuit based on the first stage of the *Pebble Crusher*. He called this the *Mighty Mite* as it was a really low-powered transmitter with an output of only some 25 to 30mW.

It's easy to assume that such a diminutive output would be useless on the air – but some QRP enthusiasts relish using extra low power to achieve results! This is often called 'milliwatting' and is given the designation 'QRPp' to indicated very low power.

I have included the circuit of the *Mighty Mite* in **Fig. 2**, partly for general interest but it also occurs to me that some readers might like to try the QRPp transmitter and then add the extra stage to complete the project. That would present an interesting challenge and certainly a sense of achievement with every radio contact made!

As I write this issue of *COTPW* some members of the G QRP Club are hoping to run a 'one transistor transmitter' day, although this will probably be on 3.5MHz (80 metres), a circuit like the *Mighty Mite* could be used to join in the fun. Since the two stages of the *Pebble Crusher* are very similar, describing the operation of the *Mighty Mite* is a good way to explain the complete *Pebble Crusher*.

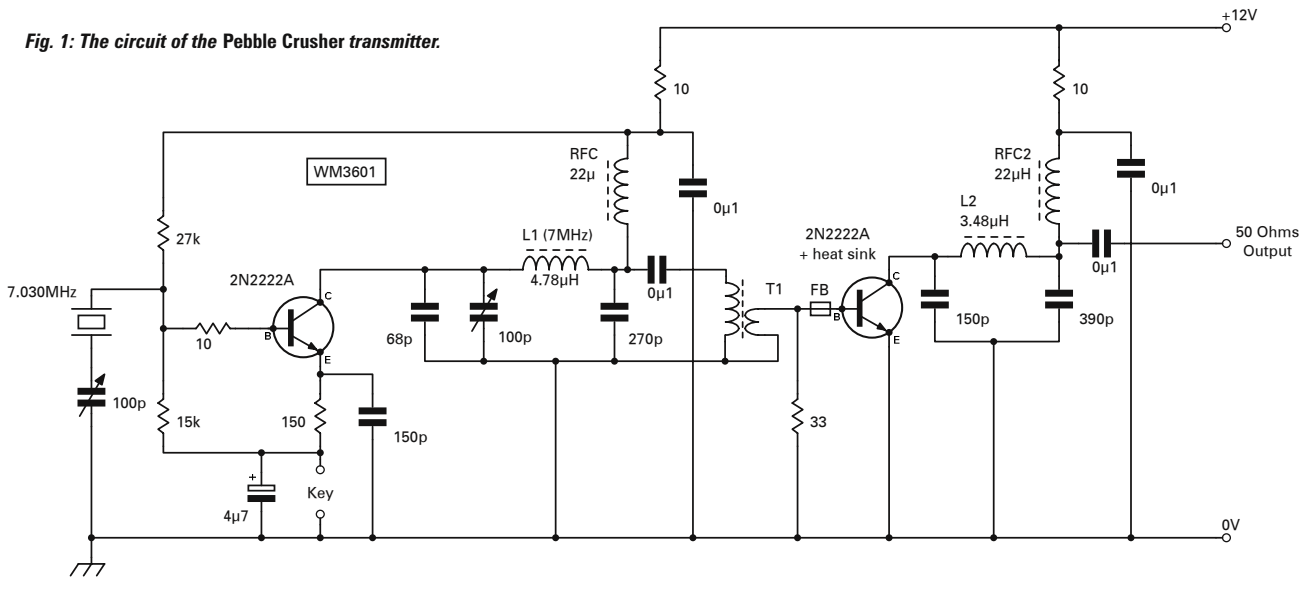
The circuit in Fig. 2 is a very simple, but sound, design for a one-stage transmitter. It uses a variable frequency oscillator (VXO) where the variable capacitor between the crystal and ground enables the oscillator frequency to be shifted. Depending upon individual crystals, that movement can be in the order of 5kHz and will be upwards in frequency.

Increasing the variable capacitance too much may cause the transistor to cease oscillating. I have chosen a crystal frequency of 7.030MHz which is the QRP calling frequency on 40 metres. Several component traders sell crystals at this frequency.

The 150pF capacitor in the emitter of the oscillator controls the oscillator feedback. This value is a compromise that appears to work well – but if the transistor fails to oscillate try increasing this value a little. The 4.7µF electrolytic capacitor across the 'key' connection is there to minimise key clicks by softening the on-off switching action of the key.

Lowering this value gives a harder keying waveform and increasing it will

Fig. 1: The circuit of the* Pebble Crusher *transmitter.



L1 = 32t 28swg on T50-6
L2 = 28t 26swg on T50-6
T1 = 12t 26swg (Pri) + 6t 26swg (Sec) on FT37-43
RFC1/2 = 22µH (or 6t 32swg on ferrite bead)
FB = Ferrite bead

further soften the waveform. A 10Ω resistor is added to the base of the transistor to reduce the risk of high frequency parasitic oscillation.

The output from the collector goes to a single-element harmonic filter in a 'pi' configuration, so called because it looks like the π symbol. A 150pF variable capacitor tunes the filter to resonance at the oscillator frequency. It should be adjusted for maximum output consistent with a clean c.w. (Morse) signal.

The pi filter is designed to suit a 50Ω output for a matched 7MHz antenna. A small radio frequency choke (r.f.c.1) provides a radio frequency collector load for the oscillator. I used a 22μH moulded inductor, but if this isn't available about six turns of thin enamelled wire wound through a small ferrite bead would give roughly the same inductance value.

Like any simple transmitter, the *Mighty Mite* requires a resonant antenna with 50Ω impedance or an antenna tuner unit. I would be interested in hearing from readers who achieve good results with a stand-alone Mighty Mite transmitter.

Similar Stages

Returning to the *Pebble Crusher*, a glance at the circuit shows that the two stages are very similar. The first stage duplicates the *Mighty Mite* and a power output of some 500mW is achieved by adding an amplifier stage. A 4:1 impedance ratio transformer (T1) matches the output of the oscillator to the input of the class C amplifier. This enables good power transfer and isolation from the oscillator stage. A ferrite bead is added to the base lead of the amplifier to prevent possible parasitic oscillations in the amplifier transistor.

The amplifier output circuit is similar to that of Fig. 2. Another 22μH radio frequency choke provides the collector load and a pi-type low-pass filter matches the collector to a 50Ω output. This is designed with a cut-off frequency of around 7.3MHz. Some experienced constructors of simple transmitters may consider two harmonic filters in such a simple project to be overkill. However, it does mean that the driving power to the amplifier has little harmonic content so unwanted signal energy is not amplified.

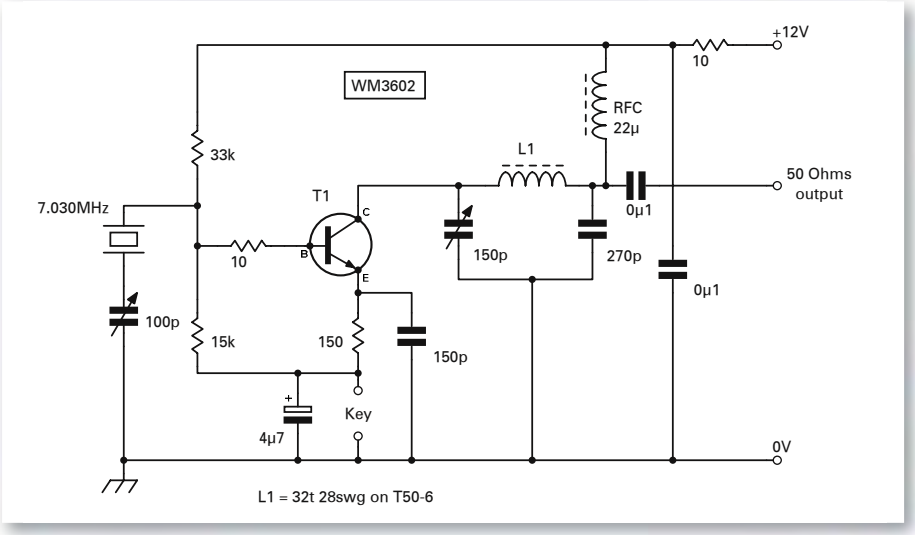


Fig. 2: Fancy trying really low power – QRPp? This circuit, the **Mighty Mite***, will provide 25 to 30mW and a great challenge to use on the air!*

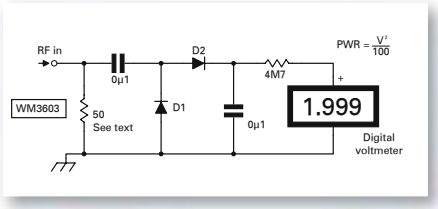


Fig. 3: The 'Easy Wattmeter' circuit.

The G3RJV Version

My version of the *Pebble Crusher* was built on perf-board; a 0.1 inch matrix board – like Veroboard but without the copper strips. The component leads are pushed through the holes and the surplus ends of the leads are used to make interconnections underneath the board. The layout roughly follows the component placements in the circuit diagram. Some small gauge copper wire may be needed to complete all the interconnections.

A trimmer capacitor is used for the VXO control, although some constructors may prefer a variable capacitor with a shaft control. The variable capacitor in the oscillator low-pass filter is also a trimmer capacitor. The inductors L1 and 2 should be wound to occupy about three-quarters of the circumference of the core, L1 has 32 turns of 28s.w.g. enamelled copper wire on a T50-6 core and L2 has 28 turns of 26 s.w.g. enamelled copper wire also on a T50-6 core.

The transformer (T1) is wound on a ferrite FT37-43 core. Wind the primary first with 12 turns of 26s.w.g. spread out over three-quarters of the core circumference and then add the secondary winding. This is made up from 6 turns of 26s.w.g. wire wound in the spaces of the primary winding at the grounded end.

I used 2N2222A transistors in a metal TO-18 casing but the plastic TO-92 version would also work. An advantage of using the metal TO-18 case is that a small heat sink can be attached to the output transistor to dissipate surplus heat. My *Pebble Crusher* uses a small clip-on heat sink designed for the TO-18 casing but it's easy to make a simple heat sink.

A small piece of aluminium or copper sheet is wrapped around a drill bit the same diameter as the transistor case, one side overlapping where the ends of the metal meet. This is then squeezed to make a tight fit on the TO-18 case. The photograph of the W1FB prototype shows that Doug used the TO-92 plastic version of the transistor.

For a heat sink, on his original project Doug used a small piece of quarter inch outer diameter brass tubing slightly flattened and cemented to the transistor casing with epoxy resin. This could also be used with the metal TO-18 casing.

The *Pebble Crusher* is easy to set up and the variable capacitor in the oscillator low-pass filter is adjusted for a chirp-free c.w. note and a transmitter output of about 500mW. The 'Easy Wattmeter', shown in **Fig. 3**, and is often featured in this column, will enable the output to be measured using a digital voltmeter and the formula Power Output = $V^2/100$.

The *Pebble Crusher* is a nice little transmitter to build and use and share in the living history of Amateur Radio. Try one for yourself! ●

Roger Cooke's

morse mode

This month Roger Cooke G3LDI takes a look at sidetone and zero beating.

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Sidetone and zero-Beating? There may be some *PW* readers who don't know what these terms mean, even more so these days with the non-requirement for a Morse test. So, a small explanation may help. When transmitting s.s.b., it's not necessary to do anything other than tune in the s.s.b. station and call them. With modern transceiver it's automatically assumed that you'll be transmitting on their frequency. This, of course, happens for normal 'same frequency' QSOs, but you can be caught out if you have previously adjusted the receiver incremental tuning (RIT), in which case you'll be off frequency by the amount of shift indicated in the RIT display.

In the case of c.w. , it's normal to monitor your transmission by the sidetone (a special, generated tone) which is also adjustable in frequency and volume. Some older transceivers (including the Yaesu FT-1000MP that I use) have a really grotty sidetone to listen to. Indeed, comparing the FT-1000MP's sidetone to that on the new FT-2000 that I also have, the difference is like comparing chalk and cheese!

Other modern transceivers, including the Icom IC-756PRO III, the newer IC-7600 and of course the IC-7800 have sidetones that are very pleasant to listen to when keying. You may not think this is important, but ask any good c.w. operator and they will tell you otherwise! A suitable analogy can be heard when a good pianist is playing a piano. Indeed, I'm using this analogy because I play the piano and can confirm most definitely that this is true. Even a good pianist playing a badly out of tune piano – with a few notes missing and the keys falling apart – they'll play badly.

If, on the other hand, the pianist has a Bluthner, or Bechstein, tuned every six months and in impeccable condition – they'll strive to play their best. Operating c.w. is like that, and a gorgeous sidetone, accompanied by a good paddle and keyer will make a good c.w. operator even better!

Sidetone Frequency

The actual audio frequency of the sidetone is a matter of personal taste and usually relates to age. Youngsters normally prefer a high tone, somewhere around 600 to 900Hz, whereas an old timer (like me) will normally prefer a 400 to 500Hz note. If you listen to that note and match the transmission that you are monitoring to the same note, you will be zero beat, in other words on the other station's frequency.

You should, as a matter of accuracy and politeness, try to get as near to zero beat as you can. Listening in the Radio Society of Great Britain (RSGB) Club Contests (CC), a calling station will be as much as 300 – 400Hz off frequency. In fact, I have often been uncertain as to whether I am being called in that situation, but then found that I was! This has often been due to the fact that the transmitting station has forgotten that their RIT is still in and he has called that much off frequency. So be careful, it is so easy to do!

What's T9X?

So, what does T9X represent? No, it's not another Chesterfield Island DXpedition – it's the normal reporting system in action. When using Morse we use RST, where R = readability, S = signal strength and T = tone. If you look this up (it's surprising how many newcomers to Amateur Radio have never heard or used the system) on the Internet you will find it will be able to give some honest reports.

However, DXpeditions and Contests all use the ubiquitous 599 to everybody – a totally meaningless report normally. This habit is related to the ease of logging and use of computer programs. Anyway, **Fig. 1** shows what you should be using with normal QSOs and there are three other additional characters that can be used on the end of a report – X, C and K.

If you receive a report of 599x, that is the ultimate you can receive. It means your signal is fully readable, extremely strong, with a perfect tone. The X on the end means it is similar to a crystal controlled transmission so 599X is the 'Holy Grail' of reports. If a C is added, it means that you have a chirp, or pull in frequency on your transmission. If a K is added it means you have key clicks, just like some of the un-modified FT-1000MPs that can be heard in contests! The two letters C and K can both be added if it is really bad, an indication that you should do something about it!

