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Reviewed

Yaesu FT-7800E mobile transceiver

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NEW Marine Web Site

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HUSTLER ZERO SPACE DX ANTENNAS

The answer to your HF Antenna Problem

Run full legal power - 80m to 10m - with no masts or guys. Low VSWR 50 Ohm feed.

Small garden, planning problems or similar restrictions? Then the Hustler range is the answer. These HF verticals will take 1kW of power, work at ground level, and are self-supporting. A single earth rod will get you going. Add buried radials for even better results. Many hams have got on the HF bands with just this simple system. So why not join in the fun. These are rugged, well-built antennas that American hams have been using for years. Now they are available in the UK from our three stores.

4BTV
40-20-15-10m. 6.52m high. Full band coverage. **£159.95 C**

5BTV
80-40-20-15-10m. 7.64m high. Full coverage* **£199.95 C**

6BTV
80-40-30-20-15-10m. 7.3m. Full band coverage* **£219.95 C**

NOTE: 80m covererage limited to 100kHz on 5BTV & 6BTV

ICOM IC-756 PRO II SPECIAL OFFER £1699 C

NEW LOWER PRICE!

Flagship of the Icom range of HF transceivers. HF & 50MHz, features large colour LCD with spectrum scope, auto ATU and 32-bit floating point DSP unit. **With *FREE* Watson HP-100 or HP-200 Headphones, state preference when ordering.**

ICOM IC-7400 SPECIAL OFFER £1299 C

HF/VHF 100W transceiver. Features large LCD with spectrum scope, auto ATU and same DSP system as IC-756PRO II. **Comes with *FREE* SP-21 Speaker & SM-20 Desk mic.**

ICOM IC-706 IIG DSP £769 C

NEW LOWER PRICE!

HF/VHF/UHF mobile DSP transceiver. Its relative small size not only makes it a great mobile rig but also for fixed station use as well. HF general coverage Rx and VHF & UHF.

ICOM IC-703 NEW £589 C

NEW LOWER PRICE!

HF/50MHz Transceiver 0.1-10W Portable, Mobile, Base Station. (9-15.87V DC) Designed especially for the Foundation Licence/QRP. Built-in features auto ATU, DSP memory keyer. (5W when using 9.6V batts)

ICOM IC-718 £449 C

NEW LOWER PRICE!

HF 100W transceiver. Covers all HF bands plus wideband receive. C/w auto notch, dual VFO, SWR meter etc. Options include extnl ATU DSP & filters.

ICOM IC-910X with 23cm £1249 C

Icom's all mode VHF/UHF transceiver with 23cm. Large clear LCD with lots of facilities. 100W on VHF and 75W on UHF, 10W on 23cm. IC-910H version £1149

KENWOOD TS-2000 £1599 C

Top-of-the-range 100W Kenwood transceiver. HF/VHF/UHF or up to 23cm with the optional module. Built-in auto ATU, DSP and its unique TNC.

KENWOOD TS-870S DSP £1399 C

HF DSP 100W base station. Excellent all round rig great for DX working with its ability to winkle out weak stations using its true IF DSP. No filters to buy.

KENWOOD TS-570DGE £849 C

HF100W base station with built-in auto ATU. Very popular rig, excellent performance on SSB and CW. Two fitted antenna sockets - very handy.

YAESU FT-1000 MKV £2349 C

200W HF transceiver, EDSP, Collins filter, auto ATU, 220V AC PSU - Acknowledged as one of the finest DX rigs on the market. Superb tailored audio and the ability to select Class A bias for dramatic signal purity.

YAESU FT-1000 FIELD £1749 C

100W HF transceiver, EDSP, Collins filter, auto ATU, 220V AC / 13.8V DC - Building on the success of the FT-1000MkV, the Field has become a respected leader in its class.

YAESU FT-897 NEW £849 C

NEW LOWER PRICE!

100W HF rig plus 2m and 70cms (50W/20W) 13.8V external supply / internal optional FP-30V AC power supply / self powered portable using optional Ni-MH pack at 20W output. Compatible with FC-30 auto ATU and ATAS 120/100 antennas. The "must have" radio for 2003.

YAESU FT-857 NEW £699 C

NEW LOWER PRICE!

HF/50/144/430MHz Mobile Transceiver HF/6m 100W, 2m 50W, 70cm 20W. (13.8V DC) Developed on the FT-897 and FT-817 transceivers. Built-in features 32 colour display, spectrum scope, AM airband receive, built-in memory keyer, detachable front panel, DSP unit supplied.

YAESU FT-847 £1199 C

1.8 to 440MHz, this all-in-one transceiver offers unbeatable value. 100W on HF plus 6m, and 50W on 2m and 70cm. You get genuine RF clipping on SSB for up to 6dB gain and there are 4 seperate antenna sockets.

YAESU FT-817 LOWER PRICE £479 C

bhi DSP Module now available!

160m - 70cms. Up to 5W output all modes. ***Ours includes*** **battery and charger.** **£589 with DSP ready fitted.**

NEW DSP Module

There is NO new FT-817 DSP! The fact is that the UK manufacturers. **bhi**, (of whom we are their largest distributor), have produced a lovely 4-stage DSP module that can be fitted inside the FT-817. The module costs £89 plus a fitting charge of £25 for retro-fitting to existing models. This includes installing a mini switch and LED on top cover.

NEW FT-817 Clip on metal front support stand. In stock now £19.95 +£1 P&P

YAESU FT-7800 BRAND NEW £239 C

Yaesu's Powerful low cost answer!

* 2m/70cms Dual Band Mobile
* High power 50W 2m /40W 70cms
* Wide receive inc. civil & military airband
* CTCSS & DCS with direct keypad mic.
* Detachable front panel
* 1000 memories plus five one-touch

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ICOM IC-2725E £269 C

The Icom IC-2725E dual band FM transceiver is proving very popular. Easy to install, the controller is separated from the main unit - great where space is limited.

ICOM IC-2100H £229 C

2m 55W FM mobile. Commercial grade, rugged construction. One piece die-cast aluminium chassis. Selectable green or amber display.

YAESU FT-8800E NEW £289 C

2m/70cm Mobile *144-146MHz,430-440MHz Tx *108-520MHz, 700-999MHz Rx * 512 memories per band * 6 Hyper memories* tuning steps: 5/10/12.5/15/20/25/50kHz * Audio: 2W output * Supply: 13.8V DC *Size: 140x41.5x168mm Weight:1kg

YAESU FT-8900R NEW £339 C

Want the best of all worlds then the FT-8900R is just the ticket! A rig with four of the most popular mobile bands - 10m/6m/2m & 70cm. Detachable head. Airband Receive.

NEW LOWER PRICE!

YAESU FT-2800M £159 C

The FT-2800M 2m FM 65W High Power mobile transceiver. Rugged construction, excellent receiver performance and direct keypad entry.

YAESU FT-1500M £139 B

Remarkably small and compact, yet built like a Battleship!
Should last for years.

KENWOOD TMD-700E £449 C

Certainly the best dual band mobile transceiver with APRS. Does not need extra high cost boards to function. The only extra if required is a compatible GPS receiver.

KENWOOD TM-V7E £359 C

A lovely cool blue display, easy with 50/35W output. 50W/35W plus 280 memos and five storable operating profiles.

KENWOOD TM-G707E £289 C

If you are looking for simplicity and low cost, here's the answer. 2m & 70cms with detachable front panel and "Easy operation mode" GREAT!

IC-E208 NEW £279 B

VHF/UHF FM Dual Band Mobile Transceiver *Freq range 144-146MHz, 430-440MHz Tx *55/50W (3 pwr steps each band) *Wideband Rx 118-173, 230-549 & 810-999MHz *512 memories *FM narrow capability *104x2 DTCS, 50 CTCSS tone squelch *16 DTMF channels *HM-133 remote control mic *Packet ready for 9600/1200bps-mini DIN or 1200bps-mic socket *Supply 13.8V

YAESU VX-7R £299 B

6m/2m/70cm handie. The case, keypad, speaker and connectors are all sealed against water damage. Wide Frequency coverage from 500kHz to 900MHz. Easy-to-read 132x64 dot matrix display + plus pictorial graphics.

Available in Silver or Black

YAESU VX-2E NEW £169 B

Dual Band Ultra Compact FM Handie. The VX-2E is unbelievably small yet provides 1.5W on 144MHz and 1W on 430MHz (3/2W with external supply). General coverage receiver 0.5-999MHz, which includes AM mediumwave & FM broadcast bands plus AM aircraft & UHF TV bands.

YAESU VX-110 £119 B

Combining the ruggedness of the VX-150 with the simplicity of 8-Key operation, the VX-110 is a fully featured 2m handheld ideal for the most demanding of applications. It has a die-cast case, large speaker and illuminated keypad.

ICOM IC-E90 £269 B

The new E-90 offers triple band coverage of 6m, 2m and 70cms. Up to 5W output and rx coverage from 495kHz - 999MHz makes this a very attractive rig.

ICOM IC-T3H £129 B

The IC-T3H 2m handheld features tough quality but with slim looks. Its striking green polycarbonate case has been ergonomically designed. The rig is capable of providing a powerful 5.5W output with either Ni-Cad or Ni-MH battery packs. Supplied with charger and rechargeable battery.

KENWOOD TH-D7E £319 B

DATA COMMUNICATOR

One of the most successful handhelds over the past few years. It has a built-in TNC for Packet use. You can also use it for APRS operation in conjunction with an external GPS unit. Plus NMEA, 200 memos, and up to 5W output.

KENWOOD TH-F7E £249 B

WITH EXTRA WIDE RX COVERAGE

- 144-146MHz Tx/Rx: FM
- 430-440MHz Tx/Rx: FM

Up to 6W out with Li-ion battery and "scanner" style coverage from 100kHz to 1300MHz including SSB on receive! This is a great radio to have at all times when you are on your travels.

NEW LOWER PRICE!

KENWOOD TH-G71E £199 B

If you want an excellent 2m/70cm dual-bander then you can't go wrong with the TH-G71. Fully functional with three power levels, 200 memories, CTCSS tone encoder/decoder, illuminated keypad and backlit LED.

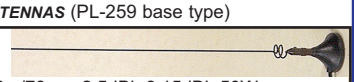
MOTOROLA T-5512 £69.99 B

Motorola Dual Pack PMR-446 Recreational 2-Way radio
·No Licence Fee or Airtime Charges
·8 Channels and 38 Codes
·3km Range
·Lightweight
·Water Resistant
·Handsfree use (VOX)
(with optional accessory)
·Supplied with 2 belt clips

MOBILE ANTENNAS

WATSON ANTENNAS (PL-259 base type)

Comes with coax & BNC



WSM-270. 2m/70cm, 2.5dBi, 6.15dBi, 50W max, micro-magnetic 29mm base, length 0.46m. **£19.95** A

W-2LE	2m quarter wave 2.1dBi 0.45m	**£9.95**	A
W-285S	2m 3.4dB 0.48m (fold over base)	**£14.95**	B
W-77LS	2m/70cm 0/2.5dB 0.42m	**£14.95**	B
W-770HB	2m/70cm 3/5.5dB 1.1m	**£24.95**	B
W-7900	2m/70cm 5.6/7.6dB	**£32.95**	B
W-627	6m/2m/70cm 2.15/4.8/7.2dB 1.6m	**£34.95**	B
WGM-270	2m/70cm On glass 3.7m coax 50W	**£29.95**	B

MOBILE BASES

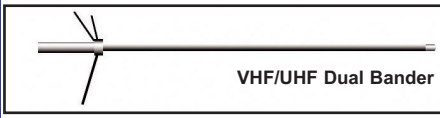
WATSON

WM-14B. Large diameter 14cm magnetic mount SO-239, c/w 5m RG-58 & PL-259

W-3HM	Adjustable hatch mount	**£14.95**	A
WM-08B	8cm mag mount, 5m cable PL-259	**£9.95**	A
WM-14B	14cm hvy duty mag mount+cable	**£12.95**	A
WSM-88V	BNC mag mount plus 3m cable	**£14.95**	A
W-3CK	5m 5D-FB cable assembly+pigtail	**£18.95**	A
W-ECH	5m standard cable kit assembly	**£12.95**	A

BASE STATION ANTENNAS

DIAMOND



VHF/UHF Dual Bander

X-50	2m/70cm colinear 6/8dB 2.5m	**£54.95**	C
X-50N	2m/70cm colinear 6.5/9dB 3.1m	**£59.95**	C
V-2000	6m/2m/70cm 2.15/6.2/8.4dB 2.5m	**£89.95**	C

CHECK OUR WEBSITE FOR FULL DIAMOND RANGE

WATSON

W-300. Very popular dualband base antenna. Supplied with u-bolts for mast fixing.

