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KENWOOD

TS-590S Amazing!

Excellent dynamic range, dual 500Hz and 2.7kHz roofing filters, Built-in auto ATU, 32bit floating point DSP, Digital processing IF chain, USB conectivity, Large display with dual colour backlight screen. This is not an updated TS-570, but a completely new design embodying the very best engineering crafted by Kenwood to compete with the very best. If you are a Kenwood fan, you will love this radio.

Get £50 Heil Gift Voucher
With this before end of March

160m - 6m with superb receiver inc. dual roofing filters, Auto ATU, 32 bit f/p DSP & USB PC connection. **£1369.95 D**

TEN-TEC

TenTec Quality starts at just £1529!

All TenTec now include 5MHz band

The EAGLE has landed Order yours today!

Jupiter-538 **£1529 D**
Jupiter-538AT £1839

The Jupiter is TenTec's entry level transceiver. Customers are impressed with the performance of this HF 100 Watt transceiver with full DSP. It includes 5MHz band as standard and has a large clear display. Lovely audio, amazing selectivity and a great receiver front end.

Check out www.hf-transceivers.co.uk

Eagle-599 **£1734**
Eagle-599AT £1939

This is TenTec's latest 100W HF-6m transceiver. Designed for mobile or portable, it offers full DSP signal processing and produces 100 Watts SSB / CW. It has a large LCD panel with colour control, and a USB socket for easy firmware uodates and PC interface needs. Triple roofing filters.

Other models in the range
Omni-VII-588 100W + ethernet control **£2549**
Orion-II-566 with dual receivers. **£3969**

ICOM

NEW IC-9100

VHF/UHF Satellite + HF + D-Star **£TBA**

Arriving Soon
100W on HF-2m 75W on 70cms & 10W on 1296MHz
Some items optional

ID-E880 NEW

- *2m/70cm 50W Mobile*
- *D-Star +D-Star Repeat Mode*
- *Extensive GPS Compatability*
- *CTCSS & DTCS + Airband Receive*
- *1000+ Memories*
- *Detachable Head*

£439.95 D

NEW FIND IT CHEAPER? We'll Match it!

IC-T70E

Dual Band 2m/70cm Handy
£159.95 D

IC-E90

Triple band 6m, 2m, 70cms.
£244.95 D

NEW IC-E80D

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

FREE software on Icom site

In Stock Now **£324.95 D**

IC-E92D

A great dual band handheld woth D-Star fitted. Wide receive
£384.95 D

IC-E2820

Great dualband mobile.
£499.95 D
Fitted with UT-123 D-Star module. **£714.95**

HF Transceivers

IC-7600 New Low Price!

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.

~~£3379~~ **£3199 D**

IC-7800	Deluxe HF / 50MHz All-Mode 200W Transceiver	**£8999 D**
IC-7700	1.8-54MHz 200W with built-in PSK-31 + keyboard	**£6239 D**
IC-7200	HF & 6m DSP 0.005-3335MHz wideband receive with USB port	**£839 D**
IC-7000	160m-70cm 100W (hf) Mobile, portable or base station	**£1189 D**
IC-718	160m-10m 100W transceiver that brings HF to those on a budget	**£539 D**

Other Radios

IC-910H	**£1299 D**	**IC-R6**	**£179.95 C**	**IC-R2500**	**£649.95 C**
IC-2200H	**£229.95 D**	**IC-R20**	**£399.95 C**	**IC-R8500**	**£1439.95 D**
IC-R3	**£399.95 C**	**IC-R1500**	**£519.95 C**	**IC-R9500**	**£10999 D**

YouKits HB-1A-MK3 NEW

Available as from Early March
Limited quantity from first shipment

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

30m / 20m Model **HB-1A-MK3-30-20**

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

Provisional Specification:

Full band coverage	
Tx: CW	Rx: SSB CW & AM
Filters	Crystal for CW & SSB
Keyer	Built-in
Power Out	3W dry cells 5W 13.8v
Memories	20 Channels
Volts	9 - 14v
Current	Tx 950mA max on Rx 55mA
Internal	8 x AA cells
External	13.8v
Tuning steps	100kHz - 10Hz
Size	140 x 95 x 35 (mm)

Flex-1500 SSB CW Transceiver

FlexRadio Systems®

PC or MAC!

All Modes 5W HF - 6m Transceiver

The **Flex-1500** offers an amazing package with selectivity down to less the **50Hz** and a live **panoramic display.** A **single USB** connection to your PC (or Apple Mac running Boot Camp) will get you on the air in minutes. It is also **"transverter ready"** for VHF - UHF operation. Hear the difference and "see" the signals. "Click" on the signal waveform - you are netted ready to transceive - EASY!!

NEW FLEX-1500 Package (ends 31st March)
FLEX-1500 + SDR Software, Heil adaptor lead voucher, "Extras" software Disc.
All this for £599.95! D

Flex-3000 100W SSB CW TX

100W All modes with built-in ATU, firewire connection, hand mic and "extras" Disc. **£1299.95 D**

YAESU

We still have the largest, most up to date stock of Yaesu in the UK!

NEW FT-450D

- *300Hz CW Filter*
- *New Hand Mic*
- *New Main Dial & VFO Knobs*
- *Key Illumination*
- *Feet*

New and improved version of the FT-450AT. **£799.95 D**

YAESU FT-2000 Deals

FT-2000 **£1999 D**
FT-2000D **£2599 D**
The FT-2000D adds 200W output and AC PSU!

The heavy-weight radio at a lightweight PRICE!

New Mobiles In Stock Now...

FT-1900E

55W 2m Mobile with 200 memories.
£129.95 D

FT-2900E

75W 2m Mobile + 200 memories.
£139.95 D

FT-7900E

50/45W 2m/70cm Mobile + 1000 Memories.
£209.95 D

HF Transceivers

FT-DX5000D	200 Watts of raw power and performance.	**£4795.95 D**
FT-DX5000MP	200 Watts plus additional panoramic display.	**£5295.95 D**
FT-950	100W HF - 6m transceiver with DSP & Auto ATU	**£1199.95 D**
FT-450	100W HF - 6m transceiver - great value.	**£639.95 D**
FT-DX9000contest	200W HF - 6m "formula one" contest machine	**£4899.95 D**
FT-DX9000D	Deluxe fully loaded base station	**£8199.95 D**
FT- DX9000MP	Amazing 400W "legal limit" radio	**£8999.95 D**
FT-857D	HF to 2m mobile. portable or base - up to 100W	**£679.95 D**
FT-817BHIDSP	Fitted with DSP module exclusive to W&S	**£629.95 D**

VHF Mobiles & Handhelds

FTM-350E	2m/70cm Mobile Bluetooth GPS APRS	**£479.95 D**
FTM-10SE	50/40W 2m/70cms stereo FM	**£309.95 D**
FT-8800E	Dualband Mobile 50W / 30W	**£329.95 D**
FT-8900R	10/6/2m & 70cm Mobile	**£369.95 D**
VX-3E	2m / 70cm Handheld Wideband receive	**£159.95 D**
VX-7R	Waterproof dualband handy (silver / black)	**£289.95 C**
VX-6E	2m/70cms handy, 5W Wideband Receive	**£239.95 C**
VX-8DE	Triple Band 6/2m/70cm Upgraded APRS	**£369.95 D**
VX-8GE	Dualband 2m/70cm 5W + GPS Antenna	**£359.95 D**
FT-60E	2m/70cms, 5W handy Wideband Receive	**£179.95 C**

< VX-8DE

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

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SD330
DIAMOND ANTENNA
Mobile "Screwdriver"

- *Length: Approx. 1.85m*
- *Weight: Approx. 1.1kg*
- *Frequency: 3.5-30MHz*
- *Max. Power Rating: 200W (SSB)*
- *Impedance: 50Ω*
- *SWR: Less than 2.0*
- *Connector: SO-239*
- *Type: 1/4 wave center loading*
- *Power Supply: DC 12V 100mA voltage & current*
- *Up-Down Time: approx. 50 sec. (3.5→30MHz), approx. 20 sec. (7→30MHz)*

£449.95 D

AOR
We are UK Distributors

AR-MINI *NEW LOW PRICE!*

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

£149.95 D

AR-8200-MKIII

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

£439.95 D

AR-8600MKII Base or Portable

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

£649.95 D

KENWOOD *NEW* TH-D72E

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

In Stock Now! £426.95 D

HF Transceivers

TS-2000E £1549.95 D

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

TS-2000X +23cm **£1799 D**

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

TS-480SAT This model gives 100 Watts on all bands up to 6m, but adds a built-in automatic ATU. **£779 D**

Handhelds

TH-F7E	2m/70cm 5W (2-pin Kenwood) SMA **+FREE Clip Mic**	**£234.95 D**
TH-K2E	2m 5W 4-Key Keypad (2-pin Ken) SMA **+FREE Headset**	**£164.95 D**
TH-K2ET	2m 5W 16-Key Keypad (2-pin Ken) SMA **+FREE Headset**	**£174.95 D**
TH-K4E	70cm 5W (2-pin Kenwood) SMA **+FREE Headset**	**£164.95 D**

VHF Mobiles TM-V71E £299.95 D

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

TM-271E	2m FM 60W mobile. CTCSS, 200 Memories, DTMF Mic	**£169.95 D**
TM-D710E	2m/70cms 50/50W mobile. APRS +EchoLink, DTMF Mic	**£449.95 D**

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NES10-2MK3 *NEW*

New DSP speaker for any receiver or transceiver.

£112.95 C

DSPKR

10 Watt integrated DSP speaker.

£154.95 C

NEIM-1031MKII

An in-line DSP module giving complete noise cancelling control

£142.95 C

www.bhi-ltd.com

TG-UV2
QUANSHENG
2m/70cm Dual Bander

The TG-UV2 is a dual band 2m/70cm handheld. It covers 136.00 - 173.995 - 400 - 469.995MHz and FM broadcast 88-108MHz. The radio includes 7.2v 2Ah Li-ion battery for extended life.

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

£81.95 D

WiNRADiO WR-G31DDC "Excalibur"
Receiver 9kHz - 49.995MHz

Meet the new industry standard receiver for serious HF work. Just plug into your PC USB port for a new experience in sensitivity and dynamic range. No hardware design can match the way that signals are extracted, demodulated and both visually and audibly reproduced. Serious DXer or casual operator, you will be amazed.

"It out-performed my 100dB HP Spectrum Analyser"

£649.95 D

TGM Comms Compact Multi-Band Beam Antennas

If you have a small garden, then this is the anser. These compact beams will fit most locations. Auto swithing, small size and easy to erect.

MQ-26SR £639.95 D
Bands: 10,12,15,17,20 Meters
Fwd. Gain 10m-6dBd,12m-5.8dBd, 15m-5.8.0 dBd, 17m-5.4dBd,20M-5.0 dBd.
Power Rating: 1200 Watts P.E.P
Feed 50 Ohm Coax.
Front to Back Ratio: 12 to 20 dBd
El. Length:11 Ft 9 inches Boom 4 1/2 Ft
Turning Radius: 6 Ft 8 inches
Wind Loading: 2.0 Sq. Ft. Survival: 75MPH

MQ-24SR £539.95 D This antenna is similar but covers 6-10-15-20m.

B-245 £949.95 D 10-15-17-20-40m 2 el. 21ft el. 10ft Boom.

TenTec
QRP Transceiver Kits

Build yourself a QRP transceiver - kit includes cabinet and all hardware.

Models for 20m/30m/40m or 80m. Covers 50kHz (user set). Output power is 3W CW with full break-in and 7 Controls. For full details visit our website www.wsplc.com

Model Codes: TT-1320, TT-1330, TT1340, TT-1380

Each kit £127.95 C

Watson
Cross Needle Meters

These are high quality, accurate VSWR meters with large, clear display featuring X-needle movements.

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

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

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

Watson
Power Supplies

Power-Max-25-NF

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

£89.95 C

Power-Max-45-NF

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

£129.95 C

Power-Max-65-NF

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

£239.95 D

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

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

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Turn that "Junk" into CASH! That NEW RADIO is now AFFORDABLE!

That's right, you can now take advantage of our new scheme. We will purchase for cash your old ham radio gear - DEAD or ALIVE! If you want to buy a new radio, then we will allow you even more! Look around you at all those items you no longer need or use. Change them into cash and make a big saving on that new radio you have always promised yourself. All you have to do is phone one of our sales staff or e-mail us and tells us what you have to dispose of and what you want to buy. You could be sitting on more cash than you think! Call 01702 203353 or e-mail: sales@wsplc.com. Do it NOW!

Watson Power-Mite-NF

22 Amps In Your Hands!

The famous Power Mite is small, yet rugged. It delivers more than enough power for any 100 Watt radio, is variable up to 16 Volts and has dual meters. But what really sets it apart is its NF (noise function) feature which allows you to remove any residual noise outside the ham band you are operating on. Fits easily inside a brief case or even large pocket!

£71.95 D

Avair
Power & SWR Meters

All models have 12V backlight and include DC Cable.

AV-201 1.8-160MHz, 5/20/200/1kW **£49.95 C**
AV-400 140-525MHz 5/20/200/400W **£49.95 C**
AV-601 1.8-160MHz / 140-525MHz **£69.95 C**
AV-1000 1.8-160MHz, 430-450MHz, 800-930MHz, 1240-1300MHz. 5W, 20W, 200W, 400W **£79.95 C**

Cross Needle Models Even Lower Prices!

The beauty of these cross needle meters is that they require no zero setting before you measure VSWR.

AV-20 30W / 200W, 3.5-150MHz **£39.95 C**
AV-40 15W, 0-150W, 144-470MHz **£39.95 C**

Diamond
VHF/UHF Antennas

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

Tonna
VHF/UHF Antennas

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

Create
Rotators

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

RC5-1 **£569.95 D**
RC5-3 **£719.95 D**

MFJ
Radio Accessories

MFJ-929 AUTO TUNER 1.8-30MHz 200W

LCD readout, 20,000 memories, long wire & coax, radio interface.

W&S £214.95 C

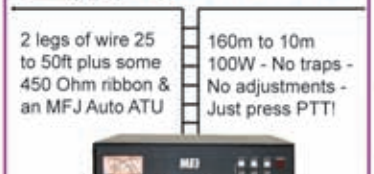
MFJ-991B Auto atu 150W **£214.95 D**
MFJ-994B Auto atu 600W **£349.95 D**
MFJ-962D 1.5kW ATU **£299.95 D**
MFJ-969 160m - 6m 300W **£219.95 D**
MFJ-971 Portable ATU **£122.95 C**
MFJ-974B Balanced ATU **£194.95 D**
MFJ-986 3kW differential tuner **£359.95 D**

MFJ-993B 300W Auto ATU

A true "Plug & Play" Auto ATU. Covers 160m to 10m. Capable of handling up to 300W - tunes almost any antenna, has X-needle meter & digital data display.

W&S £254.95 D

Build an All-Band Antenna Indoors or Outdoors - Do It Now!



MFJ-1260 Mic control 1 in/2 out **£101.95 C**
MFJ-1263 Mic control 2in/2 out **£121.95 C**
MFJ-1275 Sound card adaptor **£112.95C**
MFJ-1625 Window Ant + Tuner **£204.95 D**
MFJ-16B01 Dipole centre SO-239 **£22.95 A**
MFJ-16C06 6x dog-bone insulators **£5.50 A**
MFJ-16E01 300Ω end fed SO-239 **£10.95 D**
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MFJ-1798 80m-2m vertical **£309.95 D**
MFJ-1908H 43ft fibre glass mast **£244.95 D**
MFJ-1922 Digital screw driver control **£101.95 D**
MFJ-1924 Prog. screw drvr control **£132.95 C**
MFJ-1925 ATAS-100 controller **£74.95 C**
MFJ-202B Receiver noise bridge **£82.95 C**
MFJ-250X 1kW dummy load (x-oil) **£56.95 C**
MFJ-260C 300W dummy load **£45.95 C**

MFJ-998

W&S **£649.95 C**

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

MFJ-925 Compact auto tuner **£174.95 D**
MFJ-927 200W remote auto atu **£254.95 D**
MFJ-928 Basic auto atu **£203.95 D**
MFJ-931 Artificial ground **£114.95 C**
MFJ-932 Mini loop tuner **£143.95 C**
MFJ-934 Artificial ground + ATU **£204.95 C**
MFJ-935B Portable loop system **£204.95 C**
MFJ-945E Mobile atu 300W **£134.95 C**

TenTec
VNA Network Analyser

VNA-6000 200kHz-120MHz

NEW

This new VNA gives affordable access to many capabilities of conventional bench-top Network Analyzers. Use it to test low power amplifiers, coax cables, measure and adjust filters, check antenna impedance vs. frequency, antenna SWR, even the length of transmission lines. Requires a PC connection. **£649.95 C**

Tigertronics
SignaLink Interfaces

New Delivery Expected!

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

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

Uniden Bearcat

UBC-30XLT

A real bargain whilst stocks last.

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

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

£62.95 C

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

UBC-3500XLT

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

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

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

Watson
VHF/UHF Antennas

VHF-UHF Verticals

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

VHF-UHF Mobile Whips

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

MFJ-269

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

W&S £369.95 C

- *1.8 -170 & 415-450MHz*
- *Frequency Counter*
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Practical Wireless April 2011

contents

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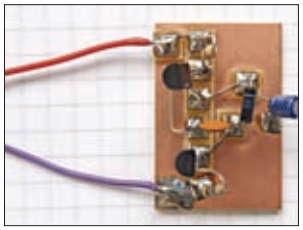
14


18


30


42


64

Front Cover
The Path up Ben Nevis, taken by **Tim Travers** as he helped Richard Newton G0RSN set up an Amateur radio station at the top of Ben Nevis last summer.

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Rob Mannion G3XFD/EI5IW's

Keylines

The Editor has been encouraged by his Grandson's enthusiastic school teachers.

Many of us might be concerned at the seeming lack of young people – interested in science and technology – passing through the education system within the UK and onto science careers. However, even though I'm normally concerned at what seems an extremely limited school science curriculum, I've recently had some encouraging reasons to ease my concerns a little.

The encouragement started recently with reports from my eldest grandson **Freddie**, who is now in his first year of secondary education. Of course, he was 'full of' enthusiasm (as many of us were when we started our secondary education) when he started his new school – but my somewhat jaundiced memories led to me thinking that he'd lose some of his enthusiasm fairly quickly. But I was wrong!

Much to my pleasant surprise Freddie is still enjoying his new school in Bournemouth and is particularly enjoying mathematics – a subject I never enjoyed or did very well at until I undertook an Open University course – and his science work. It seems as though the teachers at his school are as keen on their subjects as they can be and their dedication is helping my Grandson.

Occasionally, I get to help Freddie with his homework and we've both ended up learning something! Recently, I was stumped by one question and I was relieved – for both of us – that there had been a mistake transcribing the question – transcription errors are the bane of any Editor!

Discussing the problem at school next day, Freddie was asked what sort of job I do and after up-dating his Science Teacher, he was surprised to find out his teacher knew about Amateur Radio because he was an Amateur himself!

Personally speaking, I've always found that if an instructor, teacher or lecturer has real enthusiasm for their subject – that enthusiasm will communicate itself to those being taught. In fact, this is the reason why I think that the Foundation, Intermediate and Advanced Amateur Radio courses are so successful today. So, let's hope that the enthusiasm that must (surely) lead people into teaching – particularly in schools – isn't stifled.

Topic Closed

Only occasionally during the time – over two decades – that **Tex Swann G1TEX** and I have been working on *PW* have there been topics in the readers' letters section that have become 'hot topics' and, after discussing it with my friend and colleague, I have decided to announce the 'hand-held microphone' topic has been 'closed'.

Indeed, several of the debates in the past, have become quite heated and the subject – regarding driving with hand-held microphones, together with the associated safety issues, has become moderately 'warm' even at the Editorial offices!

So, I politely request that we have no more letters on the 'hand-held' microphone topic. And finally, while tempers cool and blood pressures drop I think it's worthwhile reminding everyone that whenever we 'poke our head up over the parapet' – announcing our opinions in print in the magazine for everyone to see and read – we shouldn't be surprised to get some reactions. You can be sure that both brickbats and plaudits will come flying at us whenever we 'expose' our opinion publicly!

Over the years my *Keylines* Editorials have sometimes raised comment amongst the Amateur Radio community around the world – and I've flinched at some of the replies. However, I have to remind myself that this is the price I have to pay for the privilege of having a soapbox (*Keylines*) to voice my opinions! But, I must also say that even when I've corresponded at length with Amateurs who hold opposing opinions to my own – I've often ended up making a good friend from the discussion.

We should always remember – that with our shared love of Amateur Radio – we've still got much in common, despite our opposing views on some topics. Surely, nobody in Amateur Radio would like to see our debates sink to the sometimes spiteful, embarrassingly unpleasant and mindless levels we can see in a certain debating centre based in London?

No wonder the radio broadcast microphones were kept away from the debating chamber for so long and TV cameras even longer. Perhaps we could teach the politicians (beg pardon, debaters) a lesson or two from our behaviour behind the microphone and on the keyboard?

Rob Mannion G3XFD/EI5IW

Practical Wireless
PW Publishing Limited
Arrowsmith Court
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BROADSTONE
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Tel: 0845 803 1979
Fax: 01202 659950

Editor
Rob Mannion G3XFD/EI5IW
rob@pwpublishing.ltd.uk

Technical Editor
NG (Tex) Swann G1TEX/M3NGS
tex@pwpublishing.ltd.uk

Art Editor
Stephen Hunt
steve@pwpublishing.ltd.uk

Advertising Typesetting/Admin
Peter Eldrett
peter@pwpublishing.ltd.uk

Advertisement Sales
Roger Hall G4TNT
roger@pwpublishing.ltd.uk

Finance Manager
Alan Burgess
alan@pwpublishing.ltd.uk

Book Orders
bookstore@pwpublishing.ltd.uk

PW Publishing Website
www.pwpublishing.ltd.uk

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Directors: Stephen Hunt & Roger Hall

Subscription Administration
Webscribe
Practical Wireless Subscriptions
PO Box 464
Berkhamsted
Hertfordshire HP4 2UR, UK
pw@webscribe.co.uk
www.mysubcare.com
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We regret that due to Editorial time scales, replies to technical queries cannot be given over the telephone. Any technical queries by E-mail are very unlikely to receive immediate attention either. So, if you require help with problems relating to topics covered by PW, then please write to the Editorial Offices, we will do our best to help and reply by mail.

Readers' Letters

Send your letters to:

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

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

Correspondence Closed: *All correspondence on the* Letters *pages associated with operating mobile radio with or without 'hands free' microphone/ or control equipment is now closed. For further information please see this month's* Keylines. ***Editor****.*

Further Details On My DAB Car Radio

Dear Rob
I was pleased to read that you liked my letter 'Perhaps DAB+ Later?' March 2011 *PW,* from your comments in *Topical Talk*. But to help further, I would just like to add a few notes for your information.

My car antenna for DAB radio is a 'passive' type on the front windscreen fitted at the time of install. There are multi (LM/MW/FM/DAB) antennas available but they cannot be fitted on some makes of car – including mine due to the rear windscreen washer! In the areas I drive around the BBC and Digital One multiplexes are generally excellent reception. (At home my Evoke receiver can also receive these services using the telescopic aerial anywhere in the house).

However in Guildford town centre *Classic FM* is excellent on DAB and poor on f.m. due to there being no frequency available from the local relay. Some of the 'more distant' London channels can be received in places around here which can be listened to but with stop/start reception/break up as the incoming digital stream is lost. There is nothing wrong with the JVC radio unit – instead it's a result of listening outside of the published service area! Some may find this unacceptable compared with f.m.! Three commercial stations have gone/going national coverage on DAB all originally from London. *Smooth* on Digital One started a few months ago, *Capital* and *Kiss* using regional and local multiplexes resulting in a bit less coverage over the UK but will be increased to some extent.

My car has several Electronic Control Units (ECUs) apparently and one fitted in the engine – basically mounted behind the radio – sends 13 carriers across Band II – and this makes f.m. useless for any radio station that coincides with one of them unless they are fairly local and I mean fairly local! The only solution here is to use DAB! And one of those stations isn't on DAB until later this year! I have noticed this issue on previous cars but only on a small scale. I did speak to the car manufactures and radio installers but they weren't particularly helpful.

£20 Star Letter

Missing a trick with reviews in PW?

Dear Rob,
I have just read the review of the Kenwood TS-590S in *PW* and can't help thinking we are missing a trick with the reviews. As someone who has several hobbies, I read equipment and software reviews regularly, and Amateur Radio reviews are a little lacking compared to others. This is true of *PW* and other Amateur Radio magazines. All have the same failing.

When I read the reviews in a photography or computer magazine, the item being reviewed is usually compared to a competitor's offering. For example, a Canon camera review will at the very least have comments in the conclusion comparing it to the competition at a similar price. Or it may be a full head to head Canon versus Nikon with comparative photos side by side, comments on handling of each, marks out of 10 for each feature, etc. I never see that type of useful comparison happening in the Amateur Radio press. Why not?

Wouldn't it be great if you could take say the Kenwood TS-590 and give a direct comparison to say the Yaesu FT-950 with comments like "the signal from xyyzzz on 20m showed as 5 & 9+20 on the Kenwood, but only showed 5&9 on the Yaesu, but the audio quality on the Yaesu was much more pleasant." Or "The i.f. DSP on the Kenwood blew the Yaesu's away and was much easier to use." I'm sure that I am not the only one who is slightly confused as to which rig should be on the shopping list!

Also, in the photography and computer magazines, there is usually a score given at the end. Some magazines may give it stars, others percentages for specific performance areas and an overall score. Again, this would be so useful for those of us shopping for a new rig if we knew for example that the noise floor on the Kenwood scored 68% and the Yaesu scored 78%, the Kenwood scored 80% for the DSP and the Yaesu scored 72%. You see what I mean?

What I am suggesting is for you to give us some reviews that really do give us what we need to know about how these rigs perform in comparison to one another. When we go to buy rigs, we are always parting with large sums of money. In fact the top of the range ones would buy you a nice small car!

Surely, we need to have done our homework so that we can make an fully informed purchase! Yes, I fully appreciate that some people will want a rig for c.w., others for s.s.b., some for contesting, or PSK, but the same is true for people buying cameras. Some for landscape photography, some for nature, some for lo light, some for portraits, etc. 73s

Gordon Hunter G8WWD
Upton
Wirral
Merseyside

Editor's comments: *Thanks for an interesting letter Gordon. Please join me on the* Topical Talk *page for further comments.*

Finally the letter from **Godfrey Solomon** (March *PW*) certainly has valid points especially about the short life of batteries on digital receivers. However I didn't know that the BBC were allowed to advertise digital radios! (Only joking!).

I hope I haven't bored you and thanks for a great magazine and hope to work you on h.f. one day.

David Miller G4JHI
Horsham
West Sussex

Editor's comment: *Thanks for the extra information David! Other than yourself, I don't know anyone else who has had success in DAB radio reception in a car, so it was very helpful information. Please see* Topical Talk *for comments on the radio in my own new car!*

Reading Problems – PW Kindle Downloads?

Dear Rob

I thought I would E-mail you and thank you for a brilliant magazine. I started reading *PW* in 1962 at the age of 12 and have continued reading it over most of the intervening years.

As I am now into my 60s I am now unable to carry out the construction projects that I used to do and find reading books, newspapers and magazines more difficult.

As I was reading the March issue of *PW* when it crossed my mind to see if the magazine was available as a download for an e-reader specifically the Kindle. I was lucky enough to have been given an Amazon Kindle as a present for a recent birthday and it has enabled me to read a wide range of books again without struggling with poor eyesight.

However, I have not been able to find *PW* listed in the Kindle store as a download and wandered if there were any plans to make it available in the future. Thank you again for an excellent magazine. Kind regards.

Richard Barrett M3YXB
New Botley
Oxford
Oxfordshire

Editor's comment: *Everyone on* PW *is delighted you enjoy the magazine so much Richard! Although there are no plans to have* PW *available as a download at the moment, the* ***Radio Amateur Invalid & Blind Club (RAIBC)*** *may be able to help. Some of their members view* PW *via image magnifying software on their computers – reading the pages on the screen – and for the registered blind,* PW *is available via the* ***Talking Newspaper service****.*

Silent Key – Steve Richardson G4JCC

Dear Rob,

It's my sad duty to inform you that my good friend, and one of the founders of the **UK Six Metre Group**, **Steve Richardson G4JCC**, passed away peacefully in his sleep on February 3rd 2011, aged 87, after a long illness.

I'm writing to you after returning from his funeral at Chichester Crematorium. As part of the Eulogy read by his daughter, **Marion**, she mentioned his passion for 6m and his work in creating the original *Six Metre Newsletter* and subsequent formation of the UK Six Metre Group. Steve's family had requested that they wanted a quiet family funeral. At his Son's request, I'm now passing on this information.

We all owe Steve a great debt of gratitude for his tireless efforts in forming the UKSMG and fighting for the first 6m special permits in the 1980s, ultimately leading to the general release of the band to all, and of course the rapid expansion across Europe and beyond.

I cherish the memories of the times I spent as a humble B licensee, listening to 6m in the early 1980s with my home-brew converter, passing reception reports to Steve on 2m, for him to relay them on 28.885MHz. I very quickly caught the bug, already being an avid v.h.f. operator, hence my UKSMG Membership Number 12.

I knew Steve for more than 33 years as a good friend and mentor, after meeting by chance on a college evening course. It was only after bumping into him a few weeks later at the RNARS HMS *Mercury* Radio Rally that we realised we had a common interest in Amateur Radio!

I expressed my gratitude to Steve's wife **Phyllis** and his family today on behalf of all associated with 6m here in the UK. I would be grateful if it would be possible to include something in *PW* to pass on the news to the many people in the UK and beyond that knew Steve. Regards,

Bob Reeves G8VOI
Waterlooville
Hampshire

Editor's comment: *I'm sorry to hear of Steve G4JCC's death Bob, but pleased to help honour him by publishing your letter. Steve G4JCC was a 50MHz man through and through and his legacy lives on through the 6m band we have today!*

Hospital Broadcasting Led To Amateur Radio!

Dear Rob,

I was very interested in the item in *PW*'s (March 2011) News & Products' by **Norman Bland M0JEC** about Hospital Radio. This is because it was really Hospital Radio that got me into Amateur Radio; that led in turn to my present role with Kenwood UK. It also led to me meeting the sister of one of my original co-workers on the station – she's now my wife **Ruth**, so I owe Hospital Radio a lot really! More years ago than I like to remember, a couple of my school friends were involved in setting up Radio Edgware, at the Edgware Hospital in North-west London. They were very technical (i.e. they knew what went on inside the mixer....) whereas I went along for the music and the social side as well.

After a short while our group split from Edgware and started Radio Brockley at the Royal National Orthopaedic Hospital in Stanmore, Middlesex. I was a DJ, with suitably long hair, but we all multi-tasked so I also acted as the engineer for other people's programmes, operating the mixer, record decks and tape machines. I'd been around Amateur Radio from very early childhood – my uncle **Bill Dyer** was **G3GEH** and I'd often sat in his shack tuning around on various receivers and even keeping a log, but it had always seemed a very grown-up hobby.

However, one of Radio Brockley's managers was my friend **Mike Solomons G8DKW** – and I was seriously impressed when he turned up at the studio one day in a new Ford Cortina which had an antenna on each of its four wings – one for its car radio, one for CB, one for his first generation mobile telephone and one for his Amateur 144MHz rig. We used to sit in his car on various local hills and work exotic locations, like South London! Here was someone of my own generation who was an Amateur – that fired me up to take the test and get my own licence. I became **G8KOP** after attending evening classes at a local

Please Slow Down On The Radio!

Dear Rob,
I'm looking forward to seeing you and **Steve Hunt** again at the next Tavistock Rally in May and I'm so pleased that you both find the time to join us – especially as you are a local boy! It was interesting to talk to Steve at the last rally and he certainly seems to know that us older readers appreciate the clear look of the magazine. I first started reading the magazine before the war when my late father read it each week when it was printed on rough newspaper type paper. After the war it was even worse until the 1950s but the front covers got much better. What a difference to the magazine of 2011, which is so clear and easy to read for someone who is on the wrong side of 80.

I'm writing though, to raise something I know has been raised before in *PW* – but I think it must be raised again. It's the subject of gabbled callsigns on the air. As well as not having good eyesight now my hearing isn't as good as it was and I do like to be able to record callsigns in my logbook. Trouble is most people on the air really do not speak their callsign very clearly even when they use the phonetic words.

Part of the enjoyment of my listening on the bands, particular 80 and 40 metres, is knowing where in the UK the stations are and the callsigns help, if I can understand them. As I mentioned to you last year when we chatted, I first enjoyed listening to radio communications when they called me up for my National Service after the war when I was a trainee farm hand. In the Army, what a difference, I worked with short wave radio and once I returned to the farm I never lost my interest. I hope you can read my wobbly handwriting and if you can, please ask everyone to give their callsign a little slower on the air. Best wishes, see you at the rally.

Arthur Luscombe
Gulworthy
Tavistock
Devon

Editor's comment: *I'll do my best to slow down myself on the air Arthur – let's hope other operators do the same. Thanks for writing – your handwriting is much better than mine! – and we look forward to seeing you and many of our other friends again at the Tavistock Rally on May 2nd.*

Tech. and sitting the C&G written test (no multiple-choice then).

Becoming a Class-A took longer. A lot longer! Much as I appreciate the delights of c.w. and recognise the levels of skill needed to work DX at 20w.p.m. while chatting to someone next to you in your shack, I really struggled to learn it. After several years study and two failed tests I finally passed at a GPO coastal radio station while on holiday – their lovely long professional Morse key did most of the work I think. So I became the very proud possessor of my first h.f. callsign **G4JLU**.

I often heard a local station in Finchley, **Angus McKenzie G3OSS**, on the air with his distinctive "Golf 3 Ocean Sugar Sugar" call so I adopted "Golf 4 Japan London United" for mine and it seemed to help my 100W from a half-sized G5RV get out a little further that it probably deserved to.

Although we all put a lot of time and effort into Radio Brockley, it wasn't all work – we got to know lots of the hospital people, including the nurses and the foreign auxiliaries. It gave us a very good social life in return and I'm still friends with many of Brockley's original volunteers all these years later. It also led to several marriages, between RB staff and with patients!

Amazingly, Radio Brockley is still going strong – only one or two of the original staff are still active there, but it's stood the test of time and is flourishing with new generations of enthusiastic volunteers. For most of them now, the original founders like myself are just names in the station's history, if they know us at all. And that's exactly how it should be – our child has grown up and is living its own life in its own way, supporting a new generation of patients at the RNOH. Best regards.

David Wilkins G5HY (ex G4JLU, G8KOP, G8LYN)
Area Sales Manager Communications Division
Kenwood Electronics (UK) Ltd
Website : http://www.kenwood-electronics.co.uk

Editor's comment: *A truly fascinating story David! Hospital Broadcasting was – and still is – supported by many Radio Amateurs. However, it's interesting to see you did things in reverse by becoming a Radio Amateur afterwards!* ***Mike Cooley G3XOC*** *and myself (Founding members of the* ***Isle of Wight Hospital Broadcasting)*** *– were able to recruit most of our fellow radio club members to help. Those were the days – great fun!*

Thank You *Practical Wireless* Readers!

Dear Rob,
I am pleased to report that there has been a very positive response to my letter about the school radio course which you published late last year. Thanks to the generosity of your readers, I now have "ready-to-go" v.h.f. stations available for loan to any student that passes the Foundation Course this coming summer. This will have a major positive effect on the youngsters remaining with, and developing in the hobby.
Kind regards and 73,

Tom Read M1EYP
Head of Mathematics
The Co-operative Academy at Brownhills
Brownhills Road
Tunstall
Stoke-on-Trent ST6 4LD

Editor's comment: *Everyone at* PW *was delighted to hear your news Tom. We wish your students every success in the Amateur Radio and school activities.*

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

City Of Norwich School On Air With GB1CNS

Members of the Norfolk Amateur Radio Club operate a Special Event station celebrating centenary of CNS School in Norwich. Steve Nichols G0KYA writes, "The NARC is to run a special event station to celebrate the centenary of its home – the City of Norwich (CNS) School – on Saturday 2 April 2011.