Pride should always accompany your operating and it should also be present in the state of your transmitted signal too. Some of the first Eastern European stations to be active on h.f. had awful transmissions. They used any old equipment they could get hold of and it was usually ex-military, but now lots of them have access to the latest top of the range equipment.

Whatever you use, please make sure it sounds good, both the transmitted signal and also the monitored side-tone. You will derive more pleasure from your operating that way. 73 and May the Morse be with you! Roger G3LDI. ●

Fig. 1:
Readability - Strength - Tone: RST Signal Reports.

R-S-T Characteristics	Readability R	Strength S	Tone T (cw)
1	Unreadable	Faint signals, barely perceptible	Sixty cycle a.c or less, very rough and broad
2	Barely readable, occasional words distinguishable	Very weak signals	Very rough a.c., very harsh and broad
3	Readable with considerable difficulty	Weak signals	Rough a.c. tone, rectified but not filtered
4	Readable with practically no difficulty	Fair signals	Rough note, some trace of filtering
5	Perfectly readable	Fairly good signals	Filtered rectified a.c. but strongly ripple modulated
6	N/A	Good signals	Filtered tone, definite trace of ripple modulation
7	N/A	Moderately strong signals	Near pure tone, trace of ripple modulation
8	N/A	Strong signals	Near perfect tone, slight trace of modulation
9	N/A	Extremely strong signals	Perfect tone, no trace of ripple or modulation of any kind

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Phil Cadman's

valve & vintage

Phil Cadman G4JCP learns about a talking electric oven and remembers his early days on v.h.f. using amplitude modulation.

Hello and welcome to my first *Valve & Vintage* (*V&V*) column of 2010. I hope you all had a good Christmas and New Year and are now eager to indulge in a little vintage home construction? I hope so because, throughout 2010 I'll be featuring more practical projects than of late. But – as ever – before I switch on my soldering iron, I must thank everyone who kindly wrote to me about the topics I featured last time.

First, my thanks to **David Bradley M6DTB** who E-mailed about Morse Code in commercial music recordings. He specifically mentioned hearing 'SOS' in Morse at the beginning of **Chris de Burgh's** *Ship to Shore*. One track I remember is **Roger Waters'** *The Tide Is Turning*, which includes lots of Morse-like noises. However, very little makes any sense.

On a related subject, when I first heard *Pandora's Box*, a track from **Procol Harum's *Procol's Ninth*** album, I was surprised to hear the lyrics:

Pegasus the winged horse
Relays his messages by Morse

The quote of course brings to mind Pegasus, the emblem of the *Radio Amateur Callbook* Inc., and the **Amateur Radio Relay League** in the USA. Coincidence? Makes me wonder!

Paul Beaumont G7VAK, from London was reminded of his childhood when he read in my December column, about Eric Chardin's home-constructed TV receiver. He remembers watching transmissions from the Crystal Palace transmitter while living in the attic of a house in West Croydon.

The set had been made by his father (who was ex-Royal Signals) from a *Wireless World* kit. The cabinet was an old tea chest with the back left open! When commercial television began, a suitable converter was constructed and attached to the set. Changing channels and fine tuning was a little hazardous, what with the open back. Thanks for that, Paul. I'm glad to have brought back some happy memories for you.

Two readers contacted me about Velocity modulation. It was nothing, as it turned out, to do with Cossor's patent, but a much later technique developed by Philips. **Andrew Howlett G1HBE**, told me he remembers working on TV sets which featured this type of velocity modulation when he was in the TV trade. Then **Liam Brady EI9DVB** E-mailed with more details.

Liam worked for a time in the **LG Philips Labs** in Eindhoven, and became familiar with what was known as **Scan Velocity Modulation (SCVM)**. He says: "There was a department working on Scan Velocity Modulation. It was considered an essential element of the chassis design and had its own software control and circuitry. The circuit was fed with the luminance 'Y' signal, which was differentiated to produce +ve and –ve going pulses at the leading and trailing edges of the video content.

"These signals were amplified and fed to a small coil of about 4μH on the neck of the cathode ray tube (c.r.t.), which opposed or aided the horizontal scan. The signal slowed the scan velocity in transition from black to white – which made the white spot brighter – and speeded up the scan velocity on the white to black transition. This made a noticeable improvement in perceived resolution as long as it was not over done."

Thanks very much indeed for the information, Liam and Andrew. I certainly hadn't come across SCVM before, so I've learned something new. Inevitably, the technique was short-lived, as liquid crystal and plasma displays have now all but replaced the c.r.t. in television receivers.

Finally, I'd like to thank everyone who contacted me in 2009. I very much appreciate your comments, stories and suggestions. By the way, my E-mail service provider has recently taken steps to prevent unsolicited commercial E-mails (Spam) reaching me.

Previously, such E-mails were marked as Spam but not automatically deleted. Consequently, there's now a small risk that a genuine E-mail may be automatically deleted. So in future, I shall acknowledge all E-mails I receive within a short time (even if I don't answer them fully straight away). So, if you don't receive an acknowledgement, please send the E-mail again, preferably as plain text.

Chatty Drains & Grates

I've recently mentioned a 'talking' drainpipe and a 'talking' fire grate, two examples of unlikely radio receivers. This time, as promised, I've a story from **Derrick Dance GM4CXP** about a 'talking' oven!

Derrick tells me that back in 1974 when he first received his licence, he became active on 144MHz amplitude modulation (a.m.) with a converted private mobile (PMR) Pye transceiver (he can't remember the model). On one occasion he was operating from his outdoor shack – which was situated close to the house – when his Mother came rushing out of the kitchen. "Your voice came out of the oven when I opened the door!", she said.

Derrick's antenna was beaming towards the house at the time and can only guess that rectification of his 144MHz signal was taking place in the oven. He eventually concluded that must have been the case, because after a good clean, the oven spoke no more! Thank you for another curious and amusing radio story, Derrick.

Derrick's 144MHz a.m. operation reminded me of my own early exploits on that band. Licenced in 1973 as **G8HHK**, my first transmitter was the transmit section of a Pye *Ranger* PMR set. Running just 10W input (and getting only 3W out, as I later discovered) with crystal control.

The receive side of my station was equally unimpressive: comprising a 144MHz converter running into a Trio 9R59DS tuning 2 to 4MHz. Naturally, the image response of this arrangement was awful and I used to receive the local electricity

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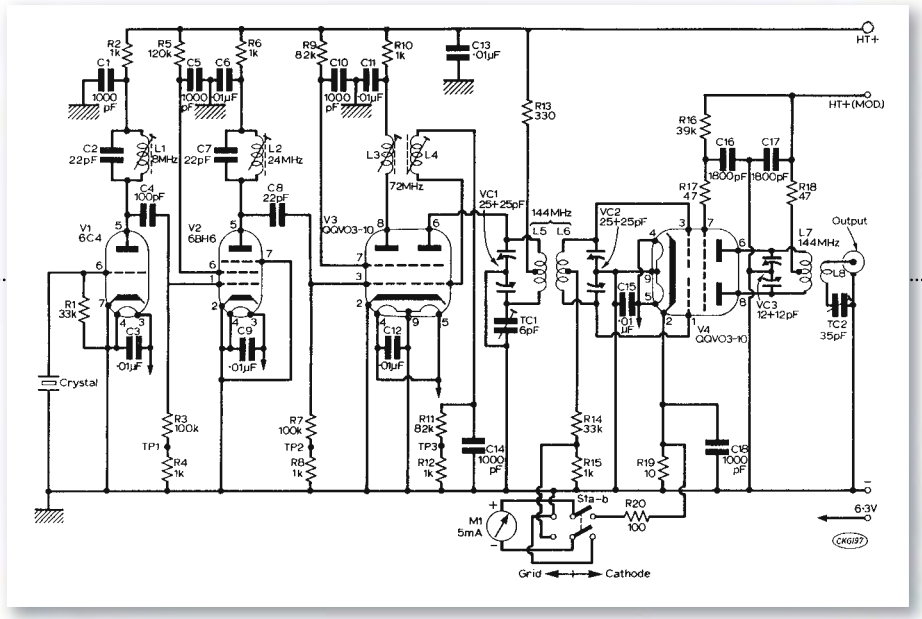

Fig. 1: This is a copy of the circuit from the September 1972 article.

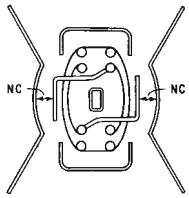

Fig. 2: A cross-section through the innards of the QQV03-20A from the VHF UHF Manual, 4th Edition, page 5.11. Courtesy of the RSGB.

board transmitters far stronger than stations that were actually in the 144MHz band! At least I had a decent beam antenna though: a 14-element Parabeam.

Despite the limitations of my first set-up, I did contact many stations (no doubt the beam helped) and had great fun doing so. As Calling "CQ" for a minute or two and then tuning 'high-to-low' (or 'low-to-high') added some 'excitement' which is missing from today's variable frequency oscillator (v.f.o.) based simplex operation. I would then wonder if anybody was calling, as I carefully tuned the band listening for any carriers.

Back then, the band plans of both 144MHz and 430MHz were based on geography, with very few set frequencies. Basically, where you were supposed to transmit within the band was determined by your location.

Directional antennas were the norm, and so when beaming in a certain direction, you had a good idea of where in the band any reply might be heard. That was the theory, but most operators always tuned over the whole band regardless. Of course, all this geography lark completely went by the board when there was an opening or contest on!

The *Ranger* Circuit

The transmitter circuit strip of the *Ranger* was similar to the circuits used by many amateurs when building crystal controlled 144MHz a.m. transmitters. To give you an idea, **Fig. 1** shows the radio frequency (r.f.) section of a typical 144MHz a.m. transmitter. This is yet another **F. G. Rayer G3OGR** design, featured in the September 1972 issue of *PW*.

The project consists of a crystal oscillator followed by a series of frequency multipliers. The power amplifier is a low power v.h.f. double-tetrode wired in push-pull. A conventional modulator supplies modulated high tension (h.t.) to the power amplifier (p.a.) valve's anode and screen grid. The Pye *Ranger* circuit is slightly different, in that the crystal oscillator uses a 6BH6 pentode in an electron-coupled Colpitts configuration.

As you can see, the circuit is quite straightforward. A triode - a 6C4 - is wired as a crystal oscillator with its anode load tuned to the crystal frequency of 8MHz. This is followed by a 6BH6 tripler giving 24MHz. Then things get slightly more interesting!

The QQV03-10 is double (beam) tetrode (more about the QQV series of valves later) but here it's used as two separate valves. One section is used as a further tripler (to 72MHz) while the other section doubles up to the final frequency in the 144MHz band.

Mathematically inclined readers will have worked out the total multiplication is times 18. So the crystal frequency needed is the final required transmit frequency, divided by 18 (around 8MHz).

In practice, young cash strapped Amateurs simply tried to get hold of any crystal with a frequency between 8MHz and 8.110MHz (or whatever, depending on the multiplication) and would use that. Always assuming the final frequency was broadly in line with the band plan and didn't clash with a beacon frequency. Or indeed one of the Aeronautical Spot frequencies, which, at the time, had to be avoided in the lower half of the 144MHz band.

The QQV03-10 power amplifier could be run with 15W input (more if you pushed things) and so an inexpensive 10W modulator would easily give full modulation. Designs like this can be built today, as all the components are still available (albeit from specialist sources) and the coils are all home-made.

However, building from scratch does take time and so a quicker (and much easier) method is to resurrect an old transmitter. Many Amateurs, who were first licensed in the late 1960s and the first half of the 1970s, particularly those who held Class B licences (the 'G8' series), may have an old 144MHz a.m. transmitter in the loft – so ask around.

Alternatively, why not try an old Pye p.m.r. set? Both the *Ranger* and the later *Cambridge* have these simple valve transmitters. Of the two, the *Cambridge* is better as it has both a transistor inverter (for providing h.t.) and a transistor modulator. It's also smaller and lighter.

Oh, we mustn't forget 70MHz! In those days the absence of commercial Amateur gear for the band meant that all transmitters had to be either home-constructed or converted PMR sets. The old 70MHz calling/mobile channel – 70.260MHz – still exists in the band plan and just about every 70MHz a.m. transmitter still around has a crystal for that frequency. Why not have a go?

Special Mention

The family of valves the QQV03-10 belongs to deserves a special mention. Double (beam) tetrodes for operation at v.h.f. and u.h.f. have been around for a long time and fall into two distinct varieties: American and European.

The American types – such as the 832A and 829B – consist of two separate valve structures housed in one envelope, with common connections for the cathodes and screen grids. Sometimes a screen by-pass capacitor may be mounted inside the envelope but all (I believe) require external neutralisation.

To briefly explain: almost all valves have some significant internal stray capacitance between their anode and control grid. **Note:** The same applies for all the electrodes, but it's the anode-to-g1 capacitance that's critical. When both the grid circuit and anode circuit are tuned to the same frequency (as in a power stage), the tiny amount of r.f. that leaks through this capacitance may be enough to cause the stage to oscillate, or at least behave erratically.

Various techniques can be employed to neutralise this stray capacitance, which usually involve deliberately feeding back an anti-phase signal from the anode to the grid. When correctly adjusted, the in and out-of-phase signals cancel at the grid and the stage is stable.

When using the American type of double-tetrodes, the out-of-phase signal has to be provided by making a small capacitor (usually just a short length of wire) connecting it between the grid of one half of the valve and the anode of the other half of the valve. As you'll appreciate, in a push-pull stage, each anode has equal **but opposite** r.f. voltages. In the more modern European double-tetrodes, this small capacitor is provided within the valve envelope, and in a correctly designed layout, no external neutralisation is necessary. How this is done is shown diagrammatically in **Fig. 2**.

Notice also that the electrode structure consists of a common cathode and common screen grid, but the control grid is split into two halves and the anode is similarly split in two. By far the most common valves of this type you'll find in both commercial and Amateur v.h.f. and u.h.f. transmitters are the QQV03-10, QQV03-20A and the QQV06-40A, see the photographs of **Fig. 3** and **4**.