W-30	2m/70cm colinear 3/6dB 1.15m long	**£39.95**	C
W-50	2m/70cm colinear 4.5/7.2dB 1.8m long	**£49.95**	C
W-300	2m/70cm colinear 6.5/9dB 3.1m long	**£64.95**	C
W-2000	6m/2m/70cm 2.15/6.2/8.4dBi 2.5m	**£69.95**	C

WATSON W-25SM PSU £79.95 B

Very popular budget switch mode power supply. *Output voltage 13.8V DC *Output current of 22A (25A peak) *Front panel output terminals *Over current & voltage protection *Quiet operation

WATSON W-25AM PSU £89.95 C

DC power supply for the shack & esp. for use with 100W transceivers. Separate voltage and current meters. *Output voltage 0-15V DC *Output current of 25A (30A peak). *3 sets of output terminals *10A cigar socket. *Over current protection

CHECK OUR WEBSITE WWW.WSPLC.COM FOR MORE DETAILS OF THESE PRODUCTS

WATERS & STANTON

1973 WATERS & STANTON PLC 30th ANNIVERSARY 2003

PRICE MATCH

VERTICAL ANTENNAS

Hustler Mobiles

Get top performance when on the move. Purchase the **MO-3 base** (137cm) for **£24.95** or the **MO-4 base** (68cm) for **£22.95**. Then add the resonator of your choice. **RM-10, RM-12, RM-15**, all **£19.95** ea. **RM-17, RM-20 £24.95** ea. **RM-40 £26.95, RM-80 £29.95**

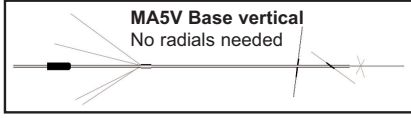
Resonator

Base section
MO-3 or MO-4

CUSHCRAFT BASE ANTENNAS

MA6V *NEW*	20-17-15-12-10-6m 250W PEP	**£269.95**	C
MA5V	20-17-14-12-10m 250W PEP	**£239.95**	C

MA5V Base vertical
No radials needed



R8	40-30-20-17-15-12-10-6m 1.5kW	**£469.95**	C
R6000	20-17-15-12-10-6m 1.5kW PEP	**£329.95**	C

BUTTERNUT BASE ANTENNAS

HF9V-X	80-6m 7.9m 1kW PEP	**£349.95**	C
HF6V-X	80-40-30-20-15-10m 7.9m 2kW	**£299.95**	C
HF2V	80-40m 9.75m (160m opt) 1kW	**£229.95**	C

HY-GAIN BASE ANTENNAS

AV-640	40-6m 1.5kW, 300W 6m (PEP)	**£369.95**	C
AV-620	20-6m 1.5kW, 500W 6m (PEP)	**£279.95**	C
AV-14AVQ	40-20-15-10m 1.5kW PEP	**£169.95**	C
AV-12AVQ	20-15-10m 1.5kW PEP	**£139.95**	C
DX-88	80-10m 1.5kW, 250W 30m	**£369.95**	C

HARI High quality German traps. (Pairs)
200W 20m £44.95 40m £49.95 80m £53.95
1kW 20m £59.95 40m £64.95 80m £73.95

HARI High quality German Baluns SO-239
200W 1:1, 4:1 or 6:1 £25.95 ea.
1kw 1:1 £34.95 4:1 or 6:1 £41.95 ea

HORIZONTAL BEAMS & DIPOLES

CUSHCRAFT

Premier HF beam used around the world by serious DX'ers.

X-7	20/15/10m 7 el. Yagi 2kW	**£669.95**	D

Not got the space for a full sized HF beam antenna, then the mini beam MA-5B should be considered.

MA-5B	10-12-15-17-20m 4 el. Yagi 2kW	**£369.95**	C
A4-S	10-15 & 20m 4 el. Yagi 2kW	**£569.95**	D
A3-WS	12 & 17m 3 el. Yagi 2kW	**£379.95**	D
D-3	10-15-20m dipole element 2kW	**£249.95**	C

Don't want a wire antenna but can't fit a Yagi, then consider a rotatable dipole.

D-3W	12-17-30m dipole element 2kW	**£249.95**	C
D-4	10-40m dipole element 2kW	**£349.95**	C
D-40	40m dipole element 2kW	**£319.95**	C
TEN-3	10m 3 el. Yagi 2kW	**£229.95**	C
ASL-2010	13.5-32MHz 8 el. log periodic	**£749.95**	C

RADIO WORKS

A choice of quality wire antennas available to fit almost any circumstances.

CW-160	160-10m 76.8m long	**£129.95**	C
CWS-160	160-10m 40.5m long	**£119.95**	C
CW-80	80-10m 40.5m long	**£89.95**	C
CWS-80	80-10m 20.1m long	**£109.95**	C
CW-40	40-10m 20.1m long	**£84.95**	C
CW-20	20-10m 10.36m long	**£89.95**	C
CW-620	20-6m 9.7m (32ft) long	**£89.95**	C
G5RV PLUS	80-10m with balun 31m (102ft) long	**£59.95**	B

YUPITERU MVT-3300 SCANNER £129 B

The MVT-3300EU covers most of the useful bands in the VHF and UHF spectrum. It has 200 memories as standard with a range of band and security channels as well. It has functions normally associated with more expensive sets such as pre-setting the receiving mode and frequency step, Duplex reception with "One Touch" function, Auto-Write and Search-Pass memory functions. There is also a Decipherment function to receive certain scrambled communications.

WATSON FC-130 Frequency Counter £59.95 B

SPECIAL PRICE

The FC-130 is an ideal frequency counter for the shack, mobile or portable use. Supplied complete with Ni-Cads, charger and telescopic whip.

MFJ-993 Intellituner Auto ATU £249.95 C

Automatically tunes any balanced or unbalanced antenna. Ultra fast with 2,000 memories, it tunes 1.8 - 30MHz and has both digital and analogue VSWR meter, audible VSWR meter feature, remote control port and radio interface. 300W SSB and 150W CW.

MFJ-974 Balanced Line ATU £159.95 C

MFJ have come up with their version of the classic Johnson Matchbox balanced line tuner. Superb balance, extremely wide matching range, covers 3.5 - 54MHz, Cross Needle SWR Wattmeter. For 80m - 6m operation,can handle up to 300 Watts. *Size: 190 x 152 x 203mm*

MFJ-971 QRP Portable ATU £99.95 C

**1.8 - 30MHz *300W/30W/6W selectable *Cross needle meter *12V DC Ext. *SO-239 sockets *Tunes wire, coax, balanced line *Terminals & earth post *Size 160 x 150 x 60mm *Weight 870g*

The MFJ-971 is the ideal QRP ATU to have on hand. It incorporates a cross needle SWR meter and displays forward or reflected power and SWR simultaneously.

bhi NES10-2 & NES-5 DSP Speakers

NES10-2

£99.95 B

**Speaker with built-in DSP noise filters *Dip switches for 8 filter settings (NES10-2) *DSP settings preset, no user adjustment (NES-5) *Plugs directly into 3.5mm speaker socket *Handles up to 5 Watts input *Max 2.5 Watts output *Requires 12V at 0.4 Amps max*

NES-5

£79.95 B

bhi NEIM1031 £129.95 B

NOISE ELIMINATING IN-LINE MODULE

** Noise attn - 9-30dB (typical) * Noise Attn levels 8 * Audio output power 2.5W RMS max (8 Ohms) * Audio connections: Line level in/out (RCA Phono), Audio in/out 3.5mm mono jack * Line i/p impedance 10K * Line o/p impedance 100 Ohms * Line in sensitivity 300mV -2V RMS * Headphone socket 3.5mm mono jack * Power 12-24V DC 500mA*

bhi 1042 SWITCH BOX £29.95 B

Connect more than one piece of equipment to your bhi noise eliminating speaker with the 1042 Switch Box. Allows 6 pieces of equipment to be connected, 3 inputs loaded at 8 Ohms and 3 unloaded inputs (for low level signals). Two audio leads provided.

YAESU VR-120D £119 B

The VR-120D handheld scanning receiver covers from 100kHz to 1300MHz. AM/FM/WFM modes (inc. preprogrammed broadcast freqs). The VR-120D's small size and tough polycarbonate case allows you to take it anywhere -hiking, skiing or while walking around town.
Power is provided by 2 x AA batteries (not supplied). Ni-Cad batteries and charger are available as options.

RIGBLASTER-PLUS

The Adventure Begins!

~~Was £139.95!~~

£119.95

Order as RB/PL/C

New Low Price!! Explore all the new digital modes. All leads provided for computer and radio. Just connect between PC and transceiver. Plugs into 8-pin and RJ-45 radios. Internal jumpers to match your radio. Software on supplied disc for CW, RTTY, PSK-31, SSTV, Packet, AMTOR, DVkeyer, WSJT, Mic EQ, Rig CTL, EchoLink etc. Requires 12V DC

NOMIC Similar to above but no 8-pin front panel socket and no CW keyer function. Self-powered. **£59.95**
Code: RB/NO/8C for 8-pin rigs **RB/NO/RJ** for RJ-45 rigs

HEIL QUALITY MICROPHONES

HCL-5/4

GM-4/5

HST-817

PROSET +

Desk Microphones

HCL-5/4	Classic retro-look HC-5/4 desk mic	**£199.95**	B

Hand Microphones

GM-4/5	Goldline HC-4/HC-5 hand mic	**£109.95**	B

Headsets & Boom microphones

HST-YM	Traveler single side headset for FT-817	**£79.95**	B
HST-706	Traveler single side headset for IC-706	**£79.95**	B

Headphones & Boom Microphones

PRO-SET-PLUS	Large H/phones with HC-4 & HC-5	**£155.95**	B

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ICOM IC-446S SPECIAL OFFER

RUGGED PMR446 HANDHELD

Don't confuse it with cheaper models, this one is rugged! The IC-446S is ideal for a multitude of uses along with reliable operation. It is water resistant, and the antenna folds away when not in use.
**8 channels *Built-in CTCSS tone squelch *38 CTCSS codes per channel *Foldaway antenna *Large backlit display *Powered by 3xAA Alkaline batts *Water resistant*
(OFFER ONLY AVAILABLE WHILST STOCKS LAST)

SPECIAL OFFER was £99.95 now £59 B

HORA C-150 2M HANDHELD

£79.95

An amazing price for a 2m Handheld!
2W output on AA cells and 5W output on external 13.8V. 1750Hz tone, 20 memories, keypad control, 5 steps inc 12.5kHz, dial illumination receive 130 - 170MHz. You won't find a better deal! Includes flexi antenna, belt clip and instruction manual. (AA cells not included)

DMTR-21 TORCH/RADIO SPECIAL OFFER

BUY ONE GET ONE FREE!! ONLY £10

Carriage £2

HOCKLEY ONLY

Watson Wind-up/Solar Torch & AM/FM Receiver

**Torch/Flashlight/Siren*
**AM 530 -1600kHz*
**FM 88 - 108.1MHz*
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SGC

New Lower Prices!

MAC-200 £339.95

Master Antenna Controller
Auto ATU for coax, wire and twin feed.

The Master Antenna Controller.

This is no ordinary automatic ATU. Covering 1.8 - 60MHz up to 200W, it has the power to think for you and remember which antenna you use on a particular band! Just change frequency and the 5-way antenna switch will know which antenna to use - no data leads necessary. Just power with 12V and connect a single coax cable between the MAC-200 and your radio. It has 3 sockets for coax cable and one each for balanced feeder and end fed wire. The built-in VSWR forward and reflected meters let you know exactly what is going on.

SG-239 Auto ATU 1.8 - 30MHz £189.95

The SG-399 is a complete automatic ATU that covers 1.9 - 30MHz and handles up to 200 Watts of power. It will work with end fed wires, coax cable and even ladder line. Designed primarily for indoor use, it can be installed near the exit wall of house or on the inside of a garage or shed. Take a coax cable from radio to ATU and then attach your antenna. Feed ATU with 12V (around 500mA) and you can be on all bands in minutes! For end fed wires you need to attach an earth wire or counterpoise. It's that simple. All bands and all modes!

Other SGC Auto ATUs (For outside use)

SG230 Covers 1.6MHz - 30MHz up to 200 Watts. Designed for end fed wires, this is the original Auto ATU from SGC. 406 x 305 x 76mm **£339.95**
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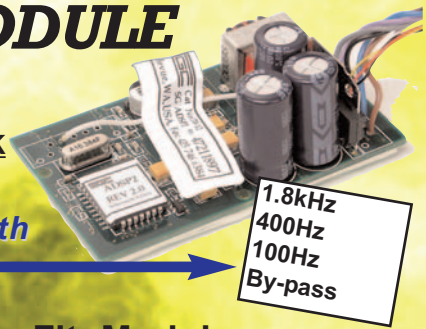
SG-237 Covers 1.8 - 60MHz with a power rating of 100 Watts PEP, this mini size unit is ideal for end fed wires. 176 x 229 x 38mm **£299.95**

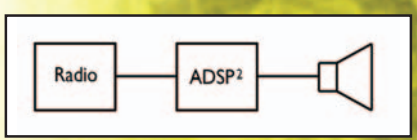
ADSP² MODULE HIGH LEVEL

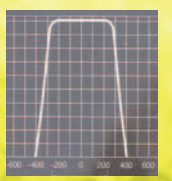
ADSP-2-HLK

Now with FREE CW/SSB Bandwidth Filter built-in



£89.95 **Easy Fit Module**





World First! DSP filter plus variable bandwidth filter. This module is designed to be placed in series with any loudspeaker, either inside your rig or inside an external speaker. Double sided tape is included. It's that simple! Just connect 12V DC to it and place the mini 2-button mode selector switch in any convenient place. You get three DSP levels plus bypass, and audio bandwidths of 1.8kHz (SSB), 400HZ and 100Hz (CW) plus bypass. Both DSP and bandwidth can be independently selected. Its a QRM killer that requires no radio modifications apart from breaking the speaker leads. Now everybody can have DSP, whatever the model. **Order ADSP-2-HLK**

SG-2020 £499.95

Transceiver
1.8 - 30MHz
1 - 20 Watts
SSB/CW/AM
Vari-bandwidth

QRP & Portable Operator's Dream! Featuring a very advanced design built into an amazingly strong die-cast alloy case. Its frugal on DC power, needing just 4 Amps (12V) for 20 Watts output and 400mA on receive. Featuring: *VOGAD and true rf speech clipping, Iambic A and B keyer, variable power down to 1W, pass-band tuning, variable bandwidth from 2.7kHz - 100Hz, bandscan, rf gain control, reverse CW, variable speed tuning, split operation, RIT, noise blanker. This is a great little transceiver measuring 69(h) x 152(w) x 178(d) mm and weighs just 2kg.*

Model with DSP SG-2020ADSP £589

MULTIMETER £19.95

Get it for FREE!

When you purchase any SGC Auto ATU listed on this page or the SG-2020. (Subject to stock availability).