"The station – the callsign GB1CNS has been applied for– will form part of the school's 100th anniversary celebrations. The NARC has been based at the school in Eaton Road, Norwich, for the past three years and recently completed its new shack there, fitted out with antennas for h.f., v.h.f. and u.h.f.

"The station will be active on all bands and modes, including D-Star via the local repeater GB7NB and 2m via GB3NB. There will also be demonstrations of SSTV and data".

Club chairman **David Palmer G7URP** comments: "As well as regular Amateurs we would love to make contact with former pupils of the school if possible, wherever they are in the world. If we can't make it on h.f. then we can use D-Star digital mode to help make up the extra miles. We will also have a special QSL card available that features some of the early photographs from the school's archive".

Originally a boys' school, the City of Norwich School (at one point called Eaton CNS) was formed in 1910 with a fee of £2 a term for boys from the City of Norwich and £5 a term for others. Now a mixed state comprehensive, the school has more than 1700 students, 113 teachers and 86 support staff. It is also a specialist technology college and arts college.

The club will also be presenting an interactive display "Its a Wireless World" to show the history of radio to all visitors at the school's open day on April 2nd.

The club has more than 100 members, a strong history dating back to the 1950s and has a very active calendar of talks, events, special event stations and courses. Meetings are held at 7pm on Wednesdays at the **Sixth Form Common Room**, **City of Norwich School**, **Eaton Road**, **Norwich**, **Norfolk NR4 6PP**, with formal proceedings starting at 8pm.

Further information from Steve G0KYA: E-mail **infotechcomms@googlemail.com**
Website: **www.norfolkamateurradio.org/**

Front cover Newsflash!

Incoming E-Mails To Be Taxed?

***Practical Wireless* provides an up-date on Government plans to earn substantial revenue from the recipients of incoming E-mails following the recent dramatic reduction of Spam on the Internet.**

Although the taxation of incoming E-mails was proposed some years ago to help the Royal Mail overcome their loss of revenue – the UK Government has held back from implementing a tax (unconfirmed reports suggest 5p per received E-mail) because of the high levels of unwanted 'Spam' E-mails being received. However (see *Topical Talk* in the March issue of *PW*) the recent dramatic drop in the level of Spam has led to a re-think by the Chancellor of the Exchequer as to when the new tax can be implemented.

Although UK Government Departments weren't prepared to confirm the news before *PW* went to press – *Newsdesk* has been informed by reliable 'inside' sources that the Government Communications Headquarters (GCHQ) in Cheltenham is to start providing taxation information on incoming E-mails from April 2011 (The option to tax out-going E-mails in the future remains a possibility). The Government has never denied that GCHQ monitors the Internet in the UK – although Ministers have refused to confirm or deny that 'Taxation Metering' is now in place, awaiting the Ministerial 'switch on'. **PW**

Chris Soames G0TZZ operating in the NARC mobile shack.

The RSGB AGM Derby Venue

The 2011 Radio Society of Great Britain (RSGB) 2011 AGM is to be held in Derby, Derbyshire in the English Midlands. It will take place on Saturday 16 April at the Menzies Mickleover Court, Etwall Road, Mickleover, Derby DE3 0XX.

The RSGB press release states: "The whole day is geared to bringing the RSGB to you and is an ideal opportunity for local clubs to socialise and meet with each other and meet with senior RSGB officers. Winners of the 2011 National Club of the Year, sponsored by Waters & Stanton, will be announced.
Further details from the RSGB
3 Abbey Court, Fraser Road
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Bedford MK44 3WH
Tel: (**01234**) **832700** (lines open from 0830 to 1630)
FAX: (**01234**) **831496**
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Anytone 70MHz Mobile Transceiver At Nevada

Mike Devereux G3SED, Managing Director of **Nevada** in Portsmouth contacted *Newsdesk* with information on their 70MHz f.m. mobile transceiver: "Dear *PW,* I'm pleased to advise you that we are now importing a 4 metre band f.m. mobile radio the Anytone AT5189D. This radio has selectable output power of 5/10/25W output and covers the UK 4 metre Amateur band. It has CTCSS decode and encode along with a built in compander to reduce noise. The D version we are importing is supplied complete with a DTMF microphone and will sell for £149.95. We also have a Nevada 4 metre Mobile magnetic antenna to match the radio selling at £29.95." Mike G3SED.

Brief Specification
AnyTone AT-5189 mobile f.m. transceiver

Frequency:	70–70.5MHz Amateur band.
Operating Voltage:	13.8V
Output Power:	5/10/25W adjustable
Channels:	250 memory channels, every channel can be named with 32 characters.
DTMF microphone:	CTCSS/DCS/DTMF/2-Tone, 5-Tone decodes and encodes.
Noise reduction:	Compander to reduce noise.
Other features:	ANI function (display missed calls) / PTT ID. Single call, group call, selective call and emergency
Dimensions:	160x155x40mm
Weight:	1kg

Nevada, Unit 1 Fitzherbert Spur, Farlington, Portsmouth, Hampshire PO6 1TT
Tel: 012392 313095, FAX: 012392 313091, Web: www.nevadaradio.co.uk

Colin M3YHH Wins G3PCJ Parrett-Tone Transceiver

Colin Lodge M3YHH from Witton Bridge in Norfolk was delighted when he heard from the *PW* offices that he had won the Tone-Parrett transceiver donated by **Tim Walford G3PCJ**. Assembled and reviewed by *PW* author **Phil Ciotti G3XBZ**, the transceiver was the prize offered in the February 2011 issue competition. Colin – absolutely delighted – said he'd tell everyone at his club (the **North Norfolk Amateur Radio Group**) of his win. Congratulations Colin! **Editor**.

Mills On The Air

In 1996 the Radio Society of Great Britain (RSGB) put out a request for any Amateurs who might be interested in putting on a station at one of The Society for the Protection of Ancient Buildings (SPAB) watermills or windmills. From this request developed the now popular Mills on the Air (event where on a weekend in May each year radio amateurs set up and operate stations in wind and watermills all over the UK in conjunction with SPAB. As well as being an exciting time for everyone involved, the event promotes amateur radio as well as the ancient sites themselves, which are open to the general public over the celebration weekend.

Jasmine Marshall G4KFP who was a member of **Denby Dale Amateur Radio Society** (DDARS) in Yorkshire, spotted the request and contacted SPAB where they agreed to set up stations at six sites. This number quickly increased to over 30 as the word spread and soon DDARS were designing QSL cards, some even becoming collector's items and log books for the event. An award certificate was next on the list which would be presented to any station working 10 or more stations. Such was the interest in the stations that 3.5MHz (80m) was choked with QSOs whilst the mills and watermills also benefited with an increase in visitor numbers.

By the second year the number of participating mills had increased to 132 including South Africa, Northern Ireland and the Irish Republic. One of the most notable contacts being **Dame Judy Dench** passing a message to a mill located in Gelligroes, Wales.

After Jasmine G4KFP, **Brian Stocks G0BFJ** and then **Tony Barr G4LLZ** continued to co ordinate the event and today **Gerald Edinburgh G3SDY** – Chairman of DDARS – has taken on the responsibility as the event continues to thrive some 15 years – with 32 stations or more taking part in 2010.

Gerald is available to give any help and advice however it is the responsibility of each group to make their own arrangements with the mill they wish to operate from. A special event call sign can be obtained from Ofcom, for example DDARS has operated from **Thwaite Mills Island** near Leeds for many years using **GB2TMI**. To see all the stations taking part, or register your own station see DDARS website **www@g4cdd.net** To claim a certificate for working 10 or more Mills on the Air stations send in your log, together with a minimum of £5, which will be donated in full to SPAB, to Gerald G3SDY via **g3sdy@sky.com**

Taking part in Mills on the Air is a great way to promote our hobby but also to help and publicise the work done by SPAB in keeping alive our industrial heritage. **The 2011 Mills on the Air takes place on May 14th and 15th 2011.** Good luck!

Further information from **Richard Blandford M0RBG** via E-mail **m0rbg@talktalk.net**

Club Scene

Each month *Newsdesk* will feature interesting selections from club magazines sent in to *PW*. It's time to 'share & Enjoy'! **Editor**.

This month we feature items from *CRA News* – the monthly newsletter from the **Colchester Radio Amateurs** – website **www.g3co.org.uk**


CRA NEWS

Thursday 17th February @ St Helena School 7.30pm. Show And Tell Night

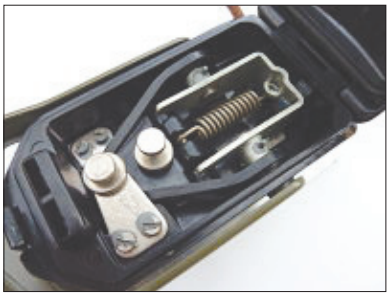
The CRA are a busy group – even a brief glimpse at their newsletter provides adequate proof! They obviously had a good Christmas social evening and **Chairman Ed Erbes M0HDK** expressed satisfaction that new callsigns were appearing – with congratulations expressed to everyone involved in the recent Foundation Course, as students and Instructors.

The electronically circulated newsletter features news about the **Martello Tower Group** (**www.martellotowergroup.com**) and their Amateur Radio activities. Additionally, for the keen collector and historian there's an interesting item on page 5 where **Creeksea Sailing Club** in Burnham on Crouch are selling a Danish-made Sailor 76D Marine transceiver (a.m. only) for their club funds. With 16 crystal controlled channels this is a bit a 1960s history on sale! The club has also recently obtained a 400mm diameter inflatable globe – a clever idea (from **Michael Palin** perhaps?) – ideal for teaching purposes, including propagation and locating those DXpeditions.

Further information from: **Kevan Pugh 2E0WMG**
CRA Newsletter Editor and Club Secretary
E-mail: **kevan2e0wmg@live.co.uk**
Tel: **07766543784**

*Congratulations to CRA on an excellent magazine, which I regularly enjoy! **G3XFD**.*

Czech Morse Keys On Sale In The UK!



A piece of Communist era history is on sale in the UK thanks to Mike Bowthorpe G0CVZ. Readers who have visited the Friedrichshafen Hamfest or one of the rallies in Germany or Holland will have seen them on sale and you can now buy them 'locally'!

Mike G0CVZ contacted *Newsdesk* to explain the background of this unusual key: "The keys were made in the early 1950s for the Czech armed forces, presumably for the army. They formed part of an h.f. base station which was called Type RM31 – although this may have been just the receiver reference – but the type name stuck and was then associated with the key. I now think the transmitter was called Type RS41. I have spoken to several Czech Radio Amateurs but they appear to know little about the keys history – although many have used the keys!

"I think that they're one of the most pleasant hand keys to use and extremely well made to a unique Czech design and cost £20 (UK postage included, the keys are sent by registered post, which requires a signature on receipt). Complete with original lead and plug. Over 50 years old but like new and still in factory wrapping. Add to your collection or use for everyday relaxed c.w. I would also welcome any further information on the key to add to my website."

Further details from:
Mike Bowthorpe G0CVZ
2 The Lawns
Fulbridge Road
Peterborough PE4 6BG
E-mail address: **mike@czechmorsekeys.co.uk**
Website: **www.czechmorsekeys.co.uk/index.html**

New Home For New Risca Club!

Clive Jenkins Secretary of the new Risca Amateur Radio Society in Gwent, South Wales contacted Newsdesk to say he was pleased with the publicity gained from the *PW* news item in the March issue – but they've now had to move to a comfortable new venue, courtesy of **The St. John's Ambulance Brigade** and new members are "Very welcome".
Further details from: Clive Jenkins
Tel: (01495) 309954
E-mail: **mc0rrd@qsl.net**
Websitewww.qsl.net/mc0rrd/
The Risca and District Amateur Radio Society meets every Tuesday from 7 to 9pm (free parking) at the **St John's Ambulance Hall**, **Risca**, **Gwent NP11 6BZ**.

Macclesfield & District Amateur Radio Society

The club shack is at the **Pack Horse Bowling Club**, **Westminster Road**, **Macclesfield**, **Cheshire SK10 3A** unless stated, (starting at 8pm). Scheduled talks include:
March 14th – Foxhunting, by **Simon Faulkner M0TGT**.
March 21st - Forthcoming practical projects.
March 28th – Radio Valves, by **Dave Lucas G0BIE**.
April 2nd –7th The Isle of Arran DXpedition GS4MWS/P.
April 4th – Sked to work club DXpedition station.

Club contact: **Tom Read M1EYP**,
E-mail: t**read@sgfl.org.uk**
Club website:
http://www.gx4mws.com

Martin Lynch Supports Keith G6NHU On Massive QSO Quest!

Keith Maton G6NHU contacted *Newsdesk* to describe a year long quest for for a QSO every day – and he's got Chertsey-based Martin Lynch G4HKS from ML&S in on the project too! Keith reports, "QSO365 is a project running throughout 2011 by myself to have a QSO per day during the year and document the progress on a blog. This is quite a personal challenge because I only have limited time each day to operate the radio. The QSOs can be on any band or mode – although to date they've all been between 3.5 and 144MHz and all have been conducted using s.s.b."

As part of the project, Keith is in the process of learning Morse code and has said that he intends to use c.w. on air during the year. All stations mentioned on the blog throughout the year will receive a QSL card with a sticker on the back mentioning the project and the day that the QSO took place. The QSO365 website and blog can be found at **http://qso365.co.uk** and the project has already been picked up and publicised on the internet.

The QSO365 project is sponsored by Martin Lynch and Sons Ltd who have kindly provided loan equipment for the duration of the project. Keith is a founder member of the Martello Tower Group and is the contest manager and webmaster for this small but enthusiastic group of Amateurs (**www.martellotowergroup.com**)."

Further details from Keith G6NHU via **g6nhu@me.com**

Waters & Stanton Go Military!

Essex-based Waters & Stanton PLC has contacted *Newsdesk*: Jeff Stanton G6XYU commented, "We are pleased to announce the completion of our first military contract. This is the culmination of two years development work on an intelligence gathering system using some of the most advanced radio equipment available. Indeed, some of the equipment did not even exist at the time that the work on this project began.

"In addition, software had to be written and developed specifically for the purpose. The past two months has involved extensive testing and refinements of the system, with many man hours being involved to reach the target delivery date of 1st of November 2010.

"This project has been the culmination of cooperation on both sides of the Atlantic with the hardware coming from TenTec Commercial Division and RF Space. The system comprises a multi-receiver installation with panoramic linked display and Ethernet network connection. This will provide one of the most advanced intelligence gathering systems available.

"Software was written in the USA and based on customer requirements and the final testing, implementation and delivery was overseen by **Steve Hoy** at W&S.

The first system is now undergoing active testing and assessment under operational conditions. If the system fulfills its promises, then it is expected that the system will be adopted extensively by the military, providing valuable orders to both Waters & Stanton and the US companies involved. The development also enables W&S to offer similar systems for other areas of government and military purposes."

Jeff Stanton G6XYU
Waters & Stanton PLC
Spa House
22 Main Road
Hockley
Essex SS5 4QS.
Tel: (**01702**) **206835**
FAX: (**01702**) **205843**
Website:
www.wsplc.com/

Steve Hoy busy working on the project.

Patrick Wodehouse G4CA – Silent Key Silent Key At 90

***Newsdesk* reports: Although he was certainly not as famous as his Uncle P. G. 'Plum Wodehouse' the humourous novellist, Patrick Woodhouse G4CA had enjoyed childhood holidays with the author of *Jeeves & Wooster* and the hilarious *Blanding Castle* stories (featuring the hilarious adventures of Clarence the 9th Earl of Emsworth) and carved out his own illustrious career in science, specialising in airborne and ground Radar with the RAF**. His expertise took him to the Far East, Africa and to the Isle of Wight, where he met his first wife. The RAF funded G4CA's return to Imperial College after the Second World War. He had an illustrious career – including development work on Radar surveillance systems for the Tornado jet – and later for the European Space Agency, based in Rome in Italy. After his retirement he lived in south London with his second wife who he'd met in Rome. Patrick Wodehouse G4CA was a Member of the Institution of Electrical Engineers for more than 70 years, enjoying Amateur Radio for almost eight decades. Patrick Wodehouse G4CA lived in Wimbledon and died on January 29th 2011. (See *The Daily Telegraph* on-line Obituaries for an extensive and fully detailed obituary on this remarkable man. **Editor**).
www.telegraph.co.uk/news/obituaries/

Feature

David Dix G8LZE dabbles with dongles, satellites and space antics with the Global Cubesat Project!

You too can have fun in space!

One of the wonderful things about Amateur Radio is that it has many facets. Whether DXing or rag-chewing, using analogue or digital modes, constructing or experimenting or participating in sport radio events we all find our niche. However, I think it is true that space, space travel and things extra terrestrial hold a universal fascination and curiosity for all. It is this widespread interest that is providing the drive towards the Global CubeSat Project.

The CubeSat Programme

The CubeSat programme was started in 1999 by California Polytechnic State University, San Luis Obispo and Stanford University's Space Systems Development Laboratory who developed a common specification to enable universities worldwide to take part in space exploration and science.

A standard '1U' CubeSat is a 100×100×100mm cube with a mass of up to 1kg but is scaleable and 2U CubeSats (200×100×100mm) and 3U CubeSats (300×100×100mm) have been built and launched. Since CubeSats are all 100x100mm cross-section, regardless of length, they can all be launched and deployed using a common system.

The common deployment system that been adopted, coupled with their small size and weight means that getting a CubeSat into orbit can be achieved at an affordable price for independent institutions. Over 40 institutions have contributed to the CubeSat programme so far providing educational benefits to many thousands of students.

The FUNcube Project

The UK contribution is being championed by AMSAT–UK and is the FUNcube project. FUNcube is a 1U satellite aimed at firing up the enthusiasm of primary and secondary school pupils while supporting the national educational Science, Technology, Engineering and Maths (STEM) initiative. The satellite has an uncomplicated control system using simple control commands negating the need for a complicated on-board computer system.

The satellite should be ready for launch in July 2011, a launch opportunity is still being sought. Once launched FUNcube should be deployed into a sun synchronous low earth orbit about 500-900km above the earth. This orbit should provide three passes of the satellite over Europe each morning and three each evening.

In addition to a 500mW p.e.p. output at v.h.f. from the linear transponder for use by Radio Amateurs there will also be a 145MHz telemetry beacon. This beacon will provide strong signal telemetry supplying data from an on-board materials science experiment, allowing the school students to compare the FUNcube data with results they obtain from similar reference experiments in the classroom.

Operating frequencies for FUNcube have now been agreed as:

Inverting linear transponder:

Uplink	435.080 – 435.060MHz s.s.b. or c.w.
Downlink	145.960 – 145.980MHz s.s.b. or c.w.
Beacon:	145.955MHz c.w. and BPSK

A key element to the success of the project is to ensure it is accessible to as many people as possible. With educational budgets being squeezed and the likelihood that teachers will not have an in-depth technical knowledge, considerable effort has been made to ensure that taking part is both affordable and simple. These aims have been achieved by **Howard Long G6LVB**, who has designed the FUNcube Dongle, (FCD), shown during its design in **Fig. 1**.

The FUNcube Dongle

The FCD is a small software-defined receiver that plugs directly into a computer USB port and works with *Windows XP*, *Vista* and *Windows 7* in either 32 or 64-bit versions. It's also compatible with *Linux* and *MacOS-X* as it uses standard USB drivers already integrated into their operating systems, **Fig. 2**. (As this article is being worked on, there's no complete *OS-X* or *Linux* package available. ***Editor***)

The dongle has an SMA antenna connector and has three main processing blocks. The first stage is an r.f. to Base-band down converter utilising a chip primarily designed for DVB-T and DAB use. This includes the oscillator, phase locked loop (p.l.l.), voltage controlled oscillator (v.c.o.) and mixer together with a low-pass filter all in one package.

The second stage is a stereo codec used as an analogue to digital converter (ADC) and also provides a linear phase filter with very steep skirts. The third block is the USB interface using an entry-level PIC24 USB component programmed to appear as a composite

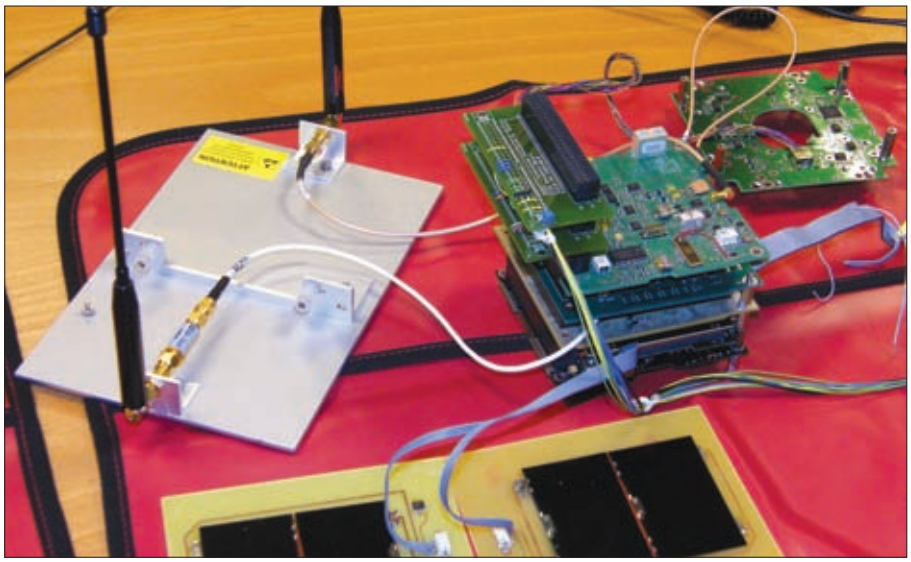


Fig. 1: Testing the FUNcube boards seen in the design phase, before final assembly by Howard Long G6LVB.

Fig. 2: The FUNCube dongle, ready to go, in place on the USB port of a portable computer.

USB device. The audio streaming from the dongle appears as a totally standard sound card so, any Amateur Radio soundcard software can be used.

Bandwidth of the completed receiver is around 80kHz and each unit is tested for a minimum of 0.15µV for 12dB SINAD n.b.f.m. at 145MHz and 435MHz. The firmware of the dongle is upgradeable.

There are two versions of the dongle. The entry level version of the FCD is frequency restricted to the two Amateur bands of 144 and 430MHz and has been designed as an entry level for minimal cost per device. This device is targeted at the educational sector and only gives access to the satellite frequency band that FUNcube and some other satellites use. The Pro version of the FUNcube Dongle, however, will receive signals in the range of 64MHz to 1.7GHz.

Following development of the FCD, the first batch of 35 Pro dongles went on sale on December 19th 2010 on a first-come-first-served basis. They sold out on-line in a **matter of seconds** and it became very clear that demand would outstrip supply for some time! The first dongles weren't commercially manufactured but put together by hand by Howard G6LVB, which considering the high density of surface mount components was a task only for brave people such as he!

A second batch of 60 devices was released at 2200 on January 2nd 2011 and again these were also sold out on-line in 20 seconds or so. The good news is that I was quick enough to purchase one of this batch and my test on this unit are detailed below.

The first commercially manufactured batch of devices arrived with Howard in the first weeks of January but the yield (those that worked okay), when tested out of the box, was only around 40%. So, much manual re-working was necessary before the 102 units went on sale on January 14th. These sold out in less than one minute!

Clearly as production difficulties are overcome more units will become available. And – once feedback has been received from the user community – decisions will be made and the design of the entry level version finalised and put into production.

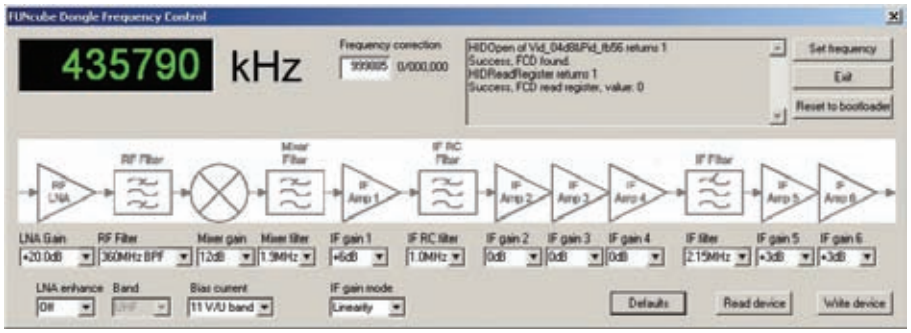


Fig. 3: The FUNcube dongle frequency control and adjustment software screen.

Dongle On Test

I wanted to make my test on the dongle as realistic as possible to prove that the FCD was 'fit for purpose'. To this end I didn't use an elaborate antenna system using Yagi antennas steered towards a satellite. Instead, I used a home-brew '700mm' quarter wave ground-plane mounted at about 10 metres above ground, fed with about 15 metres of u.h.f. TV coaxial cable joined to five metres of RG58 cable.

My antenna was a modest set up, more akin to what might be found in a school. I considered that if the FCD worked well in this configuration it would have passed the test.

To use the Dongle you will need to load two pieces of software. The first piece of software is the 'front end' software and may be downloaded from the dedicated FCD web site **/www.funcubedongle.com**

This software is used to set the local oscillator frequency of the FCD and hence its receive frequency. In addition there are several other filter and gain parameters that can be adjusted using the software, **Fig. 3**.

Secondly, you will need some software to view and perhaps decode the received signals that are fed from the dongle's on-board soundcard. Several programmes are available free to download including *Rocky*, *Spectravue*, *KGKSDR* and *WRPlus*, a derivative of *Winrad*. For my testing I used *WRPlus*.

The next thing to do was to find out which satellites would be 'visible' above the horizon and when! There are several sources to determine this information. Fortunately, AMSAT have an application at **www.amsat.org/amsat-new/tools/predict/** which will give information for a specific satellite. There's also a satellite prediction tool free with the *Ham Radio Deluxe* suite of programmes and also as part of the *Sat32pc* programme (for which a small registration fee is payable).

Consultation with the various sources indicated that the HO68 satellite had a fairly close pass due shortly before I finished this article at the time of my

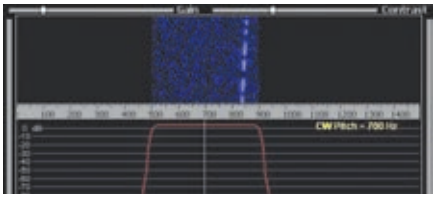


Fig. 4: The WRPlus trace of the HO68 satellite c.w. beacon – the slanting lines on the waterfall show the Doppler shift of the signal.

tests. Satellite data indicated that it had a 200mW c.w. beacon operational on a frequency of 435.790MHz. So, I fed this frequency into the FCD front end software and started *WRPlus*.

I monitored the predicted pass and when the satellite was a few degrees over the horizon I started to see faint traces of a signal on the waterfall. As the pass progressed and the satellite got closer the traces became clearer and the data from the beacon could be clearly seen and heard, **Fig. 4**.

Did It Pass The Test?

So, you're probably wondering – did the FUNcube Dongle pass my test? In replying I'm pleased to say 'Yes it did – and with flying colours!' It took less than 10 minutes to download the necessary software and get the receiver working and despite the less than perfect antenna, signals from HO68 were strong and steady.

I do hope that AMSAT-UK will be able to confirm their FUNcube launch date for later on this year and that they are able, despite the squeeze on educational budgets, to get the programme into schools and colleges.

I have had a great deal of pleasure learning about the FUNcube project and putting the FCD through its paces. I would like to thank Howard Long, G6LVB, **Graham Shirville G3VZV** and others at AMSAT-UK for their outstanding commitment.

Currently only available to those with a PayPal account, the price of the Pro FCD is £124.86* including delivery in the UK and Isle of Man – a small price to pay to travel "To infinity... and beyond!" as Buzz Lightyear would say. **PW**

*A proportion of this price is donated to AMSAT-UK.

KENWOOD

Authorised dealer

Hand-helds

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

Mobiles

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

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

Accessories

PS-60 25amp power supply unit ideal for the new TS-590S **£309.95**
SP-23 External speaker **£71.95**
SP-50B Mobile speaker **£29.95**
MC-90 Deluxe desk microphone suitable for DSP transceivers **£194.95**
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Authorised dealer

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KG-679E Superb single band 2m **£59.95**

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

TYT

TYT-800 2m 144-146MHz 5 watts 199 channels amazing **£54.95**
TYT TH-UVF1 2/70 5 watts 128 channels **£99.95**

Accessories

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

MOONRAKER

HT-90E 2m single band transceiver with full 5 watts output just **£59.95**
The HT-90E is a brilliant compact radio, perfect for beginners to the hobby. Comes complete with battery, belt clip, antenna, and rapid charger all for under £60 quid! Everything you need to get on air is in the box!

Hand-helds

ICOM

Authorised dealer

IC-E80D D-Star dual band 2/70cm handheld with wideband RX 0.495-999.99MHz **£329.95**
IC-E92D Dual band 2/70cm RX 0.495-999.9MHz with built in DSTAR **£389.95**
IC-E90 Tri band 6/2/70cm RX 0.495-999.9MHz **£239.95**
IC-T70E dual band 2/70cm handheld with 5W Tx & 700mW loud audio **£159.95**
IC-V80E single band 2m handheld with 5.5W Tx & 750mW loud audio **£104.95**

Mobiles

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

ID-1 Single band 23cm 1240-1300MHz digital and analogue DSTAR transceiver **£719.95**
IC-E2820 + UT123 Dual band 2/70cm with DSTAR fitted, 50 Watts output **£699.95**
IC-E2820 Dual band 2/70cm DSTAR compatable, 50 Watts output **£499.95**
ID-E880 D-Star ready dual band with wide band RX 0.495-999.99MHz **£439.95**
IC-2200H Single band 2m 65 watts **£229.95**

Base

IC-7800 HF/6m All mode 200 Watts Icom flagship radio **£8,995.99**
IC-7700 HF/6m 200 Watts with auto ATU transceiver **£5,999.95**
IC-7600 HF/6m 100 Watts successor to the IC-756 ..... **£3,299.99**
IC-7410 coming soon ..... **£TBA**
IC-7200 HF/VHF 1.8-50MHz RX 0.030-60MHz, 100 Watts output (40w AM) **£839.95**
IC-718 HF 1.8-30MHz RX 300kHz - 29.999MHz, 100 Watt output (40w AM) **£594.95**
IC-910H dual band with optional 23cm, 100 Watts output **£1,299.95**

Accessories

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

QUANSHENG

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

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

YAESU

Authorised dealer

Hand-helds

VX-8DE Triband same spec as VX-8E but with enhanced APRS **£369.95**
VX-8GE Dual band with built-in GPS antenna and wideband 100-999.90MHz Rx **£359.95**
VX-7R Tri band 50/144/430MHz RX 0.5- 900MHz, 5 Watts outut **£299.95**
VX-6E Dual band 2/70cm RX 1.8-222/420-998MHz, 5 Watts output **£239.95**
FT-60E Dual band 2/70cm RX 108-520/700-999.99MHz, 5 Watts output **£179.95**
VX-3E Dual band 2/70cm RX 0.5-999MHz, 3 Watts output **£159.95**
VX-170E Single band 2m, 16 digit keypad, 5 Watts output **£99.95**
FT-270E Single band 2m, 144-146MHz, 137-174MHz Rx **£104.95**

Mobiles

FT-857D All mode HF/VHF/UHF 1.8-430MHz, 100 Watts output **£669.95**
FTM-350 Dual band with Bluetooth, GPS & APRS **£479.95**
FT-8900R Quad band 10/6/2/70cm 28-430MHz, 50 Watts output **£369.95**
FT-8800E Dual band 2/70cm RX 10-999MHz, 50 Watts output **£329.95**
FTM-10E Dual band 2/70cm, 50 Watts output **£309.95**
FT-7900E Dual band 2/70cm 50/40 Watts with wideband RX **£239.95**
FT-2900E Single band 2m 75 Watt heavy duty transceiver **£139.95**
FT-1900E Single band 2m 55 Watt high performance transceiver **£129.95**

Portable

FT-897D HF/VHF/UHF Base/Portable transceiver 1.8-430MHz 100 Watts HF+6, 50 Watts 2M, 20 Watts 70cm **£779.95**
FT-817ND HF/VHF/UHF Backpack Transceiver RX 100kHz – 56MHz 76-154MHz 420-470MHz 5 Watts **£509.95**

Base

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

Accessories

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

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Yagi Antennas

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

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

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

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ZL7-2 2 Metre 7 Ele, Boom 150cm, Gain 12dBd **£69.95**
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**

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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**

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

HLP-2 2 metre (size approx 300mm square) **£22.95**
HLP-4 4 metre (size approx 600mm square) **£34.95**
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The most popular wire antenna available in different grades to suit every amateur .... All from just £19.95!

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

Accessories

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

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)

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, (Brilliant antenna HF to UHF with changeable coils) **£79.95**

Yagi Antennas

Diamond performance from the superb Diamond factory

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

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

New Ground Plane Free Colinear Verticals

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

SQBM110P 2/70cm, Gain 3/6dBd, RX:25-2000MHz, Length 100cm, SO239 fitting **£54.95**
SQBM1010P 6/2/70cm, Gain 1.5/2.0/5.0dBd, RX25-2000MHz, Length 140cm, SO239 fitting **£84.95**
SQBM1010N 6/2/70cm, Gain 1.5/2.0/5.0dBd, RX25-2000MHz, Length 140cm, N-Type fitting **£89.95**
SQBM225P 2/70/23cm, Gain 2.5/5.0/8.5dBd, RX25-2000MHz, Length 130cm, SO239 fitting **£79.95**
SQBM225N 2/70/23cm, Gain 2.5/5.0/8.5dBd, RX25-2000MHz, Length 130cm, N-Type fitting **£84.95**

VHF/UHF Mobiles

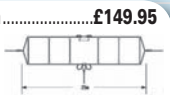
GF151 Glass Mount 2/70cm, Gain 2.9/4.3dBd, Length 78cm complete with 4m cable and PL259 ..... **£29.95**
MRM-100 MICRO MAG 2/70cm, Gain 0.5/3.0dBd, Length 55cm, 1" magnetic base with 4m coax and BNC **£19.95**
MR700 2/70cm, Gain 0/3.0dBd, Length 50cm, 3/8 fitting **£9.95**
MR777 2/70cm, Gain 2.8/4.8dBd,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

Dual and Triband Colinear Verticals

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

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

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



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

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

HF Verticals

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

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

CHAMELEON ANTENNA

The CHAMELEON V1 HF/VHF/UHF Multiband AntennaTM is a revolutionary antenna that stands at a mere 8.5 feet tall and contains a unique trap coil design. This antenna is ideally designed for mobile, portable or base station purposes were limited space is a concern.

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

GP2500

All Band HF Vertical

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

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

All at an amazing £229.95!

NEW GP2500F fibreglass version now in stock **£279.95**

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Feature

Richard Newton G0RSN describes how – with the willing help of Yaesu UK – he put the summit of Ben Nevis on the air and ended up buying the loan rig!

Ben Nevis
A Summit On the Air

This is the story of how I, with the help of my son Tom M3TJN and a friend, Tim Travers, set up an Amateur radio station at the top of Ben Nevis last summer and how I got hooked on Summits On The Air (SOTA).

Last summer my family and I joined up with Tim and his wife **Emma** and their children **Jessica**, **Luke** and **Sam** for a trip to the Highlands of Scotland, I ought to mention now that Tim isn't a Radio Amateur but we did share in an ambition to climb to the top of Ben Nevis, the highest summit in the United Kingdom.