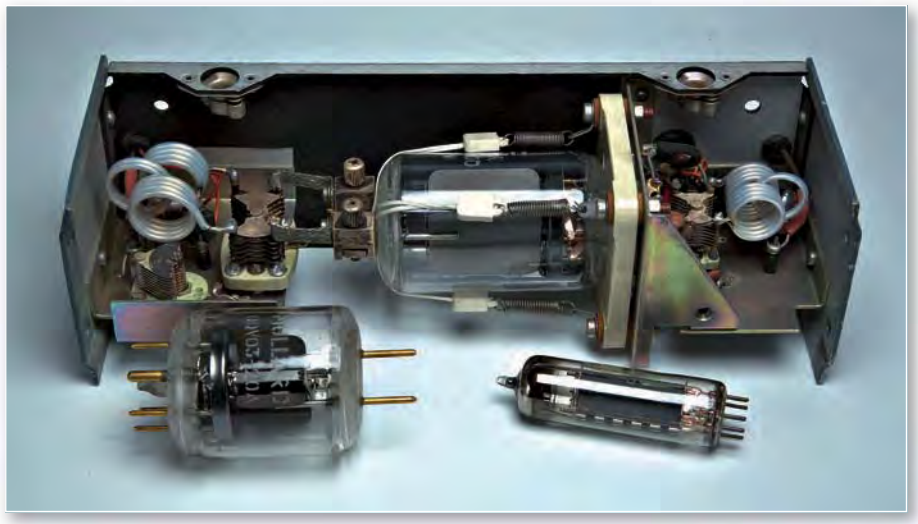

Fig. 3: A v.h.f. p.a. stage from an ex-p.m.r. using a QQV06-40 valve alongside a QQV03-10 (Smaller valve on the right) and a QQV03-20 valve (left).

Fig. 4: Comparing the American 3E29 double-valve on the left, alongside the European style QQV03-20 and QQV06-40A 'siamese-twinned' valves.

The figures before the dash indicate the maximum anode voltage (in hundreds of volts) while the figures after the dash give the total anode dissipation in Watts. Hence the QQV06-40A has a maximum anode voltage of 600V and a combined anode dissipation of 40W (2 x 20W).

Trying Amplitude Modulation

Well, before I close down this month, don't forget that a.m. is often to be found on the 3.5MHz band and occasionally on other h.f. bands too – including 28MHz. So, there's no reason why a.m. transmitters for 70, 144 and even 430MHz couldn't be put back on the air.

And don't forget, there are transistor a.m. transmitters – both Amateur and p.m.r. rigs – still around too. Indeed, **Tony Nailer G4CFY's** QRP *PW Mellstock* 70MHz modern a.m. transmitter could get you into action on a.m on 4m! So, if you're not keen on high voltages, you can try this approach. There's something about the sound of a good quality a.m. signal that sets it apart from all other modes. Try it!

Please remember to send your comments and letters to me, either via E-mail to: **phil@g4jcp.freeserve.co.uk**, or by letter to: **21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX**. 73 Phil. ●

Colin Redwood's

what next?

Colin Redwood G6MXL looks at some more operating techniques and discusses the updated 7MHz band plan.

Welcome to *What Next?* (*WN?*) where last month I looked at some ways of overcoming nerves about your first QSO and typical operating techniques for a basic 'rubber stamp' s.s.b. QSO ('on the air contact). So, this month I'm going to extend the experience to help you by looking at some other operating techniques,which will be illustrated using the Yaesu FT-817ND transceiver.

To start off this time, I should mention that in my opinion, there's one guiding principle that should apply to anyone who is using any method of communication (not just Amateur Radio) – that we must try to consider what it's like to be on the receiving end of the communication! If you follow this very basic rule, then the stations listening to you on the air will know what you're doing. It's a bit like remembering to use your indicators when driving – you have to provide some indication as to what you're planning to do!.

Anyway, enough of the basic principles – it's time to go on to the practical. However, I will provide appropriate 'indications' as we go along!

You will no doubt recall that previously I have explained how we should always check whether a frequency is in use. And that after checking a couple of times – with no response – you could reasonably assume that the frequency is not in use, and that you could consider it to be 'your frequency' for you to call and use for a while.

Imagine now that you are listening-in to a QSO that's in progress between two other Amateurs. If you want to have a QSO with just one of them, in most situations it would be considered rude to just 'butt in'. Just think for a moment – common courtesy tells us that you wouldn't break into the middle of a conversation two people might be having in a room! So, obviously it's best not to do this on the air – especially if you don't know the people in question. Instead, it's far better – and much more polite – to wait to the end of the QSO.

As the QSO draws to an end there's a pretty good chance that you'll pick up a few clues as to whose frequency it is. If you've decided – from the clues – that the station that you want to work 'had the frequency first', then once you're reasonably certain that the QSO has finished, it will be perfectly in order to call that station. The call could be something along the lines of, '**G6MXL this is M6ZZZ calling**'. This technique is known as 'Tail Ending'.

If however, the station you want to work isn't the station whose frequency it is, then you will need to be careful not to upset the station whose was on the frequency originally. You also need to help matters by suggesting an alternative frequency or better still an indication of where to listen. Something like, '**G6MXL from M6ZZZ up five**' (meaning that you would like the other station to move up 5kHz so that you can call them). You can then re-check that the frequency 5kHz up is clear, and (assuming it is clear) call the other station directly, '**This is Mike 6 Zulu Zulu Zulu calling Golf 6 Mike X-Ray Lima**'.

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Transmitting Frequencies

With most modern transceivers, the frequency that they transmit on is, for all practical purposes, exactly the same as the frequency as they receive on. However, this is not necessarily the case for older transceivers, separate transmitters and receivers, and some home-made equipment.

So, what do we do if the station you are trying to work is transmitting on a slightly different frequency? Recognising this fact is actually the first challenge! Typically the other station will appear slightly off frequency. Your reaction is likely to be to re-tune slightly, only to find that the following the next 'over' (period of transmission) from the other station is again slightly off frequency. Unfortunately, if this carries on, both stations will be re-tuning after each 'over'!

Fig. 1: The left-hand side of the front panel showing the clarifier button (CLAR) and SEL rotary control.

KENWOOD

Listen to the Future

Unique concept, brilliant execution. Kenwood's compact TS-480HX/SAT and Simon Brown's 'Ham Radio Deluxe' operating software make a world-beating combination. HRD interfaces brilliantly with either version of the TS-480 to deliver a small-footprint base station of unrivalled flexibility in control, whether you're operating voice, data, or full-on contesting. And wherever it is, this HF transceiver delivers an astonishing punch: 200W. Performance is equally impressive. For example, a quad-mixer provides RX dynamic range in the TS-950 class, while AF DSP processing offers many powerful features, including noise reduction, a speech processor and AF filters. And of course you can enjoy all the convenience of Ham Radio Deluxe's PC-based control. The TS-480HX/480SAT lets you enjoy the best of both worlds.

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Fig. 2: The display showing the " – " sign between the 3 and the R indicates that the clarifier is in use. The large R indicates that the rear antenna socket is enabled.

Fig. 3: The right-hand side of the front panel showing the yellow F button above and to the left of the main tuning control.

A similar situation can arise if you realise during the QSO that perhaps you hadn't quite tuned in the other station correctly in the first place. Unfortunately, if you adjust the main tuning control, then while you may hear the other station more clearly, the other station will think that you are slightly off frequency and re-tune their transmitter.

Fortunately, there's a simpler way of dealing with both the situations I've described. How? By using the **Receiver Incremental Tuning** (RIT) or it's sometimes known as the **Clarifier** control. Using this control allows you to receive on a slightly different frequency to the one you are transmitting on.

Note: Leave the main variable frequency oscillator (v.f.o.) untouched, so that you continue to transmit on the same frequency for each 'over', and hence the other station will not need to change their frequency.

Then, adjusting the clarifier or RIT, you can tune just the receive side of your transceiver to get it spot on frequency.

To enable the clarifier on the Yaesu FT-817ND, press the **CLAR** button briefly on the bottom left of the front panel. Then adjust the receive frequency with the **SEL** rotary control also on the bottom left of the front panel, **Fig. 1. Note: On the FT-817ND,** the display shows **"–"** to indicate that the clarifier is in use, see **Fig. 2**

When you have finished the QSO, don't forget to switch out the clarifier or RIT (by pressing the **CLAR** button briefly. If you don't, you will not hear most stations when they reply to your CQ calls!

Dual VFOs

In common with many other modern transceivers the FT-817ND has two v.f.o.s per band known as **VFO A** and **VFO B**. These enable an operator to rapidly switch between two 'current' frequencies per band. They can prove very useful and – for example – it can be quite convenient to use one v.f.o. for your working frequency and one for the calling frequency on the v.h.f. and u.h.f. bands.

Switching between **VFO A** and **VFO B** is quite simple on the FT-817ND. All you have to do is to briefly press the yellow **F** button **(Fig. 3)**.

Note: Another use for dual v.f.o.s is to have one tuned to the c.w. (Morse) part of the band and the other in the s.s.b. part of the same band. They really do help to make operating very convenient!

Split Frequency Operation

There's another situation where dual v.f.o.s will be very useful on the occasions when you need to transmit on a different frequency to the one you are listening on. This is called split frequency operation (or 'Split' for short). This is a technique that some major DXpeditions use and to understand why this technique is used, you need to think of the situation a DXpedition operator is facing.

When the operator calls "CQ", tens, hundreds or even thousands of stations will all try to call the DXpedition simultaneously. Some of these stations will keep calling long after the DXpedition station has started to transmit having heard a full or partial call sign. Obviously this is not a very efficient way of making contacts and can be very frustrating to everyone concerned.

When this happens, a good DXpedition operator will change to spilt frequency operation. The DXpedition will transmit on one frequency and listen on another,

typically 5 to 10kHz higher. The DXpedition operator will call "CQ" stating that they are listening 5kHz higher or 5kHz higher in frequency.

For example, a DXpedition s.s.b. station transmitting on 14.195MHz might listen up 5kHz on 14.200MHz. So, if you want to work the DXpedition, you will want to listen on the DXpedition's frequency 14.195MHz, and adjust your transmit frequency to 14.200MHz without changing your receive frequency of 14.195MHz.

Modern Transceivers

Most modern transceivers incorporate a facility to operate split frequency. And I suggest that readers become familiar with setting up split frequency operation on their transceivers before trying to work DXpeditions. This is to avoid the need to find and hunt through instruction manuals when wanting to work some exotic DX station!

In the case of the FT-871ND split frequency operation is quite easy to set up. Using the example above, set the transceiver's **VFO A** to 14.195MHz (the frequency you want to listen to) as I described in the Dual VFO section above.

Next, press the F key (Fig. 3) and rotate the **SEL** control (Fig. 1) until the display shows A/B, A=B, SPL **(Fig. 4**). Press the **A** key briefly to select VFO B. You can then use the main tuning control to tune the FT-817ND to 14.200MHz (the frequency the DX station is transmitting on).

With **VFO A** set to 14.195MHz and VFO B is set to 14.200MHz, pressing the **C** (**SPL**) button briefly will enable split frequency operation. You will then receive on **VFO B** (144.200MHz) and when you transmit you will transmit using VFO A (144.195Hz). You will also note that a small '**s**' icon **(Fig 5)** appears in the bottom right of the display.

Split frequency operation using the dual v.f.o.s doesn't even have to be limited to the same band. This is a useful technique for Satellite operation, as I described in the September 2009 *WN?*

When you want to return to normal operation, just press the **C** (**SPL**) button to cancel the split frequency operation. Note that the small **s** icon will then disappear from the bottom right of the display.

Fig. 4: The display showing the dual v.f.o. options.

Fig. 5: The display on the Yaesu FT-817ND with the very small s in the bottom right indicating that split frequency operation is enabled. The large S on the left indicates that the S-meter is operational.

Other Countries

Split frequency operation is a necessary technique where Amateurs in other countries have different frequency allocations. Take for example the situation in respect of the new 70MHz (4m) allocation in Belgium.

Radio Amateurs in Belgium, with permission, can only operate on a spot frequency of 69.950MHz with a maximum bandwidth of 10kHz. However, in the UK Amateurs are only permitted to operate between 70.000 and 70.500MHz.

The problems can be overcome by using split frequency. With UK Radio Amateurs listening on 69.950MHz and transmitting between 70 and 70.500MHz and Belgian Amateurs listening between 70 and 70.500MHz – and transmitting on 69.950MHz – it should be possible to make QSOs if propogation conditions are favourable.

The 7MHz Bandplan Update

Brian Waddell GM4XQJ dropped me an E-mail to point out that since I prepared the summary bandplan table that appeared in January 2010 *WN?*, the 7MHz (40m) band plan has changed slightly. CW (200 Hz) is now 7.000 to 7.040MHz, narrow digital modes (500 Hz) is 7.040 to 7.050MHz, digimodes (2700 Hz) is 7.050 to 7.060MHz, phone and c.w. (2700 Hz) is 7.060 to 7.200MHz.

In his E-mail, Brian says that is appears that not many Amateurs – using digimodes – seem to be aware that the bandplan has changed and it causes upset as the digi operators are saying that c.w. operators are causing deliberate QRM. In fact the c.w. operators are in the correct part of the band and it is the PSK stations that should be up above 7.040MHz. Please take note of the changes.

See you next month!

●

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Share your news, views and reports with fellow readers. Reports to David by the last Saturday of each month please.

This month David Butler G4ASR takes a look at winter propagation and describes how to make a moonbounce contact on the 50MHz band.

Propagation on the v.h.f. and u.h.f. bands during December was fairly quiet to say the least. Sporadic-E (Sp-E) events were however noted on the 50MHz band with openings being reported on December 13th and 14th. Surprisingly the maximum usable frequency (m.u.f.) reached the 70MHz band on the 13th with contacts being made into southern Europe. These Sp-E openings coincided with the peak of the Geminids meteor shower and it is often difficult to differentiate between the two different propagation modes.

However, there is a clue insofar that meteor scatter (m.s.) contacts tend to be made in many different directions. On the other hand contacts completed via Sp-E propagation are made mainly towards a specific geographical area. Your reports of contacts made on the 50MHz band on December 13th confirm this.

Between 0700-1500UTC UK operators reported making m.s. QSOs with the stations of DK1MAX, DL6KR (Germany), HA2RD (Hungary), LA5ZK, LA7AJ (Norway), OK1ACF (Czech Republic), OZ5IQ (Denmark), SM2CKR (Sweden), SQ2LYF (Poland), S56RR, S57TW (Slovenia) and YU1KY (Serbia). As you can see, these contacts were made with stations situated throughout much of Europe on many differing beam-headings. Between 1615-2020UTC an intense Sp-E opening was reported by UK stations, from Jersey (IN89) in the south, through England and Wales and up as far as the IO88 locator square in northern Scotland.