This smart 7-segment digital multimeter is just the item every radio station should own. *DC Volts: 10 ranges 100uV to 600V. AC Volts: 100mV to 600V. Current 0.1uA to 10A. Resistance: 0.1 Ohm to 2M Ohms.* Plus transistor hFE (NPN/PNP), diode tester and continuity buzzer. Fitted backlight button.

ADSP SPEAKER

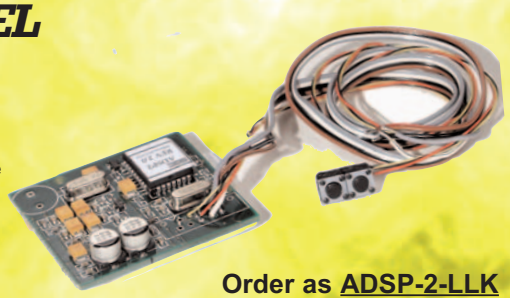
The ADSP Speaker provides simple "One Touch" digital noise reduction for use on any transceiver or receiver. Only two connections to be made - 12V DC power and audio in.

**Noise reduction: 13 / 26dB or bypass *Time delay: 6.5 / 13ms *Tone rejection: -50 / -60dB *Out of band rejection: -45dB *Noise floor: -60dB *Min input: 10mV RMS *Max input: 5V RMS *Power Output: 5W *2m lead *3.5mm mono jack plug Adjustable mount *Power: 10-15V DC *Size: 76 x 127 x 63.5mm *Weight: 310g*

£99.95

ADSP² MODULE LOW LEVEL £89.95

The ADSP-2-LLK is identical in performance to the ADSP-2-HLK described on the left. However, it is a smaller board and designed to be inserted in the low level audio stage of a radio, usually in series with the volume control or similar position.



Order as ADSP-2-LLK

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Cover subject

The Yaesu FT-7800E is put to the test by **John Goodall G0SKR** this month - read his review to see how he got on with this 'back-to-basics' twin bander. Enjoy this issue and don't forget to send off for your **Free** Callsign CD - it's a complete Callbook on disk!

Design: Steve Hunt
Photograph: Courtesy Yaesu UK Ltd.

April features

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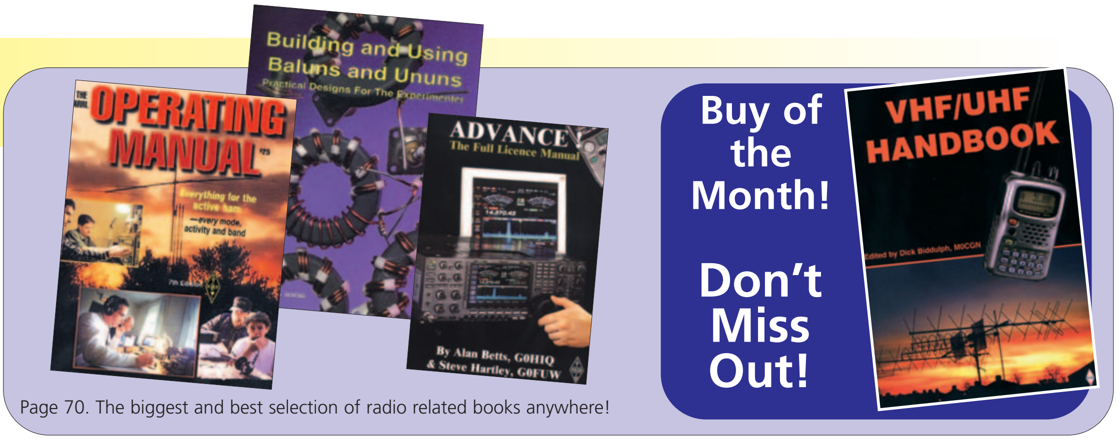

Page 70. The biggest and best selection of radio related books anywhere!

April regulars

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ANOTHER PACKED ISSUE

rob mannion's keylines

Welcome to 'Keylines'! Each month Rob introduces topics of interest and comments on current news.

It had to be the Irish (wherever you are on the 'Emerald Isle' you'll find superb hosts!) who re-introduced the Radio Society of Great Britain's Presidential Installation dinner! That's the reason why I found myself in Northern Ireland on Saturday 24 January, as a guest of my good friend **Jeff Smith MI0AEX** (on left in picture), and his wife **Jane** in their beautiful home at Kircubbin down on the equally attractive Ards Peninsula. It so happened that it was Jeff MI0AEX whose installation as the RSGB President we were celebrating. The event was hosted by the **Bangor & District Amateur Radio Society**, at the Park Avenue Hotel in Belfast.

I'm a regular visitor to the Smith household and Jeff and Jane are superb hosts. However, this time because Jeff had other things to do - and I was without my car for the weekend having flown in from Southampton - another good friend **Peter Mercer GI4VIV** provided the transport. Peter's a close neighbour of Jeff's and I'm very grateful indeed for the marvellous service shown by 'Mercer's Taxis' as he ferried me to and from Belfast City Airport, etc. We really 'chewed the fat' didn't we Peter? It was great to have a driver who's a keen Radio Amateur too!

Jeff Smith MI0AEX President of the RSGB at his installation dinner, with Guest of Honour Sean Donelan EI4GK, President of the IRTS.

Many Guests

The 'Top Table' was surrounded by many honoured guests from all four corners of our beautiful Islands. A welcome Guest of Honour, sitting alongside Jeff was **Sean Donelan EI4GK**, the President of the **Irish Radio Transmitters' Society** who was accompanied by his wife **Brid.**

Jeff who, is also a member of the IRTS, then 'set out the RGSB Presidential 'stall'. One aspect of which attracted my particular attention were the plans to extend the hobby's outreach to the young and this I feel is extremely appropriate for Jeff because in a way, he's had much experience in coaching youngsters.

Actually, Jeff's professional work is as a Peripatetic Tutor*, specialising in helping young people who - for various reasons - cannot attend school. Instead, he goes to them! In my opinion his outlook and experience make him ideal for the task ahead. I wish you well Mr President and I'm confident you'll achieve much during your term of office.

***Peripatetic:** My office copy of the *Universal English Dictionary* delightfully explains the word as "*Wandering about...especially said of Aristotle when he was teaching*"! What better an accolade for a Tutor!

Leicester On The Horizon!

As I write this edition of Keylines, the PW Publishing Ltd. Rally staff have just returned from the **Stevenage** rally in Hertfordshire. As it was a new, untried event, I wasn't on the list to attend.

However, I understand from my colleagues who were on duty that readers were enquiring about which major shows/rallies I will be attending, apart from my 'club visits'. So, I'm pleased to confirm - and look forward to meeting you at: the **New West of England Rally** in Frome, Somerset, the **Wimborne Hamfest** (**Flight Refuelling**) rally here in Dorset and, of course, the major event of the year - the **Leicester Show** in September. Everyone here is looking forward to seeing everyone else there!

Saturdays On 70MHz

Although I have provisionally marked two Saturdays in April for 70MHz 'Activity Afternoons' either or both dates may have to be changed due to my move to a new home.

If my wife **Carol** and I have moved into our new home in Bournemouth (plenty of room for antennas, including a tower for v.h.f. later) I'll be active on both **Saturday 10 April** and **Saturday 24th**. I ask those of you who hope to come on air (or listen) to keep in contact via telephone and E-mail and newsgroups so I can confirm on what dates I can/or shall be active.

Free Callsign CD

Don't forget to send for your free *PW* UK and Irish Callsign Directory CD this month! It contains the most-up-to-date callsign data listings in the form of a searchable database - it's the callbook on a disk!

On the same CD you'll also find lots of reference material and a special bonus, the very first *Practical Wireless* of all - from 1932! **Tex Swann G1TEX/M3NGS**, our Honorary Archivist, has worked hard to present this precious original in the best way possible so that our readers can 'travel back in time'.

The CD itself is free - we are only asking you to contribute towards the postage & packing - and everyone here at PW Publishing Ltd. is sure you'll enjoy it.

Rob G3XFD

practical wireless services

Just some of the services *Practical Wireless* offers to readers...

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Subscriptions are available at £32 per annum to UK addresses, £40 Europe Airmail and £49 RoW Airmail. Joint subscriptions to both *Practical Wireless* and *Short Wave Magazine* are available at £61 (UK) £75 Europe Airmail and £92 RoW Airmail.

Components For *PW* Projects

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

Photocopies & Back Issues

We have a selection of back issues, covering the past three years of *PW*. If you are looking for an article or review that you missed first time around, we can help. If we don't have the whole issue we can always supply a photocopy of the article. See page 72 for details.

Placing An Order

Orders for back numbers, binders and items from our Book Store should be sent to: **PW Publishing Ltd., Post Sales Department, Arrowsmith Court, Station Approach, Broadstone Dorset BH18 8PW**, with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling. Credit card orders (Access, Mastercard, Eurocard, AMEX or Visa) are also welcome by telephone to Broadstone **0870 224 7830**. An answering machine will accept your order out of office hours and during busy periods in the office. You can also FAX an order, giving full details to Broadstone **0870 224 7850**. The E-mail address is **clive@pwpublishing.ltd.uk**

Technical Help

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

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

Make your own 'waves' by writing into *PW* with your comments, ideas, opinions and general 'feedback'.

Amateurs of the Future

● **Dear Sir**

As someone of mature years, now looking towards becoming a Radio Amateur I find your *PW* magazine most informative and well presented. However, it's refreshing to note that teenagers are becoming Radio Amateurs (I refer to your news feature 'No Barriers In Bangor, page 13, January 2004 *PW*). The Bangor Club, Northern Ireland are thus keeping alive such an interesting hobby.

To encourage more young people to take up this hobby, how about a feature both written by and for our young people in future editions of *PW*? They are after all, our future and their input may well educate the older generation towards becoming a Radio Amateur.

My congratulations to those youngsters in obtaining their Foundation Licence - there may well be some hope for me to be equally successful.

Dr P. Dostoevskii
Ushaw Moor
Durham

Editor's comments: Take a bow Bangor and good luck to you Sir. I wish you well with your own future in the hobby!

Mains Driven Headphones?

● **Dear Sir**

Earphones/headphones - a little story from my dim and distant past. I guess that the pair of 'phones I had were 2000 or 4000Ω when I was a small boy (stupid boy?) during the Second World War, otherwise I would have had earache at least because through lack of vision and of foolhardiness (or ignorance), I plugged the wire ends into a 2-pin 5A switch socket on the 200V a.c. mains. I was fascinated to hear a crackle and discovered that I got a crackle with only one lead in a 'hole' - not something to be proud of, but I lived to tell the tale.

Editorial note - The eBay Website article in the February 2004 *PW*. The publication of this article had led to a great deal of feedback regarding the activities of this commercial 'auction' site. Some of the feedback is favourable, some readers advise caution and others have tales of woe. I've selected the various letters published here to represent the proportions of support/semi support or outright criticism of the eBay site. However, I would strongly recommend to any reader that they avoid getting onto the eBay E-mail subscription lists. I registered so I could get information and a 'feel' for their activities. However, once you're on (despite the suggestion that you can 'unsuscribe') you'll be the target for some cleverly titled E-mails aimed at getting your attention. **Examples:** I've received E-mails with subject lines worded as follows: 'Payment for successful auction', 'Your sale on eBay', etc., and many other craftily worded subject line 'attention getters'. However, when opened the subject lines are irrelevant and the E-mails are just promotions for eBay. I now adopt the approach which automatically 'dumps' E-mails from eBay, by classing them as spam. But they've now adopted the idea of putting 'Rob, PW' - so I have to check first! My advice has to be - 'tread carefully....**very carefully'** with this organisation. And although we have an unwritten rule here not to use Latin quotations - *Caveat Emptor* - (Buyer Beware) is the one which fits! Long live the rally Bring & Buy stalls and local club junk sales I say! **Editor**.

On with the letters.....

eBay Pitfalls

● **Dear Sir**

I'm writing with regard to the article on eBay purchasing in the February issue of *PW*, as your author failed to point out one of the common problems with this site. I recently purchased two items, one cost £21 and I was asked to pay £24 postage, from the south coast to the Midlands. Parcelforce charges just over £12 for a weight up to 30kg and this item was far less than that in weight. Another purchase of a very small item, bought for £22, had a request of postage of £10 when in fact the actual auction page details stated a $5 (£3) postage fee.

Anyone new to buying items via eBay and who is not familiar with standard postal charges is quite likely to be ripped off and pay over the odds. I suggest any purchaser should establish the weight of the item they are thinking of buying and check out the postage fee themselves. We already pay way over the odds for post and parcels in this country without throwing money away to unscrupulous sellers.

Ben Nock G4BXD
Kidderminster
Worcestershire

eBay Points

● **Dear Sir**

I'm writing regarding the article on eBay in the February issue of *PW* there are a few points that need further consideration. Firstly, when advertising an item, an E-mail address is published to enable prospective purchasers to request further information. The publication of my E-mail address on eBay has resulted in an increase in the number of 'Spam' messages I receive by approximately 600%.

I use *mailwasher* to bounce unwanted messages, but I still have to waste my valuable time checking the subject line and sometimes reading the message on-line before deciding what action to take. It might be advantageous to create a special E-mail address solely for use on eBay.

The second concern is more serious. I registered my card details with eBay, the following day I used it to make an on-line purchase. The day after that I received a highly embarrassing 'phone call from the retailer advising that Visa had refused to authorise the purchase. This was a considerable surprise, I have held the same card for 30 years and the account has always been maintained in an exemplary manner.

After discussing the matter with the retailer, I telephoned Visa and, after identity checks, I was advised that registering with eBay had resulted in a security block being placed on my account. I confirmed details of the purchase and assured them that it was genuine and they agreed to remove the block. I then had to telephone the retailer, explain the situation and advise them that the purchase would now be authorised, which it was. Having to telephone both Visa and the retailer rather defeats the purpose of on-line shopping and I really don't know what the answer to that is!