I started to try and figure out how I would be able to set a radio station up on top of the mountain, I considered my Icom IC-706 but the problem was power – batteries aren't light!

I popped into see **Rob G3XFD** and **Tex G1TEX** at *PW* on a completely unconnected matter; I mentioned about my plans because I knew the Editor once lived in the Scottish Highlands – and made a passing comment on whether he knew anyone that might want to loan me a Yaesu FT-817 to take to the top of Ben Nevis. He then asked the obvious question, "Why are you doing it Richard?" I then replied with a wry smile – "Because it's there!"

Yaesu UK To The Rescue!

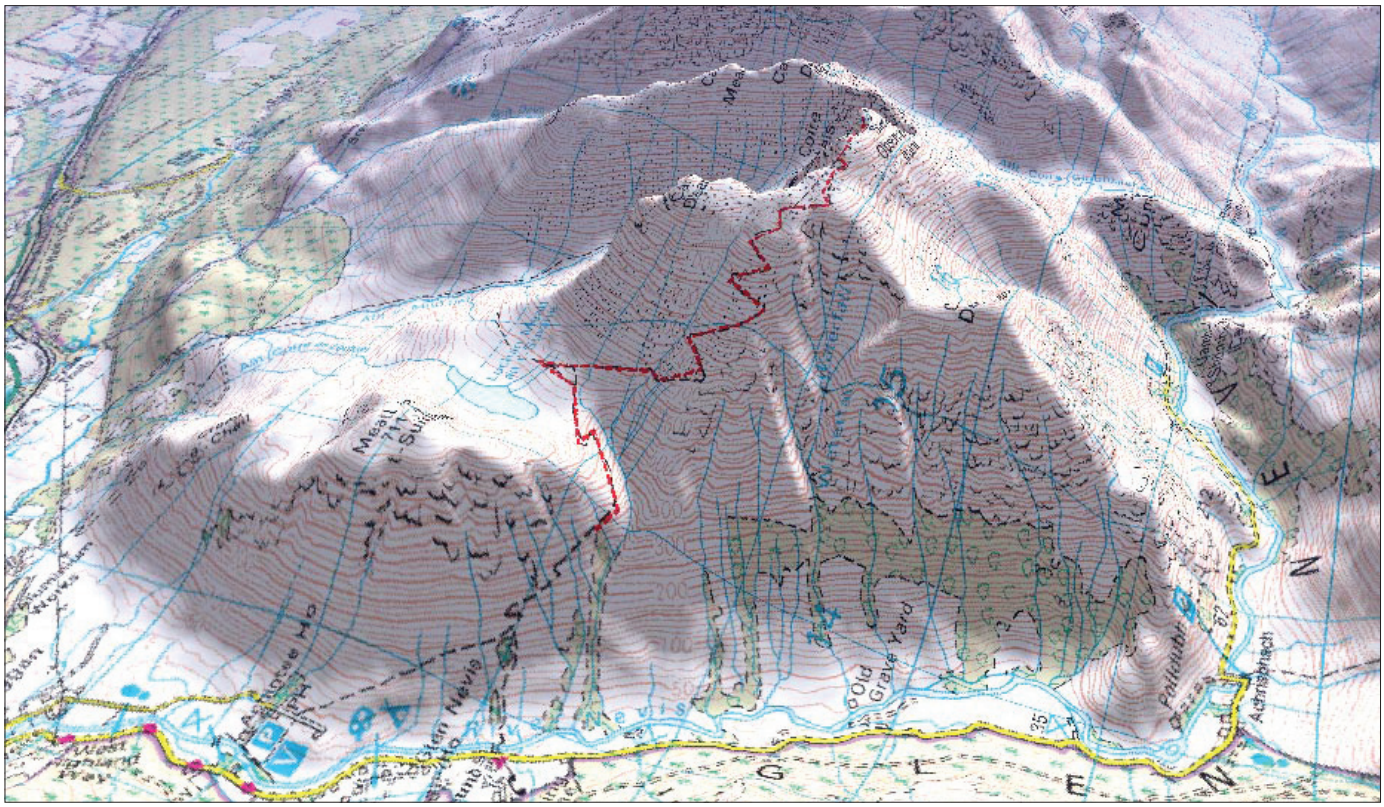
A day after our chat I received a call from the *PW* offices and couldn't believe my ears! The Editor told me, "I've spoken to Yaesu UK and they're going to loan you an FT-817ND to take to the top of Ben Nevis." I was speechless with gratitude – and the only catch was that our Editor wanted me to share the adventure with you by writing this article!

Yaesu pulled out all the stops to get the rig to me in time for me to pack it safely in the car for our long road trip to the north. For those readers who aren't familiar with the the Yaesu FT-817ND, it's a compact QRP rig, offering variable output up to a maximum of 5W. It's a multi-band, multi-mode radio covering the h.f. bands, 50, 144 and 430MHz. (Originally, the FT-817 unit was reviewed in *PW* May 2001. ***Editor***)

The FT-817ND only measures an incredible 135 x 38 x 165 mm (approx 5¼ x 1½ x 6½in). It can operate on 12V d.c. but the joy for me was that it also operates using its own internal 9.6V Ni-MH battery pack. Even with this battery pack the rig still only weighs 1.17 kg (2.58lb) now that I didn't mind carting up the mountain!

Overnight To Scotland

We arrived in Scotland on Saturday lunchtime having travelled all night. Tim and I decided that we would keep a close eye on the weather forecast, looking at the optimum day to go for Ben Nevis. The long range forecast



The 3-D map of the walk to be found at: www.wanderingaengustreks.com/Info-resources/Ben-tourist-map-large.jpg.

Photos reproduced by kind permission of Tim Travers

On the air at the summit of Ben Nevis. Richard GM0RSN/P operates while son Tom Newton MM3TJN/P stands by.

seemed to suggest the Thursday was the best bet.

It's worth noting that when climbing Ben Nevis – you don't get a lift part of the way! There's no train or chair lift – you actually start at almost sea level and you climb the whole 1344m (4409ft) up the side of the mountain.

During the approximate 8km (5 mile) ascent climbers experience some very diverse weather conditions. We planned for every eventuality and I came up with the idea of putting the equipment in freezer bags in case it got wet, so after a visit to the local supermarket I started to pack all the kit in different sized freezer bags, it looked so comical I just had to take some pictures!

My first impressions of the Yaesu FT-817ND were that I could not believe it was so small! Due to the small size, a lot of features are menu driven and the rig was so comprehensively equipped that I had to resort to reading the manual just to find out how to get the thing to charge! It was at this point I thought it was probably best if I take the handbook to the summit!

Glen Nevis Start

The Thursday morning arrived and the weather was lovely. The preparations over, we gathered at the Ben Nevis Inn in Glen Nevis and set off for the summit. We had packed raincoats, woolly hats, radio gear, a large first aid kit, extra clothing, more radio gear, food and well, yes – more radio gear.

One of the tastiest items we were carrying were the Scotch Pancakes that had been freshly made by Emma to her old family recipe. Not one of them survived the Ben Nevis trip (they were that yummy!).

I had decided on taking a home-made wire dipole for 7 and 21MHz, plus my Buddipole and tripod as a back-up. The Buddipole is a compact multi-band antenna system I purchased a few years ago from the United States after reviewing one for *PW*. It covers 50 and 144 MHz as well as the h.f. bands. The wire dipole was very light – but the Buddipole wasn't!

Tim was keen to carry as much weight as possible; he was training for some mad running race over Snowdonia. So, I reluctantly let him carry the Buddipole, plus some of the other additional equipment! Letting him do this obviously helped because I'm delighted to report Tim and his team later successfully completed the Snowdonia challenge! I'm pleased that I was able to help in some small way!

Tourist Trail

The path we took up the mountain is known as the Tourist Trail, which was first laid in 1883 so that ponies could be used to take provisions to the observatory that was built on the summit in the same year. The first part of the climb is quite gentle as you make your way up and around the contours, you then start climbing more and come out onto a plateau at about 570m, which provides wonderful views of Lochan Meall an t'Suidhe off to the left.

It's truly amazing how quickly the mountain weather changes. Indeed, we would be in bright sunshine one moment and peeling off layers of clothes. Then (as the sun disappeared) putting them back on again!

Richard GM0RSN/P busy working on 7MHz. The relative size of the Yaesu FT-817 is clearly seen.

At about 690m the small river Allt Na H'Urchaire cascades down the mountain creating the most wonderful waterfall that passes over the path, known as Red Burn. There's no footbridge – climbers just have to use the large rocks in the river as stepping stones.

It was soon after encountering this wonder of nature that we encountered the road works! Yes road works! It seems that there's no escaping road works – we were so amazed that we just had to take a picture.

Three and a half hours after we started we stepped onto the rock field on the top plateau, over to the left in mist we could see Tower ridge and Castle ridge. And, as we continued across the rocks the storm shelter and Trig point come into view, we'd arrived at the summit!

After having our arrival preserved for posterity by a photo, we found a spot and settled down to have some refreshment. The summit is actually covered in rocks and this surreal landscape was shrouded in cloud on our arrival – but the sunlight occasionally pierced through giving a really strange aura to the swirling mist that surrounded us.

I was surprised by the number of people at the summit but – despite there being so many of us – it was really quiet. Everyone was picking their way through the boulder field and politely smiling and greeting their fellow travellers, it was a truly wonderful experience but did present us with a problem that I hadn't foreseen – where were we going to erect an antenna so as not to garrotte a passer-by?

Before I knew it Tim was scaling the wall of the storm shelter like a ninja and securing the centre of the dipole at the height of about 5m (15ft), I had taken several lengths of parachute cord with us and we used one piece to secure it to the wall of the shelter as high as Tim to get it and with enough cord that when pulled tight it would take the dipole centre clear of the rock wall.

One leg of the dipole then went to a nearby metal structure and was secured above head height, in an inverted V configuration seemed to be the best fit and we used a hiking stick secured in the boulders to support the other leg. This was obviously not over head height so we had to station ourselves near to that end to try and make sure no one injured themselves or more importantly, damaged the antenna!

I got the FT-817ND out of the rucksack and connected the coaxial cable, in the interests of preserving the serenity and tranquillity of the location I decided to use an earpiece. I just used a D style mono earpiece with 3.5mm mono jack plug plugged into the side of the rig.

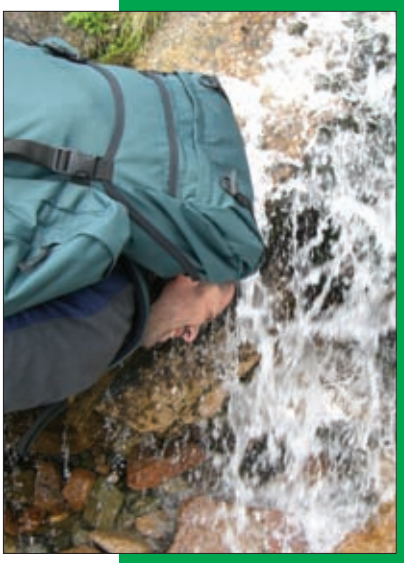
There's a small switch to the right of the speaker/phone socket, this is to adjust the audio delivered to the socket, it can be set for either a high level for an external speaker or a lower level for an earpiece or head phones.

It was the moment of truth! I turned the FT-817ND on and used the band selection keys to select 7MHz. When operating on the internal battery pack the '817ND automatically puts itself onto the 2.5W output setting and I wanted to override this and select the full 5W! Unfortunately, on top of a mountain, surrounded in cloud, in the cold, I failed to work out how to do this.

So, in front the small crowd that had now gathered around me I dug deep into the rucksack and retrieved the operating manual. After a short while reading the book of words and enduring the odd helpful and encouraging comment from Tim and Tom, the FT-817ND was pumping 5W into the dipole tuned to 7MHz.

I then heard a station in QSO near to the QRP calling frequency of 7.090MHz.

The 'Road' was orginally built to take material up to the Victorian observatory.



This was **Jon Bastin M0OTM** operating as **MX0TBG/P**. Jon was in Wiltshire, there was some fading but we were able to exchange 5 and 7 reports and had a really great chat!

The next contact was with **Dennis Barrett MM0DNX** literally just down the road in Glasgow, again some favourable reports were exchanged and compliments on the transmitted audio quality.

Ellis Simon GM4GZW in Edinburgh also gave us good reports and wished us well. The FT-817 was a joy to operate – even precariously balanced on top of a boulder. **Richard Hall GM0OGN** was my next contact; Richard was situated in Castle Bay, on the Isle of Barra, in the Outer Hebrides – famous for the 1941 wreck of the *S.S. Politician* (which was carrying a large cargo of whisky for export) and the 1949 Ealing Comedy film *Whisky Galore*. We had a very enjoyable chat after which I made contact with **Peter Leybourne MM5PSL** in Virkie on the Shetland Isles, some 450km north east of me. Peter gave me a 5&5 report.

My last contact was with **Kevin Jackson M0XLT** in Skipton, North Yorkshire, another great report on signal and audio and very pleasant chat was had. My eldest son Tom M3TJN had been helping me out putting out calls and keeping the log so it really had been a team event.

I hadn't realised it – but I had spent about two hours on the summit operating. unbeknown to me, poor Tim, had been answering questions from genuinely curious people from many different nations about what we were doing! He'd tried his best to answer from a position of not really knowing anything about the hobby at all!

A Magical Experience

It had been a magical experience, while on the summit we had met lots of people and seen so many different people obviously realising their own personal achievement, I do not think I have ever been in a place with so much positive energy that had such a quiet voice, this almost other worldly atmosphere was only broken with the occasional and short lived cheer as small groups made it to the top of the Trig point near to us. It was sadly time to leave.

As we started our decent we were just metres below the summit when we broke through the cloud and back into glorious sunshine, the views on our descent were stunning. It took us two and half hours to descend with a short break at the Allt Na H'Urchaire so that I could stick my head in a waterfall! Tim told me that it's a cultural 'must' when traversing any mountain and he was kind enough to capture the moment on camera.

When I climb my next mountain I'll take less radio equipment. I will be more focused on antenna systems and take a small 144MHz beam, perhaps an HB9CV antenna.

I will also definitely be taking a Yaesu FT-817ND – but now I'll not need to borrow one. Why? Because I was so impressed with the one the Yaesu UK loaned me – I couldn't bear to give it back, so I bought it!

PW

KITS & MODULES

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

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TRANSMIT AMPLIFIERS, for 2 or 4 or 6 metres, single stage RF switched, class AB linear. Diecast box with heatsink and SO239 connectors. **TA6SA** 2W in 25W out, **TA4SA** 2.5W in 25W out, **TA2SA** 5W in 25W out. **Complete kit £63.00, ready built £82.00**. **TA6SB** 5W in 50W out, **TA4SB** 7W in 50W out, **Complete kit £70.00, ready built £89.00**.

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TYPE	Package	F MHz	Gfs mmhos	Idss mA	Nf dB	Price £
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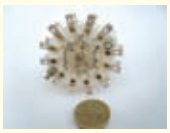
3N201	TO72	300	12.8	15	2.0	2.25
40673	TO72	400	12	15	3.5	2.50
BF964S	SOT103	1000	18.5	10	1.0	1.50

P&P £1.00 any quantity

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

NEW PRODUCT High power ceramic wafer switch 4 pole 5 way with silver plated contacts. Rated at 2kV and 10A for use in ATU's and Power amplifiers. **£8.50 each plus £1.50 P&P**.



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

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NEW PRODUCT

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

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A rock stable FET VFO. Meets the requirement for the Intermediate Licence VFO project. Modified to allow alignment to top and bottom of required band. Several versions available: 5.0 - 5.5Mhz for 20 & 80 metres; 7.0-7.2MHz for a direct conversion for the extended 40metre band; or 7.900 - 8.400MHz for use as part of a mixer-oscillator system as local oscillator for 4m RX or TX. Supplied with Buffer 2A to deliver 1.6V p-p into 50Ω with 2nd harmonic 40dB down. **PCB and component kit with potentiometer £18.00. Drilled Box and PCB kit with potentiometer and feedthroughs £27.00. Ready built £50.00**. State required frequency when ordering.

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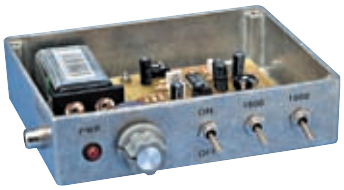
It connects directly to the loudspeaker or headphone socket of the receiver and produces up to ½W of audio to a front facing loudspeaker. The unit can be used to notch out two unwanted heterodynes, or just one while enhancing the wanted audio frequency. Similarly it can be used sharpen otherwise dull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

CLASSIC 20/80m SSB RECEIVER

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

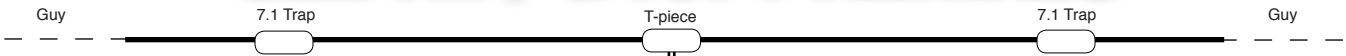
UPWEY 160m AM/LSB RECEIVER

Single conversion superhet receiver for Top Band using a 4 pole ceramic IF filter LTW455HT. Stopband –40dB at + - 9KHz, -60dB at + - 100KHz. Ultra stable Colpitts VFO, and resonator-stabilised high-side BFO. Minimum discernable signal 0.1uV. Tuneable preselector and S meter. 500mW audio output. Supply requirement 13.5V at up to 250mA. **PCB & parts kit including Main board, VFO with its box and tuning capacitor, preselector with polyvaricon, and BFO £92.50. PCB and parts kit plus drilled and labelled case and all hardware including meter, speaker, and slow motion drive £175.50. Ready built £241.50.**



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**.

G2DYM / G4CFY AERIALS



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

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

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

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

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Tony Nailer G4CFY's Technical for the Terrified
PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
E-mail: tony@pwpublishing.ltd.uk

More on feeders and transmission lines

Tony Nailer G4CFY comments on feed-back on his last session before offering some thoughts on quarter–wave transformers, wire antennas and their impedances.

Welcome to *Technical for the Terrified* (*TfT*) – where I'm aiming to remove the fear from the technical aspects of our hobby! To this end, I've received E-mails from three readers who took me to task, with some of the statements I made in the last article in this series in February 2011 *PW*. The main criticism was, that I applied to the impedance what happens to a wave in a half-wave length of transmission line. Dave Kimber G8HQP informed me that the impedance is the same phase at each half-wave point but the reactance flips at the odd quarter-wave points.

Ted Burrell G3LPU said much the same, as did **Steve Hunt G3TXQ**, who also went on to make points about common mode effects on cables, the operation of baluns, and the use of high impedance twin-feeder mainly to take advantage of lower feeder current and hence lower power loss.

Dave Kimber G8HQP also explained that the different geometries of the inner and outer of coaxial cable are of no consequence. The current on the outside of the inner and the inside of the outer are equal so perfectly cancel, so there's no emitted field. Adding also that the electric field cannot escape because the screen acts like a Faraday shield.

No doubt these readers are much more qualified and experienced in these matters than I, so I bow to their knowledge and thank them for their contributions.

Back in the October 1986 issue of *PW* I wrote an article titled *Ten Metres – Our Most Versatile Band*. In it I stated: "To get the s.w.r. of the antenna correct you must use coaxial cable cut for a multiple of a half-wave at the operating frequency during initial set up. This is because at each electrical half-wave point the impedance will be the same as at the end of the cable."

My statement prompted a highly technical exchange with one Amateur that very quickly became overwhelming, in the time needed to understand the theory and respond to it. The last straw was a letter from him running to 14 pages of A4! The problem was, what he theorised wasn't what was happening with the hundreds of antennas I was tuning up at that time for my Citizens Band customers. I vowed then, never to do articles about antennas again – but here we are again on the same subject in 2011!

Quarter-Wave Transformers

In the last *T4T* I drew attention to the see-saw effect that is achieved when a length of cable corresponds to a quarter wavelength at a certain frequency, see **Fig. 1.** This followed the mathematical relationship:

Zo = √(Zin * Zout), *Equation 1*

Where Zo is the line characteristic impedance, Zin is the input impedance, and Zout is the output impedance.

Also **Zout = (Zo^2 / Zin)**, *Equation 2*

I'll now consider the use of these equations when combining the feeders from two antennas. If two feeders are paralleled then the impedance at their junction is halved, in the same way as two identical resistors in parallel. Zt = (Z1*Z2)/(Z1+Z2). So, connecting two 50Ω feeders directly together will give an impedance of 25Ω. This impedance will immediately give a 2:1 s.w.r. and if the paralleled feeders have different lengths, then there's likely to be signal cancellation at their junction, due to phase difference of the signals in the two cables.

By applying the see-saw effect of a length of coaxial cable as a quarter-wave transformer, it's quite easy to determine what characteristic impedance a quarter-wavelength of feeder

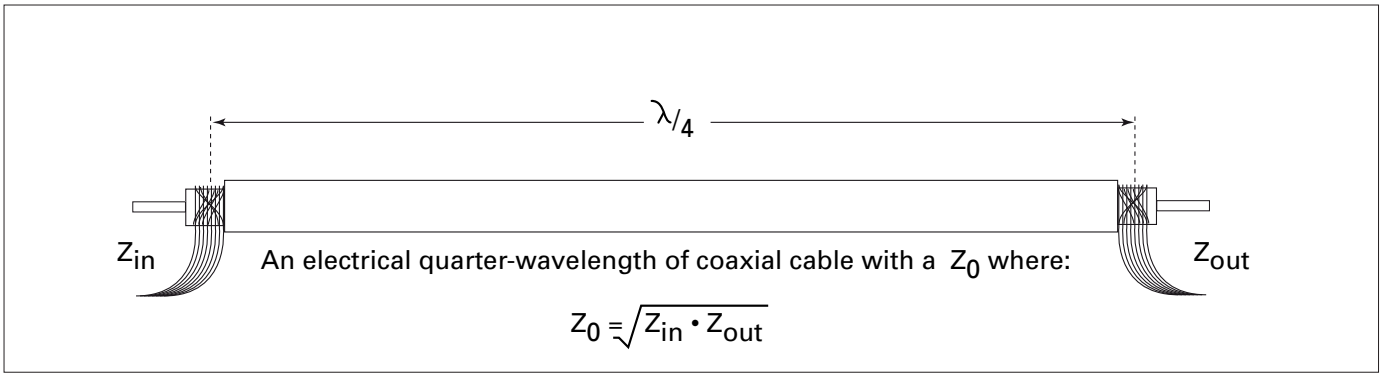

Fig. 1: The 'See-Saw' action of a quarter-wave coaxial line 'transformer' offers an impedance step-up or down.

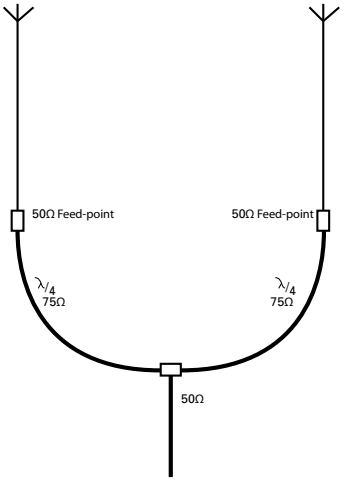

Fig. 2: Combining, or feeding two 50Ω antennas in parallel, using the transformer action of a quarter-wave section of coaxial cable.

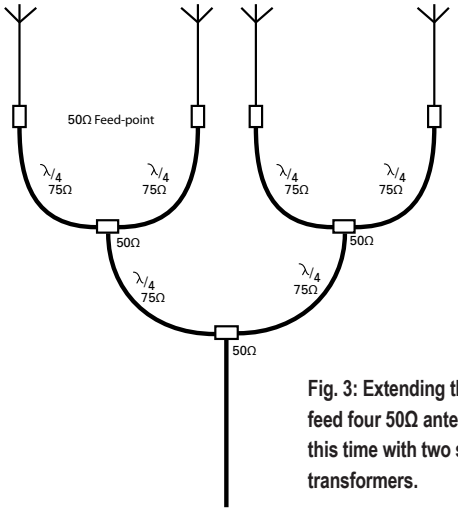

Fig. 3: Extending the layout of Fig. 2, to feed four 50Ω antennas in parallel, but this time with two sets of quarter–wave transformers.

needs to be to make it 50Ω at one end and 100Ω at the other. So, if Zin is 50Ω and Zout is 100Ω, then applying *Equation 1*, Zo = √ (50*100) = 70.7Ω.

Fortunately, there's readily available feeder with a characteristic impedance of 75Ω. By applying *Equation 2*, Zout = (75*75) / 50 = 112.5Ω. So using two quarter-wavelengths of 75Ω feeder from two antennas and joining them together will result in an impedance of 56.25Ω (in a perfect world).

However, we should be aware though, that some 75Ω feeders have solid dielectric with a velocity factor of 0.66 and that some have foamed-dielectric with a velocity factor of 0.8. Others (such as TV coaxial cable) are semi-air-spaced with ribs or a spiral wound insulator, which will be higher still in velocity factor.

Armed with this information we're now equipped to make phasing harnesses for combining two antennas at any frequency, **Fig. 2.**

Multiple Antenna Coupling

The same principals can be applied to three antennas similarly. Combining three quarter-wave feeders will result in the combined impedance being one third of each individual value. So, it will then be necessary to have Zin at 50Ω and Zout at 150Ω. Zo = √ (50 * 150) = 86.6Ω. Using 92Ω cable here will give Zout = 169.3Ω each, and 56.4Ω for the combination, which is close enough.

Paralleling four antennas into one common point would require quarter-wave lengths with a characteristic impedance of 100Ω. If a cable with 100Ω impedance is not available then the four antennas can be treated as pairs of two being coupled together using quarter–wave lengths of 75Ω feeder. Then these two feed points being brought together through two further quarter–wave sections, as in **Fig. 3.**

Antenna Impedance

In the book *HF Antennas For All Locations* by the late **Les Moxon G6XN** he considered *Lines as Reactances* on pages 37 & 38 and went on to include a graph reproduced here as **Fig. 4.** His graph ignored the ground and considered merely the lengths of the line and the diameter of the wire.

In the book, Les G6XN, described the dipole as a quarter-wave length of twin-wire feeder with the wires opened out. In the text he assumed a characteristic impedance of 1000Ω. In subsequent sections of the same chapter and in the bandwidth chapter on page 123 he repeatedly assumed a characteristic impedance of 1000Ω.

Similarly, in the *Radio Communications Handbook* 4th

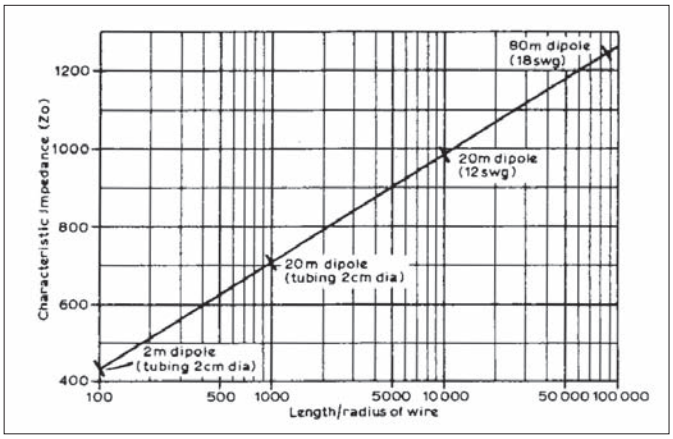

Fig. 4: Characteristic impedance of antennas, when taking the length–element diameter into account.

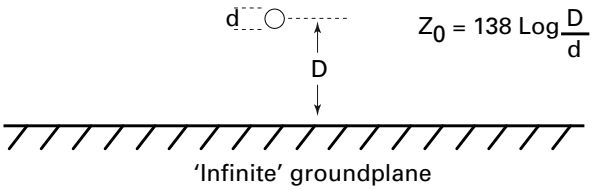

Fig. 5: To calculate the characteristic impedance of a horizontal wire suspended above a ground plane, consider it as a transmission line, with these attributes.

Edition, page 13.71 there's a table, which shows characteristic impedances Za, for wire h.f. dipoles being in the region 450–500Ω. The table included length–diameter ratios and end impedance of half-wave dipoles, with the notation 'λ2', in the range 3400 to 4200Ω.

This raises the question; "How were these values derived and what did they mean?" And, to answer the question I'll now proceed onwards to explain how it's done.

Suspended Wire

To start the explanation I'll consider a wire suspended above a ground-plane, as shown in **Fig. 5.** The formula for its characteristic impedance is the same as that of coaxial cable with the provision that the diameter of the wire d, is small compared to the value for D (the distance from the ground plane).

Zo = 138 log (D/d), *Equation 3***.**

Consider first, that a wire of 0.5mm diameter suspended 20mm above a printed circuit board (p.c.b.). Zo = 138 log (20/0.5) = 138 log(40) = 221Ω. Similarly a 1mm diameter wire 10mm above the ground-plane would be Zo = 138 log(10) = 138Ω. So far so good.

Next, I'll consider an antenna in the form of a wire suspended over an infinite ground plane and apply the formula as before. Assume a wire diameter of 1.5mm diameter suspended at 7m (or 23ft) above the plane. Then Zo = 138 log (7000/1.5) = 138 log(4667) = 506Ω.

If the wire of 3mm diameter and suspended 10m (or 32.8ft) high, then Zo = 138 log (10000/3) 138 log(3333) = 486Ω. Once more, lets try 3mm diameter 6.09 (20ft), then Zo = 138 log 6090 /3 = 456Ω.

Based on the above calculation, I'll use a value of 475Ω as the typical characteristic impedance of a horizontal wire suspended over a good earth. Next, I will consider it as a quarter wavelength transmission line and apply the quarter-wave line transformation to it.

Resonant Length

Consider a quarter–wave wire above ground, obviously as an antenna it has a resonant length, it's fed at one end but the other end goes 'nowhere'. Is the impedance at the tip infinity? Surely if this is the case, then being a quarter wavelength long the other end (feed-point) must be zero impedance and impossible to drive?

Let's assume the feed-point impedance for a dipole is 72Ω, meaning that this one half has an impedance of 36Ω to the mid point. Applying *Equation 2* again, where Zin is 36Ω, and Zo is 475Ω, the Zout = (475*475)/36 = 6267Ω. This means that at the tip of an antenna it is still live and electric and magnetic waves will still be emitted from it.

Dipole Bandwidth

Let's now consider the bandwidth of a dipole BW(MHz), it is related to the centre frequency, F(MHz), the radiation resistance R (or feed-point impedance), the characteristic impedance Zo, and 4/π by the relationship:

BW = 4*F*R / (π*Zo)MHz, *Equation 4*.

However, the radiation resistance may not be what you think it ought to be – as it's also affected by the operating wavelength and the height of the wire above ground. A further graph from the *Radio Communications Handbook* 4th Edition from page 13.49 is included as **Fig. 6**. This graph shows how the humble dipole can have a radiation resistance that varies from 30Ω to around 100Ω. A description of multi–band antennas on page 13.72 of the *Radio Communications Handbook,* shows that the same graph applies to all odd-multiples of half-waves.

If I again consider the 3mm diameter wire at 10m (32.8) feet) above ground operating as a dipole on 3.65MHz. This corresponds to a wavelength of 82.2m, so the antenna is only 0.12λ above ground and will have a radiation resistance R of just 30Ω.

The characteristic impedance Zo, for the 3mm wire 10m above ground, was found previously as 486Ω. So the bandwidth is:

(3.65*4*30)/(π*486) = 0.287MHz. Fortunately this is very close to the required bandwidth of 300kHz for the 3.5MHz band.

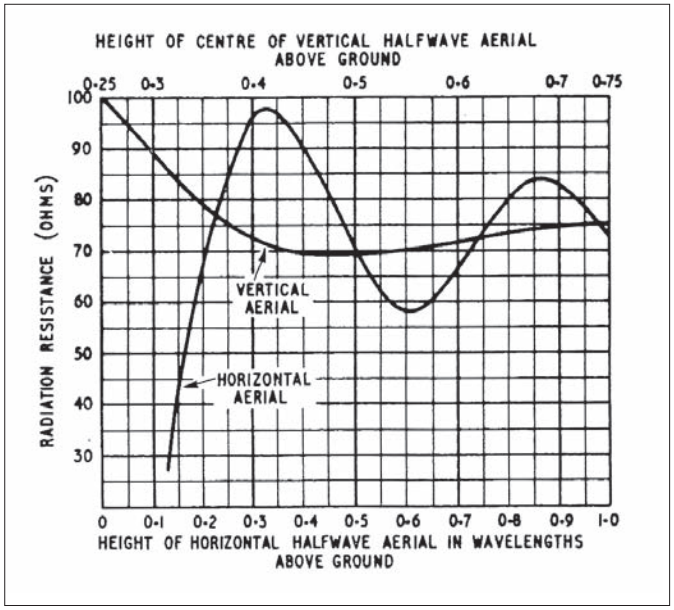

Fig. 6: Considering the feed-point impedance of antennas when mounted fractions of a wavelength above a ground-plane.

I have now demonstrated that a full size half-wave dipole resonant at 3.65MHz centre frequency – suspended some 10 metres above ground will cover the whole of the 3.5MHz band at low s.w.r. It will work reasonably well driven with 50Ω coaxial cable provided it has a feed-point balun.

Trapped Dipole Bandwidth

We'll next consider the bandwidth of a trapped dipole – although I've not actually found an explanation with supporting equations to calculate the effect on bandwidth of shortening an antenna. However, I have determined that the effect on power gain is to divide it by the square of the shortening factor. This means that an antenna that's half the length, gives quarter the power gain.

As a first approximation I'll assume that shortening the antenna by loading coils or traps will reduce the bandwidth by the same proportion. So for the bandwidth calculation for 3.65MHz, if the antenna overall length is 106 feet instead of 132 feet then the shortening factor is 106/132 = 0.8. If my guess is right, then the bandwidth will now be 287kHz * 0.8 = 184kHz. This means an antenna tuning unit is now required at the band edges to reduce the s.w.r to an acceptable level.

Next, we'll consider that the inner section is resonant on 7.1MHz. The full wavelength is then 42.4 metres and the height then corresponds to 0.24λ. At that height the radiation resistance is 80Ω. So the bandwidth becomes (7.1*4*80)/(π*486) = 1.488MHz.

Moving onwards we'll consider the same trapped dipole resonant with 7 half-waves on 28.85MHz. The wavelength is 10.4 metres and the height at 10m is then 0.96λ. The radiation resistance will be 76Ω. So BW = 28.85 * 4 * 76 / (π * 486) = 5.744MHz. **PW**

Final Words

Like the previous *T4T* there have been quite a lot of calculations this time! However, these were the application of just four different equations – although I've provided them with sufficient examples to prove their practical use.

I hope that this session of *TfT* will give you a better understanding of how dipoles work and how wire diameter and height affects their performance. If you have any comments or questions regarding this article or others in the series, you are invited to contact me on **tony@pwpublishing.ltd.uk**

Book Review

Hitler's Radio War

By Roger Tidy
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The Editor writes: Roger Tidy – a radio enthusiast himself – has produced an extremely interesting and very 'readable' book that covers a tragic period of recent history – the Second World War – when the medium and short wave radio bands were alive with sinister propaganda broadcasts from all sides. Roger concentrates on the intensive activities by Hitler's Nazi propaganda services and once I'd started the 240 page hard-backed, traditionally bound book I found it so absorbing that it was difficult to put down and I finished it in two days.

I was most impressed by the professional quality of the book, which is is superbly written and presented. Unusually, the 27 chapters are quite short – enabling each topic to be presented at a cracking (and enjoyable) pace, while not compromising the amount of information presented. Each chapter concludes with comprehensive references. There are also comprehensive Appendices, Keys to abbreviations, Bibliography, and the whole thing's topped off with an excellent index.