Contacts however, were only made with stations situated in Portugal (CT), Spain (EA), Gibraltar (ZB) and Morocco (CN). This is pretty much conclusive proof that the opening was via Sp-E propagation.

Among the c.w. and s.s.b. contacts made from the UK were the stations of CN8LI, CT1ANO, CT1DHM, CT1FFU, CT1FJC, CT1FMX, CT2JNM, EA1NL, EA1GDX, EA1GVG, EA1NL, EC1AJL, EA2LU, EA2TZ, EB3FSS, EA4AGI, EA4AKC, EA4CM, EA4CW, EA4EOZ, EA4FFM, EA4UW, EA4YR, EA5BZ, EA5EF, EA7AH, EA7BYM, EA7DLD, EA7DBP, EA7DUD, EA7EU, EA7HG, EA7KW, EA7OR, EA7WA and ZB3B

After the Sp-E opening had finished, UK operators then spent the rest of the evening making m.s. contacts with stations such as EA3LL (Spain), LA/OZ1BNN (Norway), OH6KTL (Finland), OZ1CTZ (Denmark), SO5AS (Poland) and S59F (Slovenia).

It was a similar situation up on the 70MHz band. During much of the daylight hours m.s. contact were being made with stations located in Norway and Finland. These are countries that have just gained access to the 'Four Metre' band and there was keen competition to get these stations in the log! However, just like propagation on the 50MHz band, there was a good Sp-E opening between 1700-2000UTC to stations situated in Portugal and Spain.

Your reports indicate that c.w. and s.s.b. contacts were made with the 70MHz stations of CT1FJC, CT1FFU, CT1FJO, EA1YV, EA5EF, EA5TT, EA6SX, and EA7BYM and surprisingly with EA8/EA4SV (Canary Islands) nearly 3000km distant.

After the Sp-E ionisation had dissipated, UK stations went back to

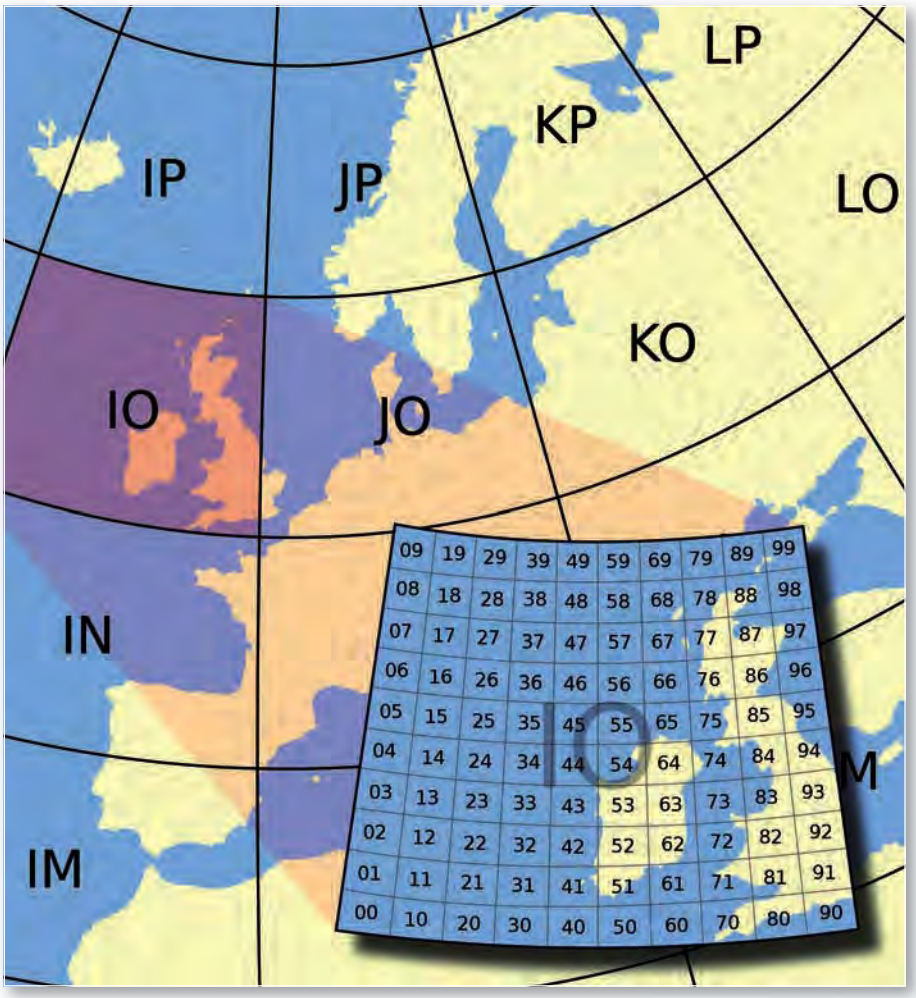

Fig.1: Part of the Maidenhead Locator Map.

Fig.2: The h.f. and v.h.f. antennas at the QTH of RU1A.

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making m.s. contacts with stations situated throughout Scandinavia. Among the contacts made, mainly using JT6M digi-mode, were the stations of OH2BGN, OH5LID, OZ1DJJ, OZ2OE, OZ8ZS, LA4LN, LA4YGA and LA/OZ2M.

Daran Josey MW0HMV (Carmarthenshire IO71) mentions that he has spent some time making JT6M m.s. contacts on the 70MHz band. During December he made digimode contacts with stations located in Denmark (OZ), Norway (LA), Finland (OH), Belgium (ON), Germany (DL), Spain (EA) and Croatia (9A). On December 13th he had just completed an m.s. contact with LA/OZ2M when he noticed a few spots on the DX cluster of UK stations hearing 50MHz beacons in Spain and Portugal.

Moving to the 50MHz band, he then went on to make s.s.b. contacts with the stations of EA4EOZ (IN80), EA4KAC (IM88), EA5EF (IM99) and ZB3B (IM76). Listening on 70.200MHz he then heard CT1FFU calling CQ and following a s.s.b. contact with that station Daran went on to make s.s.b. QSOs with CT1FJC (IM57), EA5EF (IM99), EA6SX (JM19), EA7BYM (IM66) and 9A1Z (JN86) .

Nick Peckett G4KUX (County Durham IO94) reports that he was active on the 70MHz band during the Geminids meteor shower. Using a mixture of FSK441 and JT6M modes his contacts included the stations of DI2PM (JO30), DL3YEE (JO42), LA/OZ2M (JP40), LA4LN (JO59), ON4PS (JO20), OY3JE (IP62) and OZ2OE (JO45).

Incidentally the 4-figure code given after the call sign is the 'locator' or 'grid' square. This system, devised by **John Morris G4ANB**, enables the location of a station anywhere in the world to be translated into a unique 4 or 6-figure code. The 6-figure system is very common throughout Europe and is used by v.h.f. operators to determine distance and beam-heading between stations.

The Maidenhead locator – as it is more properly known as – consists of two letters, four numbers and two letters, i.e. IO81MX. The locator system as shown in the diagram, **Fig. 1**, may also be used to calculate scores in v.h.f. contests and is often used for award purposes.

The 144MHz Band

During December the Geminids meteor shower created a reasonable amount of DX activity on the 144MHz band. Nowadays all contacts are often made using FSK441 rather than c.w. or s.s.b. Although the digimode is more efficient the use of s.s.b. during the peak of a really big shower can be quite exciting.

Your reports show that m.s. contacts were made on the 144MHz band with stations that included HA8CLI (Hungary), IK0BZY (Italy), LA/PA5DD (Norway), OE3FVU (Austria), OH1XT (Finland), OM3BC (Czech Republic), OY4TN (Faroe Islands), RN2FA (Kaliningrad), RU1A (Russia) - shown in the photograph **Fig. 2**, SM5CFS (Sweden), SP2MKO (Poland), S57VW (Slovenia), UX2SB (Ukraine), YL3HA (Latvia) and YT3I (Serbia).

Lance Collister W7GJ (Montana USA) reports that he's active on the 50 and 144MHz bands – primarily for weak signal DXing and Earth-Moon-Earth (e.m.e.) contacts. He's most interested in working new countries (DXCC) on 50MHz and over half of his DXCC contacts on that band have been made by using e.m.e.

The antennas at the station of W7GJ, shown in the photograph, **Fig. 3**, consist of 4 x 9-element Yagis on 50MHz and 16 x 17- element Yagis on the 144MHz band.

Both the W7GJ arrays are mounted on full azimuth/elevation mounts so he can accommodate single Yagi stations when the Moon is on your horizon. Lance mentions that if you have the JT65 mode and are active on 50MHz he would be very interested in running a schedule with you when the Moon is located in the right position.

The use of e.m.e. is a very productive way of working DX on 50MHz due in part to the fact that the geomagnetic Kp index generally remains quite low. During the best days of the month (with the lowest degradation from high sky noise and greater distances to the Moon) moonbounce contacts between single Yagi stations, even those running low power, are quite common.

The secret to success on 50MHz e.m.e. is to make everydB count! Any improvements will definitely be noticed on moonbounce where there is often only a dB or so between detection and a completed contact. Any improvements made to your antenna system will also pay dividends during Sp-E or F2 propagation events too. However, there are several points that need consideration.

The first thing to consider, is that you must use the very sensitive weak signal digital mode of JT65A as this transmission mode is 10 to 15dB more sensitive, or effective, than using Morse code. It's like increasing your

antenna gain by a factor of ten! This is the first requirement for anyone wanting to make an e.m.e. QSO on the 50MHz band.

Taking advantage of the capabilities of this great weak signal tool is easy, once you have the program properly set up. For a simple checklist of tips, download the file at **http://www.bigskyspaces.com/w7gj/JT65checklist.htm**

Next, you must try to increase your antenna system's gain as this will also help on both transmit and receive. Take a look at the table shown at **http://www.bigskyspaces.com/w7gj/6mTable.htm** as this will show how easy it is to add several dB by changing to a larger Yagi. You must also consider maximizing your ground gain. Many 50MHz operators don't think about 'ground gain' and just choose the antenna based on convenience or advertised gain claims.

Just as important – is what you do with an antenna when it's erected on a mast. An antenna aimed at the horizon and mounted over flat ground, with smooth terrain in front of it (free from 'ground clutter' of buildings, rooftops, cars, valleys, hills, etc.) is free to receive additional signal reflections from the ground. Good ground gain can make a single Yagi perform like a four-Yagi array. That additional 6dB gain is a huge bonus when running a moonbounce station. If you must put your 50MHz beam above a tri-band h.f. beam, try mounting it at right angles so that the h.f. elements are not shielding the 50MHz beam from valuable ground reflections.

Then you must optimise your station and this includes reducing feedline losses, making sure that your receiver is at its most sensitive. Then you should locate and replace lossy connectors and relays, and get the last Watt possible from your transmitter.

Many transceivers or older 50MHz receivers lack sensitivity in favour of increasing overload or dynamic range capability. It is very rare that the performance of a 50MHz receiver can't be improved by one or more dB by adding a modern low-noise external pre-amplifier.

Fig.: 3: The 50MHz moonbounce antennas at the QTH of Lance Collister W7GJ.

On transmit an amplifier will make a huge difference over the e.m.e. path especially when you are have low antenna gain. Remember that the difference between 100W and 400W equates to a 6dB increase in transmit system gain. That will greatly increase the ability to be copied when signals are barely at the threshold of detection.

You'll also need to replace any older or degraded coaxial cable with modern low-loss coaxial or even hardline feeder as this will help you on both receive and transmit. A good goal is to try to reduce your feedline losses to less than 1dB at 50MHz.

Finally to achieve that elusive 50MHz e.m.e. contact you must operate at the best times. Over the course of a month the path degradation can change by over 12dB due, just to the way the Moon moves across the sky. Focus your activities on the best days of each month and you will be amply rewarded with higher success rates. You can predict which days are best by consulting the free *GJTRACKER* computer program at **http://www.bigskyspaces.com/w7gj/tracker.htm** Now get building!

Deadline Time!

That's it again for another month and thank you for your reports. Please keep sending them in, preferably by E-mail to: **g4asr@btinternet.com** by the last Saturday of each month.

Good luck with the DX and see you again next month.

73 David G4ASR. ●

David writes: DX contacts mentioned in this column are made using either Morse (c.w.) or s.s.b. telephony in the appropriate sub-bands for each mode. On v.h.f. and u.h.f. this equates to contacts being made in the bottom 200kHz or so of each band.

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in the shop

This month Harry Leeming G3LLL continues looking at replacing p.a. transistors

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Welcome to *In The Shop* (*ITS*) where, now we've digested our Christmas festivities it's time to continue looking at replacing the power amplifier (p.a.) transistor in a rig. Last month I dealt with the replacement of the p.a. transistors in a 100W high frequency (h.f.) rig, but what about lower powered rigs, very high frequency (v.h.f.) rigs, which use a single transistor in the p.a. stage, or those which do not have an adjustable pre set bias control?

When a rig is produced the manufacturer can place bulk orders with their transistor suppliers and insist that all the devices have their parameters within strict limits. However, when we ordering a device, we have to take what comes, and so as in the case of the FT-290 that I chatted about a couple of months ago, the replacement transistor whilst it may be stamped with the same number as the original, can be quite different in its bias requirements!

When a rig is for frequency modulation (f.m.) only, and the p.a. stage operates in class C, the exact characteristics don't matter very much and in this case setting up the p.a. stage usually involves little more than peaking up the trimmers for maximum output.

Where the rig transmits in single sideband (s.s.b.) however, the bias must be adjusted so as to set the standing current to minimise distortion. The standing, or quiescent, current in a class B stage is not terribly critical – but there must be some current and it must not be too high. I've shown a typical FT-290 transistorised p.a. stage in **Fig. 1**.

Where no figures are given in the service manual , I usually presume that it should be around a 50th to a 100th of the maximum current that flows at full power output. On low powered rigs I tend to set it a little on the top side, an FT-290 p.a. stage that runs about 700mA maximum I set at 10 to 15mA, whilst a 100W rig peaking at 20A, I would set at around 200mA.