Incidentally, a vintage book I advertised on eBay was withdrawn from the auction, on the grounds that it was not allowed on eBay. This was odd

I enclose for you to cast your eye over, a cutting from our local paper. On the photo you will see a Mr Arthur Bailey who was my 'boss' in the 1950s and he told me years ago that he and a colleague disconnected a lightning conductor at the test point at the chimney of a local flour mill and used it as an aerial and earth for their radio experiments in the 1920s (On a dry day of course!). Hope to send you more about my early days soon.

Dennis Gadsby
Stapenhill
Burton-on-Trent

Editor's reply: What a lucky man you were Dennis! We'll be pleased to hear more of your memories - they're most likely quite exciting!

My M3 Woes

● **Dear Sir**

I read Mike Evans' letter, My M3 Woes (page 10 February letters), with amazement. Did he not actually take the trouble to read *BR68/F* as part of his preparation for his examination? He also seems to have missed the biggest difference between Amateur and CB radio....in so far as with CB its the equipment that's approved and with Amateur Radio it's the operator.

The M3 licence gives great privileges for operating within the UK for very little proof of technical expertise. It's for this reason that transceivers are limited approved kits and commercially produced equipment, which surely does include ex-p.m.r. rigs. Assuming that Mike has the knowledge, skill and facilities to re-configure them to Amateur bands and check that they are transmitting a clean signal. It's probably for this reason that 23cm and above is excluded from the Foundation Licence allocation.

It's perhaps unfortunate that *BR68/F* only tells you what you can do. But were Mike Evans to compare that with *BR68* for the **full** licence in the back of the latter he would find a list of CEPT countries which that licence permits him to operate in. The CEPT list is missing from the BR68 for the Novice and intermediate licences.

The matter of Third Party traffic is a contentious one and it's only with WRC 2003 that it has become internationally approved.

Mike may wish to contemplate that when I passed my RAE in 1982 I gained access to 144MHz and above when most v.h.f. rigs were about 10W output. I get the impression, despite his denials, that Mike expects virtually full licence privileges for Novice licence input. My advice to him is enjoy what you have, study for the 2E and M0 calls and stop 'whinging'.

Les Featherstone
G6UBM/M3UBM
Tonbridge
Kent

The Ofcom Problem

● **Dear Sir**

I have enclosed the text of a letter I have recently sent to my Member of Parliament regarding Ofcom and the Radio Licensing Centre. I don't know if the subject is sufficiently newsworthy for *PW*. I've also contacted the RSGB regarding the matter.

It's a pity the RSGB is not as pro-active in certain areas as the American national Amateur Radio body the ARRL is in calling government agencies and department to book. I was surprised not to find some reference to the present licensing debacle on the RSGB website or news page.

The letter:

To Sir Menzies Campbell QC MP
House of Commons
Palace of Westminster
LONDON

Dear Sir Menzies,
One of my several hobbies is as, prior to my advertising the book, I had a trawl on the site and found several other versions of the same book on offer, so it seemed reasonable therefore to assume that no objection would be raised to my own book.

I have been trying to find out from eBay why my offer apparently provoked an outbreak of mass hysteria and why it was not until I advertised my book that others were withdrawn. The only response I can get is to refer me to their trading terms. However, despite numerous attempts they have consistently failed and/or refused to answer any of the numerous questions that I have raised about their trading policy. Under the circumstances I am sure you will understand why, like Visa, I have reservations about the way eBay carry on business.

I have now tried to claim some money from PayPal. The payment was sitting in my account, all I wanted to do was claim it, however, before I was allowed to do so, I was directed to a screen which asked me if I wished to open a business account. I declined the offer, and, as a direct result and without any warning, eBay immediately returned my money to the sender! I would advise anyone thinking of opening a PayPal account not to bother, it isn't worth the hassle.

I eventually sorted out the problems I had with PayPal (I hope). But eBay were their usual helpful selves and merely referred me to the purchaser. I had already been in contact with them and the funds appear to be in my account. I requested eBay to transfer them to my bank account and I'm advised that this can take up to seven working days. Clearly the usual laws of physics do not apply to electrons travelling within the banking system and time will tell if the funds ever arrive. As regards PayPal charges I've noticed that a number of advertisers are demanding up to an extra 5% to cover PayPal charges.

Regarding the items that may be advertised on eBay, it occurs to me that some of your readers may collect equipment dating from and before the Second World War. If this equipment carries a certain insignia*(**see Editorial note below**) this will have to be removed before it's allowed to be advertised on eBay. I would suggest a sticker saying 'censored'. Even so it may well be that the equipment is classified as War Memorabilia and will still be rejected.

I will concede that the problems that I have had with eBay may be due to user incompetence. However, in my defence I would point out that I have taught Information Technology at Secondary level and I'm using a computer that I built!

Alan Jones (GW7HAV lapsed)
Pontrug
Caernarfon
Wales

Editorial note: Alan confirmed with me that the insignia was the Swastika, and that the historical book was also associated with the same insignia. Incidentally, I've often found the Swastika on military equipment from the period, still in place in the various museums which display equipment from the 1933-1945 period. It's part of history - and hardly a day goes by on British TV where the Swastika doesn't appear in some form or another.

Anonymous Aladdin's?

● **Dear Sir**

I'm writing about A Radio Amateur's Aladdin's Cave - *PW* February 2004. The article about eBay is very interesting and is the best introduction to this kind of business I know of. Unfortunately, the author missed one important point: most eBay sellers and buyers are totally anonymous and only known to the company eBay itself. Very attractive for potential villains!

The reports about 'lucky' bidders who have sent away the money but never received the goods are frequent. Also, there's no way of checking whether the apparent bargains are stolen. Finally, many descriptions of the gear is rather vague, often even without explicitly stating that it's in full working order. It may well be broken beyond repair!

The eBay feedback rating is not a good measure of trust. As is briefly mentioned in the article, it's very easy to get a lot of positive feedback simply by buying things and paying for them. That is, however, not an indication that the next deal will be fair.

I very much prefer to talk to the sellers directly. This is best at rallies (for example the Cambridge & District Amateur Radio Club's Rally which is due to be held on 29 February 2004 The other great market place is in the Bargain Basement section of *Practical Wireless*. I recently advertised a communication receiver there and got many offers from Radio Amateurs I really can trust.

Daniel Schlieper M3CAX
Cambridge
Cambridegshire

Amateur Radio, having held an Amateur transmitting Licence since my late teens. You will probably be aware that Amateur Radio is regulated by acts of Parliament including the Wireless Telegraphy Act and a number of statutory instruments.

Since the 29th December the former regulator, the Radio Communications Agency (RA) has been taken over by a new agency Ofcom with the Radio Licensing Centre in Bristol issuing Amateur Radio Licences on behalf of Ofcom, just as they did for the RA.

Also in recent weeks I have moved house and therefore had to notify Ofcom via the Radio Licensing Centre of my new address in order to comply with the regulations. To do this I used the form on the back of my Licence and sent it to the Radio Licensing Centre over two weeks ago. Normally such matters are handled in just few days.

To date I have not received my new licence and consequently this morning I telephoned the Radio Licensing Centre to enquire as to the delay.

It would appear that since Ofcom have taken over the responsibilities of the RA, the Radio Licensing Centre has not received a stock of new Amateur Radio Licence documents. I was informed that it might take a further three weeks before they do. In other words, the Radio Licensing Centre will have been unable to process amateur licenses for nearly eight weeks.

The Republic of Ireland is a signature to an agreement drawn up under the Confederation of European Post and Telecommunications (CEPT). This agreement allows Radio Amateurs from one CEPT country to establish a temporary Amateur station in another CEPT country. It had been my intention to use this facility next week while visiting Eire. However, as I will not be in receipt of my Licence document, I will not be able to use either my own portable equipment or that belonging to an Amateur Radio operator resident in Eire.

Therefore I would be grateful if you might forward this letter to the Minister responsible to ask why Ofcom has failed to produce new Amateur Licence validation documents and why it is not possible to issue old style Licences with the RA logo in the interim. It is my view that the transfer of responsibilities from the RA to Ofcom has been rushed with little thought or planning. In short it is a disgrace and offers little for my annual licence fee of £15.

In the knowledge that the Radio Licensing Centre also handles Marine Radio Licences on behalf of Ofcom, it would be interesting to discover if this sector has suffered similar difficulties in renewing Licenses?

Yours sincerely
Colin Topping GM6HGW
Newport on Tay
Scotland

Editor's comment: I think the Amateur Radio hobby has every reason to be concerned about the huge, multi-function agency which Ofcom is turning out to be. Its remit is widespread and totally unmanageable in my opinion. I'm extremely worried for future devleopments and will be highlighting my fears in Keylines next month.

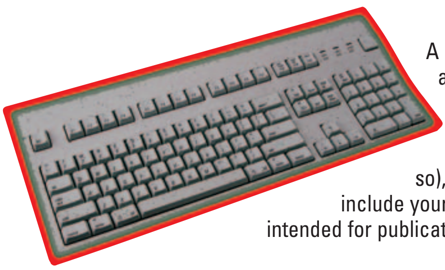
Busy 'Frequency' of Amateurs?

Dear Sir
Flipping casually through the pages of the *Oxford Book of Word Histories* recently, I came across the following. "*Frequency...is found from the mid-16th Century; it originally denoted a gathering of people*". Do you think that the word could be adopted as a collective noun? "A frequency of Radio Amateurs".
All the best for the coming season and 2004.
Andy Bluer, BEM G3UUZ
Penzance
Cornwall

Editor's comment: An interesting suggestion Andy! Your comments please readers! Incidentally, before his retirement 'Andy the Light' G3UUZ was a Radio Amateur known throughout the world for his work as a Lighthouse Keeper. We hope to feature some of his exploits operating from some interesting locations in a future issue of *PW*.

Keep your letters coming to fill *PW*'s postbag

Letters Received Via E-mail



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**

amateur radio rallies

Radio rallies are held throughout the UK. They're hard work to organise so visit one soon and support your clubs and organisations.

March 14
Wythall Radio Club's 19th Annual Radio & Computer Rally
Contact: **Martin G8VXX**
Tel: **0121-474 2077**
Website: **www.wrcrally.co.uk**
Held at Woodrush Sports Centre, Shawhurst Lane, Hollywood, near Birmingham on the A435, just 3km from J3 of the M42. Doors open 1000 till 1600 and admission is just £1.50. There will be plenty of traders in two large halls and refreshment facilities are available on site. There will also be a Bring & Buy and easy comfortable parking on site. All are welcome. For licensed Radio Amateurs, a talk-in is available on S22.

March 14
Bournemouth Radio Society's 16th Annual Sale
Contact: **Olive & Frank G0GOX**
Tel: **(01202) 887721**
To be held at Kinson Community Association Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth. Doors open from 1000 to 1600. Talk-in from G1BRS on 2m S22, Amateur Radio, computer traders, accessory traders, antenna suppliers, Bring & Buy, also specialist groups and clubs and home-made refreshments. Admission just £1.

March 20
4th Junction 28 QRP Rally
Contact: **Russell Bradley G0OKD**
Tel: **(01773) 783394**
Website: **www.qsl.net/snadarc**
The South Normanton Alfreton & District Amateur Radio Club (SNADARC) in association with the G-QRP Club are running the 4th Junction 28 QRP Rally at the Village Hall Community Centre, Market Street, South Normanton, nr Alfreton, Derbyshire, fully signposted just five minutes from M1 Junction 28 and the A38. There will be Amateur Radio, Electronics and related items, Bring & Buy and special interest group stalls, outdoor flea market (weather permitting), full range of refreshments including the traditional QRP Rally Pie and Peas, a licensed bar and a prize draw. Doors open to the public from 1000.

April 18
The Yeovil & DARC's 20th QRP Convention
Contact: **Derek M0WOB**
Tel: **(01935) 414452**
E-mail: **m0wob@tiscali.co.uk**
To be held at the Digby Hall, Hound Street, Sherborne, Dorset. Doors open from 1000. There will be a Talk-in on S22, three lectures by notable speakers, trade stands, Bring & Buy and excellent catering and parking facilities.

April 18
The West of England Vintage Wireless Fair
Tel: **(01392) 860529** or **(01749) 676635**.
Held at the Willand Village Hall, five minutes from Junction 27 on the M5. Doors open 1030 till 1500. There will be numerous stalls, including Radio, TV, Gramaphones and a Bring & Buy stall. A mini auction is to be held at 1330. There will be home-made refreshments and free parking. Admission is £2.50, accompanied under 16s free of charge.

If you're travelling a long distance to a rally, it could be worth 'phoning the contact number to check all is well, before setting off.

amateur radio news

A comprehensive look at what's new in our hobby this month.

Send all your news and club info to... Donna Vincent G7TZB at the PW editorial offices or e-mail donna@pwpublishing.ltd.uk

Wrexham ARS

Return To Scientriffic!

Wrexham Amateur Radio Society will be attending the third Wrexham Science Festival's Hands-On Scientriffic event .

Wrexham's science festival, Scientriffic takes place on Saturday 27 March 2004 from 1000 to 1700hours in a different venue from last year and with a different line-up of events. Instead of being located in the main NEWI building, the Wrexham club will be located at the Ex-Yale college Crispin Lane campus.

The Wrexham Club plan to run their event as more of an exhibition this year with demonstrations of h.f. voice data and contest operating (the event co-incides with CQWW) and a variety of hands-on events. It's hoped this year's event will be bigger and better than before with everything from Morse to antenna demonstrations and everything in between.

Scientriffic will also have plenty to interest the non-Amateur with a variety of events on offer. So, why not turn up on the day and see for yourself?

For more information and updates on Scientriffic take a look at **www.qsl.net/gb2wsf**

New Transceiver News

Icom's Mobile Offering

The choice of new transceivers just keeps on growing! The latest radio to hit the dealers shelves is the Icom IC-E208, so if you're looking for a new rig, why not check this one out?