Although I thoroughly enjoyed reading *Hitler's Radio War* – I must mention that it's presented for the 'general' reader and technical details are avoided as much as possible. When technical aspects do appear – they do so in almost an apologetic fashion. Only the approximate wavelengths of individual transmitters are provided

I was hoping that some technical information would be provided on the famous Bremen, Hamburg and Luxembourg (which the Nazis commandeered after invading the Grand Duchy) transmitters – but I was disappointed here. I was also surprised to find an important reference – involving the tape recording of radio programmes – that was seemingly missed by the author. The German broadcasters were way ahead of everyone else in the use of high quality (for the period) tape recordings – a fact that kept many German stations on the air when telephone lined based programme feeds were disrupted by enemy action. The standard shellac recording discs were extremely vulnerable!

The book concentrates on the intensive propaganda activities 'straight' broadcasting ('Germany Calling' for example) and subversive broadcasting where one side pretends to be the other side. And – surprisingly for a state that was supposedly so efficient (it wasn't!) some of the programming was very amateurish. Indeed, so amateurish that some broadcasts ended up contradicting other broadcasts! The author also provides a great deal of well-researched information and concentrates on the personalities behind the microphone, including 'Lord Haw Haw', **William Joyce** and others (some of whom I didn't know of – including a British Fighter Pilot and another character who – for a short time was held in Colditz Castle with British prisoners before he had to be removed quickly for his own safety! One interesting omission – especially as Roger mentions people who were possibly duped into broadcasting for the Germans, was **PG 'Plum' Wodehouse** the famous author – who is considered to have been tricked into broadcasting after he was interned in France.

I knew very little of the American personalities who broadcast for the Germans, but there are some fascinating and sad stories provided by Roger about American citizens who were acting against their country. However, despite the thirst for revenge after the Second World War – no American citizen was executed for their wartime enemy broadcasting activities. Indeed, some even ended up broadcasting to the Soviet Bloc during the Cold War!

The book efficiently tells the story of the devilishly clever 'Dirty Tricks' broadcasting carried out by the Axis powers – and I learned a great deal. But the radio war wasn't one sided – just use the Google search engine – entering the name **Sefton Delmer** or see **http://en.wikipedia.org/wiki/Sefton_Delmer**, to find out how this remarkable man – born in Germany himself – ran our own 'Black Broadcasting or 'Dirty Tricks Department'. The 'Black' broadcasters often used the huge *Aspidistra* transmitter built by the Canadian Engineering Battalions for the purpose, which was buried deep underground in Ashdown Forest near Crowborough, East Sussex .

I think Roger Tidy is to be applauded for producing a superbly researched and enjoyable book and I'm looking forward to reading his next publication – complete with full technical information, of course! **Very highly recommended**. Price **£20** and available from the PW Bookstore. **PW**

Ray Howes G4OWY's Antenna Workshop
PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
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Tin–tenna-2!

Antennas in tins? Not quite....but nearly! – It's another antenna from tins!

Inspired by a previous 'Tin-tenna', Ray Howes G4OWY shows you how to create another type, using recycled tins.


Tex Swann's
antenna workshop
Taking time off from making or drinking coffee, Tex Swann G1TEX makes use of the tin.

Tex Swann G1TEX
PW Publishing Ltd.,
Arrowsmith Court,
Station Approach,
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Dorset BH18 8PW
E-mail: antennas@pwpublishing.ltd.uk

Editorial introduction: Tex's coffee tin antenna is thoroughly practical – I've used one for several years and can recommend it to readers. However, Tex hasn't been entirely truthful about making coffee in the office! In fact, most of his experience in catering comes from running what he calls the 'Tea & Coffee Swindle' at the **Poole Radio Club**. In return for a modest weekly payment (the 'Swindle') we get good tea and coffee, the club makes a nice profit while Tex keeps the empty tins to make antennas! **G3XFD.**

Fig. 1: When on coffee-duty at the Poole Radio Club, Tex started thinking about the possibilities of using the top of the coffee tin as an antenna. With a diameter of a little under 150mm, the outer circumference is around a quarter-wave on 144MHz. Time to let the mind wander round a few possible design shapes. Well it has to be round – doesn't it?

Ahh coffee, but what about the tin? That looks like an interesting recycling opportunity!

Don't Waste That Empty Tin – Make Yourself.....A Coffee Time Antenna!

The *Coffee Time Antenna* that I'm about to describe, started off as I was idly(?) waiting for the kettle boiling as it was 'my turn' to make the coffees in the office. I looked as the rim of the 'tin' holding the coffee. Incidentally, the containers ceased being metal some time ago, the top (**Fig. 1**) and bottom being metal parts clamped onto a cardboard

The three quarter-wave antennas all give vertical radiation patterns:
A is directly fed, with a feedpoint impedance of about 35Ω, giving a mismatch to 50Ω coaxial cable.
B is matched to a feedpoint impedance of 50Ω, suiting 'normal' coaxial feeder.
C is a low-profile 'Blade' antenna, but still with a feedpoint impedance of 50Ω.
To make the antenna C even more compact, it may be bent around in an almost complete circle. This also reduces it's directional tendency.
λ/4
'Earth' plane

Once upon a time, there was a 2m antenna* cleverly designed by *PW*'s Tex Swann G1TEX - and not only was it environmentally friendly (because it was fashioned from what would be a normally thrown away item) it was exceedingly small and cute and apparently works a treat. Never again will I ever look at a coffee tin lid in the same way again – or just carelessly toss it in the nearest bin.

(* *Antenna Workshop* April 2010 *Practical Wireless* p17, Editor.)

Green & Cheap

So, with the 'green credentials' of the environment in mind, not to mention what's probably the most important factor – how cheap it can really be to construct your own antennas – I present another 144MHz antenna that can be built from soup cans, along with an idea for another one that I'll try.

The beauty is that it doesn't matter which flavour of soup you prefer. Or, perhaps, if like me, soup isn't on the menu too often and tend instead to have a collection of beer cans piling up at the end of each weekend awaiting appropriate disposal, these can be used instead of soup cans. The choice is yours really!

As with most things antenna wise, some clever fellow somewhere in the midst of time has no doubt built exactly the same sort of antennas that I m about to describe here. So, in that vein, I claim no originality. Maybe just like Tex or myself, a now long forgotten Amateur probably got creative and suddenly realised one day that a soup can or a beer can could have a new lease of life, an alternative use - recycle it, make an antenna!

Ground-Plane Vertical

Before I move on, I did think about making a simple ground-plane vertical for 50MHz with all those empty and now unloved cans. I even got so far as laying them all out in a nice straight line down the garden path - just to find out how many I would eventually need. Needless to say, it was a lot. Trouble was, the thought of soldering a large pile of empty beer cans together didn't fill me with a great amount of enthusiasm, even if it was a tempting prospect cost wise.

For the first Tin-tenna then, you'll need four beer cans. I used four cans that previously contained the black-liquid - the stuff that long ago used to be brewed only in the Emerald Isle, but now, is brewed everywhere else too. Luckily, four of these cans stacked end to end measured at least 489mm. If the four cans you choose to use are longer than this, you'll obviously have to shorten them to the desired length.

Next, take a trip to the kitchen to retrieve the can-opener, as you'll need to cut off the top and bottom from three of the cans. But on the fourth can, which is shown as the top can in **Fig. 1**, the bottom is left intact. To this can after you've made the right sized hole in it, fit an SO-239 connector - one of those SO-239 connectors that has a square base with a hole in each corner.

At this stage (because you won't be able to do it when all the cans have been successfully soldered together!), a length of coaxial cable with a PL239 plug on the end is screwed onto the SO-239 connector. You'll also need a PL239 plug on the other end of this length of coaxial cable, of course.

Secure Connections

After doing this, making sure the above connection is secure on the fourth can, the other three cans are now soldered together. I found a 25 Watt soldering iron did the business here. I didn't place solder around the entire circumference of all the cans - just a spot here and there.

A word about the actual soldering is probably in order here. When first trying to solder aluminium, it can be very difficult – if not almost impossible. Due to the very rapid oxidation of aluminium, the surface, refuses to be 'wetted' by solder. However, for whatever reason, the cans I used did after a bit of persuasion finally came together. I now think real-tin cans would be far better - soldering would be much easier and less stressful!

Once all four cans are happily joined up with one end of the coaxial cable appearing out the bottom, the next job is to solder a 482mm length of wire (19 inches in 'old-money') to the SO-239. This is the vertical radiator. For this, I used a length of fairly thick copper wire.

An back-to-back SO-239 connector - the one that joins two pieces of coaxial cable together is married with your feeder cable and the length of cable from the SO-239.

I didn't need to trim the vertical radiator on the initial tests, as the s.w.r. was already within my usual ball-park, 1.2:1 in the middle of the f.m. section of the 144MHz band. The s.w.r. rose to about 1.5:1 at 145.775MHz. The antenna was mounted at the top of a three metre tall wooden pole.

Signal Strength

And the funny thing is, the differences in signal strengths of most signals are marginal when switching between the Tin-tenna and a collinear located on my chimney at 12 metres high. So much for the commercial collinear, then?

In fact, the Bournemouth repeater (**GB3SC**) signal is now stronger than on the collinear! A happy outcome? Hope you enjoy building it as I did. And like me, you may not need that collinear up on the roof?

Finally, my next project using cans - might be the familiar and well-known 'J antenna'. I'll be using tin cans not beer cans this time - for reasons given earlier. I'll probably require a few more cans this time - so I'd better start drinking a bit more of the black-liquid or, drink more soup. Unfortunately, I think it'll have to be more chicken soup.

Soldering Aluminium

One last word on the problem of trying to solder to aluminium. The main reason of course, is that aluminium tends to oxidise immediately on contact with air. So, what I do is to give the appropriate area to be soldered a good going over with sandpaper.

Then, with a hot soldering iron, make a pool of solder over the part to be joined and whilst keeping this pool of solder liquid (there is no air present under the pool of solder so it won't oxidise), give the area several scratches in the pool of solder.

Next, all being well, it should be possible to solder those aluminium cans together. It is a fiddly operation and the deeper the scratches the better as it exposes more aluminium and the actual bond will be stronger. Another option I guess, would be a perfect vacuum - no oxygen equals no air to oxidise the metal underneath. **PW**

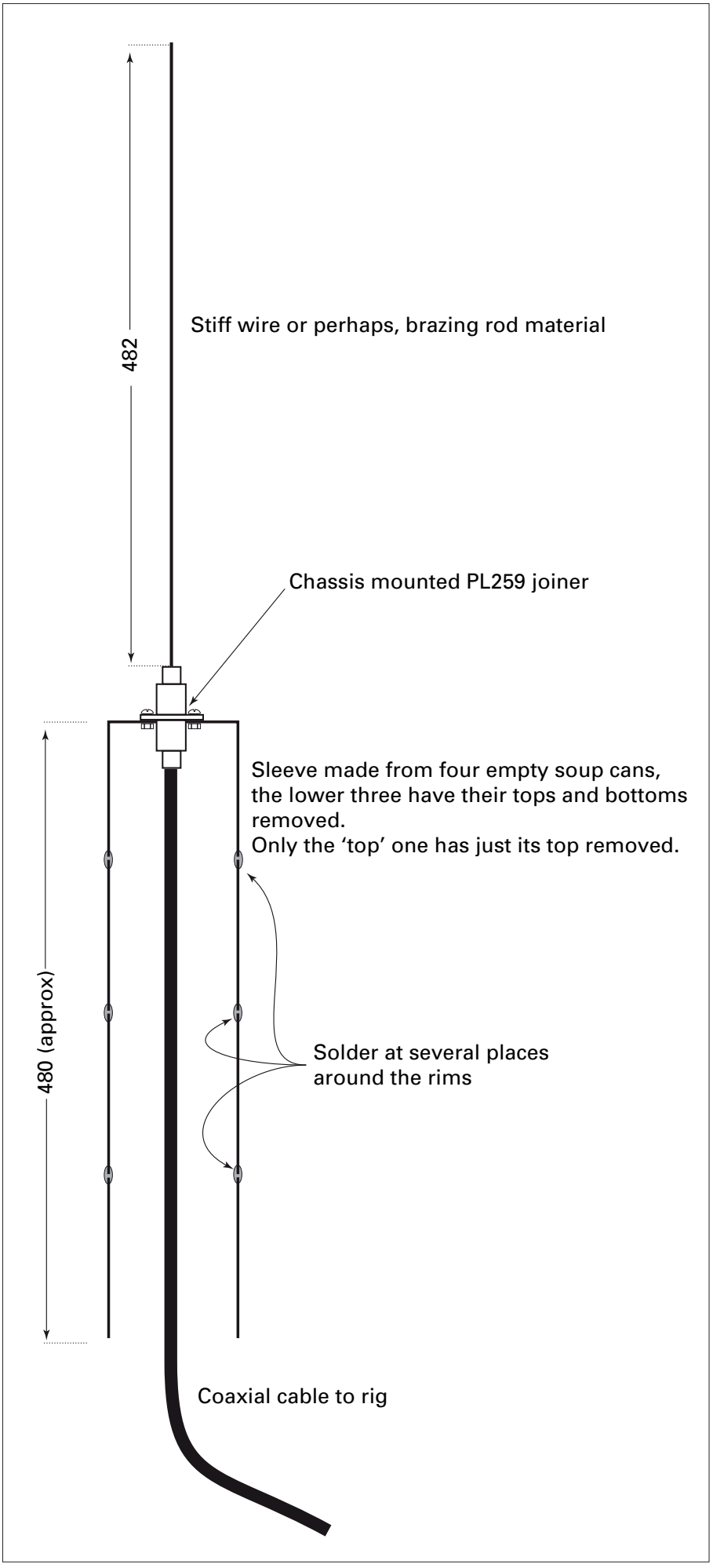

Fig. 1: A layout of the Tin-tenna, showing the use of the four tins to create the balun sleeve.

Rev. George Dobbs G3RJV's Carrying on the Practical Way
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Stable Voltages

This time around the Rev. George Dobbs G3RJV shows you how to produce stabilised voltage sources for your projects – after the appropriate quotation!

Tis plain that there is not in nature a point of stability to be found.
Sir Walter Scott

Welcome to *Carrying on the Practical Way* (*CoTPW*)! Sometimes this column describes complete projects to build and sometimes it describes 'bits and pieces' and this is one of those bits and 'pieces month'. One of the more daunting tasks for a radio constructor is building a variable frequency oscillator (v.f.o.) that remains stable at the chosen frequency. There are many popular circuits for v.f.o.s.

Most seasoned constructors have their favourite v.f.o. circuit configuration. In reality most of the common v.f.o. designs are capable of delivering a stable frequency output up to about 10MHz. Above that frequency it's a little more tricky to achieve. Building a stable v.f.o. is much more than choosing the circuit – just how it's built is also vital.

Thermal, mechanical and electrical stability are vital for v.f.o. frequency stability. A stable frequency v.f.o. The v.f.o. demands good quality components, especially those components associated with the tuned circuit.

Tuning capacitors should be air-spaced if possible and, ideally, fixed capacitors should have very little capacitance change with temperature (good temperature coefficient). The negative–positive–zero (NP0) capacitors are recommended for oscillators and frequency sensitive circuits. Silvered-mica types also work very well but are becoming difficult to find.

"Build a v.f.o. that can be run over by a steam roller!", is the advice an old-timer gave me when I first attempted transmitter construction. Ideally the v.f.o. should be in its own solid metal enclosure and all the parts must be rigidly mounted. Mechanical stability ensures frequency stability. It's also important to regulate the voltage supply feeding the oscillator. Voltage fluctuations produce frequency drift.

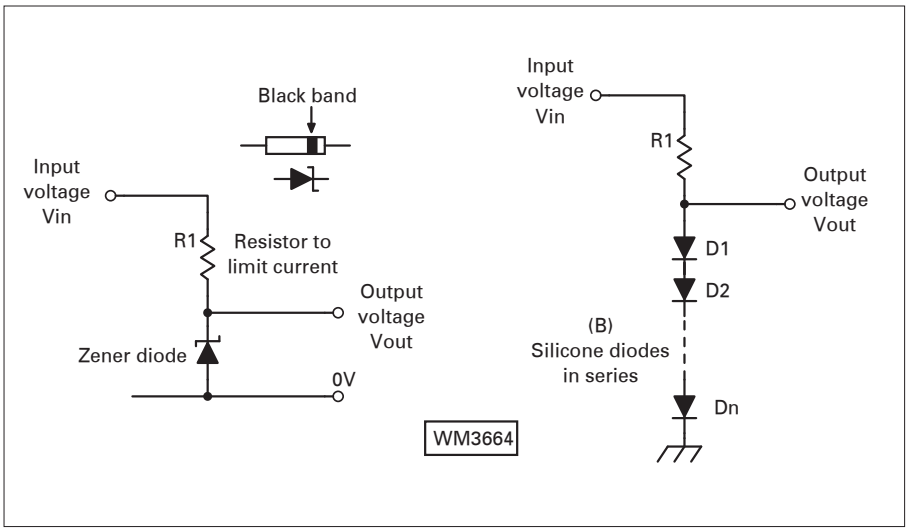


Fig. 1: Using a standard Zener diode to produced a simple regulated supply. When no load is supplied all the current must flow through the diode, increasing its dissipation.

The VFO Power Supply

To power the v.f.o. a separate voltage supply derived from the main power supply via a voltage regulator is common practice. This article discusses the methods of obtaining a suitable stable voltage source drawn from a main power supply.

I will assume that the main power source is a 12 volt d.c. type. However, although I have highlighted the need for voltage stability for a v.f.o., what follows is applicable to any circuit elements requiring a stable d.c. voltage.

The simplest way to regulate a power line is to add a zener diode. Zener diodes are designed to operate safely at their breakdown voltage and are used 'in reverse' to hold a fixed voltage at their terminals. The Figure, **Fig. 1**(**a**) shows a zener diode in a regulation circuit. It's very simple; the zener diode with a resistor to limit the maximum current. Incidentally, the commonest zener diodes are probably the BZY88 series.

The BZY88 zeners are designed for a maximum power rating of 400mW (milli-watts) with the voltage that's marked on the casing. This typically follows the continental designations where (for example) '4V7' means 4.7V. The limiting resistor value is worked out from the formula: R1 = [Vin - Vz] /I, where Vz = zener voltage and I = maximum intended current through R1. So a 12V supply to give 9V at a maximum current of 50mA requires a 9V zener diode and a resistance of 60Ω.

The diagram, Fig. 1(**b**) shows an interesting variation in which silicon diodes are used for voltage regulation. The forward voltage drop across a silicon diode is constant at about 0.7V, so forward-biased common small signal diodes can produce voltage regulation in 0.7V steps. This is really a potential divider circuit and the more diodes that are added in series the greater is the regulation voltage.

The regulated voltage is (Dn•0.7) V, where Dn is the number of diodes. Resistor R1 is used to prevent excessive current passing through the diode if the working load is removed. The circuit, Fig. 1(b) can be useful where small regulated voltages are required as silicon diodes are extremely inexpensive.

Bipolar Transistor Regulators

It's also possible to use bipolar transistors as voltage regulators. I first

Illustrating the reverse–connected transistor 'zener' regulator similar to Fig. 2B.

encountered this idea from the late **Doug DeMaw W1FB** in an article he wrote some 20 years ago.

Inexpensive *npn* transistors, like the 2N3904, can be used in the examples given in the diagram **Fig. 2**, showing how to connect the transistor as low current voltage regulator. The regulated output voltage varies according to what type of transistor is used and even with different batches of the same transistor type.

The 2N3904 transistor I tried in circuit Fig. 2(**A**) produced 8.4V. I've had several older 2N3904 transistors in sealed 'RS' bags for some time, and trying one of these produced 7.3V. A 2N2222A transistor produced 7.05V and a 2N4401 transistor produced 7.8V. These are all usable voltages for circuits like a v.f.o. and most constructors would have these types of transistor in their component stock.

The output voltages can be raised by adding silicon diodes as shown in Fig. 2(**B**) showing how to raise the voltage about 0.7V for each diode added. Using the RS type 2N3904 with two series diodes providing an output of 8.74V.

I also wondered what would happen if I used two transistors in series, as shown in Fig. 2(**C**). The output voltage was 4.96V, which would make it a viable replacement for a 5V zener regulator. (Readers may like to experiment with this idea). I had some small off-cuts of printed circuit material and built up the circuit in Fig. 2 using these and some glued-down pads. The results are shown in the photographs.

Three Terminal Regulator

Generally, these days, if a regulated voltage is require the home constructor will use a three terminal voltage regulator chip. They're not expensive and are so easy to use. They look like a transistor and have three leads; input, ground (or common) and output. The two common flavours are the '78L' series and the '78' series. The pin-outs for these are shown in **Fig. 3**.

The 78L series (resembling a plastic encapsulated transistor), is designed for a maximum current of 100mA (milliamps)

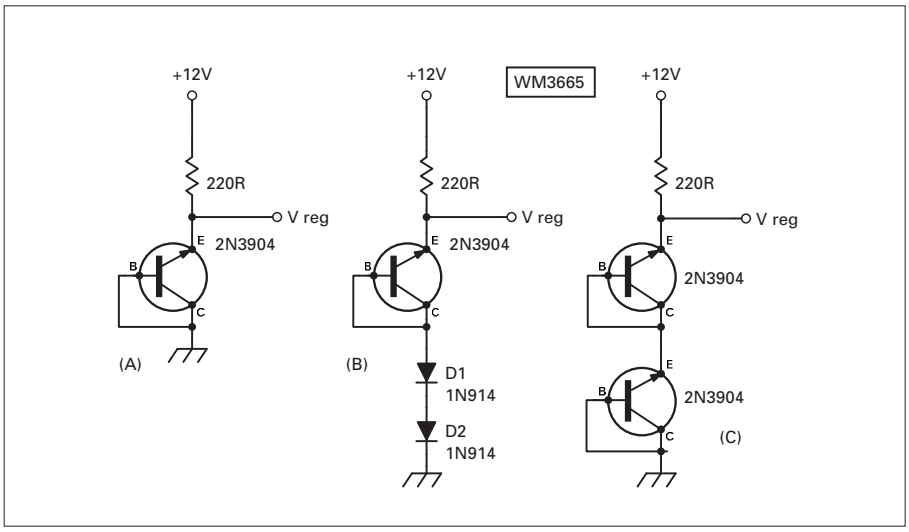


Fig. 2: Reverse connected emitter–base junctions on transistor, perform a similar function to a zener diode.

78?xx Voltage Regulators

78x05	6V	78x12	12V
78x06	6V	78x15	15V
78x08	8V	78x18	18V
78x09	9V	78x24	24V

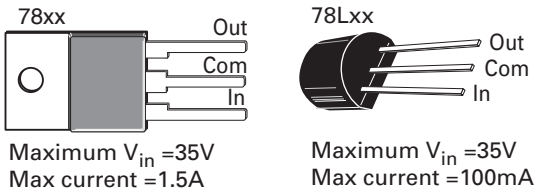


Fig. 3: Regulated voltages an pinouts for the '78x' series of three–pin regulators.

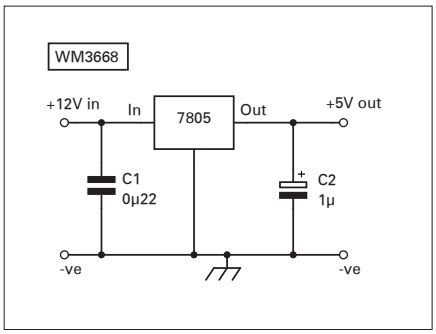


Fig. 4: The simplicity in use, of a three-pin regulator, the supply on the 'in' pin must be around 3.5V or more above the regulated output voltage.

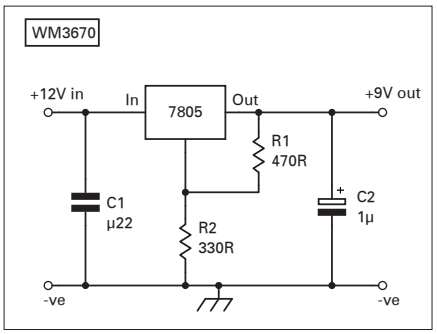


Fig. 5: Artificially increasing the regulated output voltage with two fixed value resistors.

and the 78 series is designed for a maximum current of 1A, when used with a heat-sink. The designations are simple 78L05 is a 5V, 100mA regulator, 7808 is an 8V, 1A, regulator… and so on. The two-letter designator in front of those figures, such as 'LM' or 'AN' refers to the manufacturer.

The diagram, **Fig. 4**, shows application circuit using a 7805 regulator as an example. In the basic regulation circuit, capacitor C1 helps to prevent any possible internal oscillation of the 7805 and capacitor C2 aids noise rejection.

It's recommended that C1 and 2 be mounted as close to the pins of the 7805 as possible. Sources vary as to the best values for these capacitors and in practice I have often used voltage regulators without any bypass capacitors, although this isn't to be recommended!

It's recommended that C1 and 2 be mounted as close to the pins of the 7805 as possible.

The circuit is an ideal 'solder up three parts and it works' project for voltage regulation. The circuit of Fig. 4 implies that individual voltage rated regulators have to be bought for each required voltage but thankfully this isn't so!

Three terminal voltage regulators can

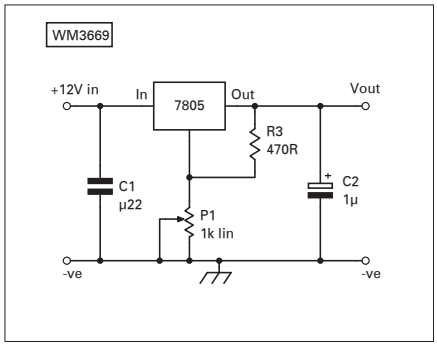


Fig. 6: Replacing one fixed resistor with a variable one, allows the output voltage to be adjusted.

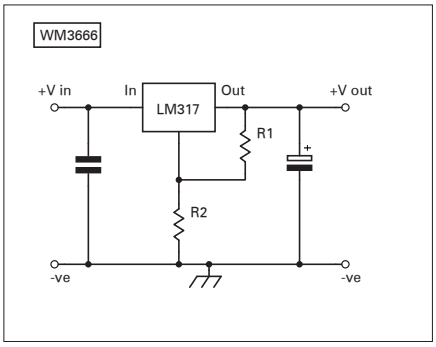
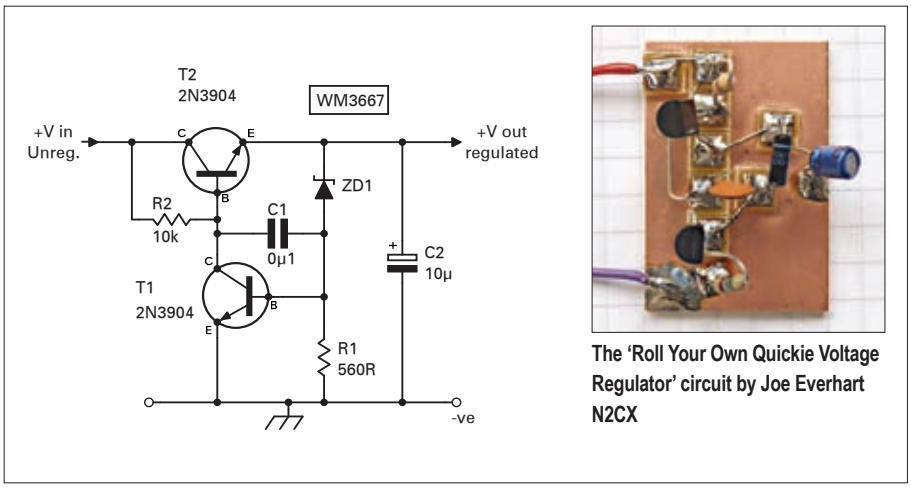


Fig. 7: Using an LM317 three–pin device, allows output voltage down to 1.25V to be produced, rather than the 5V of the 7805 device in Fig. 5.



The 'Roll Your Own Quickie Voltage Regulator' circuit by Joe Everhart N2CX

Fig. 8: A circuit produced some 15 years ago by Joe Everhart N2CX called 'Roll Your Own Quickie Voltage Regulator'.

be used at voltages higher than their designated output voltage. This requires the addition of two resistors as shown in **Fig. 5**. Increasing the voltage at the ground pin increases the output voltage. The way 7805 works is by maintaining 5V between the output and ground terminals.

If the voltage at the ground terminal is raised – the output voltage will be 5V higher than that at the common terminal. The resistors R1 and R2 form a voltage divider to introduce a voltage to the ground terminal. Usually the value of R1 remains constant (470Ω is a typical value) and the value of R2 is varied according to the required output voltage.

The formula for calculating the values of R1 and R2 is:

Vout = Vreg + R2*(I_{R1} + Iq)

Where Vout = desired output voltage, Vreg = nominal voltage (5V for 7805), R1 = any value from about 470Ω to 1kΩ, Iq is the quiescent or standby current of regulator (2.5mA for 7805) and I_{R1} is the current flowing through R1 at the regulator's nominal output voltage.

The mathematics may result in slightly non-standard resistance values, but just use the nearest preferred value. When using 470Ω for R1, the value of R2 is 100Ω for 6V output, 220Ω for 8V, 330Ω for 9V and 510Ω for 12V. The maximum modified output voltage from any three terminal regulator is about 3.5V less than the input voltage because of internal losses. So if 12V is required from the circuit in Fig. 5 the input would have to be at least 15.5V or greater. **Note:** The regulators are usable with inputs up to 30V.

Warning: A word of warning! Do not attempt to make a variable power supply using circuit in Fig. 5 by switching fixed values of R2 for the voltages you desire. It is common on wafer-type switches for one set of contacts to break before they make with the next set of contacts. This would allow the ground terminal to be floating and deliver the full input voltage to the output, which could cause harm to the circuit in use.

The best way to vary the output is shown in **Fig. 6**. In this version of the circuit R2 has been replaced by a 1kΩ linear potentiometer, thus the value can vary from zero (grounded) to 1kΩ. This is a useful circuit! By using P1 the output voltage can be varied from 5V to the maximum (input voltage minus 3.5V).

I have a version of this circuit built into a small plastic box that I hook up to my 12V bench supply when I require lower voltages to test projects. In the past I used the circuit of Fig. 4(b) to drive an ancient transistor radio in my cellar workshop in the Vicarage but, alas, the cellar and the radio were both left behind when I retired.

Variable Voltage Regulators

As many readers will know there are purpose made variable voltage regulators. The most common is the LM317 shown in a typical circuit in **Fig. 7**. The LM317 is an adjustable regulator capable of spanning a range of 1.25 to 37V and there are versions that will handle a 1.5A load. To handle the higher current loads a fairly substantial heat-sink is required.

The maximum input voltage is 40V and to ensure regulation a minimum load current of 4 mA is required. The circuit of Fig. 7 looks exactly the same as that of Fig. 5. That is not surprising because the LM317 is really a fixed regulator with an output voltage of 1.25V. All three terminal voltage regulators can be adjusted to give a higher output by adding a couple of resistors.

The calculations for working out R1 and R2 are the same as for Fig. 5 with Vreg being 1.25V. Naturally, it can be built in the fully variable voltage version like the circuit of Fig. 6. The main advantage of the LM317 is that the 'starting voltage' is very low, hence the very wide range. As most of us seldom need voltages lower than 5V, adjusting the 7805 is a good option and it is cheaper than the LM317.

Little Lurking Circuit!

Whilst on the subject of voltage regulation I leave you with a little circuit that has been lurking in my circuit folders for some time. Some 15 years ago J**oe Everhart N2CX** offered a circuit called 'Roll Your Own Quickie Voltage Regulator' to *QRP Quarterly* the magazine of the **American QRPARCI**. Joe says you can never find the regulator you want when you want it – so here's a simple substitute using cheaply available discrete components.

Joe's discrete component circuit is shown in **Fig. 8**. This circuit has very low operating current (less than 2mA) and the two transistors add plenty of gain for good regulation. The output voltage is set by choosing the correct zener diode reference voltage. For operation from a 12V source, it's best to keep the output voltage to 9V or less to allow for losses through the 'pass' transistor (T2).

After having the circuit hanging about for many years, I built a very 'ugly' version of the 'Roll Own Quickie Voltage Regulator'. I built a 9V version and it worked very well. As Joe suggests…it's a simple way to make something you haven't got when you need it. Cheerio for now! **PW**

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

FEBRUARY

February 27th

The Rainham Radio Rally

The Harwell Radio and Electronics Rally will take place at the Rainham School for Girls, Derwent Way, Rainham, Gillingham, Kent ME8 0BX. The doors will open at 10.00am (9.30am for the disabled).

Trev
Tel: 07717 678795 (leave a message)
E-mail: trev@wig1.co.uk
www.thebrats-qth.org

February 27th

The Swansea Rally

The 30th Swansea Amateur Radio Society Rally will be held at the Court Herbert Sports Centre, Neath Abbey, Neath SA10 7BE. The show will be open from 10.30am to 4.00pm and admission will be £2.00 (50p for children). There will be free parking, trade stands, special interest groups and catering with a licensed bar.

Roger GW4HSH
Tel: 01792 404422
www.radioclubs.net/swanseaars

MARCH

March 6th

The Bournemouth Annual Sale

The Bournemouth Radio Society's 23rd Annual Sale will be held at the Kinson Community Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth BH10 7LH. The doors will be open from 9.30am to 2.30pm and admission will be £1.50. There will be parking, trade stands, special interest groups, catering and facilities for the disabled.

John G0HAT
Tel: 07719 700771
www.brswebsite.org.uk

March 6th

The Exeter Rally

The Exeter Radio and Electronics Rally will be held at the America Hall, De la Rue Way, Pinhoe, Exeter EX4 8PW. The doors will open at 10.30am (10.15am for the disabled) and admission will be £2.00. There will be talk-in, trade stands, a Bring & Buy and catering. All profits from the event will be shared between the local 2m and 70cm repeaters, GB3SW, GB3EW and GB3EX.

Pete G3ZVI
Tel: 07714 198374
E-mail: g3zvi@yahoo.co.uk

March 13th

The Cambridge Rally

The Cambridge and District Amateur Radio Club Rally will be held at 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) and admission will be £3.00. There will be talk-in, trade stands, a Bring & Buy, catering with a licensed bar and facilities for the disabled.

John G0GKP
Tel: 01954 200072
E-mail: j.bonner@ntlworld.com
www.cdarc.co.uk

March 13th

The Wythall Rally

The Wythall Radio Club's 26th Annual Radio Rally will be held at the Woodrush Sports Centre, Shawhurst Lane, Hollywood, Near Wythall, Birmingham B47 5JW, which is two miles from J3 on the M42. The rally will be open from 10.00am to 3.00pm and admission will be £2.00. There will be talk-in on S22, on-site parking, trade stands, a Bring & Buy and refreshments.

Chris G0EYO
Tel: 07710 412 819
E-mail: g0eyo@blueyonder.co.uk
www.wrcrally.co.uk

March 19th

The Lagan Valley Rally

The Lagan Valley Amateur Radio Society Rally will be held at The Village Centre, 7 Ballynahinch Road, Hillsborough. The doors will open at 11.30am and there will be car parking, trade stands and catering.

Jim GI0DVU
Tel: 02892 662270
E-mail: jim.henry@ntlworld.com

March 20th

The Yeovil QRP Convention

The 27th Yeovil QRP Convention will be held at Digby Hall, Hound Street, Sherbourne, Dorset DT9 3AA (adjoining the central shopping car park). The doors will be open from 9.30am to 4.00pm and there will be talk-in on S22, car parking, trade stands, a Bring & Buy, catering and facilities for the disabled.

Derek M0WOB
Tel: 01935 414452

March 27th

The Spring Hangar Sale

The Spring Militaria, Electronics and Radio Amateur Hangar Sale will be held at Hack Green Secret Nuclear Bunker, Nantwich, Cheshire CW5 8AP. The doors will open at 10.00am and admission will be £2.50. There will be civil, military and vintage radio equipment plus vehicle spares and more.