The quiescent current will vary as the p.a. stage warms up, and so the value of the components in the bias circuit have to be adjusted so that the standing current is in this range, after say 10 minutes operation. If the current tends to continue to drift upwards excessively, make sure that the current stabilising diode, (D23 in the case of the 290), is in good thermal contact with the output transistor, by adding a blob of thermal paste.

Measuring The Current

On some rigs, particularly small portable units, it's not all that easy to break the high tension (h.t.) feed to the p.a. stage to check the current, and in these cases and sometimes with larger rigs, I adopt the following strategy – which I will now go through using the Yaesu FT-290 as an example.

Set the FT-290 up in the s.s.b. mode into a dummy load, a sensitive power meter and squeeze the push to talk (p.t.t.) switch on the microphone. Next, check that the carrier is properly balanced, that there's no sound entering the microphone, and that no output shows on the power meter. Then carefully measure the total current that the rig is taking.

The method I've described, of course, includes the p.a. transistors standing current, which can next be measured by noting how much the total current falls if the p.a. stage is disabled. To do this, short circuit the base of the p.a. transistor to chassis, (after first double and triple checking that you've got the right connection,

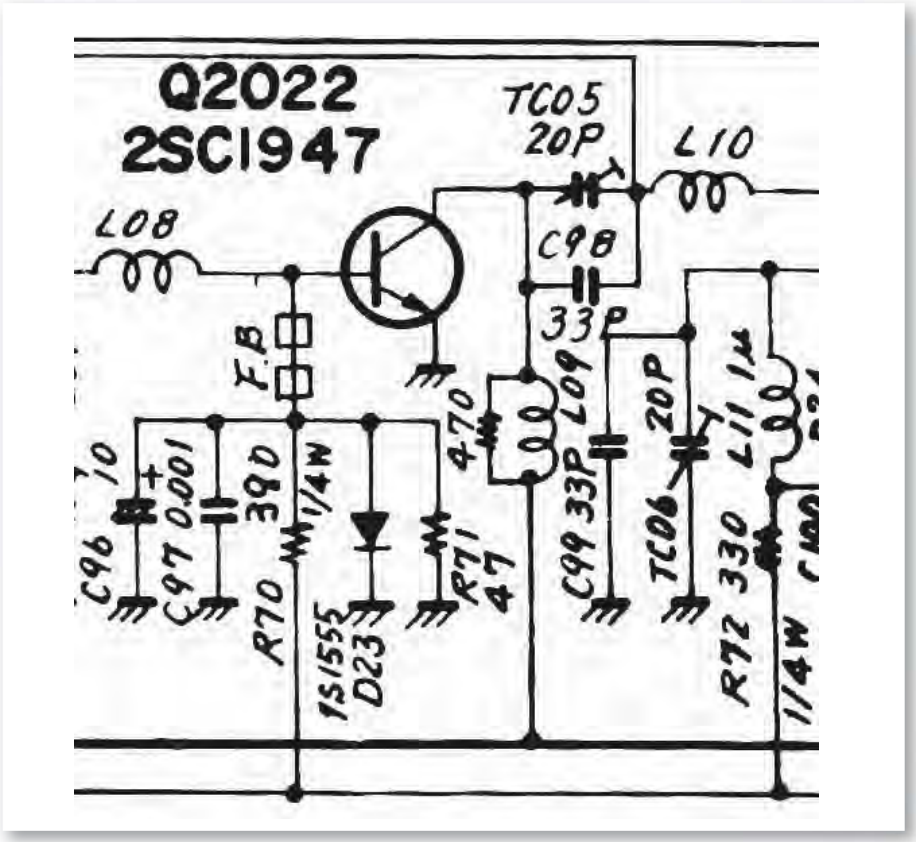

Fig. 1: A typical circuit for a low-medium power transistorised p.a. stage. The biasing is set by R70, 71 and diode D23.

Radio Spectrum under threat!

As users of the Spectrum, the issue is simple: PLA devices are causing interference and if we don't do something now we might not have a hobby take part in – it's that serious. Now is the time to start a Spectrum Defence Fund – not just to fight the PLT issue but other threats as and when they come up. The RSGB intends to challenge Ofcom's interpretation of the various Acts and Directives in respect of the PLA/PLT threat. We aren't looking to remove Comtrend and other such devices from the market place – that's an expectation too far, neither are we likely to see rapid results. What we are looking for, among other things, is to challenge Ofcom on their duty to ensure that in the future, non-compliant items such as Comtrend, are not put on the market.

A Judicial Review would likely cost in the region of £75,000 but could be a lot more as we'd be taking on organisation with almost unlimited funds to defend their corner who could, if they so desired, play a very long game that in turn we'd have to match. If every amateur in the UK pledged £10 to the Spectrum Defence Fund we'd probably have enough to fight the case and so we need your donations (no matter how small) to help us meet the threat.

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

Help us protect the future of Amateur Radio

Please donate online at

www.rsgb.org/defencefund

You can also donate by post by sending a cheque payable to 'The Spectrum Defence Fund' and sending it to; Spectrum Defence, RSGB, 3 Abbey Court, Fraser Road, Priory Business Park, Bedford, MK443WH. The 'Spectrum Defence Fund' is a secure and independently audited fund, the proceeds of which will only be used in defence of the radio spectrum.

Spectrum Defence Fund

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

check it with a meter to be sure it should have about 0.5V on it).

As you short out the base, the total current in the case of the FT-290 should fall by about 15 to 20mA. If the fall is much outside this range you'll have to alter the value of R70, (or what ever is its equivalent on an other rig), until it's correct.

When a rig has an adjustable pre-set bias control, the dodge of measuring the total h.t. current can still be used if you want to avoid having to disconnect the h.t. feed to the p.a. transistors. First, you'll have to measure the total current that the rig takes when it's generating no measurable output in the s.s.b. transmit mode.

Next, you should then adjust the bias control until the current falls to its lowest value, at this point you have turned the p.a. stage off. Then confirm as to what the standing current should be and then turn the bias control until the rig's total current increases by this amount.

Finally after replacing parts in the p.a. stage, you should peak any trimmers for maximum output, set the power level/automatic level control (ALC) as detailed in the service instructions for the correct output power and then checking that the transmitted signal is clean. If you have a spectrum analyser, and a two tone generator you'll no doubt know how to use them – but not many readers will have this luxury.

In practice, checking your transmission requires little more than a good receiver, a pair of headphones and a tape recorder. Record your voice and feed this, or better still get someone else to speak, into the microphone and transmit into a well screened dummy load.

Set up the receiver with a few inches of wire in the antenna socket and arrange the separation so that the signal is about S9+10. At this level the signal should be clean with no more than the very slightest tendency to spread. Once you have achieved this, the job is finished and by doing it yourself you'll have saved yourself quite an amount of cash.

A Blown PA Valve

A local Amateur 'phoned me up recently and asked me to look at his TS-830, which had stopped transmitting and was blowing fuses. Tracing the fault was hardly rocket science, as the picture, **Fig. 2**, of his melted 6146 shows. But wishing to avoid a repetition I wondered what had caused the meltdown?

I should have looked for the obvious first but instead I wasted time checking capacitors in the bias circuit and the fan. Then **at last** I opened my eyes – **the rig had no feet!**

A quick telephone call to the owner established that to fit it neatly into a corner under a shelf, he had removed the feet. This meant that the air inlets at the top of the p.a. stage were blocked by the shelf above and that those on the bottom were obstructed by the table it was standing on. It may sound obvious, but do think carefully about ventilation when locating your equipment?

A Faulty Valve?

During the 1950s I was an apprentice radio and TV engineer. In those days the owner of a faulty radio would often take the back off, and look to see if all the valves were lighting up. If the valves were all alight, or he was in doubt, he would then remove them and take them along to a local radio shop who offered a valve testing service.

If a valve was completely dead a purchase was made and a replacement valve would result in a cure. Often however, customers would take their valves in for testing because they thought that the radio was a little below par, in these cases tests were in no way conclusive. Sometimes a valve would register as 'low', resulting in the customer purchasing a new one. In most cases they then found that no improvement resulted.

Swapping and changing valves could also cause problems! The company I then worked for were once called out to a console radio in a large cabinet that had the complaint of "very low in volume". The van driver could see nothing obvious and so he brought the radio into the workshop for repair. I had a look at it and after making a few tests I suddenly noticed that next to the rectifier valve was a radio frequency (r.f.) pentode. Surely that couldn't be right?

It eventually transpired that the owner had decided to have his valves tested, but when refitting them had managed to interchange the EF41 intermediate frequency (i.f.) amplifier and the EL41 audio output valves. As luck would have it they both had the same pin connections, but they didn't like the swap of occupations.

The radio was 'repaired and (perhaps unwisely) the customer was informed as to exactly what we had done. He then objected to paying the bill, complaining that our driver should have spotted the fault. In reply it was pointed out to him that a van driver could hardly be expected to memorise the location of all the valves in hundreds of different models of radio!

Apprenticeship & National Service

My apprenticeship ended on my 21st birthday and my wages shot up from £5 to £11 – but not for long! Two months later I was called up for National Service at 28 shillings (£1-40p) per week.

One good thing that came out of

Fig. 2: Lack of ventilation can cause overheating of valve envelopes leading to an 'implosion' as shown on this example – it ruins the valve, of course!

my national service, is that I plucked up courage to start writing to **Brenda**, who has now been my wife for almost half a century and who I then knew slightly because we both attended the same church. It's amazing how two shy people can get to know each other by writing – even if one of them can't spell. Who says you don't get romance in *PW*?

Setting Up A Workshop

Upon release from Royal Electrical & Mechanical Engineers (REME), I went to work for Brenda's father, to set up a workshop and a Hi-Fi department in his photographic and tape recorder business. **Mr Holding** had got the idea that I would need expensive test equipment, including the latest in valve testers and was rather surprised when I told him that in my opinion such a device was a complete waste of money!

Rather than spending around £30 – 40, (1960 prices) on a valve tester, I bought a good section of spare valves. If you think that a valve may be faulty there's no better way of proving it, than to plug in a new one. There's not much point in testing a valve on a tester, only to find that you haven't got a suitable replacement available.

At that time audio test equipment made by the big names was extremely expensive and by Hi-Fi standards wasn't very good. Leak famously advertised their Hi-Fi amplifiers as having less than 0.1% distortion and so ideally after servicing one of these units, we needed to be able to check the distortion level. However, when I mentioned Heathkit DIY test equipment, **Fig. 3**, which was cheap, my new boss was somewhat taken back! but I assured him that we'd not only get equipment with good specifications, but as I had built it myself, if it ever failed I could repair it!

In those early days Heathkit really did produce some very useful test equipment at very good prices. *Hi-Fi News* once had the cheek to review a Heathkit and a professional audio generator (with a world famous name) in the same issue. The kit unit cost

Fig. 3: It may be 46 years old, but it was so well designed and built that it still functions well today!

£26, the professional unit more than ten times the price of the kit!

The distortion of the output waveform on the professional instrument was around 1%, the distortion on the Heathkit 0.05%. Even the frequency accuracy was better on the Heath gear, although in fairness the professional unit weighed a lot more and looked far more impressive! We then set up quite a Hi-Fi laboratory with Heathkit scopes, generators, distortion, power and voltmeters, a wobulator and a stereo multiplex generator.

All were fine – except the stereo generator which worked okay if it was injected directly into a stereo decoder. Unfortunately though, it gave poor separation if we used it to inject an r.f. signal into the antenna socket of a stereo receiver.

I was rather puzzled by the Heath generator's problem but on investigation noted that the multiplex feed to the r.f. modulator was de-coupled by a 1000pF capacitor. This seemed rather a large value, so I reduced it to 100pF and the stereo separation then shot up. Previously, even the best stereo tuners had only been registering around 15dB stereo separation, they now measured 35 to 40dB – which matched their specification.

So I realised, that somewhere along the line, Heathkit had slipped up. I wrote to them at their US address in Michigan, whereupon they thanked me, modified their circuit and sent a credit note for $1 and I've been a fan ever since!

Blackburn Technical College

I wasn't the only one purchasing the kits. When, years later, I started teaching the Radio Amateur's Examination (RAE) course at **Blackburn Technical College**, I found that their radio and TV laboratory was absolutely packed solid with Heath equipment.

I think it's a a pity that Heathkit had to go out of business. The way their constructional manuals reduced making and using a complex piece of equipment into hundreds of simple steps was an art.

In comparison the makers of many pieces of modern equipment don't even seem to be able to produce clear instructions as to how to use them, let alone make them! Have you ever tried reading a mobile phone instruction book? Or perhaps I'm just getting old – see you next month. ●

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

Carl Mason's

hf highlights

Carl Mason GW0VSW presents a round-up of your activities on the h.f. bands. Reports to Carl by the 15th of each month please!

Welcome to *HF Highlights*! This month I'll begin with news of a new 'online' book which is being written by French amateur **Gerard Debelle F2VX**. Gerard is writing the *History of Amateur Radio* in the French Overseas Territories (1920-1962) and the first ten chapters are now available at **www.lesnouvellesdx.fr/histoires.php**

The site contains all publications and articles published in the newspaper ***Les Nouvelles DX*** over the past 25 years and several other features that include a QSL photo album containing over 7200 cards in 12 galleries. I've taken a look at these and the galleries particularly the sections for cards from the ten 'Most Wanted' DXCC Entities, the 58 deleted DXCC entities and obsolete prefixes, etc., which were very interesting!

The site is updated regularly and now includes (this bit will encourage you to brush up on your French!) a section entitled Bien d'autres choses y ont été ajoutées (anciennes QSL, album photo...). Voir les rubriques disponibles ici à gauche. *The Story of the Broadcast Amateur* is the section where Gerard is transferring his library of books dealing with the beginnings of electricity, the telegraph and the beginnings of radio onto the web page, as he slowly converts them to pdf format.

The site is in both French and English and can be found at **http://lesnouvellesdx.fr/photos.php**

The DX News

On to this month's DX news now and to the Island of Montserrat NA-103 which is a British overseas territory, located in the Leeward Islands south east of Puerto Rico in the Caribbean Sea. Christopher Columbus gave the island its name on his second voyage to the New World in 1493 and it is nicknamed the 'Emerald Isle of the Caribbean' as its coast resembles the coast of Ireland and because many of the original population were of Irish descent.