The IC-E208 is a dual-band f.m. mobile transceiver offering a wealth of new features, as well as retaining many of those from its predecessor, the IC-207H. With its selectable amber, green or yellow display, large tuning dial, increased output power and wide-band receive the manufacturers are hoping it will appeal to new and experienced Amateurs alike.

Features of the IC-E208 include:

- Detachable front panel
- Over 500 memory channels
- 55W/50W output power - (55W in 145MHz band/50W in 430-440MHz)
- 9600bps data connector
- Selectable squelch
- Narrow f.m. capability
- Auto repeater function

Available now from authorised Icom dealers with a recommended price of £329.99 inc. VAT the IC-E208 is supplied with a remote control microphone, front panel separator cable, d.c. power cable and controller bracket.

Contact Icom (UK) Ltd. for more details or visit your local approved dealer. While you are looking for more information why not check out Icom's revamped website? A review of the IC-E208 will appear in *PW* very soon.

Icom (UK) Ltd.,
Sea Street, Herne Bay, Kent CT6 8LD
Tel: (01227) 741741
FAX: (01227) 741742
Website: www.icomuk.co.uk

Contest News

The 2004 *Short Wave Magazine* Listening Contest

After the success of the 2003 SWM Listening Contest this year's event is taking place again on Monday 3 May in conjunction with a day's operation of the magazine's Amateur Radio callsign G3SWM.

Short Wave Magazine will be running a station manned by **Editor Kevin G7TZC/M3SWM, Clive G4SLU** and various other keen volunteers from the Dorset Police Radio Club. The station will operate from Dorset's famous Island of Portland at grid reference SY700727.

The station will begin operating at 0700 and finish at 1600, the main band used will be 40m on approximately 7.070MHz. It's likely that the station will be operating on other bands too and this will be mentioned on the day in the 40m frequency.

The objective of the station is to work as many other stations as possible so that listening contest entrants have many logging opportunities. Licensed Radio Amateurs are also invited to work the event station. Every hour, on the hour, starting at 0800, G3SWM will observe a 10 minute window for M3 exclusive contacts to promote M3s working the station.

An attractive and unique QSL card will be available for the day's activity and to make things even more interesting the station will be located in the relatively rare WAB square SY77DOR*. This square's rarity is due to most of the area being occupied by ocean.

The overall winner of the *SWM* Listening Contest will be the station who has amassed the most points based on the stations they have logged during the nine hour operating period. All stations **must** work G3SWM to be a valid logging and all reports must include the report given to G3SWM and the serial number allocated, if the contact is to be considered. There will be several winning categories for the Listening Contest, overall winner, best UK place and best overseas place.

The full Contest rules are printed in the March 2004 issue of *Short Wave Magazine* and on the Contest website at **www.discovery-com.org/swm/contest/**

* Note that G3SWM is not an active WAB Book Holder.

Terry's Outstanding!

Long time 'friend' of PW and Amateur Radio ambassador Terry Barnes GI3USS is awarded the Caldwell Shield.

The Caldwell Shield Achievement Award is an award presented by the Radio Amateur Invalid & Blind Club (RAIBC, Northern Ireland) in memory of **Mary Kathleen Caldwell GI1VLZ**. The award is given in recognition of outstanding service to the RAIBC (NI).

Pictured here (right) is **Terry Barnes GI3USS** (a former President of the RSGB) being presented with the Caldwell Shield by **Merrill McNinch GI6JGB** (left) Chairman of Bangor and District Amateur Radio Society on behalf of **David Caldwell GI0HOW.**

The presentation took place at the Bangor's club Annual Quiz Night on Wednesday 7 January 2004. Well done Terry - keep up the good work!

Photo courtesy of Bertie Drain GI4POC

Annual Awards

Every year members of the Warrington Amateur Radio Club vote to choose the recipients of two awards, which honour previous members and carry their callsigns.

The first award is the G0IQE award and is given to the member who is regarded as having done the most for the club during the preceding year. The 2003 winners were in fact a team of three - **George Fare G3OGQ**, **Colin Horribin G3SBI** and **Dave Roberts G8KBB** - the designers of the ground breaking CDG2000 Amateur transceiver, which has been the subject of a series of *RadCom* articles and is featured on the club's website. Colin received the award on behalf of the team.

The second award is called the G1HUX award and is given to the member who is judged to have done the most to help and encourage young people to enjoy Amateur Radio. This was presented, for the second year running, to **Albert Heyes G3ZHE** in recognition not only for his assistance to local schools and to the Foundation Courses but also his technical help to a local ATC squadron.

Warrington ARC also run a construction competition within the club and the 2003 winner was **Keith Pocock G8MKO/M3AAB** for his kit built Elecraft K2. All the presentations were made by the club chairman Mike G4VSS.

If you'd like to join the Warrington Club please contact the Secretary **John Riley** on **(01925) 762722** or **E-mail: john.riley17@btinternet.com** Alternatively take a look the club's website for more details: **www.warc.org.uk**

● Colin Horribin G3SBI receiving the G0IQE award from Mike G4VSS.

● Keith Pocock G8MKO/M3AAB receives his award for coming first in the Warrington construction competition.

● Albert G3HZE receives a hearty handshake from Mike G4VSS in recognition of the GIHUX award.

Radio President for 2004

The Installation of the 67th RSGB President recently took place in Belfast. On Saturday 24 January **Jeff Smith MI0AEX** was 'installed' as the 67th President of the Radio Society of Great Britain at a celebration dinner held in Park Avenue Hotel in Belfast. For his report of the event please see **Rob Mannion G3XFD**'s Keylines on page 9 in this issue.

● From left to right: Jeff Smith MI0AEX, Sean Donelan EI4GK and Jane Smith MI0JSJ.

● (above) The Irish Radio Transmitters Society (IRTS) President Sean Donelan EI4GK.

● (below) The 2004 Radio Society of Great Britain president Jeff Smith MI0AEX making his speech.

Open Day

Doors Open for all at QSL!

With the rally and open day season getting into full swing, here's another date to add to the list.

Weston-Super-Mare based QSL Communications would like to welcome radio enthusiasts from far and wide to their Open Day on Sunday 16 May. Representatives from Kenwood Electronics, Icom (UK) Ltd. and Yaesu UK Ltd. will be attending to exhibit their latest products and **David Wilkins G5HY** from Kenwood will be on hand to demonstrate and answer questions about the TS-480 Transceiver. So, why not go along and join in - there will be plenty to see and everyone will be very welcome. For more information contact Jayne at QSL.

QSL Communications
Unit 6 Worle Industrial Centre
Coker Road
Worle
Weston-Super-Mare
BS22 6BX. Tel: (01934) 512757

Photograph courtesy of Darren Warburton.

Sad News

Two Amateurs Remembered

Unfortunately sometimes in our line of work the PW team is faced with passing on sad news about Radio Amateurs who have passed away. This month we remember G8VGF and G3FEX.

John V. Middleton G8VGF, the retiring Chairman of the Lincoln Shortwave Club (LSWC) and the repeater keeper of GB3LM and GB3LS sadly passed away aged 58 on Saturday 17 January 2004. He will be greatly missed by all who knew him, as will his services to the Lincoln Shortwave Club which included the LSWC Hamfest.

Brian Oddy G3FEX, author of Long, Medium and Short in our sister publication *Short Wave Magazine* passed away in hospital, aged 75, on the morning of 19 January 2004. **Ron Ham**, long time friend and former *PW* & *SWM* author remembers Brian.

"The science of radio communication was Brian Oddy's life, to which he contributed so much. He was a brilliant engineer in both the mechanical and electronic fields. His television skills were greatly appreciated in the 1950s when, via his own radio and television business, he serviced a multitude of receivers. Television in those days required a lot of understanding, especially in low signal areas like West Sussex. Brian was among those who saw the beginning and end of the 405-line system in Bands I and III and the start of the 625-line transmissions in Bands IV and V.

Brian was dedicated to Amateur Radio with special interests in building antennas and equipment for the u.h.f. bands and listening to overseas broadcast stations. In the Amateur world he was one of the pioneers of the 430 and 1296MHz bands and for more than 20 years of his professional life he was a microwave links engineer for BBC Television.

Typical examples of his mechanical skills were shown when he designed and built a 9m tower from Handy-Angle to support his array of u.h.f. antennas. And again when, with a lathe, he made the complex cavities for his 430 and 1296MHz converters.

Immediately following his retirement from the BBC until his sudden death in January 2004 he wrote the monthly column LM&S for *SWM*. He always had great respect for opinions and comments from our readers and his regular contributors. It must have been obvious to anyone who read Brian's pages that he was dedicated to the work and had a deep understanding of the subject.

I knew Brian for over 50 years, a good friend who was always ready with a helping hand coupled with a keen sense of humour. He would often see the funny side of a serious subject and sometimes, just a brief glance in his direction would bring to one's mind an inappropriate desire to laugh. I will always have happy memories of Brian and a lasting admiration of his technical ability".

We extend our deepest sympathy to his wife, Yvette and his two daughters, Elizabeth and Rosilind.

Ron Ham

Reproduced courtesy of Kevin Nice G7TZC Editor of *SWM*

amateur radio clubs

Keep up-to-date with your local club's activities and meet new friends by joining in!

AVON
West Somerset ARC
Contact: Mrs J C Everard G0SZO
Tel: (01984) 633060
The West Somerset Amateur Radio Club meet on the first Tuesday of the month at 1930hours at the West Somerset Community College, Minehead in the Gibbs Block. Visitors are always welcome. Forthcoming meetings include: **April 6:** AGM & a talk by RAYNET representative; **May 4**: Talk by Oli G3NFY and **June 1:** Foxhunt.

DORSET
South Dorset Radio Society
Contact: Carol Hodges
Tel: (01305) 820400
The South Dorset Radio Society meet at Chickerell Church Hall, Chickerell, Weymouth on the second Tuesday of the month. Doors open 1930hours - why not go along and join in? **March 11**: St. John Ambulance Demonstration at the usual meeting place; **April 13:** SDRS AGM; **May 11:** Talk on APRS/PSK3 by **Martin Poynter-Smith**. Refreshments are available during the meetings.

ISLE OF WIGHT
Brickfields Amateur Radio Society
Contact: Richard Pratt
Tel: (01983) 562978
The Brickfields Amateur Radio Society traditionally meet at Newham Road, Binstead, Ryde, Isle of Wight on Monday evenings from 1930-2200hours but are now running an afternoon club on Thursdays from 1400-1630hours. The society is also able to offer Amateur Radio training courses.

KENT
Dover Radio Club
Contact: David Harding G0DQI
Website: www.DARC.org.uk

The Dover Radio Club meet every Wednesday at 1930 hours in term time at the Dover Boy's Grammar School. The club offers Foundation and Intermediate Courses, as well as Morse training. Why not go along and join in? **March 17:** Natter Night; **24th:** Gadget Night - short talks by members; **31st:** Operating & Natter Night and **April 7:** Club AGM.

MERSEYSIDE
Wirral & District Amateur Radio Club
Contact: Tom Howarth G4BKF
Tel: (07050) 291850
E-mail: secretary@wadarc.com
Website: www.wadarc.com
The Wirral & District Amateur Radio Club was founded in 1976 and has just celebrated 25 years of service to h.f., v.h.f. operators and s.w.l.s. The Club has a unique format of meetings at the Clubhouse on the second and fourth Wednesdays of every month with "Drinkers and Waffler" nights on the other Wednesdays. This format means that a forum is provided every week for members to get together and 'talk radio'.

The Club prides itself on a high programme content of radio and related technologies, with additional general interest and social events to encourage YL, XYLs and 'harmonic' attendance. Club meetings are held at the Irby Cricket Club on the Wirral with D&Ws at various pub locations in the area.

Forthcoming meetings include: **March 10** A talk entitled 'Learning to Fly'; **24th**: Amateur Radio Software night; **April 14th:** A talk on Project Goodwill (Albania 2003) by **Prof. J.A. Share G3OKA** and on the **28th April**: There will be a talk by **Glynn Parry**, a local Historian. All newcomers are welcome.