Rod Siebert
Tel: 01270 623353
E-mail: coldwatr@hackgreen.co.uk
www.hackgreen.co.uk

APRIL

April 3rd

The South Gloucestershire Rally

The Avon Scouts Amateur Radio Club together with the Thornbury and South Gloucestershire Amateur Radio Club will be holding their third rally for the West Country at the Avon Scouts Activity Centre, Fernhill, Almondsbury BS32 4LX. This is conveniently located close to the crossover of the M4 and M5 motorways. The rally will start at 10.00am, admission will be £2.00 and there will be talk-in on S22, ample parking, refreshments and facilities for the disabled. There will also be space for 20 car boots on a hard standing nearby; tables and boots are available at £5 each and prior booking is essential.

Stan Goodwin G0RYM
Tel: 01454 413177
Mobile: 07833 517370
E-mail: gentryone@googlemail.com
www.avonscouts.org.uk/woodhousepark

April 10th

The Blackpool Rally*

The 49th Northern Amateur Radio Societies Association (NARSA) Radio, Electronics and Computing Exhibition will be held at the Norbreck Castle Exhibition Centre, Queens Promenade, Blackpool FY2 9AA. The doors will open at 11.00am (10.45 for the disabled) and admission will be £5.00 (concessions £4.00, under 14s free). There will be car parking, talk-in on S22, over 50 traders, special interest groups, a Bring & Buy, catering with a licensed bar, Morse tests and facilities for the disabled.

Dave Wilson M0OBW
Tel: 01270 761608
E-mail: dwilson@btinternet.com
www.narsa.org.uk

April 10th

The Cambridgeshire Rally

The Cambridgeshire Repeater Group Annual Rally will be held at the Foxton Village Hall, Hardman Road, Foxton, Cambridgeshire CB22 6RN. The doors will open at 10.00am and admission will be £2.00. There will be talk-in on S22, trade stands, a Bring & Buy, catering and facilities for the disabled.

Lawrence M0LCM
Tel: 01223 654880
E-mail: rally2011@cambridgerepeaters.net
www.cambridgerepeaters.net

April 17th

The Andover Boot Sale

The Andover Radio Club's Spring Boot sale will be held in the Village Hall at Wildhern, which is north of Andover just off the A343 (postcode SP11 0JE). The doors will open at 10.00am for buyers (9.00am for sellers) and admission will be £1.50. Vendors will be charged £6.00 per boot or £8.00 per table. 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 17th

The Lough Erne Rally

The Lough Erne Amateur Radio Club 30th Annual Rally will be held in the Share Holiday Village, Lisnaskea, Co. Fermanagh BT92 0EQ N. Ireland – access from 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 and facilities for the disabled.

Iain
Tel: 028 66326693
E-mail: gibbjgbb@aol.com
www.lougherneradioclub.co.uk

April 17th

The Kempton Rally*

The West London Radio and Electronics Show will be held in the Kempton Park Racecourse, Stains, Sunbury-on-Thames, Middlesex TW16 5AQ. The doors will open at 10.00am (9.50am for the disabled) and there will be free parking, talk-in, trade stands, a Bring & Buy, special interest groups, lectures, a raffle, catering and facilities for the disabled.

Paul M0CJX
Tel: 0845 165 0351
E-mail: info@radiofairs.co.uk
www.radiofairs.co.uk

MAY

May 1st

The Dambusters Rally

The Dambusters Rally will be held in the Thorpe Camp Visitor Centre, Coningsby, Lincolnshire LN4 4PE. The doors will open at 10.00am and admission will be £3.00 (under 12s free). There will be talk-in on GB4FR and GB3F, parking and overnight camping.

David
E-mail: tcrm@hotmail.co.uk
www.qsl.net/gb4tcm/dambusters.html

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

It's ALE for All!

This time, Mike Richards G4WNC takes a look at a slightly different type of MFSK communication system – ALE.

Welcome to *Datmodes (DM)* where Automatic Link Establishment (ALE) is under the microscope this time. It's primarily a radio development that's used by commercial, military and Amateur Radio operators all over the World. Although not particularly well known in amateur circles, ALE has been responsible for a total transformation in the use of commercial h.f. radio. As you know all too well, h.f. propagation prediction is something of a black art and years of experience are required to become truly proficient.

It's this high level of skill in predicting conditions, that contributed to the demise of commercial h.f. radio – it was just too expensive to run. However, the rapid development of microprocessors opened the way for a new type of automatically controlled communications link. Through the use of digitally controlled transceivers and modems, it becomes possible to build a system that can automatically send short test transmissions over a variety of bands and keep a note of their successes.

The information develops into a propagation table showing the best frequencies for a given station at a variety of times. In very simple terms, that is just what ALE does. By keeping an up-to-date list of all the best working frequencies, the system can automatically select the optimum frequency for any given communications requirement. This automation takes a step further and fully manages the link and completes the circuit set-up on request.

Turning the basic idea into a practical working system was a major task but that has been done. all the details are set out in US standard: MIL-STD-188-141A/B. Before I show you how Amateurs can make use of ALE, so let's take a closer look at the technicalities of the system.

Table 1: ALE Tones to data bits mapping

Data	Tone freq (Hz)
0	750
1	1000
11	1250
10	1500
110	1750
111	2000
101	2250
100	2500

Table 2: ALE 3-bit Preambles

Preamble	Data
THRU	1
TO	10
COMMAND	110
FROM	100
THIS IS	101
THIS WAS	11
DATA	0
REPEAT	111

The ALE Recipe

As with most of the systems I'm covering at the moment, ALE uses Multiple Frequency Shift Keying (MFSK) for the digital modems at the heart of the system. The ALE MFSK employs eight tones spaced 250Hz apart and ranging between 750Hz and 2.5kHz. This range of tones was chosen because it fits neatly within the standard communications voice-band, so the modems could be used with existing s.s.b. transceivers.

In previously describing MFSK systems, I've shown that it's common practice to use each tone to represent several bits of information. In the case of ALE, each of the eight tones represents three data bits as shown in **Table 1**.

Each of the ALE tones has a fixed duration of 8mS, so with 3-bits per tone that gives a transmission rate of 375 bits per second. Due to the limited range of information that needs to be sent, the ALE system operates using a standard 24-bit word format.

The first three bits of each word are used for the preamble, which indicates the type of information that's about to be sent. ALE employs just eight standard preambles which are: 'TO' (010), 'THIS IS' (101), 'THIS WAS' (011), 'REPEAT' (111), 'DATA' (000), 'THRU' (001), 'COMMAND' (110) and 'FROM' (100) – see **Table 2**. The numbers in brackets show the data bits associated with each preamble. The remaining 21-bits of the standard word are used to carry three 7-bit ASCII characters.

The 7-bit values can be used to carry the identity of the calling station or even be used for messaging by combining subsequent ALE words. There's no special encoding of these characters, the three 7-bit characters are just popped together sequentially. I've shown an example of how an ALE word is formed in **Fig. 1**. Addressing methods

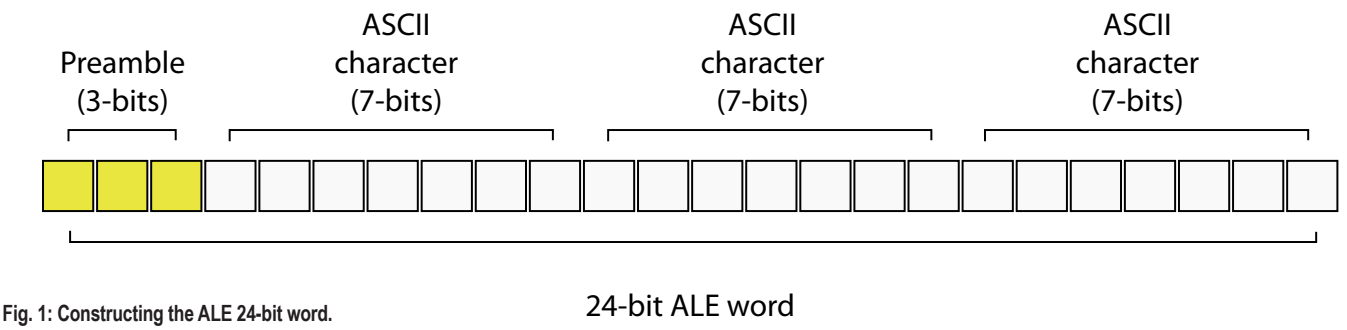

Fig. 1: Constructing the ALE 24-bit word.

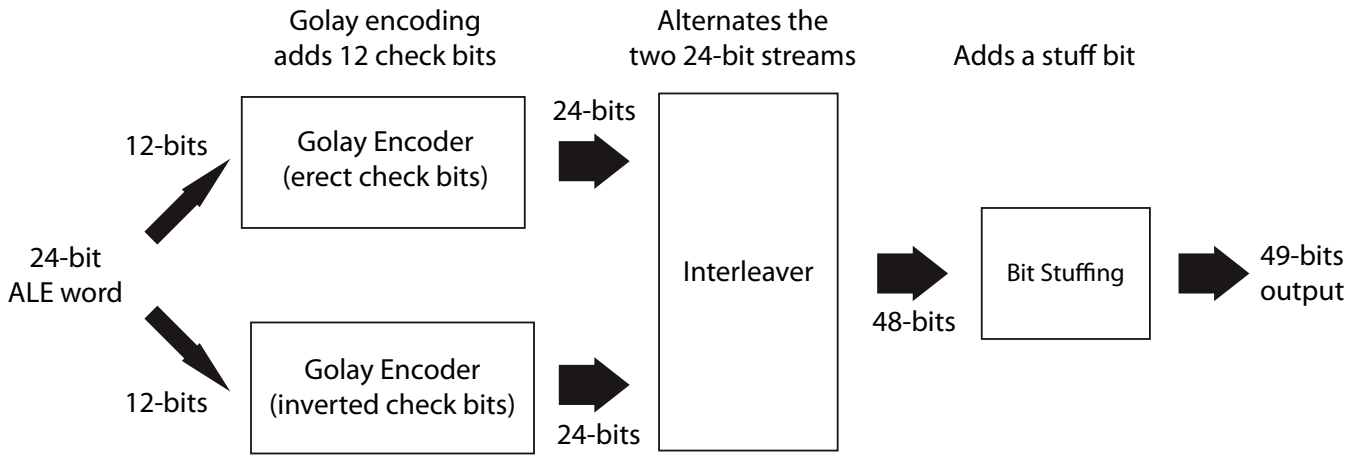

Fig. 2: The ALE encoding process.

vary depending on the size and type of network.

The use of just three ASCII characters for the address may seem rather limiting. But by using 36-alphanumeric characters for each of the three ASCII fields there is a capacity of 46,656 unique addresses (that's 36 x 36 x 36)!

While the construction of the ALE word may seem very straightforward, the word is not simply passed through to the tone encoder – that would be far too easy! As with many of the systems I've described recently, Forward Error Correction (FEC) is applied to help the decoder make sense of poor quality signals. And although this may seem counterproductive as a very weak link won't be any good for an s.s.b. channel, the error correction data is used to measure the quality of the link.

The objective measurement of poor quality links helps to build a more accurate picture of overall propagation conditions. In cases where a voice quality link cannot be found, short text/data communications can be carried-out using the ALE data layer to carry the message.

The FEC system employed for ALE is complex and uses Golay Encoders followed by an Interleaver and a bit–stuffer! I've illustrated the encoding process in **Fig. 2**. As with other FEC systems, the Golay encoder performs its FEC work by adding extra bits to the original 24-bits of ALE data. The ALE word is first split into two 12 bit words and these are sent to separate Golay encoders.

These encode the original 12-bits but also add an extra 12 check bits, hence doubling the total number of bits to give two 24-bit outputs. Just to make life more interesting the check-bits in the second Golay encoder are inverted! The outputs from the Golay encoders are then interleaved (i.e. mixed alternately) to create a new 48-bit word. This 48-bit word then has an additional stuff-bit added making a total of 49-bits to be transmitted for each 24-bit ALE word.

At the receiving end of things, the process is reversed, i.e. the 'stuff bit' is checked and discarded and a de-interleaver is used to split the signal into the separate 24-bit words, which are applied to Golay decoders to produce the decoded 24-bit ALE word. In addition to the normal processing to recover the original signal, the amount of error correction employed is noted and used as a measure of the quality of the link.

With the limited space available here, this is a much abbreviated description of what is really a complex mathematical algorithm. If you'd like to know more, take a look at the MIL-STD188-144 technical description that can be found here: **http://hflink.com/standards/ALE_standard_188_141B.pdf**

Working System

Let's now take a look at a typical ALE system so as to understand how it works. When the system is at rest, all stations that form part of the ALE network are set to scan the active frequencies in the network. This usually happens at a rate of about 2 to 5 channels per second and each of these stations will be listening for an ALE transmission.

Of course, if everyone just sat there listening there would be nothing to hear, so each station is programmed to send a regular sounding signal on each frequency. This is a simple message addressed to no one in particular but does include the address of the originating station. Other stations in the network that hear the sounding use the signal to assess the quality of the path to that station.

The signal is analysed to produce a Bit Error Rate (BER) and a Link Quality Assessment (LQA) using SINAD measurements. The BER and LQA data is stored locally and used whenever the station is called upon to initiate a new connection. To set-up a communication channel the calling station operator simply enters the address or callsign of the wanted station and the ALE system will automatically initiate transmissions to find the target station.

When the target station hears the call it will automatically respond and a handshake process follows to make sure both stations have a working link. Once this is complete, the original operator is alerted that the channel is ready and the link will switch to s.s.b. or whatever mode is required. This makes setting ups a call, both simple and a trouble-free operation.

For occasions when a communication 'net' is required the participating stations are given a common 'net' address and the calling ALE station will then attempt to find one common frequency where all stations can be contacted. Once the link is established, the success is signalled back to the operators as before. In addition to pre-arranged net calls, the ALE system includes GROUP calls where the operator can create an ad-hoc or custom list of participating stations and leave the ALE system to find a common communications channel.

It's this ease of use that has brought h.f. radio back on to the commercial scene as a viable communications system. Although the system was

originally designed to be added to existing networks, most new commercial h.f. radio kit has ALE built-in as standard or a factory-fit option.

Amateurs & ALE

Despite its commercial origins, ALE has many applications in Amateur Radio and there are specialist teams around that make good use of it. One of the most obvious applications is in support of emergency networks where Amateur Radio has always played a vital role in the more remote areas of the World. The ease with which reliable links can be set-up is a real help in times of crisis. Amateur use of ALE has been facilitated thanks to the generous efforts of **Charles Brain G4GUO**.

Charles G4GUO has developed a software based ALE control unit (*PC-ALE*) that handles data via your rig's audio in/out and provides standard CAT control signals to manage the automated tuning of your rig. The *PC-ALE* program is available completely free of charge and can be downloaded either from the HFLINK website **http://hflink.com** or from the Yahoo HFLINK User group at: **http://tech.groups.yahoo.com/group/hflink/**

There's also a limited ALE functionality included in the *MultiPSK* program, also available via the HFLINK site. By far the best place find information about the amateur implementation of ALE is the HFLINK website itself. In addition to carrying the software and technical information files, HFLINK coordinates the amateur ALE networks and has full details of the band allocations.

Whilst many of their networks are designed to support emergencies, they encourage all Radio Amateurs to make full use of the networks when they're not in use for emergencies. That makes getting going with ALE so much simpler as you can test your set-up with well proven stations.

Getting Going

The first step is to download and install the *PC-ALE* software, which I suggest you start with, as it has the most comprehensive feature set and there is plenty of help available **Fig.s 3** and **4**. Once downloaded and installed, you need to get the excellent *PC-ALE* set-up guide – you'll find a copy here: **http://hflink.com/pcale/setup/**

You'll see from the set-up guide, that you also need to download a QRG file. This contains all the ALE network frequencies and is used to control the automatic scanning. You can find a copy of the QRG file here: **http://hflink.com/pcale/** You really do need to run through the set-up guide **carefully**, especially the section where you set-up your call as it's **very easy** to get this wrong.

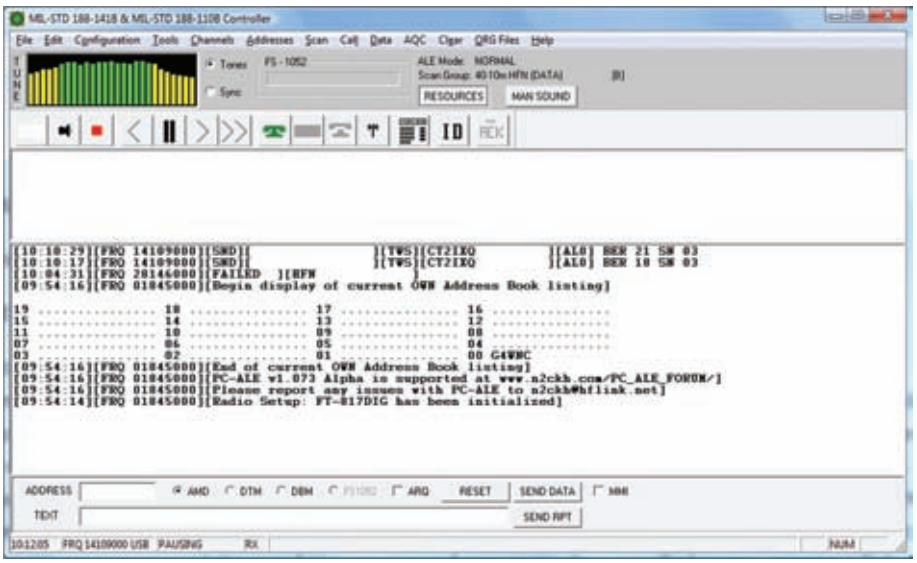

Fig. 3: The main screen of PC-ALE.

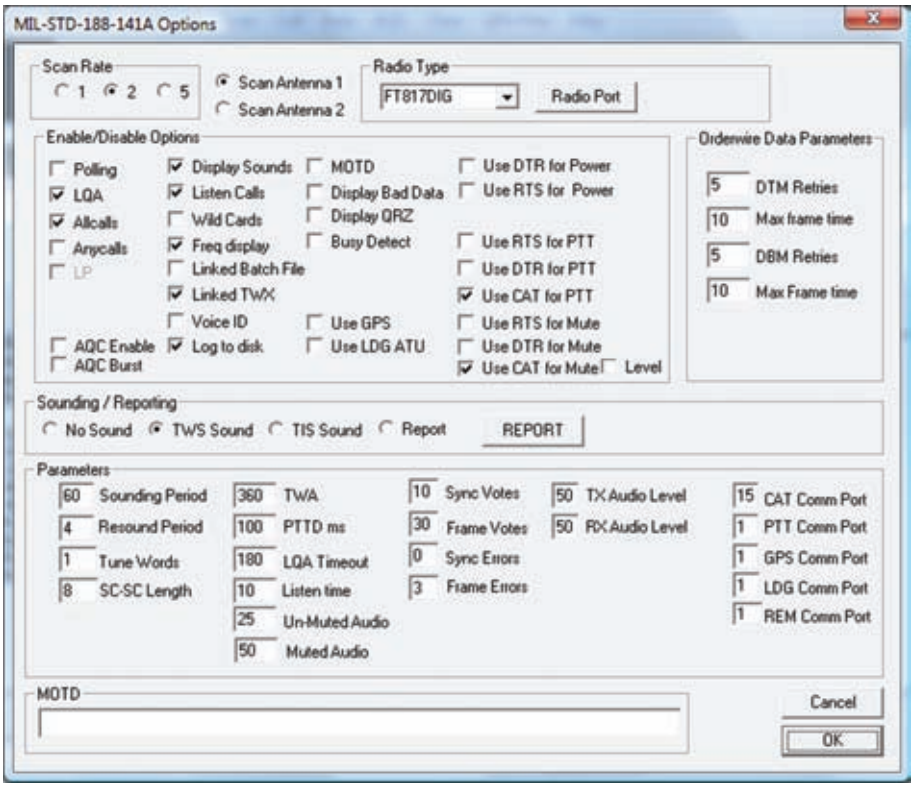

Fig. 4: Configuring PC-ALE.

When you've completed the set-up you need to check that your receive system is working properly. If the connections and levels are correct, you should see plenty of activity in the spectrum display at the top left of the screen. If there's no activity, you should check connections and your record level settings in *Windows*. For some reason my system drops the record level control to zero when I first start *PC-ALE* so I have to remember to turn it back up again!

When the configuration is complete please remember to go to the QRG Files menu and select 'Dump QRG' to save all your configuration info. If you don't do this you'll have to set-up every time you run the software! If all is well on the receive front, use the menu to choose: Channels – Select Active Group to choose the bands and networks that you want to monitor. A good place to start is the 14MHz (20m) HFN/HFL network.

Assuming you have completed the tests in the *PC-ALE* set-up guide you can now start using the system by connecting to stations that you have been able to receive. It's well worth keeping a close eye on the HFLINK website to see who's on air and the HFLINK user group to keep abreast of the latest developments.

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Customer Comments from Geoff G3CYL

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ML&S Price: £59.99

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ML&S Price: £92.99

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See www.wouxun.co.uk

ICOM

IC-7000

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IC-E90	6/2/70 FM handie	£239.95
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NEW Icom IC-9100 All-Rounder HF through to 23cms Base Transceiver

V/UHF Satellite + HF/50MHz bands + D-STAR DV mode

- HF/50MHz 144/430(440)MHz & 1200MHz coverage
- SSB, CW, RTTY, AM, FM & DV modes
- 100W on HF/50/144MHz, 75W on 430(440)MHz. 10W on 1200MHz
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Icom IC-7600 **£3299.95**

This new Mid-range HF base station from Icom has arguably the best screen for user interface in the business. Successor to the IC-756Pro3.

New! Solid State Amplifiers from RM!

BLA-1000. £2799.95
Flagship 1kW key down all mode HF Linear Amplifier with built in PSU.

Full range now in store. See web for details.

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AVAILABLE FROM STOCK £1489.95

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Peter Hart says: "I found the radio friendly, intuitive & easy to use"

For further information see our website: www.hamradio.co.uk

TS-2000X
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Kenwood HF Products

TS-480SAT	Remote head HF/6m 100W inc ATU Transceiver	£779.95
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New Range to ML&S, HUGE DISPLAY, PEP & Average reading.

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Nissei	TX-402	125-525MHz, 2/20/200W	£59.95
Nissei	TX-101A	1.6-60MHz, 20/200/2kW	£84.95
Nissei	TX-502	1.6-525MHz, 2/20/200W	£89.95

See www.hamradio.co.uk for more details on all of these items ... and much, much more! E&OE

Perseus VLF-LF-HF Receiver

only £649.95

as reviewed in Radcom May Issue

PERSEUS is a VLF-LF-HF receiver based on an outstanding direct sampling digital architecture.

Unlike lower class direct sampling receivers, the PERSEUS RF analog front-end has been carefully designed for the most demanding users. PERSEUS can also be operated in a wide band mode as a 10KHz - 40MHz spectrum analyzer with more than 100dB dynamic range in a 10KHz resolution bandwidth. PERSEUS is a Software Defined Radio and relies on PC software applications to carry out the demodulation process.

RFspace

SDR-IQ™ Software Defined Radio, Spectrum Analyzer and Panoramic Adapter.

Now in stock together with the IF-2000 IF Interface board for the FT2k & FT-950. Both on DEMO at Chertsey.

See http://www.hamradio.co.uk/acatalog/RF_Space.html

£469.95

The New RadarBox is now available from ML&S!

We like to give our customers a choice when it comes to choosing a new Virtual Radar so what better way than to add the RadarBox to the range.

Radar Box-3D. ML&S: £489.00
Radar Box-Pro. ML&S: £399.00

AirNav Systems

There is more excitement amongst RadarBox users and potential users now that the 3D version of the RadarBox is now available. This radical software upgrade brings to life the RadarBox with superbly detailed Google Earth mapping overlay. This is a major advantage that puts RadarBox firmly on top of it's competitors. Just look at these crisp, clear screenshots with the pictures of the aircraft in 3D and their precise position shown on the map. RadarBox has always given the best graphics of any system, and this latest addition really underlines the superiority of RadarBox. Known as RADARBOX-3D this complete system is available from all good communications dealers around the world. There is also an upgrade disc available for all existing users of RADARBOX-PRO, order this upgrade as RADARBOX-UG. RADARBOX-PRO is still available for those users who want a radar decoder without Google Earth and 3D.

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TWO NEW SUPER MODELS FROM LDG

NEW! YT-450	Auto Tuner for the FT-450 & FT-950	£224.63
NEW! YT-847	Want a really good Auto ATU for your FT-847? Here it is!	£224.63
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AT-897Plus	Bolt-on Alternative Auto Tuner for the FT-897. Wider tuning range and cheaper too!	£179.95
IT-100	New version of the AT-7000	£159.95
YT-100	NEW AUTO ATU for FT-897/857 or FT-100 with additional Cat Port Control	£177.65
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Z-100Plus	Ultimate autotuner for Yaesu FT-817D	£134.95
Z-11ProII NEW	Portable compact & tunes 100mW to 125W	£159.95
RCA-14	4-way DC Breakout Box	£52.12
KT-100	Dedicated tuner for Kenwood radios	£173.57
RBA-1:1	Probably the best 1:1balun out there	£35.69
RBA 4:1	Probably the best 4:1 balun out there	£35.69
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New batch here now!!

With the massive increase in 4m activity thanks to the new Wouxun KG-699 4m handie, along comes this new 60W 4m mobile.

- Frequency: 70MHz - 4m Amateur band (66-88MHz)
- Output Power: 25W 250 channels, every channel can be named with 32 characters.
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AT-5K (3.5kW) Antenna Tuner **£999.95**
BT-1500A Balanced Antenna Tuner **£589.95**
PM-2000AM Power/SWR Meter **£159.95**

Palstar Dummy Loads
DL-1500 (1.5KW) **£119.95** **DL-2K** (2kW) **£229.95**
DL-5K (5kW) **£379.95**

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Palstar R30A, fitted Collins filters for SSB & AM **£649.95**

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Latest high performance switch mode PSU. 25amp. £84.95

SPS-8250	25A continuous, fully metered power supply	£79.95
MP-960060A	Switch mode power supply	£179.95
MP-9626	120A, 13.8V DC power supply	£299.95
MP-8230	13.8V DC, 25A power supply	£69.95
MP-925	Linear 25-30A, 13.8V DC power supply	£99.95
MP-6A	13.8V DC, 6A power supply	£29.95

FACTORY APPOINTED DEALER for FLEX

The entire FLEX Range is now on demonstration in the ML&S Super Store!

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Low cost SDR Transceiver, connect via USB & you have 5W 160-6m! **£599.95**
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100 Watt SDR 160-6m with Auto ATU fitted. **£1299.95**
Flex 5000A
Flagship 100W SDR Base 160-6m **£2495.95**
Flex 5000A-ATU
Same as 5000A but built-in Auto ATU **£2795.95**
Flex 5000A-ATU+Twin RX
as above but with second receiver **£3434.95**

VENTUS WX-928-ULTIMATE

ULTIMATE in professional weather stations, offering the usual feature set of the WX-831 but uses a Anemometer with solar cells, Satellite Meteotime forecast over the next 4 days and a massive split screen.

Only £199.95

VENTUS WX-831 New much improved wireless Weather Station ML&S Price: £119.95.

The UK's favourite rig-mounted antenna system

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1.8-460MHz with Monster 1.8M Whip! **£119.95**
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NEW Mini VNAPro Now with Bluetooth!

The new miniVNA PRO, the big brother of the well-known miniVNA, is an extraordinary and unique handheld vector network analyzer that makes available a multitude of new features and capabilities which are perfect for checking antennas and RF circuits for hams and commercial users. Together with your PC/Laptop, you can add to your laboratory the further advantages of having this first-class VNA instrument. This is the first world's wireless analyzer able of scanning and sending the data using an integrated Bluetooth module to a remote PC/Notebook up to 100 meters from the miniVNA PRO's location. This makes real-time antenna setup easy!

ML&S: £349.95

MiniVNA original still available (without Bluetooth): £259.95

Miracle Antenna

Miracle Antenna is back! **With some important Hot New products.** Introducing the New MMD Mixed Mode dipole. The first and only electrically centre-fed mechanically end-fed dipole ever offered to the Ham Radio market, the MMD provides a host of benefits never available in an end-fed dipole.

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MMD-30 30M MIXED MODE DIPOLE **£99.95**
MMD-40 40M MIXED MODE DIPOLE **£99.95**

Miracle Ducker iL HF-70cm Mini ATU with BNC **£109.95**
Miracle Ducker HF-70cm with PL-259 ..... **£109.95**
Miracle Antenna HF-70cm fitted with telescopic **£109.95**

See www.hamradio.co.uk for more details on all of these items ... and much, much more! E&OE

Emerging Technology

Chris Lorek G4HCL shows how once again Amateur Radio work is proving its valuable worth to the emerging future of radio communications.

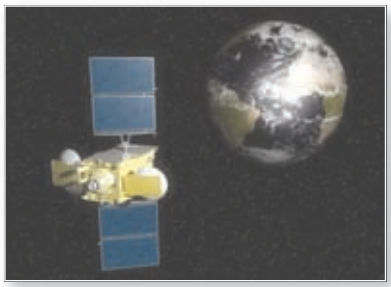
Dynamic Radio Frequencies on Satellites

The latest European Space Agency (ESA) satellite, ***Hylas-1***, will be the first payload to employ a new architectural concept called the Generic Flexible Payload (GFP) which allows the satellite's frequency plan to be changed at will, via commands from down here on the ground. Combined with new power amplifier technology that redistributes the satellite's transmit power, this means that it can flexibly re-allocate its resources whenever needs change as time goes by.

The 'highly adaptable'' system was developed in Portsmouth, Hampshire in Southern England and and Stevenage in Hertfordshire, north of London, and allows receivers on the ground to use data download speeds of up to 10Mb per second. It's been reported that one person who will be keenly watching developments is **Sir Martin Sweeting G3YJO**, Chairman of **Surrey Satellite Technology** and **Chairman of AMSAT-UK**. He has a vision to make the UK the 'Vodafone of the moon' by launching smaller and cheaper satellites with services that can be purchased by other nations.

As telecom satellites go, *Hylas-1* is on the small side with a launch mass of just over 2.5 tonnes. With space agencies catching on to the idea smaller satellites, the UK could be in a strong position to capitalise on its expertise. I've often attended weekend-wide AMSAT-UK Satellite Colloquiums at the University of Surrey in Guildford, which is the home of Surrey Satellite Technology, in the past and I've witnessed first-hand the pioneering work done by UK Radio Amateurs in small satellite technology. Once again, Amateur work is proving its valuable worth to the emerging future of radio communications technology.

Blast off from the European Space Agency's site



An artist's impression of the Hylas satellite in orbit.

No Batteries?

How about it if your hand-held transceiver didn't need any batteries at all? This is exactly what a company has achieved with their 'Powercaster' transmitter and 'Powerharvester' receiver, albeit over fairly short ranges of up to around 12-13m. The TX91501 Powercaster transmitter from the Powercast Corporation uses the 915MHz ISM (Industrial, Scientific and Medical) band to transmit radio signals for power and data. This is the power source for their companion Powerharvester receivers, which convert the received radio frequency (r.f.) energy into direct current (d.c.) power for battery-free operation or to wirelessly trickle-charge batteries.

The receivers also output the data broadcast from the TX91501 as well as the received signal strength indication (RSSI) or S-meter' reading. Initial versions of the transmitter broadcast a unique ID for device authentication or location-tracking applications, while versions in the future will also transmit

The 'Powercaster' transmitter allowing powering of devices without batteries over a short distance.

data such as time-stamps for end-device synchronisation and control. For the technically-minded, the r.f. signal uses Direct Sequence Spread Spectrum (DSSS) modulation for power and Amplitude Shift Keying (ASK) modulation for data.

The transmitter is available in versions with an output of either one or 3W Effective Isotropic Radiated Power (EIRP). The companion receivers would typically be embedded into micro-power devices such as wireless sensors, instrumentation and controls, for uses such as environmental monitoring, building automation, energy management and industrial monitoring, but of course these can also be incorporated in two-way f.m. speech radios as well as data.

One such use could be for local remote control of your main Amateur Radio station around your house and garden, letting you chat on 14MHz (20m) single sideband (s.s.b.) for example – while you're enjoying sitting in your living room or back garden, without any problems of your remote control hand-held batteries going flat!

Microminiature Piezo Speakers

Many of us are familiar with the piezoelectric effect, where an electrical voltage can cause a mechanical change in a piezoelectric material such as a crystal or ceramic resonator, and vice versa where mechanical changes can produce a small electrical voltage. I've mentioned this effect and its uses in this column in the past, with power-generating clothing and the like. But now there's another use, that of a tiny, thin, waterproof speaker.

I've been using Murata ceramic resonators now for many years, in fact my published design of around 25 years ago for a piezo-controlled 1750Hz toneburst using just five components and a Murata 455kHz ceramic piezoelectric resonator has been used by many Amateurs around the world. The same company haven't been resting on their laurels, as they've now developed a tiny ceramic speaker based on piezoelectric technology.

The speaker has a thickness of just 0.9mm, with a rectangular shape to reduce 'dead space' in applications including hand-held v.h.f./u.h.f. transceivers. It's waterproof too which, of course, is essential for when we use or radios outdoors, especially in British weather!

Conventional methods of waterproofing traditional dynamic speakers – which we currently use – typically have waterproof sheets that cover the output sound holes, and which usually reduce the output volume and the audio quality.

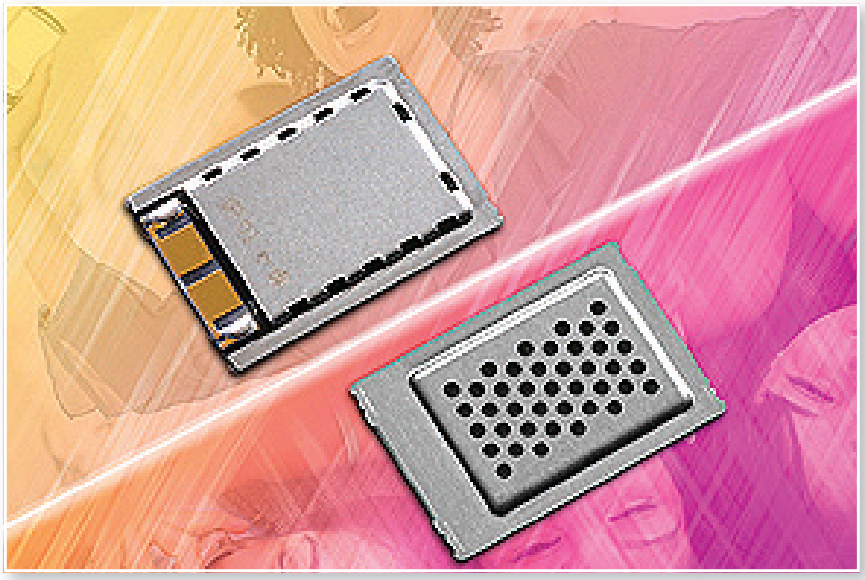
Murata's approach incorporates a rubber film into the speaker itself. This leaves the output sound holes open, with the width of the metal frame housing the speaker being increased to improve the seal between the metal frame and the chassis of the tiny speaker, preventing water penetration.

Additionally, because no magnets are used, there's no possibility of problems being caused by iron-laden sand, or electromagnetic effects on magnetic sensors or ferrite cores within the hand-held radio.

The company state that the speaker has a flat frequency response, which makes it suitable for both voice and music because the frequency response of a rectangular speaker is much improved over circular types. The rectangular ones are multi-modal and multiple oscillation modes can be generated along the long and short sides of the diaphragm, to create as many 'peaks' on the frequency axis as possible.