Mike Rioux W1USN will be on Montserrat operating as **VP2MPR** from the February 28th to March 13th using mainly s.s.b. and PSK31, while **Bob Reiser AA1M** will operate mostly c.w. as **VP2MPL** from the March 3rd to the 11th. Both operators' QSLs should be sent via their home calls.

Next we go to Mexico! The Mexican Revolution was a major armed struggle that started in 1910 with an uprising led by Francisco I. Madero against longtime autocrat Porfirio Díaz and to celebrate both this and the bicentennial of Mexico's independence the **Radio Club Queretaro XE1RCQ** will operate on the h.f. bands as **4A1B** until the end of the year. The QSL route is via LZ3HI and the logs will be uploaded to *Logbook of the World (LoTW)*.

A multi-national DXpedition to Kurdistan, Northern Iraq, which has Iran, Turkey and Syria on its borders will be active from the capital city Erbil from April 3rd to 11th. The team will be using the call **YI9PSE** and plans to operate c.w., s.s.b. and RTTY using Elecraft K3bs on all h.f. bands with at least three stations running at the same time. Any QSL cards are good via N6NKT and further information and updates can be found at **www.yi9pse.com/**

On to the West Indies now and St. Eustatius NA-145 which is a part of the Netherlands Antilles and in its long history has changed hands more than 20 times. It's volcanic in origin and at one time one of the busiest and most powerful commercial ports in the Caribbean. When the British set up blockades during the American Revolution, most goods destined for the new colonies went into St. Eustatius.

It wasn't uncommon to see hundreds of supply ships off the St. Eustatius' capital Oranjestad. When that war ended supplies and mail were sent directly to the 'new' United States and the economy of the island changed dramatically. Today it's tourism which is the main industry and it is from here that **Jim Power Jr. K1NA** will once again be active as **PJ5NA** until March 27th. When he's not taking part in contests Jim will concentrate on 10, 17 and 24MHz bands together with 1.8, 3.5 and 7MHz during the evenings. Please send QSL cards (direct only) to J. E. Power Jr, **52, Pleasant Street, Chichester, NH 03258, USA**.

New Polish Diploma

You may like to keep an ear open for **Witek Onaczyszyn SP9MRO**, who will be active as 3Z0RADIO. You can QSL via SP9SX until December 31st to celebrate the 80th anniversary of the **Polish Amateur Radio Union** (PZK) and the 85th anniversary of the IARU.

Several other special event stations are expected to participate in the celebration including 3Z80PZK, 3Z85IARU, HF80PZK, HF85IARU, SN80PZK, SN85IARU, SO80PZK and SQ85IARU.

An award the **PZK 80 Year's Diploma** is also available by working several of the stations mentioned previously and other individual SP calls between the February 1st and the April 30th this year, so you have plenty of time to collect the necessary points!

Keen mobile operator Paul Whitelock G0GMY uses professionally fitted Yaesu equipment.

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Skewen
Neath
Port Talbot SA10 6SP
Tel: (01792) 380882
E-mail: gw0vsw@btinternet.com

Further information on the diploma and all the special event stations that are operating can be found at **www.qrz.com/db/SN80PZK**

Your Reports

On to your reports now, and the first is from **Martin Addison 2E0MCA** in East Finchley, North London. Martin worked IQ6CC (Italy) 2048 and DJ0AAA (Germany) at 2102UTC on 3.5MHz using a Yaesu FT-2000 and 50W into a G5RV antenna.

Also on the 3.5MHz band was **Bill Ward 2E0BWX** who lives in Edwinstowe, Nottinghamshire. Bill used an Icom IC-7400, running 50W s.s.b. to a SRC X65 end fed wire antenna to work s.s.b. stations PA3GEG (Netherlands) 1720 and IW1FGY (Italy) at 1800. While the 7MHz band gave him DL7SPR (Germany) 0910, PD1RO (Netherlands) 1200 and SI7GM (Sweden) at 1535UTC a special event call celebrating Marconi's Nobel Prize on December 10th 1909. SI7GM QSL cards should go via SM6JSM.

The 14MHz Band

On 14MHz was **Eric Masters G0KRT** in Worcester Park, Surrey who ran a Kenwood TS-570 with a homebrew modified W3EDP antenna, tuned with an SG-230 auto tuner, to work c.w. at 5W QRP. Eric had QSOs with USA stations W1KM at 1627 and K5ZD at 1648UTC both stations are in Massachusetts.

In Cambridge, New Zealand **Peter Leng ZL4TE** used his Yaesu FT-1000MP MkV, Cushcraft AV-3 3 band vertical on the 14MHz band and with just 5W s.s.b. and managed a QSO with YJ0NA (Vanuatu) OC-035 at 0715 QSL via JK1NFL. (This was Peter's only entry into the G QRP Club's Winter Sports activity and one he was very pleased with!). Peter wrote, "This DX entity was a new one for me as I had never heard of it so I had to look the country up!"

Peter discovered that , "It is known officially as the Republic of Vanuatu and is an island nation located in the South Pacific Ocean. The archipelago is of volcanic origin and lies some 1750km (or 1090) miles to the east of northern Australia. The island was first inhabited by Melanesian people until the Europeans began to settle in the area in the late 18th century. Both France and the United Kingdom claimed parts of the country in the 1880s and it was not until 1906 that they both agreed a framework for jointly managing the archipelago as the New Hebrides, through a British-French Condominium. In the 1970s an independence movement began to rise and the Republic was formed in 1980."

Thanks for the geography lesson Peter! Other s.s.b. stations to make Peter's log – while running a Ranger amplifier and 500W included TM6WRC (France) a special call for the World Rally Championships at 0831, OH7FVK (Finland) 0902 and 7Z1CQ (Saudi Arabia) 1139 while c.w found HB9QO (Switzerland) at 0936UTC.

In Chelmsford, Essex the log of **Martyn Medcalf M3VAM** included E74AA (Bosnia & Herzegovina) 0927, SN7Q (Poland) 0936, OL9Z (Czech Republic) 0949, UX3MZ (Ukraine) 0956, 7X4AN (Algeria) 1042, LZ2LP (Bulgaria) 1211, and UP2L (Kazakhstan) 1232 QSL via UA9AB. Next came VE2IM (Canada) 1331, DL/KJ5T (Germany) 1436, HA1AV (Hungary) 1538, RX3WO (European Russia) 1552, OZ8CTH (Denmark) 1646 and CT2HXM (Portugal) 1935UTC using his Icom IC-746 and Comet CHA-250BX vertical antenna.

A Diamond CP-6 vertical antenna and s.s.b. was used by Bill 2E0BWX who found SP4JTJ (Poland) 0925, 9A9A (croatia) 0915, IZ6BXV (Italy) 0920, PR7CPK (Brazil) 0921, CT1EHK (Portugal) 1510 and LZ2LP (Bulgaria) at 1515UTC.

In Hampshire **John Wakefield M0XIG** thought he had operated his last special event for 2009 until he heard that the Admiralty site at Mount Wise, Plymouth had been sold for development. He managed to get permission to operate before the developers moved in and John operated **GB2MWT** (Mount Wise Telegraph) for a short period in early December.

The Yaesu FT-1000MP Mk5 was used at GB2MWT with an Acom 1000 amplifier and Comet H-422 dipole in a 'V' configuration running East/West about 7.5m above ground.The DX included VP8LP (Falkland Islands) SA-002 at 0859, 9K2RX (Kuwait) 0906, CN8QN (Morocco) 0942, UA9XL (Asiatic Russia) 0958, PS8CC (Brazil) 1000, 5B4AIX (Cyprus) AS-004 at 1002. Then came JY4CH (Jordan) 1120, 6Y5WZ (Jamaica) NA-097 at 1135, 4Z5PQ (Israel) 1155, VE3XN (Canada) 1245, VU2NKS (India) 1344, 7Z1TT (Saudi Arabia) 1354 and 9H1NB (Malta) EU-023 at 1541UTC.

The 18 & 21MHz Bands

Keen mobile operator **Paul Whitelock G0GMY** has had a Yaesu FT-857D and Yaesu ATUS 120 antenna professionally installed in his car and spent last summer travelling with his

caravan around Europe. His favourite band is 18MHz and even though Paul is having a short break from operating, while staying in Turkey for the winter, he sent in a photo of his h.f. station at Auvergne, 4000 feet up near to Puy Marie in France. Paul's equipment works very well and his log includes calls from Norway to the USA and Japan.

Thanks for that Paul! I have tried mobile operating myself from a few locations in South Wales using Watson whip antennas fixed to the roof of my car with a small mag-mount and had some interesting contacts running just 5W sideband. Good reports were received from most of Europe and the lack of QRN – which I suffer from at my home – made the contacts even more enjoyable. If you get the chance have a go. You may be surprised at what you can work!

Someone who also does well on the 18MHz band is **Elgin Mackinley M0ELG** in Kidderminster, in Worcestershire. And even though he found 18MHz noisy at times he managed JH3NGN (Japan) 0825, TL0A (Central African Republic) 0848, 9K3YM (Kuwait) 1027, FM5AN (Martinique) NA-107 at 1529, VU2PAI (India) 1556, K6YRA (USA) in California at 1612, 9M2TO (West Malaysia) at 1626UTC with 100W s.s.b. to a home-brew vertical antenna, which is obviously working very well!

On Wednesday December 18th Martin 2E0MCA heard a strong Australian s.s.b. station – VK8DP – on the band at around 1000UTC in the morning. Martin said, "He was calling for a specific French station and I was my usual polite self and patiently waited for a chance to call him. A Spanish station called and the Australian responded and they had a brief chat before being descended on by a pile of Russians that the

Australian refused to work on the basis that his French friend had now come up on the frequency."

"Why am I relating this? Because during the course of the period I was listening to him there was a very distinct echo to his voice, which I believe indicated that I was hearing him both long and short path at the same time. At one stage I heard something that he had said echo again even later than the first original echo – and I suspect that the signal had actually gone right around the earth a second time!"

"I had a chat with Don (my instructor and station manager at GB2DHH) about this and he thinks that was the case although one of our fellow GB2DHH operators thought I was hearing an echo off the corks around his hat". Has any other reader heard similar on the h.f. bands recently?"

Martin logged CR6A (Portugal) on Armona Island at 0954, UE4LWM (European Russia) 1048, OH8GVQ (Finland) 1109, EV1R (Belarus) 1230 and KB1MSX (USA) in New Hampshire at 1231UTC with 50W and the half size G5RV.

Back in Surrey Eric G0KRT had one 100W s.s.b. QSO with K6YRA (USA) in California at 1605. Then, switching to 21MHz and with 5W and the key, he logged more US stations including N8RA in Connecticut 1547, NY4A in North Carolina 1524 and K1TTT in Massachusetts at 1601UTC.

The 28MHz Band

There was just one report for the 28MHz band and that was from New Zealand where Peter ZL4TE logged ZL1TAP in Tauranga on North Island OC-201 using f.m. via a repeater in 'VK(Australia) with 50W while later, two Australian calls made his log, VK3HHM in Victoria at 0756 and VK7ZE in Tasmania OC-006 at 2325UTC running 100W s.s.b.

Signing Off

Well that's about it for now. My thanks to all our reporters for their logs and to **Mauro Pregliasco I1JQJ/KB2TJM** editor of the *425 DX Newsletter* for all the DX information. Until next month I wish you all good DX.

73, Carl GW0VSW. ●

Calling all HF Highlights Correspondents!

Editor's Special request: For most of us trying go work the DX on the h.f. bands it still seems as though the bands are still very much 'in the Doldrums'! However, from some of this month's reports it looks very much as though the DX **is about**, although (frustratingly) many of us are missing the opportunities! So, although the times of your own successful DX QSO can only be an approximate guide for the rest of us – who would like to try to work the DX ourselves – the full details would be very helpful. Obviously, **Carl GW0VSY** won't have room to mention all the times from your log – but he will find the space to mention the time of your best DX. So, don't forget to supply details of the **time**, **date**, **frequency**, **power**, **mode** and **antenna** used. Please ensure that you describe what form of antenna (and earthing systems) were used. Readers won't necessarily know that the *Abracadbra Skywave DX-Chaser* by Magic Carpet Antennas is a dipole, vertical or beam antenna! Good luck with your DX chasing – let's hope more of us can join you in working those elusive DX stations! **G3XFD**.

TRADERS TABLE

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KENWOOD TS850 HF WITH FILTERS £599
ALINCO DJ-596 DUAL BAND HANDHELD £99.95
ALINCO DJ-G7E TRI-BAND HANDHELD £299.00
ALINCO DJ-S45CQ UHF HANDHELD £39.00
ALINCO DJ-496 70cms HANDHELD £89.00

SCANNING RECEIVERS

ALINCO DJX30 WIDEBAND SCANNER £99
BEARCAT 800XLT BASE SCANNER £239.99
BEARCAT USC230XLT (25 – 1300MHZ) £109.95
ICOM R3 HANDHELD SCANNER £199
ICOM RX7 WIDEBAND SCANNER £165
YAESU VR120 H/H WITH BAT/CRGR £99
YAESU VR120D HANDHELD SCANNER £79
ICOM R5 HANDHELD SCANNER £165
MAYCOM AR108 AIRBAND/MARINE H/H £49
MAYCOM FR100 HANDHELD SCANNER £59

RECEIVERS

ETON E10 SW PORTABLE RADIO £59
ETON E100 SW PORTABLE RADIO £59
ETON E5 SW PORTABLE RADIO £69
ETON G3 SW PORTABLE RADIO £89
HITACHI WS1 WORLDSPACE RADIO £79
PALSTAR R30AA Ex Display AS NEW £499.95
SANYO WS1000 WORLDSPACE RADIO £79
STEEPLETONE SAB2000 RECEIVER £25
TARGET HF3 COMMUNICATIONS RX £149
YAESU VR5000 COMMS RECEIVER £375
YAESU VR5000D WITH DSP £435

DAB DIGITAL RADIOS

NEVADA ND01 PORTABLE DAB/FM £39.95
PANASONIC RFD3 DAB RADIO £29
ROBERTS RD41 DAB RADIO £99
PORSCHE DAB/FM + IPOD DOCK £199
PURE EVOKE 1XT DAB RADIO £75
PURE TEMPUS 1XT DAB RADIO £49