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Heavy Duty Aluminium (1.2mm wall)
1¼" single 5' ali pole **£7.00**
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(All swaged poles have a push fit to give a very strong mast set)

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N-Type plug (Large entry) **£2.50**
SO239 Chassis socket (Round) **£1.00**
SO239 Chassis socket (Square) **£1.00**
N-Type Chassis scoket (Round) **£2.50**
N-Type Chassis scoket (Square) **£2.50**
SO239 Double female adapter **£1.00**
PL259 Double male adapter **£1.00**
N-Type Double female **£2.50**
SO239 to BNC adapter **£1.50**
SO239 to N-Type adapter **£3.00**
SO239 to PL259 adapter (Right angle) **£2.50**
SO239 T-Piece adapter (2xPL 1XSO) **£3.00**
N-Type to PL259 adapter (Female to male) **£2.50**
BNC to PL259 adapter (Female to male) **£2.00**
BNC to N-Type adapter (Female to male) **£2.50**
BNC to N-Type adapter (Male to female) **£2.50**
SMA to BNC adapter (Male to female) **£3.95**
SMA to SO239 adapter (Male to SO239) **£3.95**
SO239 to 3/8 adapter (For antennas) **£3.95**
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Please add just £2.00 P&P for connector only orders

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S27-4 4-element yagi. Freq: 27-28MHz. Length: 3.8mtrs. Gain: 10.5dB **£69.95**

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MB-1 1:1 Balun 400 watts power **£24.95**
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MB-6 6:1 Balun 400 watts power **£24.95**
MB-1X 1:1 Balun 1000 watts power **£29.95**
MB-4X 4:1 Balun 1000 watts power **£29.95**
MB-6X 6:1 Balun 1000 watts power **£29.95**
MB-Y2 Yagi Balun 1.5 to 50MHz 1kW **£24.95**

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CS401 Same spec as CS201 but4-way **£49.95**

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RC26 Alignment Bearing for RC5-1/3 ..... **£49.95**

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Hatch Back Mount (stainless steel) 4 mts coax/PL259 3/8 or SO239 fully adjustable with turn knob **£29.95**
Gutter Mount (same as above) **£29.95**
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SO259 fitting **£14.95**
Gutter Mount (cast aluminium) 4mtrs coax/PL259 3/8 fitting **£9.95**
SO259 fitting **£12.95**
Hatch Back Mount 3/8 4mtrs coax/PL259 ..... **£12.95**
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ANTENNA WIRE & RIBBON

Enamelled copper wire 16 gauge (50mtrs) **£11.95**
Hard Drawn copper wire 16 gauge (50mtrs) **£12.95**
Equipment wire Multi Stranded (50mtrs) **£9.95**
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PVC Coated Flexweave high quality (50mtrs) **£37.95**
300Ω Ladder Ribbon heavy duty USA imported (20mtrs) **£15.00**
450Ω Ladder Ribbon heavy duty USA imported (20mtrs) **£15.00**
(Other lengths available, please phone for details)

HF BALCONY ANTENNA

BAHF-4 FREQ:10-15-20-40 Mtrs LENGTH: 1.70m HEIGHT: 1.20m POWER: 300 Watts **£159.95**

MISCELLANEOUS ITEMS

CDX Lightening arrestor 500 watts **£19.95**
MDX Lightening arrestor 1000 watts **£24.95**
AKD TV1 filter **£9.95**
Amalgamating tape (10mtrs) **£7.50**
Desoldering pump **£2.99**
Alignment 5pc kit **£1.99**

TELESCOPIC MASTS (aluminium & fibreglass options)

TMA3 3" to 1¼" heavy duty aluminium telescopic mast set, approx 40ft when errect, 6ft collapsed **£199.95**
TMA2 2¼" to 1¼" heavy duty telescopic mast set, approx 40ft when errect, 9ft collapsed **£149.95**
TMA1 2" to 1¼" heavy duty aluminium telescopic mast set, approx 20ft when errect, 6ft collapsed **£99.95**
TMAF-1 2" to 1¼" heavy duty fibreglass telescopic mast set, approx 20ft when errect, 6ft collapsed **£99.95**
TMAF-2 2¼" to 1¼" heavy duty telescopic fibreglass mast set, approx 40ft when errect, 9ft collapsed **£189.95**

HF YAGI

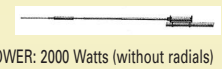
HBV-2 2 BAND 2 ELEMENT TRAPPED BEAM FREQ:20-40 Mtrs GAIN:4dBd BOOM:5.00m LONGEST ELEMENT:13.00m POWER:1600 Watts **£399.95**

ADEX-3300 3 BAND 3 ELEMENT TRAPPED BEAM FREQ:10-15-20 Mtrs GAIN:8 dBd BOOM:4.42m LONGEST ELE:8.46m POWER:2000 Watts **£329.95**

ADEX-6400 6 BAND 4 ELEMENT TRAPPED BEAM FREQ:10-12-15-17-20-30 Mtrs GAIN:7.5 dBd BOOM:4.27m LONGEST ELE:10.00m POWER:2000 Watts **£599.95**
40 Mtr RADIAL KIT FOR ABOVE **£99.00**

HF VERTICALS

VR3000 3 BAND VERTICAL FREQ: 10-15-20 Mtrs GAIN: 3.5dBi HEIGHT: 3.80m POWER: 2000 Watts (without radials) POWER: 500 Watts (with optional radials) **£99.95**
OPTIONAL 10-15-20mtr radial kit **£39.95**



VR5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 4.00m RADIAL LENGTH: 2.30m (included). POWER: 500 Watts **£189.95**

EVX4000 4 BAND VERTICAL FREQ:10-15-20-40 Mtrs GAIN: 3.5dBi HEIGHT: 6.50m POWER: 2000 Watts (without radials) POWER: 500 Watts (with optional radials) **£119.95**
OPTIONAL 10-15-20mtr radial kit **£39.95**
OPTIONAL 40mtr radial kit **£14.95**

EVX5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 7.30m POWER: 2000 Watts (without radials) POWER: 500 Watts (with optional radials) **£169.95**
OPTIONAL 10-15-20mtr radial kit **£39.95**
OPTIONAL 40mtr radial kit **£14.95**
OPTIONAL 80mtr radial kit **£16.95**

EVX6000 6 BAND VERTICAL FREQ: 10-15-20-30-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 5.00m RADIAL LENGTH: 1.70m(included) POWER: 800 Watts **£299.95**

EVX8000 8 BAND VERTICAL FREQ:10-12-15-17-20-30-40 Mtrs (80m optional) GAIN: 3.5dBi HEIGHT: 4.90m RADIAL LENGTH: 1.80m (included) POWER: 2000 Watts **£319.95**
80 MTR RADIAL KIT FOR ABOVE **£89.00**

(All verticals require grounding if optional radials are not purchased to obtain a good VSWR)

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(Hi Grade Heavy Duty Commercial Antennas)

UTD160 FREQ:160 Mtrs LENGTH:28m POWER:1000 Watts **£49.95**
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MTD-2 (2 BAND) FREQ:40-80 Mtrs LENGTH: 20Mtrs POWER:1000 Watts **£49.95**
MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts **£89.95**
MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts **£44.95**
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(MTD-5 is a crossed di-pole with 4 legs)

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10mtr RG58 PL259 to PL259 lead **£7.95**
30mtr RG58 PL259 to PL259 lead **£14.95**

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10mtr RG58 Mil spec PL259 to PL259 lead **£10.95**
30mtr RG58 Mil spec PL259 to PL259 lead **£24.95**
1mtr RG213 Mil spec PL259 to PL259 lead **£4.95**
10mtr RG213 Mil spec PL259 to PL259 lead **£14.95**
30mtr RG213 Mil spec PL259 to PL259 lead **£29.95**
(All other leads and lengths available, ie. BNC to N-type, etc. Please phone for details)

SPX-100 'PLUG N GO'

Normally £49.95. This month **£39.95**!! Plus £6.00 P&P
6mtrs through to 80mtrs.
Change band by using a simple fly lead and socket at the base coil and fine tune with the adjustable telescopic whip.
Standard 3/8 thread 1.65mtrs fully extended.

Looking At ...
Tropospheric Propagation Part 1

This time Gordon King G4VFV starts looking at Tropospheric Propagation, explaining space waves, field strength and refraction.

I find that one of the most exciting aspects of v.h.f. and u.h.f. working is hearing signals from distant places in the UK and Europe suddenly materialise as if the station were just down the road. While this can happen at almost any time of the year, it becomes more prominent from the spring to autumn, particlularly when it coincides with the collapse of a prolonged spell of warm, dry weather, for example.

Longer wavelength radio waves are reflected back to Earth over substantial distances by the refractive influence of the ionosphere, some 50 to 500km above the Earth's surface. At a much smaller wavelength, depending on the density of the ionosphere, the signal will no longer be reflected back to Earth, but will pass through the ionised layers to start a never-ending journey into outer space!

The Troposphere

However, of particular interest in this instalment is in the refractive influence that the Earth's local atmosphere, known as the troposphere, has on signals of very short wavelength. The troposphere extends to around 10 or 11km above Earth in temperate latitudes, increasing to about 16km around the equator. The temperature of the troposphere normally decreases with elevation by about 6°C per kilometre, dropping to about -57°C at 10km.

The troposphere cannot be regarded wholly as homogeneous, as it tends to change with the weather and sometimes, instead of falling with elevation, there's a sudden reversal and the temperature starts to increase. Indeed, because the weather on Earth is born in the troposphere it's not unreasonable to conclude that it plays a fair role in the propagation of very short wavelength radio waves. For now, though, let's take stock of the waves involved in tropospheric propagation.

Space Wave

As Radio Amateurs we tend to orientate and beam our v.h.f. and u.h.f. antennas to exploit the so-called 'space wave'. This is the name given to the wave that travels through the troposphere fairly close to the surface of the Earth.

As you would expect, the maximum distance over which the space wave can be propagated is related to the height of both the transmitting and receiving antennas. One reason for this is because the space wave is not just a single wave. In effect it's a combination of two waves, a wave direct from the transmitting antenna plus a wave reflected at a low angle from the ground, as shown in **Fig. 1.**

The two waves that make up the space wave are known respectively as the direct wave and the ground-reflected wave. For small angles of reflection, the ground-reflected wave undergoes a reversal of phase of virtually 180° at the surface of the Earth, which means that there's a tendency for it to cancel the direct wave.

However, at normal receiving distances, which are large compared with the height of either v.h.f. and u.h.f. antennas, complete cancellation doesn't occur because the path length of the ground-reflected wave is greater than that of the direct wave. As the height of either antenna is increased so is the path length of the ground-reflected wave. This increases the field strength of the space wave. The increase continues with height up to a maximum where the difference in the lengths of the paths taken by the direct wave and the ground-reflected wave corresponds to the signal half wavelength.

From then on any further increase in height causes the field strength to fall, this time reaching a minimum when the difference in path lengths corresponds to the full wavelength. The cycle repeats as the height increase continues, but at normal receiving distances and antenna heights, the receiving antenna would usually need to be pretty lofty to reach the space wave's first field strength maximum.

What's the Field Strength?

The following equation, which takes account of the destructive effect of the ground-reflected

The gain of the proposed antenna system of this TETRA mast, seen here under construction about 1km from Gordon's home in Brixham, will be 8.5dBd, puttng the capture area around half a square metre at a wavelength of 0.75m.

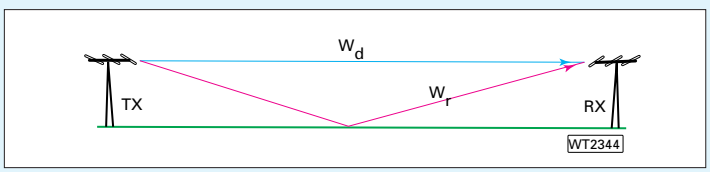

Fig. 1: The space wave at the receiving antenna (RX) can be regarded as two waves, the direct wave (Wd) from the transmitting antenna (TX) and the ground-reflected wave (Wr).

Continued on page 22

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A4S	4 ele beam (10-20m)	SPECIAL ~~£599.95~~	£429.00
R-6000	Vertical 6, 10, 12, 15, 17, 20m	~~£349.95~~	£315.95
R-8E	Vertical (40-10m) "special"	SPECIAL ~~£499.95~~	£349.99
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2m	5ele crossed (boom 64"/10.5dBd)	£79.95
2m	8ele crossed (boom 126"/13dBd)	£99.95
4m	3ele (boom 45"/8.5dBd)	£56.95
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Complete kit (requires feeder) ..... £69.95 del £7.50

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STANDARD G5RV

Full size 102ft (now includes heavy duty 300Ω ribbon) .... £28.95 P&P £6

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SO-239	£5.99

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5m length	£5.00 P&P £3.00
10m length	£10.00 P&P £3.00
300m roll "club special buy"	£135.00 P&P £10.00

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1.1 Balun			£25.00 P&P £4
4.1 Balun			£25.00 P&P £4
6.1 Balun			£25.00 P&P £4
40 mtrs	Traps	(a pair)	£25.00 P&P £4
80 mtrs	Traps	(a pair)	£25.00 P&P £4
10 mtrs	Traps	(a pair)	£25.00 P&P £4
15 mtrs	Traps	(a pair)	£25.00 P&P £4
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5.35MHz	Traps		£25.00 (a pair)

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CW-40	(40-10m) 20m long	£94.95 P&P £8.50

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P&P £8.50

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PLT-80	80m mobile whip (64" long)	£24.95
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PL-259 - PL-259	4m	£9.99
BNC - BNC	1m	£6.99
BNC - BNC	5m	£10.00

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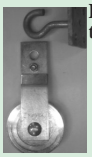

Pulley will hang freely and take most rope up to 6mm. (Wall bracket not supplied).

PULLEY **£8.99** + P&P £2.50

Wall bracket, screws not supplied. Simply screw to outside wall and hang pulley on

WALL BRACKET **£2.99** P&P £1.00

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30m pack nylon guy 4.4mm/B/load 480kg	£12.50 P&P £3
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Never before has one hand portable offered so much. ★ Covers 100kHz-3GHz (all mode) ★ Computer control capability ★ 8-33kHz steps for the new airband spacing ★ Reaction tune capability ★ Includes nicads/charger/ antenna and car lead.

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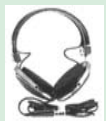

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SMA 40cm flexible whip that is ideal as replacement.

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BNC 40cm flexible whip for the ultimate in gain. (Rx:- 25MHz-2GHz).

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wave, is interesting since is gives a fair inkling of the field strength that one might expect in open country at a given distance within the normal reception range from a transmitting antenna:

where W is the equivalent

$$\text{Field strength E(V/m)} = \frac{88(\sqrt{W})h_t\, h_r}{\lambda d^2}$$

radiated power (e.r.p.) in watts, h_t and h_r the respective heights of the transmitting and receiving antennas in metres, the wavelength of the signal in metres and d the distance in metres.

The equation shows that the field strength of the space wave is proportional to the square-root of the power and the heights of the antennas, and inversely proportional to the wavelength and the square of the distance Substituting values, we find that at a distance of 20km from a 144MHz Amateur Radio station running 100W e.r.p. from a 20m high transmitting antenna the field strength at a 10m high receiving antenna works out to 220mV/m.