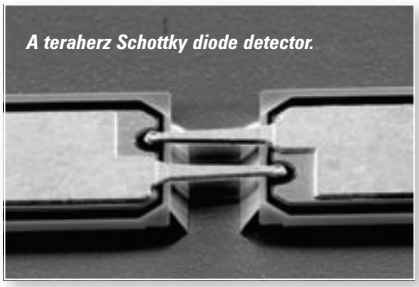
Moreover as piezo speakers are primarily a capacitive load, they can dramatically reduce power consumption, especially in a speech bandwidth for two-way radio. For the technically minded, it gives a powerful sound pressure level (SPL) output volume of 90dB maximum (measured at 1kHz, with 5Vrms, sine wave, at 0.1m, 0dB:20μPa) for the speaker measuring a tiny 19.5 by 14.1 by 0.9mm, with a resonant frequency of 1400Hz±20%. This coincides nicely with this being virtually the exact centre of the audio passband for two-way radio communications (typically 300-3000Hz).

So it looks like our new handhelds could well be smaller and lighter, and hopefully somewhat lower priced as well as having even better audio from the receiver's internal speaker without the 'rattling' effect we'd otherwise get at high volumes.



Ultra-slim, ultra-small piezo-electric 'speakers' may find their way into rigs in the near future.

Terahertz Technology


A teraherz Schottky diode detector.

Teraherz technology, which is used in controversial airport body scanners could now also help power high-bandwidth communication systems, as well as helping aircraft land safely. Terahertz scanners detect a type of high-frequency electromagnetic radiation emitted by anything with temperatures higher than around 10° Kelvin.

The radiational Terahertz frequencies can penetrate dry, non-metallic materials such as clothing or sand, but is absorbed by water and metal. This allows the scanners to create computer images of people's bodies that reveal items hidden under their clothing – an application that has attracted criticism since it started being used in airports recently.

Terahertz devices were first used in astronomy to see through interstellar dust, but this technique can also be used in a similar way to help pilots see through the dust created when landing a helicopter in the desert. It does so by acting as a kind of radar to locate the ground where lasers would be dispersed by the particles.

The radiation would also have an advantage over traditional radar signals because it can create a 3D model of an object it is tracking, as well as providing information about its location. The signal is emitted at a high frequency between 100GHz and a few Terahertz and is found between the infrared and microwave parts of the electromagnetic spectrum. But of possibly more interest to us, its high frequency allows it to transmit large amounts of data, which could be used as part of a local-area communications system.

There are several ways of generating the radiation, including using short-pulse lasers. One method uses specially developed Schottky diodes that operate at room temperature rather than under sub-zero cryogenic conditions. These are at about a quarter of the width of a human hair, but are currently being made and may well see use in the very near future. Our Amateur microwave experiments may well have led the way to this emerging technology!

Wireless Electricity


Wireless power is transmitted over a 2m distance from the coil on the left to the coil on the right, where it powers a 60W light bulb. The researchers are (deliberately!) obstructing the direct line of sight between the coils. Front row: Peter Fisher and Robert Moffatt; second row: Marin Soljacic; third row: Andre Kurs, John Joannopoulos and Aristeidis Karalis.

Wireless electricity has been discussed plenty of times in the past, but it's rapidly becoming a reality. Cordless charging has already been used to a very limited extent in the past, but as I've shown in this column is increasing in technology. Scientists have pursued wireless power transmission for years — notably, eccentric genius Nikola Tesla, who devoted much energy toward it roughly a century ago.

The problem with wireless power transmission is that broadcasting energy in all directions, let's say as radio waves, can be tremendously wasteful – with a vast majority of power ending up squandered into free space. Scientists have proposed beaming power from orbital solar power stations to Earth for years.

You can, of course, focus energy along just one or a few directions – perhaps using laser beams – but approaches like this can prove dangerous and cumbersome. Such an approach also needs an uninterrupted line of sight between the source and device and some type of tracking system on the receiving device if it's moving around.

More recently, physicist **Marin Soljacic** from the **Massachusetts Institute of Technology** (MIT) says that he began thinking years ago about how to transmit power wirelessly so his cellphone could recharge without ever being plugged in. From this, Marin and his colleagues devised 'WiTricity' based on the effect of magnetic resonance. This is because most common materials interact only very weakly with magnetic fields, so little power would get wasted on unintended targets.

"The fact that magnetic fields interact so weakly with biological organisms is also important for safety considerations," said Marin's MIT physicist **Andre Kurs**.

In their latest work, the scientists designed two copper coils roughly 500mm in diameter that were specially designed to resonate together. One was attached to the power source, the other to a light bulb.

The practical demonstration of their earlier theoretical work managed to power the light bulb even when obstacles (humans!) blocked direct line of sight between the source and device. We may well be rid of some more wires, and also some batteries soon, without our bodies getting uncomfortably warmed up by the transmitted power!

PW

See you soon as I explore the future on behalf of *PW* readers. Chris G4HCL.

Tim Walford G3XFD's Valve & Vintage

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The Plank VFO!

Guest Valve & Vintage author Tim Walford G3XFD takes a break from working with those new-fangled semiconductors and describes a vintage style valved mixer-type v.f.o.

The Editor tells me that he thinks that there are readers skilled enough in the art of woodwork who would perhaps like to make a Plank variable frequency oscillator (v.f.o.) to drive what were originally a rock-bound (quartz crystal controlled) c.w. transmitters like The Plank transmitter! Readers will recall the Jan 2010 *PW V&V* article, Fig. 1, which showed the replica c.w. rig built by the late Eric Godfrey G3GC, to demonstrate the type of equipment that he first used on the air in about 1938.

The transmitter circuit (**Fig. 2**) had a crystal controlled (and keyed) oscillator for 7MHz (40m), driving through two loosely coupled resonant circuits, into an 807 output stage*. This article is about making the transmitter's operating frequency variable. Again I must emphasize that I am not offering kits or any parts! I did not include the TX circuit in the earlier article as I felt it had too many obscure parts in it; while the 6K7 and 807 valves are readily available, I was less confident about other parts, which might be difficult for readers to locate.

Note:** The complete Plank transmitter and receiver combination was in action – mounted on a farm trailer, parked in a field, with special insulation over the h.t. components – during the 2010 QRP In The Country event at Tim G3PCJ's farm. As I commented in a subsequent* Keylines*, I was astounded at the excellent performance on the 7MHz band using c.w. That's why I invited Tim to present this article.* ***G3XFD*.*

Basic Requirement

Let's look at the basic requirements. I wanted a device that could plug directly into the transmitter's crystal holder so that it could remain crystal or v.f.o. controlled. The transmitter's crystal oscillator uses the Miller configuration (see *Technical for the Terrified PW* Feb 2010) where the crystal is connected directly between the 6K7 valve's control grid and 0V/earth. This is a high impedance point where over 20V p-p would be expected under crystal operation and hence similar drive levels would be needed from the external v.f.o.

The transmitter is capable of operation on 3.5MHz (80m) and 7MHz without doubling. So, the external v.f.o. has to be able to provide either band with a frequency range suitable to cover the c.w. and lower single sideband (s.s.b.) sections for possible 'phone operation by amplitude modulation (a.m.).

The obvious approach of having an external v.f.o. at transmit frequency is not viable for two reasons; firstly it's quite likely to 'chirp' due to transmitter r.f. getting back into the v.f.o. resonant circuit (especially with wood and wire grounds instead of a metal chassis!) and secondly, band changing would be less easy and wouldn't have a single tuning scale for both bands. The alternative crystal mixing technique avoids the snags!

The frequency mixing scheme, which mixes an external crystal oscillator with a v.f.o., can be either additive or subtractive mixing to the wanted frequency. Using a v.f.o. frequency below 5MHz is desirable for best stability. I chose to use a 10 MHz crystal for 40m and a 6.5MHz one for 80m, from which is subtracted a v.f.o. signal running from 3.0 to 2.85MHz;.

My choice of crystal frequencies would give at least 150kHz up from the bottom edge of both bands, with both bands tuning the same way – actually backwards but this doesn't matter. The full circuit is shown in Fig. 2, each section is discussed in the next section. **Note:** You could alternatively use 9 and 5.5MHz crystals with a nominal 2MHz v.f.o., or possibly others around these values with a wider v.f.o. range.

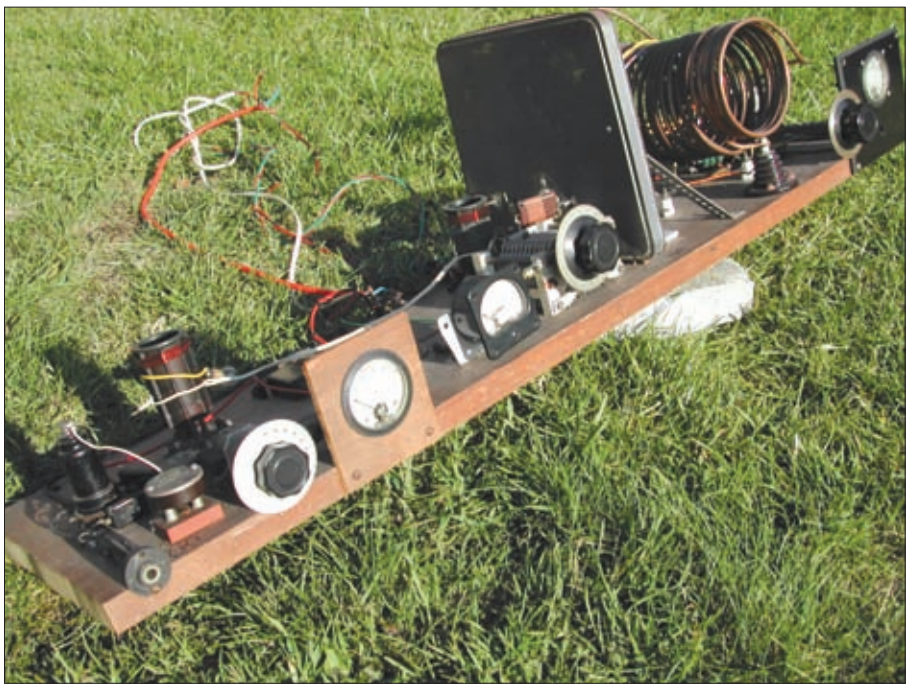


Fig. 1: The Plank transmitter, published in *PW* for January 2010, in all its wooden glory.

Double Triode

As I didn't have any single triodes to hand, I chose a 6SN7 double-triode, with one section for the actual v.f.o. running near 3MHz. The other section is to provide a buffer against any changes in loading or capacitance, arising from the following mixer. I chose to use the Hartley form of oscillator because I happen to like the Hartley oscillator configuration, with

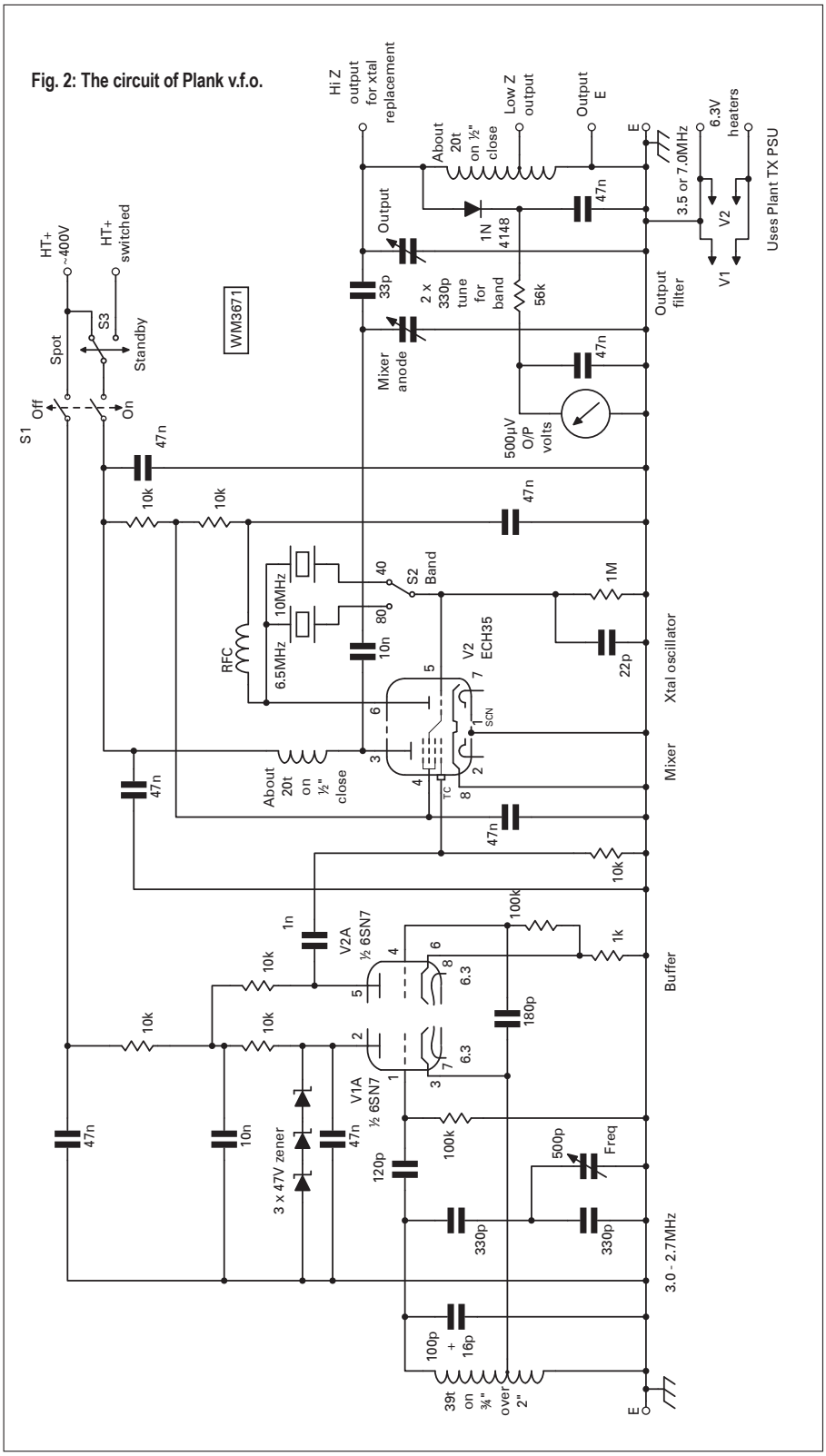
its simple resonating capacitors, as the required feedback is obtained by a tap on the coil.

My junk box had a suitable 0.75 inch diameter ceramic former (It was an old imperial former!) for the v.f.o. coil which took 39 tightly wound turns of 24 gauge wire spread over 2 inches. The tap is one third of the way up from the ground end. A bit of juggling with the fixed silver mica capacitors got it resonant from 2.7 to 3MHz using an old 500pF air variable fitted with a ball type epicyclic slow motion drive.

Constructors without a good stock of silver mica capacitors could fit a trimmer across the coil because polystyrene resonating caps should be almost as good. Somewhat to my surprise when I completed the v.f.o., the drift turned out to be less than 50Hz after half an hour from cold. The anode supply of the oscillator is stabilized at 140V by three big 47V Zener diodes, which are heavily de-coupled for r.f.

The oscillator is deliberately left running all the time for the best stability (one of the great advantages of a mixer/oscillator type of v.f.o.). Output is taken at the low impedance cathode tap on the coil to the following 'buffer' stage, which uses the other triode in the 6SN7 envelope. This actually has a small gain to raise the drive to the following mixer stage in order to get a high eventual output voltage.

Fig. 2: The circuit of Plank v.f.o.



Using A 6K8

I happened to have a 6K8 frequency changer valve, so it was obvious I should use the triode section for the crystal oscillator and the heptode section for the mixer – just as would normally be the case in a receiver. The oscillator has to operate with either the 10 or 6.5MHz crystals and this is easily arranged by putting them in the anode to grid feedback path of the triode section, with a toggle switch for selection.

It's necessary to remove the mixer's output signal during reception (to avoid it drowning the receiver!). So, the crystal oscillator and mixer are switched off during reception by the transmit-receive relay in the transmitter.

A separate 'spot' toggle switch is provided to assist with putting the transmitter onto the reception frequency. Because it is crystal controlled, this oscillator will come back correctly on frequency every time!

It would be better to use larger crystals than the modern HC49 types that I had to hand. The smaller types might be prone to heating with the higher signal levels inherent in valve circuits, but I've not noticed any problems. **Note:** The switching wiring around these crystals should be as direct as possible.

The Heptode Section

The heptode section of the 6K8 is conventional with the mixer band-filters at its anode. Again my junk box provided two identical 330pF air variables with enough capacitance swing to resonate on 3.5 and 7MHz without any changes in inductance or extra fixed capacitance. (Always salvage old air variables – they're getting like the proverbial 'hen's teeth' nowadays!).

Twin resonators are required to reduce the unwanted mixer outputs. The filter inductors do not have to be high quality and I used *pvc* electrical conduit for the formers with 20 turns of 24s.w.g. close wound.

The *pvc* waste pipe could also be used but with less turns owing to the larger diameter. My original circuit had the first resonator with the full h.t. voltage on the capacitor stator but – I soon learnt that capacitive coupling to it and the rest of the filter would prevent flashovers!

Incidentally, have you ever tried to find where the arc (and hence the resultant

slag developed by the arcing) is located in a 'flashed' air variable? Its impossible, so don't bother – use the other section if dual gang! Bearing in mind the need for over 20V p-p at the output, it would have to be taken at high impedance from the second resonator; this is alright provided the capacitance of the connecting cable to the transmitter is low.

I found that two feet (600mm) of old half inch spaced twin feeder could be placed across the whole of the output coil, provided its resonating capacitor is reduced to bring it back to resonance.

The final addition was a high impedance r.f. voltmeter to indicate when the variable capacitors are set for maximum output.

Construction Style

The general construction style **Fig. 3** had to be in keeping with the other parts of the whole Plank project! This implies a heavy planed softwood wood plank (about 1 x 10 x 15in) as the base, with the octal valve holders mounted up about 0.75in by long screws and tubing. The 'earth' or chassis is provided by lots of solid 2.5 mm^2 copper wire stripped from mains cable – this is formed into a grid of many rectangles of not more than about 1.5in per side.

The component tag strips (or group boards from RS – part no 433 703) are given several earthy points and also bonded well to the frames of the air variables – **Fig. 4**. My front panel was a piece of rigid plastic of the sort used to make signs, screwed at its bottom edge to the front side of the wooden plank, and braced by the mountings of the air variables.

The Plank style of construction is so much easier than any metal-bashing and is quite good enough for this application! Any switches carrying h.t., fitted to such an insulating front panel, should have their bodies also wired to 0V. As this unit would never be used without the transmitter, it was arranged to run off the same mains power supply unit.

Finally I must thank all those who have expressed an interest and encouraged these Plank projects – Eric G3GC would be delighted! I hope to have them all operational (including the Plank modulator and the antenna matching unit) at the **QRP in the Country** event on **July 17th 2011**. Look out for the publicity in *PW* – everyone is welcome and I hope to meet you there! **PW**

Fig. 3: The Plank v.f.o. as seen from the front.

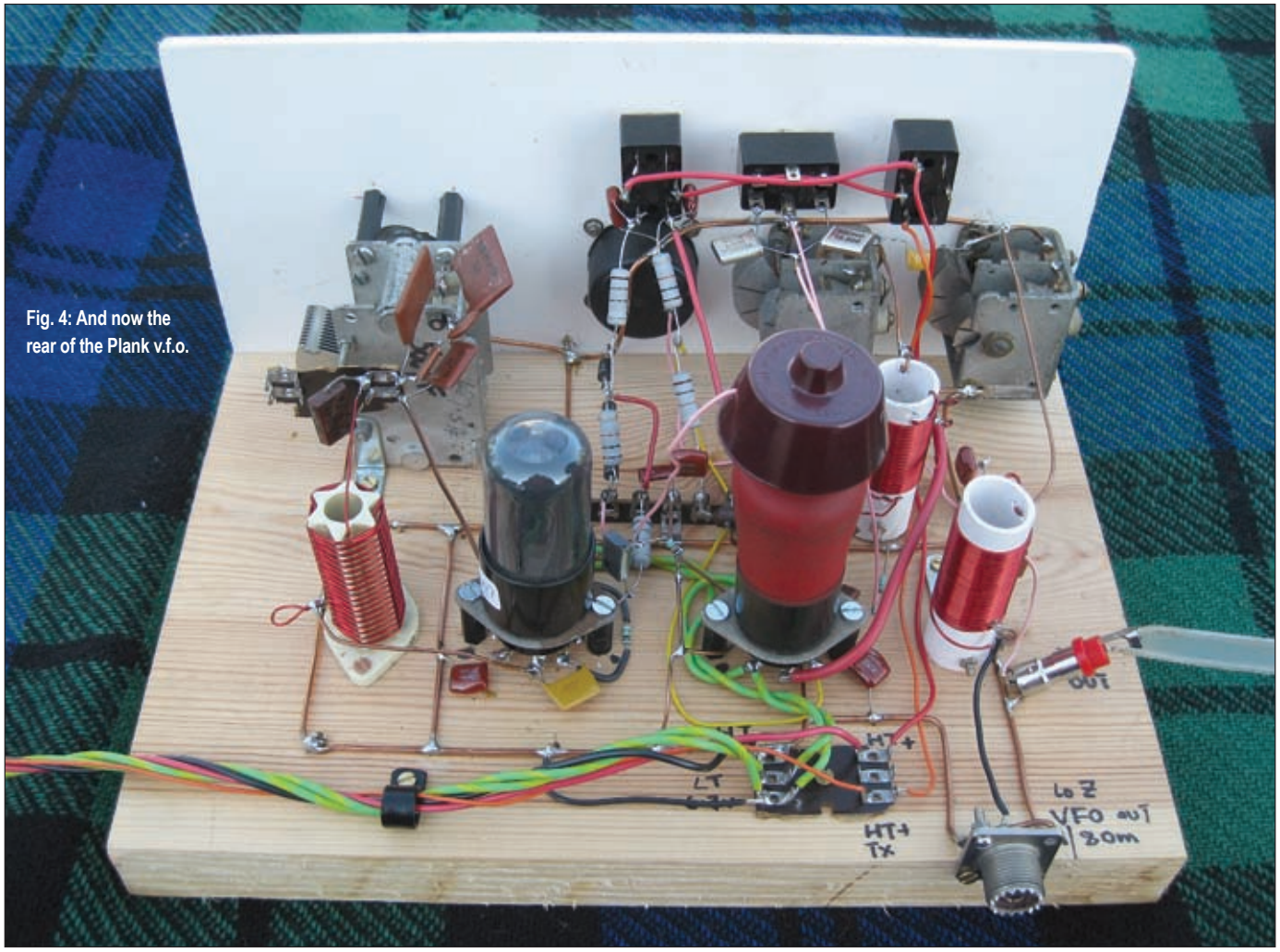


Fig. 4: And now the rear of the Plank v.f.o.

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MFJ-969 ATU £159.00
MFJ-994B 600 Watt IntelliTuner ATU £275.00
Yaesu FC-30 Antenna Tuner Unit £169.00
TSA-6602 - Quartz mini antenna tuner. (Rare) 144-430 £25.00
LDG AT-7000 Auto Tuner £129.00
Vectronics VC-300D Tuner £199.00
Global AT-1000 SWL ATU £69.00
MFJ-935B Loop Tuner £149.00
MFJ-924 MFJ UHF ATU £85.00
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Mirror Mount £5.00
MV6+3 6/10/12/15/17/20/30/40/80 £88.95
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SE-1300 Discone £40.00
CX-310A 3-way Coax Switch (SO-239) £55
MC-4MT Mobile Cable £13.00
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Lodestar SWR-2T SWR Meter £15.00
Emperor Ninja CB £69.00
Lodestar SWR-2S SWR Meter £15.00
CTE-737 50-Watt CB Amplifier £34.95
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Moonraker Minor Plus 80 Channel UK CB Radio £45.00
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NC-386 Ni-Cd Battery Charger £20.00
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AEC LP-30 - Low Pass Filter £15.00
Workman TVI-2K Low Pass Filter £25.00
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FDC-450A 70cm Handheld £79.00
FDC-150A 2m Handheld £79.00
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Quansheng 2m Handheld £69.00
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Wouxun KT-689 2m Transceiver £59.00
CSC-90 Soft Case for VX-2E £10.00
FT-708R 70cm Hand Held Transceiver £49.95
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Icom IC-756 £699.00
Icom IC-707 Amateur HF transceiver £399
Kenwood TS-570DG/E HF transceiver £599
Alinco DX-70TH HF & 6m transceiver £399.00
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AOR 8200 Mk I £220.00
UBC-785XLT Base Scanner £209.00
AR-MINI - pocket sized receiver £120.00
FR-100 Handheld Scanner £55.00
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Kenwood TS-271E £165.00
Kenwood TS-790E 2/70 Base £750.00
FT-290RMKI 2m Multi mode £150.00
Icom IC-821H £599.00
Yaesu FT-8900 Quad Band Mobile £279.00
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IC-7400 HF, 6m & 2m transceiver £999.00
Yaesu FT-857D Multi-band Mobile £539.00
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Kenwood TM-V7E 2/70 FM Mobile £249.95
Kenwood TM-D700E Dual Band Mobile £299.00
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Kenwood TM-702E VHF/UHF £149.00
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The TINY-2 MK-II £109.00
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NEIM1031 Noise Module.....£142.95.
NES10-2 MK III speaker .....£112.95.
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More on meteor scatter!

Tim Kirby G4VXE practices what he preaches– and he's been listening to the high power French transmitter just below the 144MHz band.

Welcome to the *World of VHF* (*WoVHF*)! I think that readers will be interested to hear that I've been monitoring the Grand Réseau Adapté à la Veille Spatiale (GRAVES) transmitter near Dijon in France on 143.049MHz (mentioned last month, see http://en.wikipedia.org/wiki/Graves_(system) and found it fascinating to hear the signals come through on a regular basis. Morning time from 0700-0900z seems to work well, though I don't think I've ever listened to the frequency for a few minutes without hearing something!

Dave Robinson WW2R (well known to many as **G4FRE)** pointed me at a fascinating article on the NASA website written by **Dr Tony Phillips** to be found at: **http://science.nasa.gov/science-news/science-at-nasa/1998/ast22dec98_1/** about a study of meteor scatter conducted using the NAVSPASUR radar in Texas.

The NAVSPUR radar is a similar system to the GRAVES radar system in France, although it operates at the higher frequency of 216.98MHz. Dave says that from his location in Texas, NAVSPASUR isn't a good indicator of meteor activity as the tropo signal is too strong! However, further away from the site of the radar, across most of North America and the Caribbean, meteor reflections should be good.

The article itself makes good reading, and I was particularly interested to see the trace recordings showing a meteor reflection as well as reflections from satellites. I think my next challenge is to see if I can record some satellite echoes myself using the GRAVES signal.

The 'screen-grab' of **Fig. 1**, which is the meteor reflection from GRAVES transmitter using *Easygram* software. The meteor is the bright short trace. You can just see a weak tropo signal – the thin blue line in the centre of the trace

In order to create visual traces from the GRAVES (or any other beacon signals) I use a piece of free software called *Easygram*, which is available to download from **http://ok1fig.nagano.cz/EasyGram.htm**

Graham Boor G8NWC also recommends *Radio-SkyPipe II* which I installed easily and used to create traces in strip recorder format from the GRAVES signal. You can download the software at **www.radiosky.com/skypipeishere.html**

The 50MHz Band

Not too much 50MHz band activity to report, although **Mark Marment CT1FJC**, in Luz, Portugal, reports making some JT6M QSOs with Spain and Northern Ireland. (I think it's fascinating to see QSOs like these being made on what is, to all intents and purposes, a closed band!).

John Blick MM6KSJ (Rothesay, Isle of Bute, Scotland) tells me he's keen to make his first QSOs on 50MHz f.m with his Yaesu VX-8E.

Further south, the GB3FX repeater near Farnham in Surrey often shows good activity during commuting hours and can be heard widely around the South of England even when I'm operating mobile!

On the other side of the world, far from the band being in the doldrums, **Steve Mahony VK5AIM** (Elizabeth Downs, South Australia) worked 35 stations in all states on s.s.b. Steve started on 50MHz a.m. with all-valved equipment around 1965. During the 1970s the introduction of commercial s.s.b transceivers made a big difference in v.h.f. DX. In the following years he worked all states, VK1-VK9 on s.s.b.

Steve kindly sent a picture of his antenna system with a 4-element for 50MHz; an 18-element for 432MHz and an 11-element for 144MHz. Steve has a separate, vertically polarised, antenna system for n.b.f.m.– with 11-elements on both 144 and 432MHz and a 1296MHz Yagi. Steve sent in a picture of his antenna system for 50, 144 and 432MHz see, **Fig. 2**.

Fig. 1: A screen-grab, showing meteor reflection from GRAVES transmitter using Easygram software.

The 70MHz Band

The 70MHz band reports start with lots of n.b.f.m contacts from myself, operating as G4VXE during the last month and it's good to hear a fair amount of activity taking place, here in the south of England at least!

I wonder what 70MHz activity is like in other areas of the country? One of my more distant contacts was with **Dick Richardson G8DER** in Southam, Warwickshire over a distance of around 60km. There was a substantial amount of fading on Dick's signal here, typical of 70MHz: long, slow fading where signals can almost vanish completely and then come back up to good strength over a period of several minutes. I've noticed this many times on s.s.b. but I think this was the first time I've noticed it on an f.m signal.

The Tring 'parrot', **MB7FM** came back on the air in early January on 70.4375MHz following its off-air period due to a fault. As space on 70MHz is at a premium, this is a simplex repeater and operates as a 'store and forward' system. Your over, which can last up to two minutes will be stored by the 'parrot' and then re-transmitted. The QSOs are not exactly snappy, as you can imagine, but works better than you might think and it proves a useful facility.

Since the MB7FM system was reinstated, I've had some interesting contacts, including **David G8JGO**

Fig. 2: From 'down-under, Steve Mahoney VK5AIM's antenna system for 50, 144 and 432MHz. Makes you jealous, doesn't it?

who was operating portable near Peterborough. We were both interested when we found we could hear each other occasionally – but weakly – on simplex'. It wasn't strong enough to work each other without the benefit of the 'parrot' but it was interesting nevertheless.

Dave Remnant M0SAT also enjoys using MB7FM and finds that people who've not tried the system are initially quite dismissive of the system until they have a chance to use it, when they realise it is quite a boon to 70MHz activity.

I've found that a call on the 'parrot' often results in a QSO, so I've been enjoying trying that if a simplex "CQ" on 70.450MHz goes unanswered. When the weather gets better, I'm hoping that the 'parrot' may allow me to break my 'duck' of QSOs using my Wouxun 70MHz hand-held rig by operating from one of the local hills.

The 144MHz Band

It's great to hear once again from **John Blick MM6KSJ** on the Isle of Bute in Scotland who told me, "I like experimenting with different power levels and antennas with my 'handies'. It's amazing the results you can get, even indoors inside our stone-built cottage.

"Firstly, with my Yaesu VX-8E HT on 2.5W and the Watson WSMA-7000 rubber duck I was inside the cottage (too cold to stand outside!) and spoke to **Dan Mitchell KC8IWY** in Monroe, Michiga USA, **Mick Pye M3MBP** in Wolverhampton and **Bill 2E0EZX** in Sheffield all through – MB7INA on 145.2375MHz, which is on the Scottish Mainland.

"Early results from a MFJ-1720S flexible antenna (I've only had it a couple of days) show that I can work the same repeater with just 200mW, still indoors in the warm and not sitting at a window. Very impressive so far!"

"With a few trips to the mainland the past few weeks, I've also done a bit of APRS using the Watson when portable and a Diamond MR-77S when mobile. Before the ferry gets to the mainland I'm showing up on **http://aprs.fi** from the car and then I do portable when I'm out and about on foot".

Thanks for the up-date John! Now it's on to **Jim Bertram GM0GMN** in Largs, Scotland who is now APRS active with his new Kenwood TH-D72E handie and he and John have chatted on 144MHz simplex and sent and received APRS packets simultaneously".

Mark Marment CT1FJC has been busy working on his 144MHz moonbounce (e.m.e) station. He's been working on a new amplifier built to a YU1AW design, which could develop over 1kW output at 144 MHz for e.m.e work. It's almost finished now but Mark had to change the GS35B due to an expensive 'duff' tube on the first run up!

Mark kindly included some pictures of the new amplifier which look great, **Fig. 3**. Mark's planning to replace his e.m.e antenna system this spring. Currently he is using 2 x 9-element vertical, home-brew version of a DK7ZB design, giving 15.25dB gain. With this system, JT65B and about 90W from a TS-2000 and small solid-state amplifier, he's worked

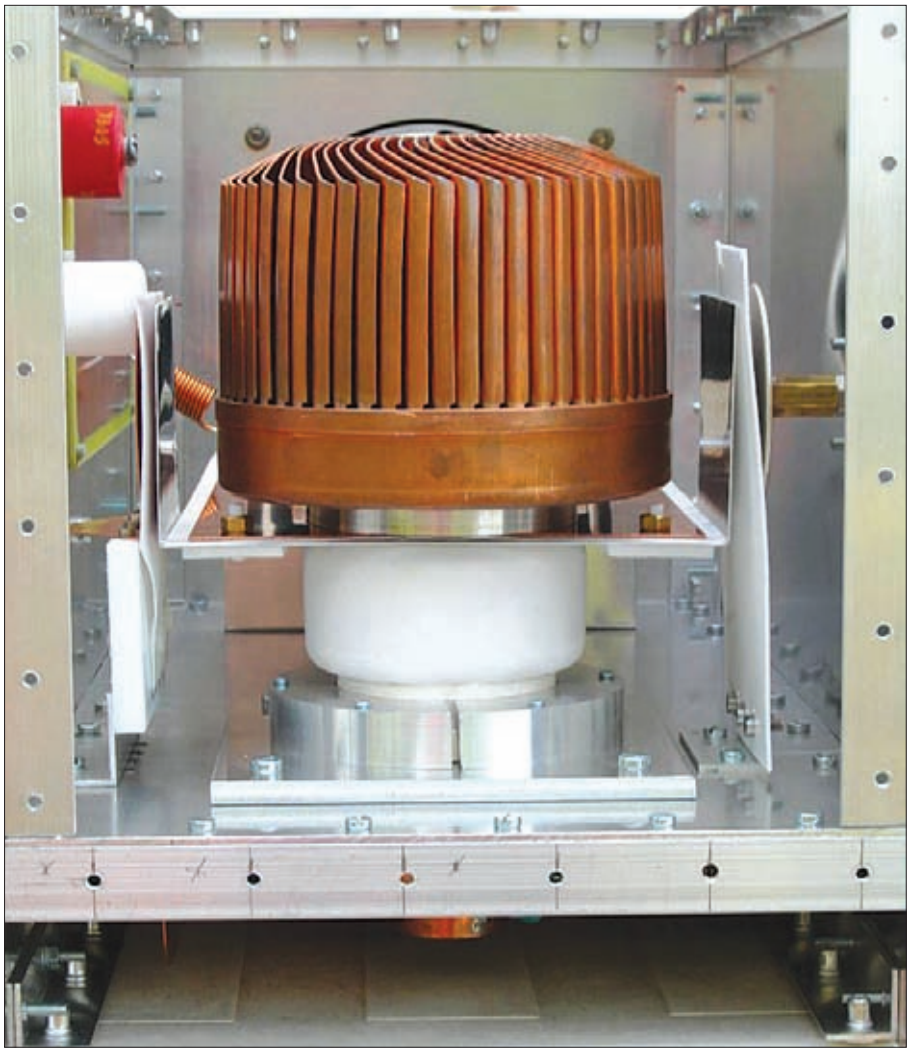


Fig. 3: An end-view of the anode compartment of Mark CT1FJC's new 144MHz amplifier.

14 DXCC countries and 34 stations. He's also planning to upgrade to 4 x 7-element horizontal, again to a DK7ZB design, but one with around 17.25dB gain.