CB RADIO

TEAM ROADCOM CB RADIO £89

ACCESSORIES

HEIL TRAVELLER HEADSET (IC706) £59
HEIL TRAVELLER HEADSET (FT817) £59
ICOM CS-RX7 CLONING SOFTWARE £19
JIM M75 SCANNER PREAMPLIFIER £49.95
TIMEWAVE 59+ DIGITAL NOISE FILTER £159
TIMEWAVE 599ZX DIGITAL NOISE FILTER £249
YAESU MH35A2B SPEAKER MIC £19

POWER SUPPLIES

KENWOOD PS430 20A POWER SUPPLY £59
PALSTAR PS15 12-15A POWER SUPPLY £39

ANTENNAS

COMET H422 4 BAND DIPOLE EX-DISPLAY £199.95

WATERS & STANTON

01702 206835

Make	Model	Description	Price
Uniden	UBC-60XLT	66-512MHz (with gaps) FM Hand Held Receiver 80Ch. 4 x AA cells	£55
Icom	IC-A3E	Airband H/Held + NAV/COM 50ch Alphanumeric	£180
Optoelectronics	Optolinx	TTL to RS-232 Interface (supports 4 devices)	£65
Ameritron	AL-82	10-160m 1.5kW Linear Valve Amplifier with 2x 3-500 Tubes	£1,699
Yaesu	FT-712RH	70cm FM Mobile Transceiver 35W	£125
Microset	PT-110	12V Stabilized 10A PSU with Over V / A protection	£69
Optoelectronics	Model40	"Scout" 10MHz-1.4GHz Frequency Counter + Reactive Tune & 400ch.	£199
Nevada	PSDL	50ohms Dummy load Dc-3000MHz max 15W	£30
MFJ	MFJ-216	Deluxe Amplifier Saver to Adjust Amplifiers without Transmitting	£55
Uniden	UBC-278CLT	25-174,406-512,806-956MHz AM,FM,WFM + MW Desk/Mobile Receiver 100Ch. 10V + psu	£99
Matsui	MR-4099	Portable World Band Receiver with FM stereo and SSB	£59
Heil	AD-1-Y4	Cable for pro set and yaesu 4 pin round	£10
Cobra	HG-S100	15W Rugged External Speaker with 4" cone	£19
DRAE	VHF	140-460MHz Wavemeter	£25
Alinco	DJ-X3E	100kHz-1300MHz AM, FM, WFM Hand Held Receiver 700Ch, 8.33kHz + Ni-MH & Charger	£109
Icom	PS-55	12V 20A Matching PSU	£99
Linear Amp UK	LA-SPC	Supertuner 10-160m 1.5kW ATU + 2x Coax, Balanced Feed & PWR/SWR Meter	£329
Toyo	T-200	3.5-500MHz 200w Dummy Load	£39
Eton	E1100	Compact Portable AM, FM stereo & 10 Shortwave Bands Receiver + Clock	£25
Icom	SP-10	5W Mobile Speaker 4ohms	£35
Yaesu	MEK-2	Microphone Lead Extension Kit for Yaesu Mobile Trasceivers	£25
Panasonic	GX-3700	Portable Receiver with 32 presets FM LW MW	£29
Alinco	DJ-X3E	100kHz-1300MHz AM, FM, WFM Hand Held Receiver 700Ch + 8.33kHz step	£95
Kenwood	AT-50	1.8-30MHz 100W Matching Automatic ATU	£219
Alinco	DJ-X3E	100kHz-1300MHz AM, FM, WFM Hand Held Receiver 700Ch + 8.33kHz step	£95
Alinco	DJ-X7E	100kHz-1300MHz AM, FM, WFM Hand Held Receiver 1000Ch + 8.33kHz step	£115
Watson	W-10AM	12V Variable 10A PSU with meters	£39
Uniden	UBC-60XLT	66-512MHz (with gaps) FM Hand Held Receiver 80Ch. 4 x AA cells	£59
Kenwood	TS-2000	Deluxe HF All Mode Base Transceiver + Gen.Cov. , Auto ATU & DSP filters 100W 240V AC	£1,089
Realistic	PRO-2026	66-956MHz (with gaps) AM,FM Scanner 100Ch. 12V	£49

RADIOWORLD

01922 414796

IC-756PRO-MKIII Icom HF + 6m Trx.....£1,795
Yaesu FT-1000MP MKV 200w HF DSP Base.....£1,399
Yaesu FT-1000 "CLASSIC" HF Transceiver.....£1,399
Kenwood TS-2000X HF/6m/2m/70cm & 23cm Transceiver.....£1,299
Icom IC-R8500 Receiver.....£1,099
Kenwood TS-790E Dual-Band Base/Mobile Transceiver.....£999
Icom IC-910H 2m/70cms base 100w.....£999
Yaesu FT-920AF HF / 6M Base.....£899
Yaesu FT-847 HF-6-2-70 Base.....£899
TenTec Jupiter 538.....£899
Yaesu FT-920.....£799
Yaesu FT-736R 6m, 2m & 70cm Base.....£799
Kenwood TS-850S/AT.....£699
TS-480HX.....£599
Kenwood TS-570DG/E HF transceiver.....£599
Yaesu FT-736R 2m/70cm Base Multimode.....£599
Icom IC-706MkIIG DSP.....£549
Fairhaven RD-500VX Comm Rx.....£499
Icom IC-R7000 HF MOD FITTED.....£499
AOR AR-8600MkII.....£499
Yaesu FT-857D Multi-band Mobile.....£475
ELDORADO-BK High Sierra Motorised Vertical Antenna.....£469
Kenwood TS-930SAT.....£450
AOR AR-3000A Wideband Receiver.....£450
TS-440SAT built in atu.....£399
Palstar AT-1KP Antenna Tuner.....£339
Yaesu FT-101ZDmk3 HF Transceiver.....£325
Microset SR-200 2m 200w.....£319
MFJ-989C MFJ 3kW ATU, ANTENNA TUNER.....£299
Yaesu FRG-8800 RX inc Converter.....£299
AOR AR-8200Mk3 Scanner.....£299
Yaesu FT-690R II.....£275
Ten tec RX-320 PC COMMUNICATIONS RECEIVER.....£275
Yaesu FTV-901R 2m / 6m Transverter.....£275
Icom IC-490E 70cms Mobile.....£250
Yaesu FT-290MkII 2m Multi-mode transceiver.....£250
Magnum S-9 Multi Mode mobile Transceiver.....£240
Kenwood TH-D7E Dual Band Handheld.....£240
Icom IC-T81E 50-54 / 144-146 / 430-440/1240-1300.....£240
DR-635E Alinco 2m/70cm FM Dual Band Mobile T.....£230
UBC-800XLT mobile scanner.....£229
Eton Satellit 750 FM Stereo/LW/MW/SW/Air receiver.....£225
Yaesu FT-480R 2m Transceiver.....£220
AOR AR-2002 Receiver.....£199
Yaesu FC-30 Antenna Tuner Unit.....£ 189
AOR AR-8000.....£189
Kenwood TM-G707E Dual Band Mobile.....£189
Ranger RCI 2950DX 10 - 12m Transceiver.....£179
Kenwood TH-F7E Dualband Handheld Transceiver.....£179
MVT-7100 Scanner.....£179
Yaesu FV-901DM VFO.....£175
ICOM IC-2200H 144–146.....£175
IC-E90 6m / 2m / 70cm Handheld.....£169
Alinco DJ-X10 Wide Band Rx.....£165
Kenwood TS-271E.....£165
PS-33T Kenwood 13.8V 20.5A PSU.....£159
Yaesu FT-790.....£159
FT-290RMKI 2m Multi mode.....£150
Daiwa CNW-518 Antenna Tuning Unit.....£149
MC-90 Desk Mic for DSP.....£149
MFJ-784 DSP Filter.....£149
M/Mods 144/100.....£149
Icom PS-60.....£149
Kamtronics KAM Multimode TNC.....£140
Alinco DJX30 Scanning Receiver 100KHz - 1.3GHz.....£140
Icom IC-T7E Dual Band Handy.....£139
MFJ-462B CW/RTTY/ASCII/AMTOR Decoder.....£139
AOR ARD9000 Digital Voice Interface.....£129
Magellan GPS 315 Receiver.....£129
Icom IC-R5 Receiver.....£129
MFJ-949E Versa Tuner.....£125
Yaesu FT-41R Handheld Transceiver.....£120
Microset PT 135 PSU.....£120
CUB Optoelectronics MINI Counter.....£119.95
Icom PS-15 20A power Supply.....£119

Classified Ads

To advertise on this page see the booking form below.

DISCLAIMER Some of the products offered for sale in advertisements in this magazine may have been obtained from abroad or from unauthorised sources. ***Practical Wireless*** advises readers contemplating mail order to enquire whether the products are suitable for use in the UK and have full after-sales back-up available. The publishers of ***Practical Wireless*** wish to point out that it is the responsibility of readers to ascertain the legality or otherwise of items offered for sale by advertisers in this magazine.

Aerials

GAREX ELECTRONICS VHF/UHF accessories and aerials, TVI Filters, 4m & 6m Transceivers.
Tel: 07714 198374
www.garex.co.uk
PO Box 52, Exeter EX4 8WX

G-WHIP ANTENNAS Mobile, base, backpacker and commercial models. WWW.gwhip.co.uk or telephone 02380 445212 after 6pm.

GROUNDBREAKING PERFORMANCE!
New price, new band coverage, new compact, innovative design. "That'll be the I-PRO!"
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Whilst prices of goods shown in advertisements are correct at the time of going to press, readers are advised to check both prices and availability of goods with the advertiser before ordering from non-current issues of the magazine.

Valves

VALVES AND ALLIED COMPONENTS IN STOCK Ring for free list. Valves/ books/magazines wanted. Geoff Davies (Radio). Tel: 01788 574774.

TOP PRICES PAID
for all your valves, tubes, semi-conductors and ICs.
Langrex
Unit 4, Daux Road, Billingshurst, W. Sussex RH14 9SJ
TEL: 01403 785600. FAX: 01403 785656.
www.langrex.co.uk

QSL cards

FULL COLOUR QSL CARDS for all your QSL needs. Shirts and caps with callsigns and also ham cartoons by GW3COI. For free samples contact Chris M0DOL.
E-mail: qslers@aol.com
P.O. Box 184 Northampton NN3 9JH.

Repairs

REPAIRS TO ALL AMATEUR AND VINTAGE Rx/Tx Cost effective service. Phone or call in for details. Kent Rigs, 52 Salisbury Road, Chatham, Kent ME4 5NN. Tel: 07903 023437.

RELIABLE REPAIRS for all amateur and vintage equipment. Professional service, reasonable rates.
Tel: 01807 580376.
E-mail: radiorepairs@btconnect.com

For sale

X-tals 100kHz-250MHz. Std 10.106, 10.245, 10.7, 11.155MHz @ £1.50. Callg 3.56, 7.030, 14.060, 28.060MHz @ £1.50. 1.7468MHz X-tal Clansman 321 ex-stock p.o.a. 10.7MHz 10kHz filter @ £5.75, 1.4MHz SSB filter p.o.a. P&P £1.50 + VAT. IQ Electo Tel: 0208 391 0545. E-mail: vincentvoy@hotmail.co.uk

Antenna Analyzer WE-030A 0.3-30MHz, graphical, fast, small and hand-held. £195. www.rfequipment.co.uk

ORDER FORM FOR CLASSIFIED ADS

PLEASE WRITE IN BLOCK CAPITALS

The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 70p extra. Semi-display setting £13.90 per single column centimetre (minimum 3cm). Please add 17.5% VAT to the total. All cheques, postal orders, etc., to be made payable to PW Publishing Ltd. Advertisements, together with remittance, should be sent to the Classified Advertisement Dept., Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: 0845 803 1979, Fax: 01202 659950.

Please insert this advertisement in the ..... **issue of *Practical Wireless*** (if you do not specify an issue we will insert it in the next available issue of *PW*) for ..... insertion/s. I enclose Cheque/P.O. for £.....(42p per word, 12 minimum, please add 17.5% VAT to total).

Name: .....

Address:.....

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Telephone No.:.....

Box Number @ 70p: Tick if appropriate

Category heading:.....

Please photocopy this form or write on a separate sheet if you prefer

BARGAIN BASEMENT

SEND YOUR ADVERT TO:-

PRACTICAL WIRELESS, BARGAIN BASEMENT, ARROWSMITH COURT, STATION APPROACH, BROADSTONE, DORSET BH18 8PW

For your advert in Bargain Basement please remember to include your dated, coloured corner flash from this page along with your entry.

BARGAIN BASEMENT RULES - £4 per advert

Please write your advert **clearly** in **BLOCK CAPITALS** up to a maximum of **30 words**, plus **12 words f**or your contact details on the form provided and send -it together with the dated corner flash and your **payment of £4** (**subscribers** can place their advert **free of charge** as long as they provide their **subs number and corner flash**), cheques should be made payable to **PW Publishing Ltd.**, credit card payments also accepted.

Send your advert to **Bargain Basement, Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW** or E-mail your advert to **peter@pwpublishing.ltd.uk** (If you don't want to include your credit card details on your E-mail, just 'phone us on **0845 803 1979**.

Please help us to help you by preparing your advert carefully. Any advert which contains **??** marks indicates that the advertiseing dept. could not read/interpret the wording.

Please avoid FAXing your advert - it could delay publication.

Advertisements from traders or for equipment that it is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. **No responsibility will be taken for errors and no correspondence will be entered into on any decision taken by the Editor on any of these conditions.**

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.

FOR SALE

ALA-1530 LOOP ANTENNA less antenna interface and power unit. Plus AR300XL rotator and remote control. Garden mounted on 6ft. post. Free if you will dismantle.
Tel: Norman 01202 747223 (Poole).

CLASSIC DRAKE TX/RX 200 watt. TC 4XC 160-10m filters, 1.5-2.4 CW, SSB, 200 watts. PEP on voice peaks, AM notch filter in good working order plus circuit manuals. Moving house forces sale. Tel: Roy 01282 866181 after 7pm (Colne, Lancs).

KENWOOD TH-D7E 144/430MHz. FM dual bander with data. Boxed, excellent condition, £150. Tel: Paul G6DHT 01406 350148 (Lincs).

KENWOOD TS-870 mint, boxed, £500. Icom IC-703 HF QRP rig. Very good condition, boxed, £250. Icom IC-R735 PA fault, RX okay, £60. Eddystone 880/2 needs TLC, offers, silent key sale. May part exchange WHY. Wanted TS-440 spares.
Tel: 01279 815020 (Essex).