You should understand, of course, that in free space and out of range of the destructive effect of the ground-reflected wave, the field strength of the direct wave would suffer little attenuation other than that resulting from the inverse-distance law of spreading, according to the equation:

where W is the e.r.p. in watts

$$\text{Field strength E(V/m)} = \frac{7\sqrt{W}}{d}$$

and d the distance in metres. The field strength is again proportional to the square-root of the power, but this time inversely proportional to the distance alone. Substituting the same values for power and distance, we find that the field strength in this case works out to 3.5mV/m.

Tropospheric Refraction

Because radio waves travel in straight lines it may seem that the communication range would be limited to the optical horizon distance between the tops of the transmitting and receiving antennas as shown in **Fig. 2**. This is not the true story because waves of very short wavelength are refracted by the troposphere, resulting in their path curving slightly round the Earth, thereby increasing the communication distance, albeit, less reliably, over that of the optical horizon.

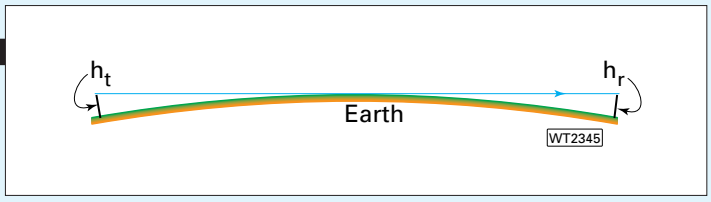


Fig. 2: Even though radio waves travel in straight lines the tropospheric propagation distance is not limited to the optical horizon distance between the tops of the transmitting (h_t) and receiving (h_r) antennas.

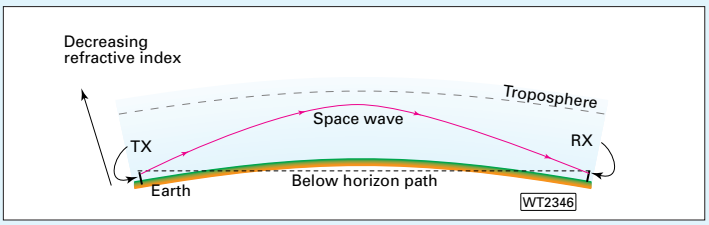


Fig. 3: The slightly curved wave path through the troposphere increases the propagation a little beyond the optical horizon distance.

In a homogeneous troposphere the refractive index decreases linearly with height by around 40 parts in a million in the first kilometre. Propagation-wise this is tantamount to the Earth's radius undergoing an increase of about 33%, which means that communication between the transmitting and receiving antennas is retained even when the straight-line path between the two antennas cuts through the Earth's surface as shown in **Fig. 3**.

Propagation beyond the horizon is also aided to a small degree by diffraction of the wave round the Earth's curvature. This subject will be further considered in Part 2, which will also look at some other features of tropospheric propagation. Until then keep an all-mode ear on the v.h.f. and u.h.f. bands for signs of a tropo lift.

PW

The Yaesu FT-7800E

Twin Band VHF/UHF Mobile Transceiver

John Goodall G0SKR, as keen as ever, gets to grips with yet another introduction from the Yaesu stable. What's his opinion? Read on to find out!

The Yaesu FT-7800E dual-band transceiver could be described as a 'back to basics model'. However, I think that's could be a most unfair title to give this twin band v.h.f./u.h.f. transceiver.

As it's one of the latest releases from the Yaesu stable I was pleased to get to grips with the FT-7800E. The transceiver is indeed an easy unit to operate, but with no less than 13 operating buttons on its front panel, it also has a few hidden surprises. I for one would be happy to have this rig installed in my car or in the shack!

Getting down to our own 'basics', let's take a look at this piece of kit as I get it out of the box. At first it looks quite humble as I pull it from its familiar brown eco-friendly recyclable cardboard packing.

● Fig. 1: Showing the detachable control head which is removable for easier mounting (see text).

But I wasn't to be fooled! Yaesu are responsible for turning out some excellent transceivers into the Amateur market place. The FT-7800E is no exception.

What's On Offer?

So, what's on offer this time? On opening the box, I found it contained the FT-7800E itself, the MH-48 microphone, a d.c. power cable, a mounting bracket and hardware, and a couple of spare 15A blade fuses. **Note:** In my opinion this is an excellent change from the 1in standard

● "A nice surprise is in store for anyone who buys a Yaesu FT-7800E" writes G0SKR in his review.

round glass fuse to the more readily available blade variety. The blade types are available from almost all motorists accessory shops.

The rig is not excessive when it comes to measuring up in size. Dimensions are: 190mm front to back (including knobs and fan); 140mm wide and 40 mm high.

The front panel, **Fig. 1**, is removable for remote mounting, a very useful item in today's modern vehicles with few areas to mount Amateur Radio equipment. The front panel is uncluttered but with all the buttons needed for easy operation of the set.

On the transceiver's rear panel you'll find the single antenna output socket. Incidentally, it's nice to see the N type being used here. The data-out socket is also to be found on the rear panel, on the opposite side to the antenna socket. This would be used for connection to a Terminal Node Controller (TNC) for – dare I mention the word without being turned into stone – Packet!

The handbook clearly identifies the pin designation for data output socket. However, it's a pity Yaesu didn't include such a plug with the review model. They can be obtained from various outlets, but I feel Yaesu may in future consider including one in the box!

Some mobile operators prefer a separately located loudspeaker. To this end, Yaesu have provided a rear panel mounted 3.5mm jack for an extension speaker.

The cooling fan is mounted in the centre of the rear panel, **Fig. 2**. It comes into operation when the operator presses the push-to-talk (p.t.t.) switch on the microphone. This fan, on the review model, although small is very powerful, extremely quiet and hardly noticeable when operating. Fans can be irritating and annoying if noisy, not only to the operator, but also to those on the receiving end!

Yaesu, with its later model v.h.f./u.h.f. transceivers, have moved away from the traditional T Lucar type connector for the d.c. input. Instead, they've moved to a new unique non-reversible, non-standard connector, **Fig. 3**. Oh how I wish manufacturers would stay with tested and tried connectors! They make life so much easier when moving a rig from one vehicle to another, or vehicle to shack, scout hut or wherever. My adapter lead boxwill soon be too big for the car!

Fig. 2: The powerful cooling fan is almost silent when running. A single N type plug is provide for v.h.f./u.h.f. use. The data input socket (see text) is directly under the power input entry point, with the external loudspeaker socket to the far right (see text).

Warm Glow

Having connected my d.c. supply to the FT-7800E, I was surprised by the warm orange-red glow from the buttons and the display panel, **Fig. 4**. The visible area of the display, though only 17 x 65mm, is very clear and easy to read. You don't have to be looking at the display from directly in front of it – I quickly found that from most angles the display could easily be read.

Earlier in this article I mentioned the transceiver's twin band as opposed to dual band operation. "What's the difference"?...you may well ask.

The answer is that a transceiver, which displays both working and standby frequency (that more often than not, is usually one v.h.f. and one u.h.f. frequency, I call dual-band). Conversely, the transceivers that only display **one frequency of one band at one time**, I call twin band. The FT-7800E is of the twin band variety, although there are a few surprises in that department to come later!

The Controls

The front panel has three rotary controls, two to the left edge and one larger to the right hand edge. The upper of the left-hand rotary controls is for volume, whilst the lower is the squelch control.

The larger knob on the right of the front panel is the rotary encoder control. This changes the frequency displayed whilst it's in **VFO mode** or the **Memory channel** whilst in Memory mode.

Above the main encoder rotary knob can be found the non-illuminated push button for power on or off. Pushing and holding this button briefly switches the unit on. When powered-up the unit gives a soft three tone announcement followed by the warm glow from the buttons and display. A warm welcome!

To the lower edge of the display are a row of seven dual function buttons. The left most button, marked **MHz/PRI**, with a momentary push, allows, when operating the rig in VFO mode, the MHz frequency to be changed. Pushing and holding this button for half a second activates the priority channel scanning mode, or simply dual watch.

The next button to the right, marked **Tone/HM/RV**, when operated with a momentary push, toggles through CTCSS (Continuous Tone Coded Squelch System) encode; CTCSS encode and decode; Reverse CTCSS; DCS (Digital Code Squelch) and off.

The reverse CTCSS works as it sounds, programme a CTCSS frequency and with this facility active, the radio unmutes the audio when it hears a signal with matching tone. Pressing and holding this button for half a second reverses the transmit/receive frequencies whilst in a repeater mode. **Note:** This function is designed for briefly listening on the input of a repeater. (Checking if you can hear the other station you're talking to, if you can, you can move to a simplex frequency, thus keeping the repeater clear for other users).

The next button along the lower row is marked **Low/ACC**. When momentarily pressed this toggles the output power settings of the radio to **Low**, **Mid 2**; **Mid 1** and **High**.

Each press of the button is greeted with a soft double tone, rising in frequency for each setting. The Low gives 5W power on both v.h.f. and u.h.f.. The MID2 enables 10W power on both v.h.f. and u.h.f. while Mid 1 gives 20W power on v.h.f./u.h.f. The High setting gives 50W on v.h.f. and 40W on u.h.f.

Pushing and holding the same button for half a second accesses the pre-programmed Weather Broadcast Channels. (Incidentally, 10 pre-programmed channels are available for listening to National Oceanic and Atmospheric Administration frequencies, but these aren't available in the UK).

Note: The press and hold feature can be modified to other functions. For example, **Dim** and **Lock** are just a couple of useful functions for this press and hold for **Low/ACC**.

The **Band/Set** control is the next button along the row and this is the most powerful of all the buttons. For example, In VFO mode, momentarily pressing this button toggles through the various bands of operating: 144, 250, 350, 430 and 850MHz. **Note:** Transmission is only possible on 144 and 430MHz Bands.

Range Impressive

The frequency range of the FT-7800E is impressive as it can receive from 108 to 520MHz without breaks and from 700 to 999.990MHz.

Amplitude modulation (a.m.) is automatically selected for 108 to 137MHz (Civil Air Band) and between 300 and 320MHz. However, a.m. is fully switchable for most frequencies via the **Set Menu**, allowing a.m. listening on the Military Air Band – should you wish to break the law and listen!

Remember you are only legally allowed to listen to Broadcast stations, Amateur and Citizen Band stations. Everything else is forbidden!

Pushing and holding the **Band/Set** button for half a second puts the transceiver into **Menu** (**Set**) mode. This functions allows the operator to modify any of the 48 menu items within the transceiver. These items include; No. 01 - **APO**, Automatic Power Off; No. 43 - **Steps** (sets the synthesiser steps); No. 35 – RX (receiver) mode (Selects the receiving mode) **Auto/FM/AM**; No. 43 - **TOT** (this sets the time out timer). And these are just a few of the items available for you to modify.

The next button is the **V/M**

Fig. 3: Yaesu, with their late model v.h.f./u.h.f. transceivers, have moved away from the traditional T Lucar type connector for the d.c. input. Instead, they've moved to a new unique non-reversible, non-standard connector (see text).

MW (memory write) control. This, with a momentary press, toggles between **VFO**, **Memory** and Home channel. Pressing and holding for half a second when in VFO mode enters the frequency MW mode, used when entering the frequency into a memory slot.

Fig. 4: Having connected his d.c. supply to the FT-7800E, G0SKR was surprised by the warm orange-red glow from the buttons and the display panel. John found that the visible area of the display, though only 17 x 65mm, is very clear and easy to read.

It's worth noting at this point, that the FT-7800E, has a massive 1000 standard memories. It also has **Home Memories (HM)** – one for each band; 50 sets of **Band-Edge Memories**, for programmable memory scan; **20 Memory Banks**; five **Hyper-Memory Channels**; **31 Smart Search Memories** and not forgetting the 10 pre-programmed weather channels! That's a lot of memory channels in anyone's book – I don't think I even know a thousand frequencies – still, if you need them the FT-7800E has them ready for use!

The **Scan/Sel** button is next and this is simply used for scanning operations. Momentarily pressing activates the scan feature, whether in VFO or Memory. Pressing and holding for second selects the scan mode, number of Bank or any of the numbered Banks programmed.

The **S.SCH/ARTS** is the button used for Smart Search Memories and Auto Range Transponder System (ARTS). A single momentary press, activates the Smart Search mode. In this mode the unit searches above and below the displayed frequency, storing up to 15 active frequencies above, and 15 active frequencies below the displayed frequency.

The latter facility can be so useful when you're visiting a location for the first time. You may not be sure of the repeater frequency or what activity you may be expected to find on the simplex frequencies – there is life on 144MHz I promise you! Pushing and holding the same button for half a second puts the rig into ARTS mode (for use with another station having a similar facility).

To the left and right of the main display are six buttons. Three buttons to the left, these being numbered (appropriately) 1 – 3. To the right, three buttons, two numbered 4 and 5, and one for Internet Connection, on a u.h.f. frequency.

The buttons numbered 1 through to 5 are **Hyper Memories**. Hyper Memories allow for the total present configuration of the radio, to be quickly stored by the simple press and hold of one of these buttons, into one of the five slots.

Fig. 5: The review model was supplied with MH-48 DTMF Hand Microphone which made the operation of the unit extremely easy. The v.f.o. frequencies can be entered directly to the display, from the numeric keypad (see text).

Couldn't Be Simpler!

Programming of the radio couldn't be simpler, thankfully! The displayed frequency, offset if used, CTCSS or DCS frequency and power level can be stored in any of the 1000 memories.

It took me all of five minutes to program the review model with all 144 and 430MHz, repeater and simplex frequencies, along with a few extra I shan't mention – but I do like aircraft and live near the sea!

The review model was supplied with MH-48 DTMF Hand Microphone, **Fig. 5**. This made the operation of the unit extremely easy.

The v.f.o. frequencies can be entered directly to the display, from the numeric key pad. Memory write and Memory/VFO mode are also accessible directly from the microphone. On the lower edge of the front of the microphone are four buttons, P1 – P4. These can be programmed to facilitate any of the radio front panel buttons.