I knew Mark was active on e.m.e., but somehow I imagined he was using a 'big' station and to learn that he isn't, is really inspiring! Indeed, it suggests that even a single Yagi of say 13 elements (I have an old 13-element portable Tonna in the garage!) and a 100W or so should make some good contacts on e.m.e using the *WSJT* software. Anyone else up for the challenge?

The vertical/horizontal mounting is an interesting point. For e.m.e work, it doesn't really matter whether you mount the antennas vertically or horizontally because signals reflected from the moon will vary in polarisation – so you'll have the correct polarisation as often (or as infrequently) – whatever you choose! Having said that, as most people want to use their moonbounce array for tropo work as well, horizontal mounting is the norm.

Note too, that for Es – once again, polarisation isn't critical, as by the time your signals have been reflected from an E layer which is moving around, the polarisation will have changed from how it was originally transmitted.

Rick Lee G7FCT reported hearing the Humberside repeater, GB3HS on 145.650 on January 23rd whilst mobile in Wiltshire – a nice bit of localised tropo. I was mobile on the same day in Oxfordshire and heard the Wolverhampton repeater, GB3BX coming through on 145.675MHz.

Steve Mahony VK5AIM had a nice Christmas present with QSOs from Adelaide to McKay on the northern coast of Queensland, VK4 on 144MHz s.s.b on the evening of December 25th. Steve says that the distance was over 2000 km and that the DX was there for about 15 minutes and then gone. Tropo or Es, I wonder? Either is feasible, but I'm guessing perhaps Es (being summer in Australia, it's Es season).

Paul Goodhall M3JFM from Oxford made his first 144MHz s.s.b. contacts on January 30th. Using his new FT-817 and 5-element yagi, he worked G8DOH near Hook Norton and then myself!

Here at G4VXE, the most interesting 144MHz activity was just as I was putting the finishing touches to this column! On January 31st, I was on the very edge of a nice tropo duct from western France, north-east up towards Denmark and Northern Germany.

Driving home, the n.b.f.m. channels were very busy. On 145.750MHz I could hear F5ZBH to the east and GB3BC in the west! It made interesting listening. Later on, I had a quick contact with F8BRK in IN99 on s.s.b. and then later in the evening, I noticed the HB9HB – Biel Switzerland – beacon coming in steadily.

The HB9HB beacon had faded by the time I got up on February 1st. However, driving to the railway station heading for London, I was excited to hear **IR0RSS** operating on the voice mode from the International Space Station on 145.800MHz, working a school station in France and answering their questions about space.

The 432MHz Band

I spent a few minutes on s.s.b. during the RSGB UK Activity contest on January 11th. Best DX was working **John Arnold G4NPH** near Ely. It was also good to work **Bob Chandler M0MCV** (JO01) and **Reg Woolley G8VHI** (IO92) as well as some more local stations. Reg G8VHI who was participating 'seriously' during the session said that activity was 'manic' and that he'd been pleased to make 88 QSOs.

Steve VK5AIM in his interesting letter mentions that he has worked all Australian states on 432MHz. He says that it took time and patience! I'll bet it did, as there are some long distances to be covered there which would be particularly challenging on the band. Congratulations, Steve – it would be good to hear more about this achievement when you get a chance!

I was mobile, driving to work on January 18th when I was surprised to hear PA3EGD/M calling CQ at S9! This proved to be coming from one of the v.f.o.s that was scanning various channels of 'interest' and the signal proved to be on 435.300MHz – a satellite downlink frequency. This is the downlink from AO-51.

I was impressed! Had I been prepared for the pass, it would have been interesting to try and work through the satellite myself. Even if you have 'only' got what you may consider a simple vertical antenna, this will work well for satellites that are passing over, higher in the sky.

Peter Goodhall 2E0SQL has one of the new AMSAT Funcube dongles. This is a receiver from 64-1700MHz which plans into your USB port and acts as a Software Defined Radio (SDR) receiver. Batches of the receiver that have been released have been sold out within minutes as they provide a very cost-effective and exciting way of monitoring v.h.f/u.h.f./s.h.f.

Peter and his father **Paul Goodhall M3JFM** have already installed some new v.h.f./u.h.f antennas complete with azimuth/elevation rotator. On January 30th, Peter made his first QSOs using the AO-51 satellite working IZ8JHD, EA1NL and EA1MX – congratulations to you Peter!

The 1296MHz Band

The PI9CAM group who use the 25m diameter dish at Dwingeloo in the Netherlands use the dish for their moonbounce tests on both 432 and 1296MHz. What's particularly special is that they use Software Defined Radio receivers and make the output of the receivers available on the internet at **http://websdr.camras.nl:8901/**

So, whilst they are active you can tune their receiver and listen to e.m.e signals for yourself using nothing more than your internet browser (you will need to have Java and Javascript enabled). On January 16th I was alerted on Twitter to the news that the team were active, so I had a listen. It was fascinating!

Some activity was taking place using the *WSJT* program, but it was also great to listen to PI9CAM operating on s.s.b. You could listen to them transmitting and then a second and a bit later, slightly higher than their transmit frequency, owing to the Doppler shift, you would hear their echo. Absolutely brilliant!

With the 25m dish at their disposal, signals can be quite strong, so it was interesting to hear several s.s.b. QSOs taking place including one with Japan and LX1DB in Luxembourg.

When the group are not active from the dish, the webpage contains a recording made by the group on 432MHz during the 'Echoes of Apollo' project when the KP4AO group were active from the Arecibo dish in Puerto Rico. Have a listen using the webpage, tune the receiver for yourself and see what a pileup of moonbounce signals sounds like! You'll hear a combination of WSJT, c.w and s.s.b signals.

It's probably worth saying that many people can access the SDR at the same time, so you can tune the receivers as you wish and you won't affect anyone else's enjoyment of the band, so experiment as much as you like.

That's it!

That's all we've space for this month. Just enough room to say that April is a great month to get your station ready for the Es season – we should see some openings on the low v.h.f. bands at least, during May! Whether it's Es or anything else that happens on v.h.f/u.h.f be sure to let me have your news – thank you. Tim G4VXE.

PW

Graham Hankins G8EMX's In Vision
92 Sunningdale Road, Tyseley, Birmingham B11 3QJ
E-mail: g8emx@tiscali.co.uk

Internet Streaming

Graham Hankins G8EMX brings you 'In Vision', his round-up of Amateur Television news, asking for your comments on Internet streaming.

Welcome to *In Vision (IV)* – which reflects the World of Amateur Televsion! For the past few years the British Amateur Television Club (BATC) has been providing an ATV streaming service over the internet. Because so many ATV station cannot access a repeater and thus enjoy any contacts, the club – at a not insignificant expense – bought and installed a powerful server to provide multi-user smooth video so that members could watch other stations 'transmissions' and could upload video of their own. So, this is ATV via the Internet, as distinct to ATV via the Amateur Radio bands.

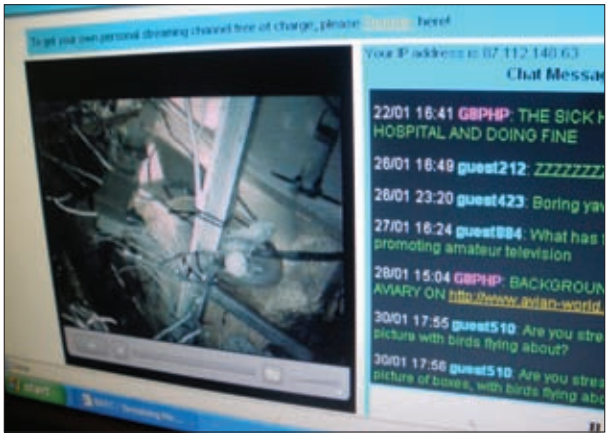
I have been known to be critical of this move to Internet ATV, by the BATC as it is not 'Amateur Television' by my definition. But it has been in operation for a while now, so I thought that an 'informal audit' might be interesting. There is a link 'BATC TV streamer' direct from the BATC's web site home page **www.batc.org.uk** The link takes you to the 'batc.tv ' page, from there, go to 'Members Streams' to view what is being sent out in vision.

Not A Lot!

At 19:30 on Sunday January 30th the answer (what was being sent on on the 'Members Streams'), to quote the late, great **Eric Morcambe**: "Not a lot!" There were mammoth lists of callsigns, some of which were showing as 'streaming' but most were not. But even selecting some of the streaming callsigns did not bring up any vision.

Next to each 'screen' there are scrolling text chat messages and some of these confirmed that others could not see any vision either; remarks like: "Where's the streaming video", "You have chat facility but no streaming video" were read on several streams. But video did appear from three stations – one in Quebec, Canada, the other two were from UK callsigns.

The Quebec station's screen showed a typical 'shack shot', with the camera very slowly panning from side to side but no operator was in sight (incidentally, this was also being streamed at 0730 the next morning – had it been on all night?). One of the UK stations was streaming its test card, but the other was streaming a very cluttered, static scene which appeared to consist of various shelves and boxes. What was this and why–oh–why was it being streamed?



I grabbed this Internet streamed ATV shot and some of the comments (apologies for the poor quality of the pic). But is it really ATV?

Birds Fluttering

Then I noticed a few birds fluttering about! Reading some of the chat messages this was, apparently, a shot of an aviary! This had, unfortunately, produced such comments as 'boring', 'yawn' and, more tellingly, 'what has this got to do with Amateur Television?' What indeed? Your comments would be appreciated, although I may be wrong!

Video over the Internet is notorious for 'freezes' and jerky motion because bandwidth issues prevent the high-speed data flow essential for smooth vision. The BATC's streaming server cost the club a few thousand pounds and one reason for this was to provide a wide bandwidth to deliver a relatively uninterrupted data flow to many users. Now bandwidth costs money, so there has been some comment within the BATC about members streaming images for great lengths of time.

After a complaint from a member that the club had, they claimed, asked them to limit their usage, **Chris Smith G1FEF** who is the 'brains' behind the whole streaming project, replied: "Just to put the record straight, the member was not told to restrict his stream, we sent a blanket E-mail requesting that people streaming a lot to consider more efficient use of the facilities, as the server bandwidth was getting rather high and bandwidth costs money. We are a club, not a commercial concern and the streamer is funded entirely by voluntary donations."

Chris aded: "The E-mail was aimed at 'testcard' shots and what we have termed 'home security' shots that some were streaming 24/7…….the E-mail wasn't aimed at that particular member, it was sent out to anyone using over a certain amount of bandwidth on the server."

Goodby To Analogue!

The end of the broadcast analogue service in 2012 draws ever nearer! You may remember that, last year, I wrote to museums and the government , urging that some analogue transmission equipment be preserved for posterity. Well, the 'clock is ticking' and with official bodies usually moving slowly, I think it's worth a gentle reminder.

Perhaps readers of *In Vision* do too? In August 2010 I had a reasonably favourable reply from a **Saima Mirza**, Relationship Manager, Museums, Department of Culture, Media and Sport. Now government personnel do change over time, but I am going to write to the same person again, asking if there has been any progress! Maybe you could, too? Good luck! **PW**

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

Morse – Keys and Recordings!

Roger Cooke G3LDI brings you news of a Czech Army Morse key and recordings that he forgot to say where they were!

Welcome to the World of Morse and my regular column – *Morse Mode!* Being a G3 I spent most of my time on c.w. when I first got my licence and one of my first 'awards' was the Rag-Chewer's Club certificate.

In order to obtain the certificate you had to have a number of contacts lasting over 30 minutes, and of course in those days, the 1950s, the majority of contacts were on c.w. This award has now been revived by the Society for the Preservation of Amateur Radio (SPAR) and the full rules for obtaining this can be found at: **www.spar-hams.org/index.php**

So why, you may ask, am I mentioning the certificate revival? Answering the question is simple because when I'm listening over the bands it really is becoming rather a silly situation. Hearing something common, such as a CT1 or W3 or LZ and then hearing the QSO consist of nothing more than 'G3LDI 599 73 QRZ' seems pretty meaningless to me! Even the mere exchange of a name is omitted. So, I would like to see a reversal of this stupid procedure. Common calls are **not** expeditions, so let's get back to some normality.

Czech Army Morse Key

I was recently asked to review this straight key, seen in **Fig.**s **1** and **2.** It arrived in its original wrapping paper and measure about 150 x 65mm and has a strange plug on the end of the lead. The lead resembles cloth covered mains wire and the plug looks like the old two pin mains plug. The key has a case made from what looks like thick brown Bakelite, very robust – and it has a hinged lid.

The pivot is unusual in that the lever is in the form of a U-shaped bracket on the outside of the case and there is a very strong return spring. I adjusted the gap to what I like to use using the knurled screw at the front of the key. (It also has a locking screw on it).

It seems hard to believe that these

Fig. 1: The Czech Morse key seen from the outside.

keys are 50 years old. The one I have looks brand new and is very well made to a unique design. I have never seen one like this before. The construction is typical of the day and 'built like a battleship' springs to mind!

The balance is good and it does not bounce up and down when it's in use. The bottom is just metal so it does tend to slide around on the desk – if you have a nice shiny desk that is! To stop it sliding I think it would be a good idea to sit it on a piece of that sticky webbing as you see in the picture. This is what I've done and it anchors the key down nicely.

They Czech key is quite pleasant to use, other than the fact that I'm used to my old type D with a round type keying knob with a flat piece underneath. The Czech has a flat keying knob only. However, it's possible to modify it to suit you and make the key unique. Several people have done this, adding a more 'bulbous' knob to the present one.

The keying contacts are substantial and well engineered. It's possible to set the key for a minimal gap and as usual with contacts, cleaning should be with a piece of paper slid between the contacts and dragged out. With a completely enclosed key however, there should not be too much of a dust problem.

Take a look at the full details on the web site: **www.czechmorsekeys.co.uk/**

At only £20 plus post and packing, I think the Czech key would be an ideal investment for somebody wishing to take up c.w. and use both to learn with

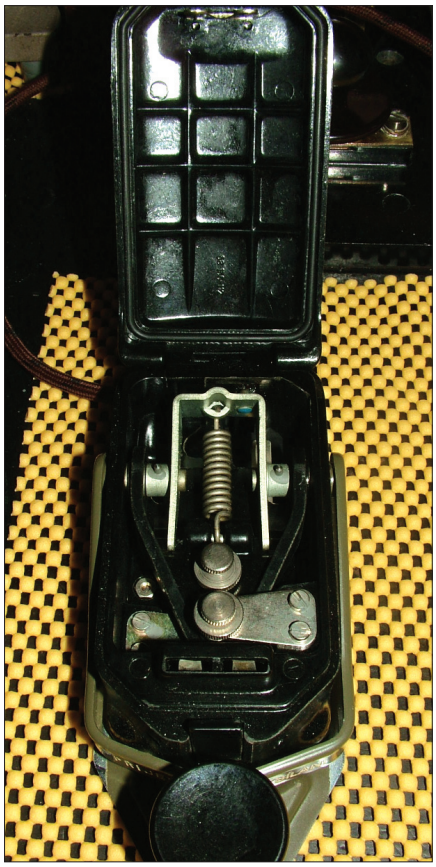


Fig. 2: the unusual design visible inside the 'shell'.

and use on the air. I would thoroughly recommend it and my thanks to **Mike Bowthorpe G0VCZ** for sending it and also donating it to our local Club, the Norfolk Amateur Radio Club (NARC). I shall be offering it as a prize from the NARC to the first new student to obtain a Morse certificate.

Old Morse Recordings

My apologies to those who are waiting to hear the recordings that I mentioned in my November column (my excuse is that I am a G3!). I completely forgot the URL. Here it is now and I very much hope you enjoy them. You will find all sorts here:

http://mikea.ath.cx/www.n1ea.coastalradio.org.uk/index.html 73 and May the Morse be with you!
Roger, G3LDI

PW

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Looking At HF Propagation Parameters

This time Colin Redwood G6MXL responds to an E-mail from a reader who is somewhat puzzled by propagation forecasts. So, it's over to you Colin.....

This month's *What Next?* (*WN?*) column is prompted by an E-mail I received from Denny Teasdale M3HSJ. He said that he found it "a bit difficult understanding all the numbers in the propagation forecasts...i.e. SF, AN, K index et al. Is there any chance of a short article in *Practical Wireless* to help explain them all...? It would be fantastic if you could" help!

Thanks for your E-mail Denny – propagation is a big subject, with whole books devoted to it, so this *WN?* column will focus on the numbers in the high frequency (h.f.) propagation forecasts that Denny refers to. The Foundation, Intermediate and Advanced licence training courses build up some knowledge at each level, but they don't cover propagation forecasts.

The Sun

Most h.f. propagation is associated in some way with the sun. I must remind readers never to look directly at the sun (when we see it that is!).

Refraction Effects

At h.f., most propagation is by means of signals being refracted (bent) by the ionosphere back to earth. This happens because radiation from the sun has created pockets of ionised gas in the ionosphere. In order for this to happen, the part of the ionosphere in question must be facing the sun (i.e. during the day time).

During the night the part of the ionosphere that is shaded from the sun by the earth does not get ionised. And any daytime ionisation disappears, hence h.f. signals do not get refracted to the same extent.

In addition there's a seasonal effect. During the summer months, daylight hours are longer than in winter. This of course means that during the summer, the ionosphere is ionised longer each day than in winter. This is covered in the Foundation Licence course.

As explained in the Intermediate and Advanced Licence courses, the ionosphere is made up of several layers (D, E, F1 and F2). Each of these layers can be ionised and can refract (or in some cases absorb) radio frequency signals in the m.f. and h.f. bands.

Fig. 1: The radio telescope at Dominion Radio Astrophysical Observatory, Penticton, British Columbia, Canada. It's used to measure the solar flux at 1700UTC each day. Photo reproduced by kind permission of Jason Nishiyama.

Sun Spots

There are several additional factors affecting propagation – including sun spots – that also come into play. One factor is the amount of activity coming from the sun itself. As I briefly explained in the July 2010 *WN?*, the amount of ionisation of the earth's ionosphere is also linked to the (nominally) 11-year cycle of sun spots on the sun.

During periods of large numbers of sunspots, ionisation and hence refraction of h.f. radio signals by the earth's ionosphere is greater than when there are fewer or no sunspots.

A count of the number of visible sunspots is often shown on propagation websites as 'SN'. So, if there are 28 sun spots visible, SN 28 will be shown, but please remember that the number of sunspots can vary considerably from day to day.

For long-term analysis over a number of years, the smoothed sunspot number (SSN) is normally used. This is calculated using six months of data before and six months of data after the desired month, plus the data for the desired month. Because of this amount of smoothing, the official SSN is half a year behind the current month.

Solar Flux

The amount of radiation from the sun, received on the earth is termed the solar flux (SF). The unit of measure is the solar flux unit (usually abbreviated SFU).

The solar flux on earth is measured daily at 1700UTC, by the Dominion Radio Astrophysical Observatory, Penticton, British Columbia, Canada. It's made by measuring the radio emissions from the sun at a frequency of 2.8GHz using a radio telescope (**Fig. 1**). The signals at 2.8GHz are of such a short wavelength they are not significantly affected by the ionosphere – resulting in stable measuring conditions. The solar flux is directly related to the number of sun spots.

As you might expect, the higher the solar flux on earth, the better h.f. propagation will be. Good h.f. propagation is normally associated with a period of several days of high solar flux measurements. Important though it is, the solar flux is not the only factor that needs to be taken into account in predicting h.f. propagation. There are a number of other factors that need to be considered, not least being ionospheric storms.

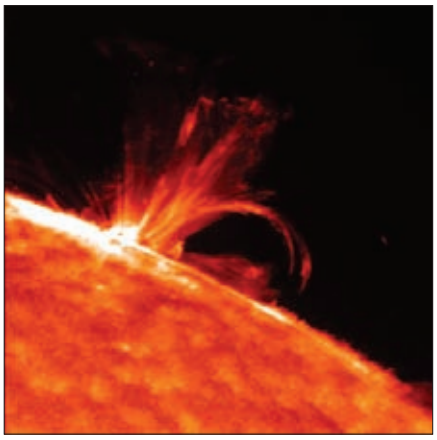

Fig. 2: A solar flare on the sun. Photo reproduced by kind permission of NASA.

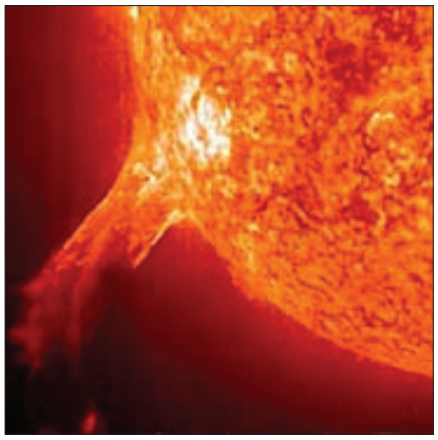

Fig. 3: A coronal mass ejection (CME) erupting from the sun. Photo reproduced by kind permission of NASA.

Table 1: The approximate conversion between the A and K indices.

a Index	0	3	7	15	27	48	80	140	240	400
K Index	0	1	2	3	4	5	6	7	8	9

Ionospheric Storms

An ionospheric storm is turbulence in the ionosphere above the earth. During ionospheric storms, the ionisation that occurs in the ionosphere can drastically reduce so that signals are not refracted back to earth. A big storm can sometimes stop almost all ionospheric propagation on the h.f. bands for a few days. There are several causes of ionospheric storms, including geomagnetic storms on earth and solar flares on the sun.

Geomagnetic Storms

Ionospheric storms often follow a geomagnetic storm. Geomagnetic storms are disturbances of the earth's magnetic field. It therefore makes sense to measure the earth's magnetic field as an aid to predicting ionospheric storms.

Magnetic Field

At many places around the world, the earth's magnetic field is measured at three-hourly intervals using a magnetometer. The measurements are made in units of nano Teslas (Tesla is the unit of magnetic flux).

The eight measurements taken during each day are then averaged to obtain the A index for the location. The values range from 0 to 400. A value of 0 indicates quiet, whilst a value of 400 indicates a severe storm.

The K index is based on the same magnetometer measurements as the A index, but unlike the A index, the measurements are **not** averaged. In addition the K index uses a quasi-logarithmic scale. The relationship between the A index and the K index is shown in **Table 1.**

When the K index or A index is low, it's unlikely that there will be ionospheric storms triggered by geomagnetic storms. But geomagnetic storms are not the only cause of ionospheric storms, so relying on low K or A indices alone is not sufficient.

Solar Flares

Another cause of ionospheric storms is solar flares. Solar flares are eruptions of radiation and particles from beneath the surface of the sun (**Fig. 2**). The radiation occurs right across the electromagnetic spectrum from radio waves through visible light up to X-rays and gamma rays. The radiation arrives first, whilst the particles travel at a somewhat slower speed of around 1,000km per second. (see **http://en.wikipedia.org/wiki/Solar_variation)**

When the radiation and particles from the sun meet the earth's ionosphere, they can have an impact on the ionospheric propagation on the earth. The radiation arrives first and the earth's magnetic field diffracts the radiation towards the earth's North and South poles.

The arrival of the radiation has the effect of increasing the ionisation at the lower layers in the ionosphere (the D layer) close to the earth's poles. This prevents higher frequency h.f. signals getting to the higher E and F layers of the ionosphere. In practice this means that the h.f. bands will be closed across the poles.

A day or two later, the particles from

the solar flare arrive, impacting the earth's magnetic field as measured by the A and K indices. This often results in a geomagnetic storm, with an ionospheric storm following. In these cases, the impact on h.f. propagation can be severe, with contacts limited to ground wave (short distance) propagation for up to a week. This is sometimes referred to as a Dellinger Fade-Out (see **http://en.wikipedia.org/wiki/Sudden_ionospheric_disturbance** for further information.

Solar flares are classified according to the strength of their X-rays. They are measured across wavelengths of 0.1 to 0.8 nanometres (1–8 Angstroms). The power of the solar flare is measured in Watts per square metre. They are then classified according to **Table 2**.

Within each of the letters is a numeric subdivision between 1 and 9 where 9 is the strongest within each category. So a reading of X3 is less than a reading of X7 for example, but a reading of B9 is much less.

Solar wind speeds and particle density are measured by the Advanced Composition Explorer (*ACE)* spacecraft, in real time, and gives a warning of about one-hour for pending geomagnetic activity. The solar winds are measured in km per second. The particle density itself, is measured in protons per cubic centimetre.

Coronal Mass Ejections

Coronal mass ejections (often abbreviated as CMEs) are another form of disturbance on the sun. Like solar flares, coronal mass ejections occur mainly at times of high numbers of sun spots. Coronal mass ejections (**Fig, 3**) produce a large increase in the flow of the 'solar wind' leaving the sun.

If this wind happens to hit the earth, then results, similar to solar flares can follow. In addition particles are drawn to the earth's North and South poles resulting in polar lights or auroras (Aurora Borealis in the northern hemisphere and Aurora Australis in the southern hemisphere) (**Fig. 4**).

Bad News & Good News!

Whilst auroras can be bad news for h.f. operators – v.h.f. operators welcome auroras as they can enable them to make contacts by bouncing v.h.f signals off the particles forming the aurora. When s.s.b. signals are affected by an aurora, they sound as if the other station is whispering loudly, whilst c.w. signals can sound as they're 'rasping'. Reports of such signals include an A to indicate the auroral effect (e.g. RS55A).

Fig. 4: A visible aurora borealis seen in the northern hemisphere.
Photo reproduced with the kind permission of Dirk Obudzinski. Copyright 2010 www.borealis2000.com.

HF Propagation
Jan 06 2105 UTC

Solar flux:	87 ↓
A Index:	5 ↑
K Index:	1 ↓
Sunspots:	50
Forecast:	Stable
Conditions	
< 10MHz:	Good
10-20MHz:	Good
20-30MHz:	Normal

Solar data from WWV.
WebProp © G4ILO's Shack.
Put this on *your* website.

Fig. 5: Trends can be shown with arrows and hyphens (see text).

Table 2: The main classification of X-rays in Watts per square metre (Wm^2). Within each classification there is a subdivision between 1 and 9.

Classification	Power Watts per square metre (W/m^2)
A	10^{-8} to 10^{-7}
B	10^{-7} to 10^{-6}
C	10^{-6} to 10^{-5}
M	10^{-5} to 10^{-4}
X	10^{-4} to 10^{-3}

Finding Information

Now we've come to the crux of the matter! It's all very well to know the principles, but **how do you** get up-to-date information on the solar flux, A, and K indices and the possibility of an ionospheric storm? Fortunately, the information is shown on numerous web sites, including many DX clusters such as **www.dxsummit.fi/**

Some sites also interpret the data to predict the likely propagation. However, when you're looking at the prediction, you'll need to take into account where the predictor is based. Don't forget – for someone on the other side of the earth, they might have summer when it is winter where you are! Likewise they may be closer to the North or South Pole than you are and it may be day time with them whilst it's dark with you. Some sites get round this by using the Ap and Kp indices – the respective A and K indices averaged for the planet.

My advice to Denny and readers generally is – treat any predictions with a degree of caution. At the end of the day they **are** just predictions, just like the weather forecast on earth!

Presentation Of Measurements

Sometimes you'll see the solar flux, A and K indices presented with an upward arrow, a downward arrow or a hyphen after them (**Fig 5**). This is used to show the trend. If the arrow is up, it indicates the value in question is increasing. If the arrow is down, then the solar flux is reducing. If there's a hyphen, the solar flux is stable.

Hopefully I've answered Denny's question in respect of many of the numbers used in propagation forecasts. I'll look at other propagation parameters such maximum useable frequency (MUF) on another occasion. Cheerio for now! **PW**

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!

RSGB

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.

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Summits on the Air for h.f. Activists!

Carl Mason GW0VSW presents his report of your activities on the h.f. bands and he's pleasantly surprised how active the SOTA members were during the last winter. Reports to Carl by the 15th of the month please.

It was interesting to see over the winter season the number of Summits on the Air (SOTA) stations active on the high frequency (h.f.) bands appearing on various 'clusters', see www.sota.org.uk/ Despite the cold, and in some cases extreme weather, there were operators prepared to brave the elements and operate from mountainous areas or even the summits of some mountains giving many of us the chance to work them.

Sometimes, there's often a long and difficult hike or climb to reach a particular summit or area so equipment tends to be lightweight and therefore – QRP is ideal using either commercial or home-brew equipment. One such operator is **Stefano Papini IK5XCT** (Cascine di Buti, Italy) who regularly activates areas of Italy using a Small Wonder Lab **www.smallwonderlabs.com/** DSW-II transceiver for 14MHz. It's powered by a 1.2Ah battery which enables about 4W output to a inverted 'V' dipole supported by a 5m fishing pole.

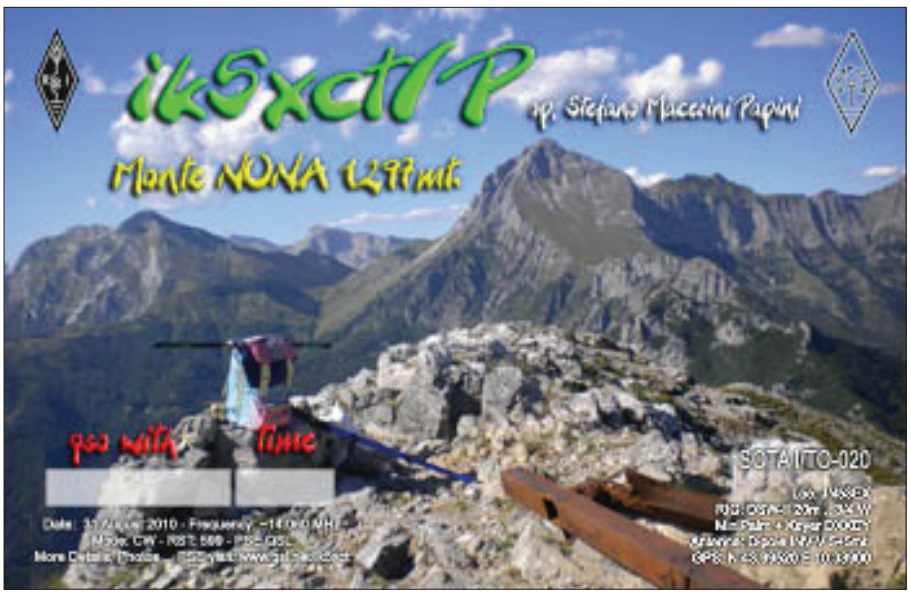
I was fortunate to work Stefano, who was on Monte Nona TO-020, a mountain peak at 1297m in Tuscany during a morning opening last year when I too was also running QRP. Take a look at **http://xoomer.virgilio.it/ik5xct/om.htm** which has information on this, his other activities and the equipment he uses.

Not long after this I worked **Kjell Eriksen LA1KHA/P** on 10MHz who it turned out was running **just 100mW** c.w. from a location called Holtankollen LA/TM049 at 253m in Telemark, a county located in southeastern Norway

The F5LKW/P QSL card.

and extending from Hardangervidda to the Skagerrak coast. I have yet to find out what antenna he was using from this location – but whatever it was his signal was very good with me using my dipole and for a short while he was being received at RST549.

Enjoying a small pile up at the time I listened to Kjell working several stations around Europe who commented on the 'strong' signal being copied by them. He uses several low power transceivers including the Elecraft KX-1, DSW II or Rockmite transceiver which is also available from Small Wonder Labs. You can see photographs of his station on Holtankollen at **www.flickr.com/photos/28342011@N06/5338640215/**



The QSL card from IK5XCT/P.

Roger Ducroux F5LKW/P (France) is also a keen hiker and SOTA operator and we enjoyed a short two-way QRP

QSO on 14MHz when he was working from Tete Du Douard F/CR-243 at 496m in the Côtes-du-Rhône. The interesting thing for me about the contact was an E-mail I received from Roger a few days later thanking me for the QSO and inviting me to listen to his operation for that day.

As well as operating, Roger records his activities and puts the result on the web for all to hear. It was unusual, not only to hear my own callsign as he had heard it, but also the callsigns of other stations worked that morning, many of which I was unable to copy myself. You can see the video* of that day's operation at **www.youtube.com/watch?v=KjxRJacJ0Ug**

For a time, Roger walked with a backpack which carried a Yaesu FT-897D with external batteries and an inverted 'V' antenna for his activations. However, this soon changed to a FT-817 with its internal batteries Chapstick MP1 vertical antenna which covers the 7 to 28MHz bands to save on weight – this set up is ideally suited to portable operating. He normally runs just 2.5W output when transmitting which helps to conserve battery life.

Height definitely does have an advantage for these SOTA activators and with simple equipment and very low powers are enjoying great results and having a lot of fun at the same time. I'm sure with a little thought and ingenuity many of you would be able to do the same.

Hopefully, the examples I've mentioned and the possibility of some more unusual locations has fired your imagination and we will be hearing more of you venturing out into the fresh air and operating 'portable' on the h.f. bands this year!

Both Tex G1TEX and I have watched this excellently produced video and we both recommend it to readers. **Editor.*

The DX News

On to some DX news now and we begin with **Bruno Lyautey DH1BL** who will be living on Mayotte AF-027, an archipelago located in the northern Mozambique Channel in the Indian Ocean for the next three years. He's currently active as **FH/DH1BL** but expects to get a full FH callsign in the near in the near future.

Bruno will be using a Yaesu FT-920 and running 100W to a heavy duty version of the 5-band 'Spiderbeam antenna for the 14,18, 21, 24 and 28MHz bands erected 9m above ground. His QSL cards will be printed once the FH callsign is issued and will be available via DL7BC direct or via the bureau.

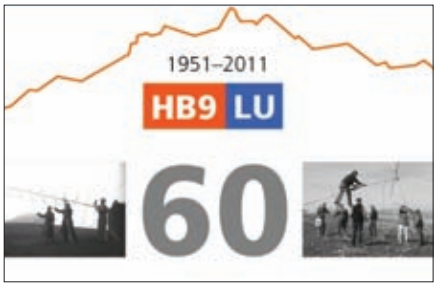
Aruba SA-036 is a 33 km long island of the Lesser Antilles in the southern Caribbean Sea and it is from here that Devere 'Dee' Logan W1HEO will be operating as **P4/W1HEO** from the P49V contest station on Aruba between April 3rd to 16th using both s.s.b. and c.w. focusing mainly on the 10-28MHz bands – QSL via Dee's homecall direct or through the bureau. Dee is a founder of the Fairfield (CT) Amateur Radio Association, the Northwest (Houston) Amateur Radio Society and the Ham Radio Promotion Project that provides publicity and recruitment help to radio clubs.

As a writer, Dee is a contributor to the *DX Magazine*, WorldRadio Online's promotion and recruitment column and author of the booklet *Tips and Tactics from DX Pros*. This 32-page booklet dealt with subjects such as the mark of a good DXer, station equipment, favourite DX antennas and working those pile ups!

Peter Bruker HA3AUI will be in South Africa and active in his spare time as either **6W2SC** from Cabrousse in Senegal or **J5UAP** from Varela in Guinea-Bissau until March 31st. Peter plans to operate mainly c.w. or RTTY on all bands from 1.8 to 28MHz. His website can be found at **www.cqafrica.net** QSL and the QSL is via HA3AUI direct only.

In Switzerland the special event callsign **HB60LU** will be used to celebrate the 60th anniversary of **Union Schweizerischer Kurzwellen-Amateure** (USKA) branch of Lucerne. The club usually operates with the call HB9LU but will be using the special call until the end of the year – operating on all h.f. bands. The QSL will be via Leo Marbach HB9DWL and more information can be found at **www.hb9lu.qrv.ch** though for the moment this is only available in German.

The QSL card issued by HB9LU.



The HB60LU QSL cards – as mentioned in DX News.

Your Reports

On to your reports now and **Eric Masters G0KRT** in Worcester Park, Surrey starts us off. Using his Yaesu FT-817 and a modified home-brew W3EDP antenna 25.6m (84ft) long with counterpoises tuned with an SGC-211 auto tuner Eric worked – using 5W c.w. – 5A60A (Libya) at 0156 who stated saying "I do not work DX often on this band" and with 1W DK1HWK (Germany) at 1630UTC.