KENWOOD TS-450S manuals, good condition and clean, £350 plus carriage.
Tel: 01745 570538 (North Wales).

PIRATE RADIO 1960s, 1970s. Sounds, pics of Caroline, London 270, Scotland, City, 208, Manx Radio RNI transferred from tapes from 99p. Real memories of the offshore stations in jewel case. Tel: Dave 01244 31673 (Chester).
E-mail: g8zre@hotmail.com

PYE TELECOM TRANSMITTER Taylor valve tester, miniature oscilloscope, UHF signal generator, portable receiver tester. Signal generator, US Navy FM/AM radio receiver equipment model RBK-8. Linear 500W, old. Sold as seen, offers.
Tel: 01353 663362 (Ely).

YAESU FRG-7700 with memory manual. Also, RII55 modded internal PSU and signal meter. Both working well, eight boxes of radio related gear. All for £100. Collect only. Tel: Peter Howell 01282 439275 (Burnely, Lancs).

YAESU FT-817D battery, charger plus case. All in mint condition, as new. Eight weeks old, £300.
Tel: 07522 574408 (Hampshire).

YAESU FT-847 24 amp PSU. MFJ-949 ATU. 400W linear amp, NEC PC tower with Windows7. Tele/tape receiver, CW reader. Some home-brew, plenty of spares, complete station. Plus, plenty of components and transformers, £500. Recent stroke victim going QRT. Tel: J Williamson 0161 775 8444 64 Sandy Lane, Irlam, Manchester M44 6WT.
E-mail j.williamson133@btinternet.com

WANTED

DRAKE AC-4 power supply and MS-4 speaker. Also, Kenood SP-930 speaker. Tel: Dave G4AFQ 01784 252278 daytime (Ashford).
E-mail: g4afq@poshost.com

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 rods. Tel: Peter Tankard 0114 2316321 between 9am and 9pm (Sheffield).

SHORT WAVE MAGAZINES 1952 January, February, 1953 september, November, December, 1954 March, April, December. 1957 May, August. 1959 July, August. 1966 April, May, July, August, October, November and December.
Tel: 01352 771520 (North Wales).

TEN-TEC CORSAIR 2 in top order. No mods, faults, etc. Tel: Alan G0HKG 01787 223356 (Colchester).

TRIPLE OR DOUBLE conversion radio receiver in good working order, please. Would prefer valve type or good military radio. Will pay your price and will collect. Tel: Meryl 01538 385735 (Staffordshire).

VALVE TRAWLER RADIO Woodsons of Aberdeen. NR6M 'Mini Clipper' many still around. Please look in your attic. Will collect any distance. Tel: Brian 01843 594732 or 079444 18259.

With renewed interest now I am retired, I am looking for cheap Wireless sets numbers 12 or 19, or 33 or accessories or Power Supply, and other wartime sets. I am looking pairs of Weymouth (Weyrad?) coils circa 1955 types CT2W2 and CS3W3 any reasonable price paid. I am trying to reconstruct a set I made as a schoolboy, so only these coils will do. Tel: Anthony, 01908 373114

Bargain Basement order form

Please insert this advertisement in the next available issue of Practical Wireless.

☐ For Sale ☐ Wanted ☐ Exchange

PLEASE NOTE: as a security measure, you must include your house number and postcode.

Name .....

Address .....

.....

..... Post code.....

Telephone Number .....

PLEASE WRITE IN BLOCK CAPITALS

CARD NUMBER

VISA SWITCH AMERICAN EXPRESS MasterCard

Signature..... Security number

LAST THREE DIGITS ON THE BACK OF THE CARD

Switch issue number (if on card) .....

Start date of card..... Expiry date of card.....

My Subs Number is.....(or mailer label) .....

		(30)	

CONTACT DETAILS FOR ADVERT. Please only write in the contact details you wish to be published with your advert, ie. do you want your name & address, or just your telephone number? Your advert, you decide! **PLEASE - No FAXed Ads!** (12)

B.B. Mar '10

THE PW PUBLISHING
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mail order...huge range in stock...fast delivery

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RSGB COMMUNICATIONS HANDBOOK

10th edition
Following a major revision the RSGB Radio Communication Handbook is now the biggest edition ever and even better than before! 64 pages bigger than the previous edition, the 10th edition of the RSGB Radio Communication Handbook is now packed with even more material than ever before. The contents have also had the biggest revision ever and to make way for all the new material some chapters have even been moved onto the accompanying CD.

* Biggest Handbook ever - 864 A4 pages
* 26 chapters and two appendices
* 600,000 words!
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* Bonus CD
* New "Great Outdoors" Chapter
* LF including the use of higher power limit on 500kHz
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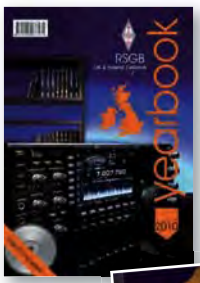
* Surface Mount Technology
* Software Defined Radio
* Projects for 136kHz to 76GHz

If you only ever buy one book on amateur radio, this should be the one!

£29.95

RSGB YEARBOOK 2010



Bigger and better than ever before!
The newly expanded RSGB Yearbook 2010 contains 528 pages and over 1.25 million words. Now with over 200 pages of information it remains the most comprehensive guide to amateur radio in the UK and worldwide.
FREE CD
Packed with bonus material the RSGB Yearbook CD is a great extra benefit of buying this great book.

£18.99

The CD-ROM version of the RSGB Yearbook 2010, but with a lot more besides!

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* Exam Licence and Course Information
* Prefix Lists
* Latest Band Plans
* Award and Contest Information
* Technical Help
* 864 pages

NEW IN STOCK NOW

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Since the last edition of abc Air Traffic Control in 2005, there have been many changes in the air traffic control industry in the UK and UK-related airways.

IN STOCK NOW

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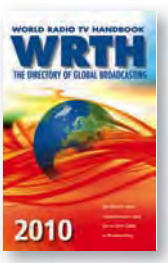
The Scanners books, originally created by Peter Rouse, have been consistent best sellers. They are the UK's leading guides to the short wave radio equipment employed by enthusiasts to monitor the VHF/UHF frequencies used by airfields, the maritime and emergency services and many other users. Scanners 6, the sixth revised and updated edition, includes up-to-date frequency listings and information on the latest digital technologies, mobile radio, using PCs (home, laptop and palm) with radio receivers, shareware/freeware software for monitoring and decoding and radar-style displays on palmtop computers.

£9.95

NEW IN STOCK NOW



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The 64th edition of the best selling directory of global broadcasting on LW, MW, SW and FM.
The Features section has a stimulating introduction to the art of FM DXing, reviews of the latest equipment and a fascinating account of visits to five All India Radio stations.

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• Clandestine and other target broadcasters
• MW and SW frequency listings
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ONLY £23.00

	Pages	Price
AIRBAND		
● NEW IN NOW **AIRBAND RADIO GUIDE** 7th Edition (abc)	112	£9.99
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● **MILITARY AIRCRAFT MARKINGS 2009** Howard Curtis. (abc)	224	£9.99
● **AIRWAVES 2009** (Photavia)	144	£11.50
● **CALLSIGN 2009** (Photavia)	111	£11.50
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● **DIRECTORY OF AIRCRAFT SELCALS** 8th edition. (Seldec)	205 PLUS CD	£15.95
● **UK & IRELAND AIRBAND FREQUENCY GUIDE** (Seldec)	146	£8.99
● **HF AIRBAND FREQUENCY GUIDE** (Seldec)	225	£14.75
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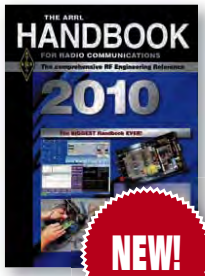

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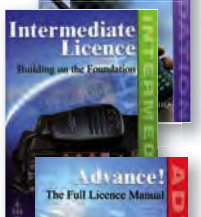

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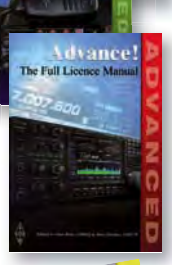

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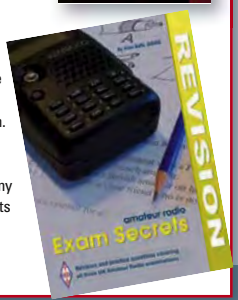

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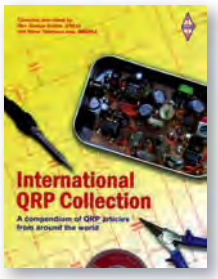

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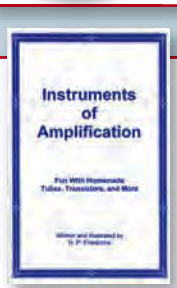

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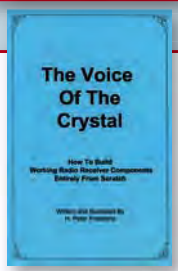

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Rob Mannion's

topical talk

This month Rob G3XFD discusses the conversion of illegal 27MHz equipment, club visits and the Dartmoor Rally at Tavistock.

The topic raised by **Derek Ford G7POS** in his letter (*Letters* this month) regarding the conversion of otherwise illegal CB transceivers – most often multi-mode rigs featuring amplitude modulation (a.m.), single sideband (s.s.b.) and narrow band frequency modulation (n.b.f.m.), has long been of particular interest to me. Indeed, I seemingly made such a nuisance of myself by continually applying pressure via *PW* to the former **Radiocommunications Agency** (RA) – that it was made obvious that they were considering some form of prosecution to 'shut me up'! Rather a shame really, especially as my intention was two-fold – helping Amateurs to obtain equipment and to reduce crime!

Fortunately, commonsense prevailed and although I wasn't able to get the ban, on converting illegal CB equipment, lifted entirely or even extended – the threat of prosecution evaporated. In fact I was more disappointed than relieved, because the loss of the opportunity for Radio Amateurs to help clear illegal CB equipment from car boot sales and any other form of market here in the UK.

Although the former RA has disappeared – despite the CB radio problems I greatly respected this organisation – I've never altered my opinion that the conversion of illegal multi-mode CB radios to be converted by Licensed Amateurs should be permitted with the minimum of formalities. And it seems as though – from the letter sent by Derek G7POS and others with the same interest – that there is still a great deal of CB equipment available for conversion, along with the necessary skills to convert the rigs.

What's also obvious to me, is that there are still many illegal CB transceivers available in the UK. Some of these will be quite old – 20 years or more – but others are quite modern. The modern transceivers that can be seen at car boot sales or advertised in local newspapers or 'free ads' sheets (we refuse to accept adverts for such equipment in *PW*) clearly demonstrates that they are still being imported into Europe.

In fact, I think that the vast majority of illegal multi-mode CB transceivers that can be obtained here in the UK today – actually come here via the European Union (EU). Gone are the days when the occasional CB transceiver arrived in the baggage after a holiday in the USA. Very few come directly by air nowadays – instead they seem to come – perhaps two or three at a time – in heavy goods vehicles (HGV) from the EU.

Indeed, if the activity I can often hear – just below 28MHz on s.s.b. – from foreign HGV drivers having just arrived on the Poole (Hamworthy) ferry from France, is anything to go by, they seem to have some very good quality s.s.b. equipment. The authorities on both sides of the English Channel have far more important things (more important than illegal CB radios anyway) to worry about. Smuggled drugs and illegal immigrants are much higher priority.

I can't see the clandestine import situation ever changing – and I think that intercepting illegal CB radio equipment will always be a very low priority for the authorities. However, if licensed Radio Amateurs **were** permitted to obtain such equipment for conversion, we could at least help by denying each rig to illegal s.s.b. operators on 27MHz.

Club Visits

I'm delighted to say that the delayed visits to the **Chester & District ARC** and other clubs are now being re-scheduled. The Chester trip has been confirmed for Tuesday evening **March 2nd** and I will be very pleased to meet friends old and new at the club's headquarters in Waverton, near Chester.

The next visit is to the **Plymouth Radio Club**, which has now been confirmed for Tuesday evening **April 13th**. However, if you'd like to come along on either date (you'll be very welcome) – please contact the clubs directly. I'll publish details of other club visits as they are confirmed.

Finally for this month, I'm delighted to confirm that the **Dartmoor Radio Rally** at **Tavistock College, Crowndale Road Tavistock** on Bank Holiday Monday May 3rd, is on my list again this year. **Steve Hunt** (our Rally Manager) and I look forward to meeting you there!

Rob Mannion G3XFD/EI5IW

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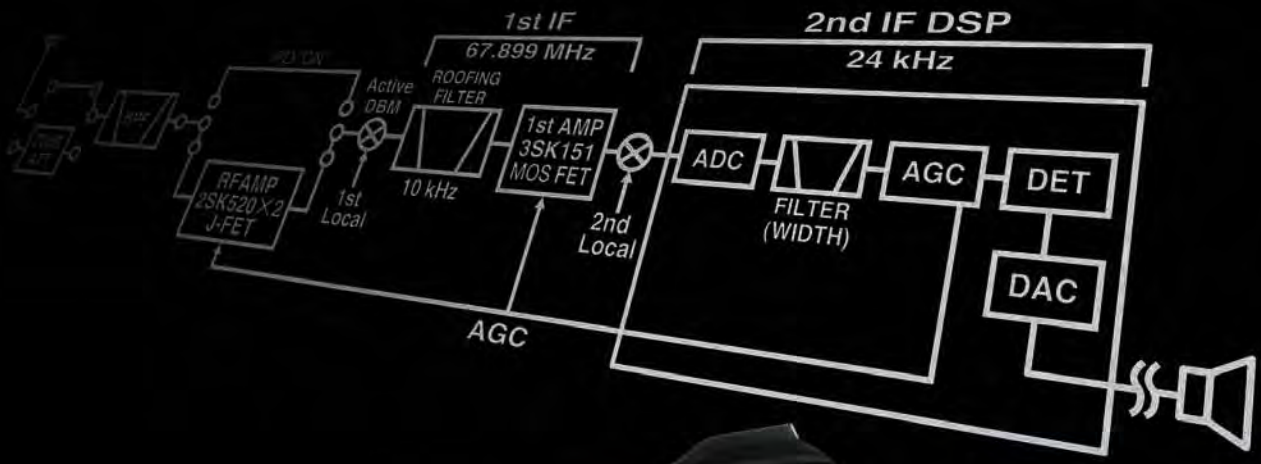

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