Moving to 7MHz his QRPp c.w. Eric found ON6MG (Belgium) 1340, EI8FH (Ireland) EU-115 at 1348, DH3LK (Germany) 1445, F6FTX (France) and IW3ILM (Italy) at 2015UTC.

The QSL card from 9M2CNC.

Also on the band, **Bill Ward 2E0BWX** was in Edwinstowe, Nottinghamshire who used his Icom IC-7400 and SRC X65 wire antenna logging s.s.b. station OE7AJT (Austria) at 1030 with 50W and F5TJV (France) – using PSK31 – at 1307UTC running 25W.

On to 10MHz now and the log of **Jim Pedley GM7TUD** in Locharbriggs, Dumfries who tried RTTY for a change working VK9NN (Norfolk Island) OC-005 at 1014. Next came VK6IR (Australia)

The QSL card sent from T6AE.

The QSL card from FK8FE who runs 5W QRP from an FT-817 to a Vertical GP Marconi for 14MHz. He was worked by Peter ZL4TE on 14MHz c.w.

OC-001 at 1350 and a c.w. contact with MJ0ASP (Jersey) at 1640UTC. All were achieved using a Kenwood TS-590 with 100W and Cushcraft D3W rotatable dipole.

The 14MHz Band

Moving to the 14MHz band next, and to **Tom Hutton G0HUT** in Farnborough, Hampshire who tried PSK31, logging ES0IC (Estonia) on Kassarr Island EU-034 at 1205. Then came CS2EPC (Portugal) a special call for the European PSK Club **http://eu.srars.org/** (QSL via CT1BWU) at 1222. Then came YO7CKQ (Romania) at 1510 and a single s.s.b. contact with CO6LC (Cuba) NA-015 at 1213UTC (QSL direct only to PO Box 761, Santa Clara 50100, Cuba). The equipment used for his QSOs included a Kenwood TS-450AT running 30W PSK or 80W s.s.b. into a Cobra vertical antenna.

On to New Zealand now and to **Peter Leng ZL4TE** who used a Yaesu FT-1000MP MkV and 100W to a Cushcraft AV-3 vertical with various modes this month. His RTTY worked IZ2MGN (Italy) at 0921, VK2AD (Australia) in Sydney at 0923, UT5UDX (Ukraine) 1128 and F2FZ (France) at 1141.

Peter's s.s.b. found VK5HMS in South Australia at 0747, DL3NCR (Germany) at 0921, RO9A (Asiatic Russia) 0922, HL5NLQ (South Korea) 0932, UA1T (European Russia) at 0941. Next came F1PKH (France) at 0947, LA2IT (Norway) 0950, YB8EL (Indonesia) 0953, LY1TR (Lithuania)

The LU8XW QSL sent to Jim GM7TUD for QSOs on 21MHz c.w.

0956, 9M6TMT (East Malaysia) 1009 and HS0ZIN (Thailand) at 1020.
Peter also made several c.w. contacts including FK8FE (New Caledonia) OC-032 at 0858 and JA5CPJ (Japan) AS-117 at 0934UTC.

In Portadown, Northern Ireland is where we'll find **Tom Ruddell 2I0TJR** who worked several stations in the USA and Canada before hearing and working 9K2MU (Kuwait) at 1412. Tom said "my time for operating this month was limited and the number of stations I copied outside Europe were few and far between – so it was quite an achievement for me to work Murtarda as he's well known for only working stations in the United States."

Later, a trio of stations in Washington State, KW7Y 1658, W7VJ 1714 and AC7VA at 1737UTC followed each other into the log. Tom was using a Kenwood TS-570DG with 25W to a home-brew vertical antenna. Tom went on to say "Conditions have been very average this month so my log doesn't have many exotic entries but VU (India) and YB0 (Indonesia) have made welcome appearances on the band at workable signal strengths. However, they were only interested in contacting stations in North America. Several Australians were heard at reasonable signal strengths but I never did manage to get the openings I needed to work them."

Back to the digital modes and the 25W of PSK31 from Bill 2E0BWX found IN3GNV (Italy) at 1053, OE5WIN (Austria) at 1051, HA1ZW (Hungary) at 1210. Then came F4EZD (France) at 1218, OM7DD (Slovakia) at 1425, EA3ACD (Spain) at 1437 and OK2FB (Czech Republic) at 1448UTC.

The 18 & 21MHz Bands

The 18MHz band provided **George Davis G3ICO** in Yeovil, Somerset with a variety of c.w. contacts including A45XR (Oman) 1143, 4S7NE (Sri Lanka) AS-003 at 1155 (QSL direct to N.Ranasinghe, 140, Armitage Drive, Glendenning, NSW 2761, Australia). Next came OX3XR, (Greenland) NA-118 at 1440, VE9CQ (Canada) 1448, and V31BD (Belize) at 1453 (QSL via K5WW). Finally, George worked VQ9LA (Chagos Island) AF-006 at 1540UTC. All were achieved using a Elecraft K2 running at 10W to a 40m long doublet antenna.

Back in Dumfries, Jim GM7TUD used the D3W again, working YB0NFL (Indonesia) at 1211, W6UB/M (USA) on Key Largo NA-062 in Florida State at 1538. Then came CE9/VE3LYC (Chile) on Wollaston Islands SA-031 at 1651 and V31ME (Belize) on NA-073 at 1655UTC (QSL via DJ4EL).

Moving up to 21MHz and changing his antenna to a Cushcraft MA5B mini-beam, Jim added c.w. stations VQ9LA (Chagos Island) 1055 9M2CNC (West Malaysia) Richard Everitt G4ZFE in Kuala Lumpar at 1110. Then came LU8WX (Argentina) Radio Club Ushuaia on Tierra Del Fuego SA-008 at 1507 (QSL via WD9EWK). Jim reported, "I have been getting to grips with the new Kenwood TS-590 as its audio settings took some time to set up correctly. Band conditions have not been that great as both 24 and 28MHz have been completely flat throughout the day."

Jim did manage one s.s.b. QSO with Tullio Mott T6AE (Afganistan) at 1102UTC who is a Carabinieri Officer, now a branch of the Armed Forces, currently deployed to the city of Adraskan, Western Afghanistan. Tulliot operates with a Yaesu FT-897 with a tuner and 4-band dipole antenna, (QSL via IW2KKI).

Signing Off

Well that's it for this month! The bands have been rather mediocre again with short skip into Europe and high noise levels making any DX signal particularly hard to copy.

However, it's good to see our reporters with the lower power stations holding their own against those running higher and both categories have been able to work some interesting DX.
As usual my thanks go to **Maurio Pregliasco I1JQJ/KB2TJM** editor of the ***425 DX Newsletter*** for all the DX information and to all our reporters for their logs. Until next month I wish you all good DX. 73, Carl GW0VSW.

PW

Harry Leeming G3LLL's In the Shop
The Cedars, 3a Wilson Grove, Heysham, Morecambe LA3 2PQ
Tel: (07901) 932763 E-mail: G3LLL@talktalk.net

The Largest 'Wet storage battery' in the UK?

This month Harry Leeming G3LLL looks at the problems associated with excessive loads on the natonal electricity grid – and a remarkable mountain in Wales that acts as a type of storage 'battery'!

Welcome to *In The Shop* (*ITS*) where I'm starting by describing an entirely possible scenario. It begins thus: After an unexpected delay caused by penalty shoot outs, the final whistle blew at the end of the World Cup. A large percentage of those who were watching decided that it was time for a cup of tea or coffee, millions of electric kettles were switched on, and there was a terrific demand for extra electricity.

If no provision was made for these sudden increases of use, the voltage would fall, and frequency of the whole National Electricity Grid would drop way below 50Hz. Before long lights would start to go out, as towns would have to be disconnected from the grid to stop the entire system collapsing.

The Grid supply system is designed to operate at exactly 50Hz, and the mains frequency is monitored by the National Grid operators 24/7. Any increase or decrease of load causes the generators at power stations throughout the UK to either slow down or speed up, and so vary the frequency of the grid a fraction. The grid control centre does actually watch for popular programs (such as the soap operas) ending and they have a whole range of measures – including power stations on 'standby' – that can be switched in to stabilise matters during sudden demands. But these measures have their limits.

Large coal fired power stations, and nuclear power station such as the two at Heysham, a few miles south of my home on the Lancashire coast, are at their most efficient when run continuously at full power. These are used to provide 'base line' power day and night.

Other power stations top-up the supply as demand increases, but at times supply can even start to **exceed demand**. If this were allowed to happen the voltage and frequency would both start to drop. So, to prevent this happening power stations would have to be taken off-line and the heat that had been built up in them would be just wasted. Would it not be better to store power?

There are ways of storing large amounts of electricity, and in the autumn Brenda and I visited the UK's largest pump storage power station* at Mount Elidir Fawr. This is now known as 'The Electric Mountain', and its exhibition centre is located near to the start of the Snowdon railway in North Wales. The mountain is few hundred feet lower than Snowdon, is made of almost solid slate – and more importantly – has two lakes, one at 600 metres above sea level (a.s.l.) holding close on 2000 million gallons of water, and the other at the bottom of the mountain.

Inside the mountain an enormous cavern has been excavated, large enough we were told to take St. Paul's Cathedral, and this is the heart of the 'pumped storage' power station. There are several miles of tunnels, and on our visit we were handed hard hats, and driven **into the mountain** on a 36 seat coach – it really is engineering on a gigantic scale! Building started in 1974, took ten years and at that time it was claimed to be 'the largest engineering project in Europe'.

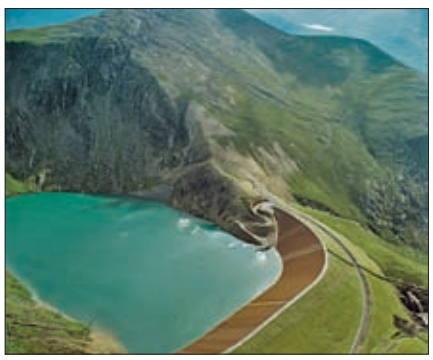


Fig. 1: Harry describes how a pumped storage hydroelectric power station works. They're ideal for powering millions of power amplifiers at the 'drop of a hat'.

Scotland has two pumped storage hydroelectric stations, Sloy (on Loch Lomond) and Cruachan. The Cruachan Power Station was the first pumped storage station in the world when it opened in 1965.* ***Editor**.*

How It Works

When required water from the top lake, **Fig. 1**, flows down a tunnel and then into a vertical shaft, resulting in a solid column of water more than three times the height of Blackpool Tower. Goodness knows what this weighs, think of the weight of just one bucket of water; I was told that this creates a water pressure of around 1000 pounds (half a ton) per square inch!

The water is applied to six inlet valves which can be opened hydraulically, and which are each closed by two yellow 15 ton weights operating against the water pressure via levers, see **Fig. 2**. In the event of system problems, they 'fail safe', and the water supply is cut off.

The water is used to drive up to six turbines; these are coupled by enormous steel drive shafts to six generators. The station at maximum power uses around 80,000 gallons of water a second and produces electrical power equivalent to the needs of the whole of Wales for up to five hours. More importantly it can do this 'at the drop of a hat', maximum power is 1800MW, from standby to 1320MW takes around 12 seconds. When completely stood down, it can still be up and running in an emergency in not much over a minute!

The clever bit starts late at night, when there would otherwise be a

surplus of generated electricity. The whole system is thrown into reverse, the generators become electric motors, and the turbines start to act as pumps. By morning the water has been pumped back up the mountain and they're ready for the next day's demands.

I am one of those people who always have a question to ask and what I wanted to know was what the system efficiency was. Frankly I was expecting it to be something well below 50%. and I was amazed to be informed by the extremely knowledgeable lady tour guide, that it was around 75%. For every four units of 'cheaper' off peak electricity they purchase from the generating board for pumping during the night, they sell back three units of peak priced electricity during the day and so make a profit.

So, If you are thinking of working a little DX from the top of Snowdon, do drop in at 'The Electric Mountain' first, it really is worth the trip to see engineering on such a large scale, all hidden in a mountain so as not to spoil the beautiful countryside. See **www.electricmountain.co.uk** for more details.

Fig. 2: The 15 ton balance weights on the valves that control the entry of water into the turbines deep inside 'Electric Mountain'.

It's Been Modified!

I'm very wary of the phrase "It's been modified!" I'll now tell you why. '**Peter**' brought a rig to me that he had just purchased second hand and asked if I could give it the once over,and touch up the alignment. On the outside the rig looked 'mint', and when I tried it out it seemed to function okay. But then I removed the lid, I said "Oh dear!". Inside were a couple of home-made circuit boards, loads of extra wiring, and a few odd parts hanging from the circuit boards.

I certainly didn't want to go any further, because if one of the 'rat's nest' of leads dropped off, I wouldn't have had a clue as to where it came from. Regretfully, I replaced the lid, 'phoned Peter and told him that unless he could come up with full details of the modifications there was nothing I could do. Unfortunately, it transpired that the person who had done the work was a Silent Key – so that was the end of the matter.

Modifying rigs, to try and improve their performance, is part of Amateur Radio, and over the years I have produced quite a few add on kits myself. As to modifications however – there are two golden rules adopted here at G3LLL.

Golden Rule 1: Make sure that all modifications are documented and that copies of any relevant instructions or magazine articles are firmly stapled in the instruction book.

Golden Rule 2: If you are thinking of purchasing a piece of second hand equipment, have a look inside. If it shows signs of having been modified, make sure that you're given full written details and a circuit before parting with your money.

Crystal Oscillators

"My FT-101E has just stopped functioning on 21MHz (15m), have you any ideas" was the plaintive request I'd often hear in the shop. In fact, it was quite a common fault on FT-101s from the Mk1, right through to the 'E', and is caused by the failure of the 21MHz local oscillator. Fortunately, in most cases it only needs a slight tweak at the relevant trimmer and all will be well.

Most pre-1980 rigs switch a different crystal into circuit when changing bands, and a typical circuit of band-change crystal oscillators, taken from the FT-902, is shown in **Fig. 3**. Here a separate crystal and transistor oscillator stage are switched in on each band. However, it's worth having a look how these crystal oscillators function, because – at first glance – it looks as they shouldn't work.

For a stage to oscillate there needs some kind of positive feedback from the output to the input. but, in Fig. 3, the only connection between the base and the collector of Q1, is via its internal capacity. With a resistive load, such as that presented by a tuned circuit at resonance, the feedback would be negative and hence oscillation would seem impossible.

This kind of circuit was common in valved equipment and was known as a 'tuned anode tuned grid' (t.a.t.g.) oscillator. It works because the output circuit is tuned slightly higher in frequency than the crystal. The difference in resonant frequency causes a phase shift, which results in the feedback becoming positive – but aligning this type of crystal oscillator requires a special approach.

The 'standard way' to align a t.a.t.g. – or its modern relative a tuned collector tuned base (t.c.t.b.) oscillator, is to tune the output circuit higher in frequency than the crystal, by either, first setting the slug partly out of the coil, or setting any trimmer towards minimum capacity. Then you should connect a diode probe to the output of the crystal oscillator (D01 in the case of the FT-902), or tune a receiver to the crystal's frequency.

Next, you should increase the inductance of the coil by screwing the core in, or increase the capacity of the trimmer. The crystal should start oscillating and you'll be able to trim the circuit for increased output. However, just as the circuit seems to be getting near to peak, oscillation will suddenly cease.

Note the maximum reading that was obtained on the meter connected to your diode probe, or on the receiver's S-meter, just before oscillation ceased and then repeat the operation. This time (Except on the FT-901 or FT-902!) you should leave the coil or trimmer at a setting that gives about 80% of peak output on the diode probe reading, or a fraction of an S-point less than maximum on the receiver. This setting should ensure that the crystal oscillator gives good output and that it starts reliably when the rig is switched on from cold.

The Exception Makes The Rule!

We're often told that it is the exception that makes the rule and with the FT-902 it certainly does! Most rigs of the FT-902's vintage mix the output of the band-change crystals with the v.f.o. to produce the receiver and transmitter's final injection frequency for the mixer.

Here's the exceptions! The FT-902,

and the earlier 6-band version the FT-901, use a phase-lock loop (p.l.l.) instead to produce the required signals. Unfortunately, whoever wrote the service manual seems to have forgotten this point, as there is absolutely no mention of the p.l.l. in the alignment instructions! So, when an FT902 turned up with the top half of the 3.5MHz (80m) band missing, I was on my own.

Usually, aligning a p.l.l. stage isn't that difficult – even without full alignment instructions. To start, you should first set the rig's tuning so it's just beyond the point where the indicated frequency on the display comes to a stop. Then poke a metal screwdriver (carefully and gently, avoiding the windings) into the coil on the PLL board, that you think may possibly be the one you need to adjust. Once you've hit the right hole the presence of the metal screwdriver will alter the inductance of the coil and the frequency on the display will alter.

Having found the correct core, use a proper trimming tool and give the core a half a turn one way or the other until the circuit comes into lock, with the digital display then indicating the correct frequency. Next, find a setting on the coil that enables the p.l.l., (and hence the rig) to correctly track across the entire band.

Double check that the rig will still tune at the high frequency (h.f.) and low frequency (l.f.) extremes of the band when it is first switched on. Then, after it has been given time to warm up for an hour or so, you should be home and dry. Unfortunately, this wasn't the case with my errant FT-902!

The FT-902 should tune from just below 3.5 to slightly over 4MHz when it's switched to 80m. Unfortunately, wherever I set the p.l.l. core, the rig would only tune over a 250kHz section of the band either at the h.f. or the l.f. end of the 80m band.

Having fiddled for some considerable time I noted that the service manual reproduced typical r.f. voltages that should be present at certain points. The output of the crystal oscillator board was quoted as being '80-150mV'. Normally I take such readings with a rather a large piece of salt, but I checked it, and found it was double the quoted figure. By now I was at the 'try anything' stage' and so

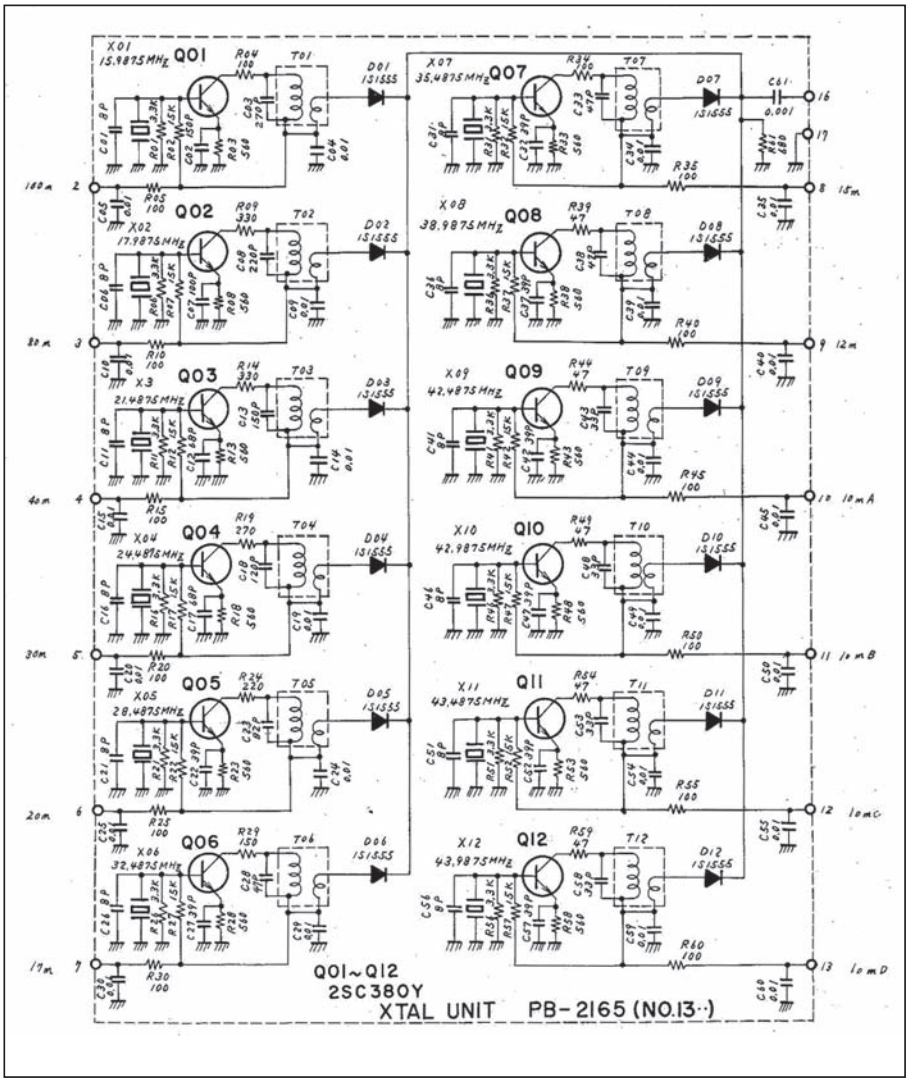


Fig. 3: Most pre-1980 rigs switch different crystals into circuit when changing bands, and a typical circuit of band-change crystal oscillators (from the FT-902), is illustrated here. A separate crystal and transistor oscillator stage are switched in on each band.

I de-tuned the 3.5MHz crystal oscillator coil until the reading fell to 100mV. The rig then worked perfectly over the whole band.

Since having discovered the problem, I've had a few FT-901 and FT-902 rigs with the same 3.5MHz problem. I can only conclude that in these cases someone has tried to align the crystal oscillator 'The standard way'.

What Valve Is This?

If you have a large collection of old valves, you're almost bound to have some where the type number is either difficult, or impossible to decipher. However, if you can see where the number has been stamped, but you just can't be sure as to what it is, then try the following. Put the valve in the fridge for a few minutes and then, when it's really cold, breath gently on it. With a bit of luck the condensation from your breath will enable you to read the number.

A Safety Plug?

As all 13A sockets incorporate safety shutters to prevent children inserting their fingers, you may have wondered as to why people still insert small plastic dummy plugs in unused sockets. A customer then put me straight on this matter after I had forgotten to replace one advising me that, "It prevents power leaking into the room, and so reduces my electricity bill!"

So now you know, but please don't say you read it first in *PW*! Cheerio for now. **PW**

Problems

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

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FOR SALE

ARMSTRONG 626 AM/FM tuner amplifier. Classic British HiFi. Tel: Arthur GM4LBE QTHR 01595 694270 (Shetland). E-mail: arthurtait@tiscali.co.uk

C.B. RADIOS and equipment for sale due to bereavement. Tel: Rosie 01842 879054.

EX MILITARY R-107 radio receiver in very good condition. Fully operational handbook and circuit diagrams, £125 o.n.o. Buyer collects. Tel: David Holm 01509 856825 (Loughbourgh, Leices).

ICOM IC-735 boxed, £250. IC-3220H dual band mobile. Boxed, £90. IC-R7000, £380. IC-R9000 with accessory pack, £1100. IC-SP20 LS filter, £75. SM-8 desk microphone, £75. Yupiteru MVT-7100 scanner, £60. Yaesu MH-31B8, new, £30. Tel: Tony G3KAG 01335 324393 (Derbyshire).

ICOM IC-7000 12 month Icom warranty. Boxed as new, £800. MFJ-949E ATU, £80. Icom IC-R100 receiver, £100. Tel: John G4XYY 01937 844197 (Bramham).

ICOM IC-746 internal auto ATU, speech readout. Boxed with manual, little used in good working order, £700. Including P&P in UK. Tel: GW0PQI 01492 623672 (Penmaenmawr).

KENWOOD TS-480 SAT in good condition and in original box. Plus SPA-30 extension speaker, £475. Kenwood TS-870 complete with desk mic in original boxes, £425. Buyer collects. Can deliver 50 miles radius. Tel: Dave 01443 683912 (Mid-Glamorgan).

REALISTIC 2006 £45. Realistic PRO-39, £20. Prefer buyer collects but will post. Tel: 01606 597342 (Cheshire).

SONY ICF PRO-80 needs attention hence, £15. Lowe HF-150 shortwave receivere plus discone antenna in good condition, £50. Tel: 01425 470767 (Hampshire).

THREE SECTION SLEEVED lattice mast, 60 foot, CW rotator, £650 o.n.o. Buyer to dismantle and remove. Tel: Frank 01295 263652 (Banbury).

YAESU FT-840 HF, boxed with manual. In excellent condition, £295. MFJ-948 manual, ATU, boxed as new, £75. Suit above. Tel: Frank 01691 623467 (Shropshire).

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CIVIC TAPE RECORDER circuit diagram. Reel-to-reel, two-track, three-speed, three valves. I already have the service sheet for the Collaro Studio deck incorporated into it. Tel: Godfrey Manning G4GLM 020 8958 5113. E-mail: cgmm2@btinternet.com

DIGITAL FREQUENCY METER covering at least 0-30MHz. Tel: 01591 620747 (Powys).

MARCONIPHONE 287 RADIOGRAM external picture/photo. Five valves, early 1940s. Also Trader Service Sheet 39 that refers to this set. Tel: Godfrey Manning G4GLM 020 8958 5113. E-mail: cgmm2@btinternet.com

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B.B. Apr '11

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ALINCO DJV17 VHF/FM H/HELD £99
ICOM E91 DUALBAND HANDHELD £169
KENWOOD TS570DG HF TRANSCEIVER £699
YAESU FT2000 HF BASE TRANSCEIVER £1699
YAESU VX3E DUALBAND HANDHELD £110

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ALINCO DJX2 AM/FM/WFM RADIO £79
BEARCAT 72XLT H/HELD £80
ICOM R5 HANDHELD SCANNER £145

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JRC NRD545 COMMS RX WITH DSP £799
LOWE HF 150 RECEIVER £189
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KINETIC SBS1E RADAR RECEIVER £319
YAESU VR5000 WITH DSP £435

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JIM M75 SCANNER PREAMPLIFIER £54
KENWOOD MC85 MICROPHONE £79
PALSTAR AA30 ..... £69
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YAESU FC30 ATU £165
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YAESU FT-60 ..... £120
ICOM IC-703 ..... £350
ALINCO DJ-V5 ..... £200
ALINCO DJ-195 ..... £100
ALINCO DJ-S11 ..... £75
ALINCO DR-430 70cms £85
ICOM PMR 446x2Water Resist/w.charg £200
MIDLAND CB 77-250K £50
MIDLAND CB 77-805UK £55
MAXON ALERT 7E CB £65
STANDARD HX260E Marine H/H New £99

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LOWE HF-225 with Keypad £325
YAESU FRG-9600 ..... £225
YUPITERY MVT-7100 ..... £110
YUPITERU MVT 7300 ..... £99
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UNIDEN UBC-860XLT Desktop £65
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Military Straight Key Circa 1940 ..... £35
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Microset	RU-45	70cm 3-15W in,45W out Linear + GaAsFET Preamp 12V	£149
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Timewave	DSP-59	Multi-mode Audio Noise Filter with Gain Control 12V DC	£89
MFJ	MFJ-940A	28-30MHz 10m Mobile ATU + meter 150W	£39
Yaesu	CD-24	12V DC Charge Adapter for FT-897D Ni-MH	£69
Garmin	eTrex H	Hand held 12Ch.High-sensitivity GPS + 500 Waypoints 2 x AA cell (not supplied)	£59
Uniden	UBC-60XLT	66-512MHz (with gaps) FM Hand Held Receiver 80Ch. 4 x AA cells	£59
MFJ	MFJ-784B	Tunable DSP Audio Filter with Noise Reduction 12V	£189
Shure	526T	Dynamic Desk Microphone + Mic-lock VOX & Amplifier 1x PP3	£59
Alinco	DJ-V17E	2m FM Palm Transceiver 5W, DTMF keypad & CTCSS	£99
Watson	WM-2000	Desk mic + Amp, Compressor & Graphic Equalizer	£79
Alinco	DJ-V17E	2m FM Palm Transceiver 5W, DTMF keypad & CTCSS	£99
Icom	IC-E90	6m,2m,70cm FM Hand Held Transceiver + DTMF keypad CTCSS & wide RX	£159
SW	7-11	10W Mobile Speaker 8ohm	£19
Palastar	R-30CC	1KHz-30MHz AM/SSB Communications Receiver & Collins Filters 12V + psu	£399
AirNav Systems	Radarbox-3D	3D Real-time Aircraft Virtual Radar using ADS-B + Internet Networking & Google Map	£339
Icom	IC-PCR1500	10kHz-3300MHz All Mode PC Controlled Receiver with USB, CDROM 12V + psu	£259
MFJ	MFJ-986	1.8-30MHz 3kW Differential ATU	£239
SGC	MAC-200	1.8-60MHz Microprocessor controled ATU with 5 Inputs, 200W	£199
Microset	RU-432-95	70cm 3-25W in,95W out Linear + GaAsFET Preamp	£399
Hi Mound	HK-705	Budget Straight Morse Key	£29
Star	M-298	Marine 4W Hand Held Transceiver + Ni-Cad & Charger	£49
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Yaesu	VR-500	100kHz-1300MHz All Mode Hand Held Receiver 1000Ch.Alpha	£129
RT Systems	ADMS-3	Programming Software and Serial Cable for VR-500	£25
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Kenwood	TM-271E	2m FM Mobile Transceiver 50W + CTCSS	£109
Kenwood	TS-480S AT	HF + 6m All Mode Base/Mobile Transceiver with Gen.Cov. RX, DSP Filter & Auto ATU 100W 12V	£539
Alinco	DJ-X30	100kHz-1300MHz AM, FM, WFM Hand Held Receiver 1000Ch.	£129
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RADIOWORLD

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MF J-969 ATU	£159
Icom PS-85 Icom 20A 13.8V Switch Mode	£159
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Yaesu FC-30 Antenna Tuner Unit	£169
Bearcat UBC-9000 Scanner	£179
Icom IC-R10 Hand held Scanner	£179
Bearcat UBC-780XLT	£179
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Yaesu FTV-901R 2m / 70cm Transverter	£275
Yaesu FT-8900 Quad Band Mobile Transceiver	£279
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Trio R2000 HF Receiver	£299
Lowe HF-225 HF receiver	£299
Kenwood TM-D700E Dual Band Mobile	£299
AirNav Radarbox 2009 version	£299
AOR AR-8200Mk3 Scanner	£349
ICOM IC-E2820 dual-band mobile transceiver	£369
Icom IC-707 Amateur HF transceiver	£399
Alinco DX-70TH HF & 6m transceiver	£399
Icom IC-R72 Receiver	£399
FR-101 Receiver HF+2m+6m	£399
Yaesu FT-817ND HF 6m VHF UHF 5W Transceiver	£419
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AOR AR-3000A Wideband Receiver	£450
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Yaesu FT-857D Multi-band Mobile	£539
Kenwood TS-570DG/E HF transceiver	£599
Icom IC-821H	£599
Icom IC-706 MkIIG with DSP	£629
IC-7200 HF Transceiver	£649
Yaesu FT-897D Multiband Portable Transceiver	£649
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Icom IC-R8500 Receiver	£1,099.00
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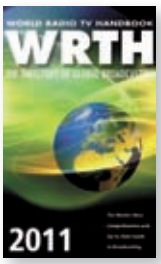

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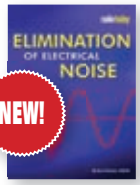

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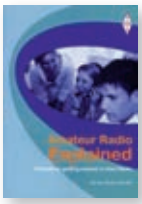

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A fascinating fully illustrated and documented description of the bridging of the Atlantic by wireless in 1901 by Marconi, who was only 27 at the time. 96 pages.

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

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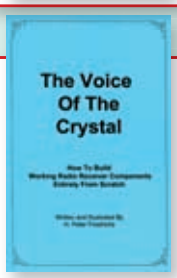

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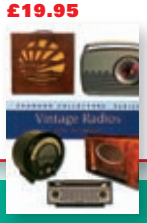

This book tells the collector and the armchair wireless enthusiast everything there is to know about classic radios from the 1920s to the end of the 1960s. All the important makes and models are discussed and the author also covers buying and selling, care and restoration and many other topics, including foreign radios and radio-related ephemera. Illustrated with many colour photographs, this is the perfect collector's companion to the fascinating hobby. 208 pages.

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Topical Talk

The Editor comments on an interesting letter concerning reviews in *PW* and discusses the broadcast radio in his new car.

The letter (*Letters* this month, page 7) from Gordon Hunter G8WWD carrying suggestions regarding Amateur Radio equipment reviews in *PW* raises some interesting points. Indeed, Gordon and I swapped a number of E-mails after his original note, discussing the various points. I agreed with Gordon that our efforts to provide the best reviews possible should be discussed via the pages of the magazine once again.

In an ideal world, all our Amateur Radio transceiver reviews would – after a full evaluation by an author chosen for their ability to fully convey their technical likes and dislikes of a particular item via their review – backed up by a check list (checked against the published specifications) of results, measured by our own test equipment.

Unfortunately, along with many companies involved in testing and evaluating equipment – we can no longer afford the extremely expensive equipment. The same applies to the calibration/certification to undertake and present such tests.

Even the largest Amateur Radio equipment manufacturers must wince at the expense involved with the official testing of equipment – indeed, the 'Type Approval Tests' are a major cost for them. So, there's no chance for a magazine such as *PW* to publish reviews with – what would be meaningless test results without the necessary certification. Any results we published, produced from 'unofficial' tests would have to be accompanied by notification that the equipment was uncertificated and that our check figures were our own and not from a registered test facility.

Bearing in mind the constraints I've mentioned – our team of review authors do their very best to provide meaningful, understandable equipment valuations. Indeed, I don't think any reader can be possibly left in any doubt as to what our authors think of any item they've reviewed. Even if they have doubts and criticisms – these doubts will appear in the review and the manufacturer/supplier can reply to any criticism via a 'Reply Panel'.

However, Gordon G8WWD has brought up some valid points, particularly on equipment comparison. Recently, **Roger Cooke G3LDI** who reviewed the Kenwood TS-590S compared the new rig with his own Yaesu rig. However, comparison such as Roger was able to do is only possible when comparable equipment is to hand. Manufacturers are unlikely to provide equipment for comparison purposes. Or will they? (We'll see!).

Although the Amateur Radio equipment market is markedly different from the photography and computer markets mentioned by Gordon (far fewer manufacturers for a start) I think some of his ideas are relevant. So, to ensure that the Editorial team and authors continue to produce reviews that can be fully understood by our readers and leave them in no doubt of the reviewer's opinion – I'm inviting you to send in your suggestions. Please write!

No Long Wave!

With the kind and expert help of **Alan Burgess** (our Accounts Manager) a motor trade expert and enthusiast, I've recently purchased a diesel automatic estate car. However, although it's ideal in all other respects, I discovered that the built-in radio doesn't cover long waves! I was genuinely disappointed to find that the German made (Blaupunkt) receiver in my (Turkish built) Peugeot Bipper Tepee (what a mouthful!) estate car doesn't cover long waves. I think long waves are essential on car radios for BBC R4 reception because totally reliable Band II coverage is not a reality in the UK.

The Droitwich (Wychbold Farm) 198kHz transmitter and its two associated transmitters, Westerglen and Burghead in Scotland, provide an excellent alternative service for BBC Radio 4 listeners. If you require the Daily Service at 0945 on Monday to Friday or the Cricket commentary – a long wave equipped car radio is a necessity.

Now that I've had the required hand controls fitted to my car (quite an investment!) the next two jobs are to fit my 70 and 144MHz equipment. This will be followed by a long wave receiver using a wire antenna hidden along the plastic roof bars. The home-brewed receiver will provide audio to one of the (legal) cigar lighter Band II transmitters (designed for MP3 players, etc.) feeding R4 via Band II to my car radio. Has anyone else tried this idea? I'd be interested to know!

Rob Mannion G3XFD/EI5IW

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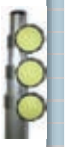

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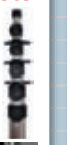

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