The review model microphone was programmed as standard for the buttons to have the basic functions; P1 – Band selection in VFO mode or Memory Tuning in Memory mode; P2 – VFO/Memory/Home mode; P3 – 1750Hz Tone for repeater access; P4 – Low/Mid 2/Mid 1/High power levels.

Operating A Pleasure

Operating the FT-7800E was a pleasure and the list of contacts is too great to include here. However, out of interest even my wife could operate it – but don't shout too loud - she'll only want one for her Birthday!

The receiver on the review model was indeed sensitive and worked very well on a.m. receive – though of course - to stay within the law I didn't really listen to anything on that mode!

The ease with which the rig can be programmed and operated makes it an ideal first transceiver for **any Amateur**. However, I would particularly recommend it as a back-to-basics, simple to programmed and operate rig. Having a dedicated 10W power setting, what better transceiver is there for our ever growing number of Foundation Licensees?

At a price of around £239 the FT-7800E is a bargain indeed. My thanks go to Yaesu UK for the loan of this excellent bit of kit and to all the guys who assisted with my on-air checks.

PW

Product

Yaesu FT-7800E v.h.f./u.h.f. mobile transceiver

Company

Yaesu UK Ltd.

Contact

Tel: (01962) 866667

Pros and Cons

Pros

The ease with which the rig can be programmed and operated makes it an ideal first transceiver for **any Amateur**. However, I would particularly recommend it as a back-to-basics, simple to programme and operate rig. Having a dedicated 10W power setting, what better transceiver is there for our ever growing number of Foundation Licensees?

Cons

Yaesu, with its later model v.h.f./u.h.f. transceivers, have moved away from the traditional T Lucar type connector for the d.c. power input. Instead, they've moved to a new unique non-reversible, non-standard connector. No data socket plug supplied.

Summary

At a price of around £239 the FT-7800E is a bargain indeed.

Price

In the region of £239

Thanks

My thanks go to **Yaesu UK Ltd., Unit 12, Sun Valley Business Park, Winnal Close, Winchester, Hampshire SO23 0LB**, for the loan of the review model.

radio basics

Rob Mannion G3XFD asks "Are you just starting off in the hobby and not sure what tools will help with your radio construction"? If the answer is 'Yes', Rob has some advice and ideas to help!

When I started off in the hobby my pocket money didn't go very far and most of my hand-tools were simple and sometimes very old. Despite this most were of very good quality and one pair of War Surplus pliers, bought when I was eight years old - are still in use today! The moral is of course - buy the best quality you can and the tools will last a lifetime.

Nowadays, there's an excellent choice of hand-tools available from many sources, as shown in **Figs. 1, 2, 3, 4, 5, 6** and **7**. But care has to be taken in selecting what to buy. For example, it's entirely possible to buy a complete set of tools (Hammer, screwdrivers, hacksaw, socket set, pliers, spanners, etc.) for less than £15 from some High Street d.i.y. chains.

However, to quote a rusty old cliché - "You get what you pay for"….and I speak from experience. I've fallen into the trap of thinking that the smartly finished black plastic toolbox with its good selection of tools would be 'handy for the car'. Unfortunately though, when I first used the socket set the metal was so soft it literally crumbled away. So, my advice is to buy with care.

Made In China

Nowadays, many products are produced in mainland China, and they are quickly catching up with Taiwan in the variety and amount of goods they produce. Several years ago I would have warned anyone to think twice, (perhaps three times!) about buying Chinese made electronic/electrical goods - but their quality control is improving fast!

To be fair, the quality of the electrical goods coming from China nowadays often reflects the European country and the brand name carried on the product. For example, I have a Chinese-made TENS machine (used for pain control in arthritis, etc) which is made for **Boots the Chemist**. It's of first class quality! I also have a portable DVD/CD player bought from my local **Woolworths** store. Also made in China, this too is of superb quality in both design, construction and reliability.

The reason for mentioning the Chinese products is because, as the quality control of their products improves, there are now some amazing bargains to be found, especially in consumer electronics and tools. **Tip:** Best buy what you need now - remember that Japanese goods were once very cheap, and as living standards and wages for Chinese workers improve (as they should!) prices will gradually increase.

A month or so ago I purchased an exceptional bargain from my local Woolworths in the shape of a quick-heat soldering gun complete with comprehensive soldering kit for around £14. Admittedly, the first one had to be returned because of a fault - but the replacement has worked perfectly. So, just be aware of variable quality control and you'll get full advantage of bargain prices.

It's worth mentioning the soldering tool kit as it contained some extremely well made accessories. These included a de-soldering tool, of the same design in Fig. 6, which is very good

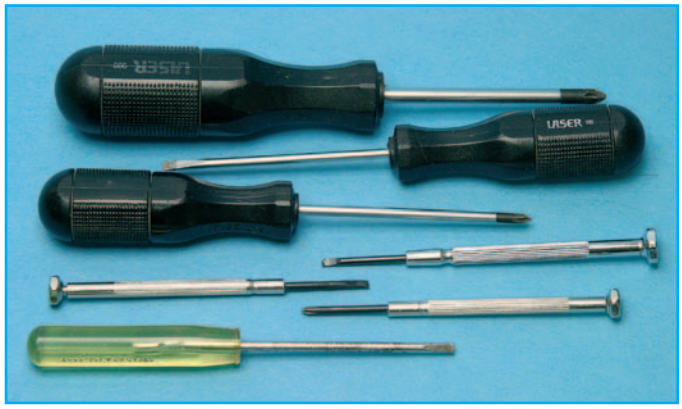


Fig. 1: You need the best selection of screwdrivers possible. I feel that you can never have too many!

Fig. 2: A good choice of quality pliers and forceps is essential for the workshop. Spring loaded types (the springs hold the jaws open) feel better in the hand and are recommended.

Fig. 3: Small cutters, tweezers, scalpels along with fibre-tipped pens (for cleaning contacts, etc.) are extremely helpful. Although more expensive, reverse action (you squeeze to open them) tweezers are very useful for heat shunting while soldering) and are highly recommended.

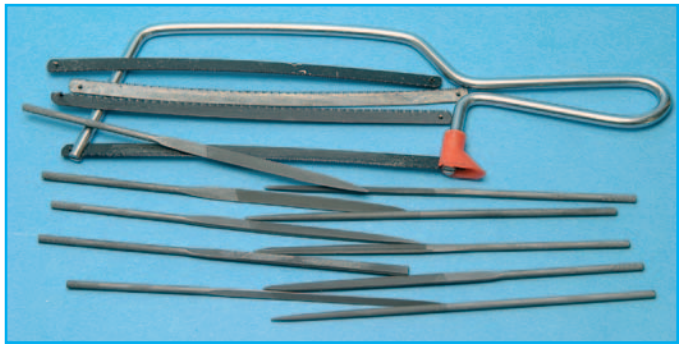


Fig. 4: Buy the best quality files you can afford, and ensure you have a good selection of round, half round, triangular and flat section types. A simple 'Junior' hacksaw is suitable for most light work.

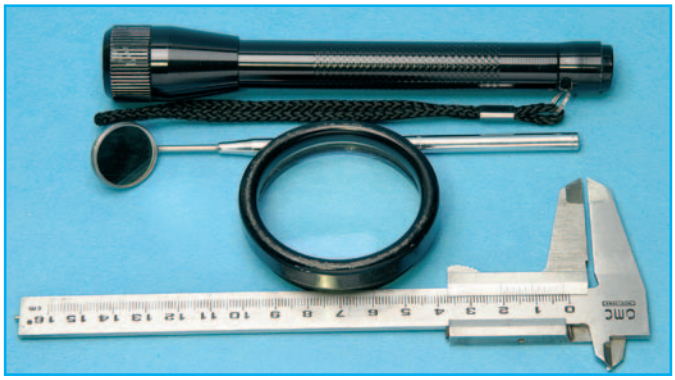


Fig. 5: A good quality small torch is very useful, together with a dental inspection mirror and magnifying glass. Buying an Engineer's gauge will also help you get those internal and external measurements right!

Fig. 6: A heavy duty soldering station (the example in photograph is British made) is an excellent investment. Desoldering wick (the orange disc) and a de-soldering pump are also extremely useful (see text) .

quality indeed. There's also a magnifying glass 'helping hand' device complete with crocodile clips for holding the items to be soldered.

Rotary Grinding Tool

Another item which is becoming an increasing bargain for the hobbyist is the portable, hand-held rotary grinding tool, Fig. 7. Usually powered by internal rechargeable batteries, these popular little tools are supplied with battery chargers and a remarkably comprehensive set of grinding/sanding/engraving and drilling attachments.

Also made in China, the extremely useful little drill/grinder sets can cost as little as £15. Like the soldering kits, they are housed in a soft grey plastic tool box. I bought mine from the **Robert Dyas** High Street hardware chain. However, I've seen them literally everywhere where tools and hardware are sold.

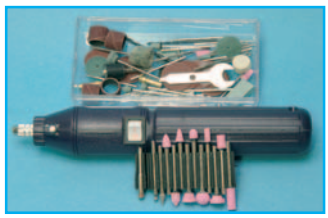
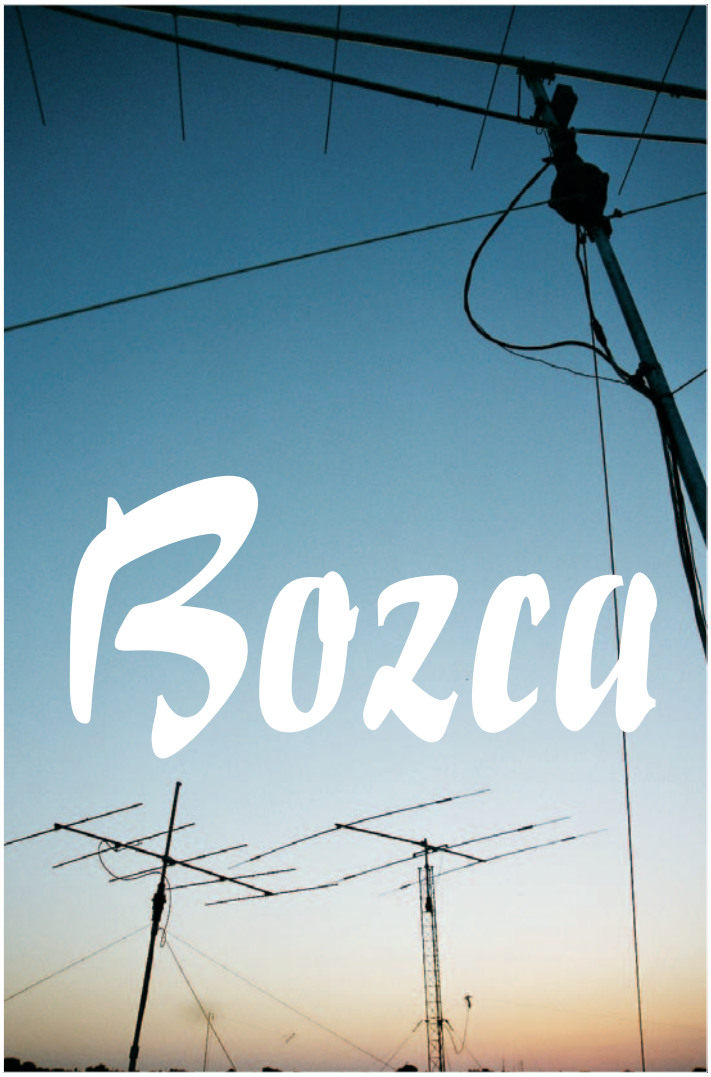


Fig 7: A battery powered rotary grinding/drilling tool with a comprehensive set of tools, such as this can prove extremely useful in your workshop.

Until you've actually used one of the mini-drill sets it's difficult to appreciate their versatility. For example, I've even found the miniature grinding stones with the kit to be very useful in making my own 'Copper Island' boards. All I have to do is to mark where I want the copper islands to be and then grind away the copper laminate surrounding the island.

Next, I use the tool to drill the p.c.b. laminate. Any rough edges on the board can be sanded by another of the supplied tools. Altogether, I consider these little units to be ideal for use in a radio workshop.

I'll be looking at some more ideas for your workshop, including really simple test equipment next month. I shall soon be equipping my own new workshop and will of course pass on some of the ideas to help readers. Cheerio for now. **PW**



● Sunset silhouetted antennas of YM0KA.

Bozca Ada

Henryk Kotowski SM0JHF tells us about his DXpedition to Bozca Ada Island and the Amateur Radio activity that he encountered. Read on to discover more of this Turkish Trip!

The best target for a DXpedition is an uninhabited island. The next best is an island without resident Amateur Radio operators. Therefore Bozca Ada fares well.

Bozca Ada Island is located a few miles off the western coast of Turkey in the Aegian Sea, near the Dardanelle Straits and the historical town of Troya. Its Islands On The Air (IOTA) designator is AS-099.

I decided to take a trip there at the end of June 2003. A friend of mine, who I'd met some five years earlier in Istanbul, **Aziz Sasa TA1E** was planning another spell of activity from his summer QTH located in the middle of Bozca Ada Island and I decided to join the group.

Real DXpeditions are not as easy as simply taking a flight and having your multi-band vertical antenna installed by the hotel personnel. For my tip to Bozca Ada I had to I fly to Istanbul one Friday afternoon to be met by Aziz. Then we drove to his home so he could pick-up a few items and then around 0200 hours, when the traffic on Turkish highways slowed down, we set out for a 450km (300 mile) long night ride! At 0600 hours we reached the ferry that crosses the Marmara Sea and at 1000 we finally embarked the ferry boat to Bozca Ada.

On Arrival

When we finally arrived at Aziz's 'summer house' on Bozca Ada, around noon local time (UTC +3), the other three members of the group were busy erecting antennas for the 50 and 144MHz bands on the roof in readiness for the 50MHz IARU contest, which was due to start in three hours. The two antennas for the 50MHz band were already installed - a rotary Yagi and a vertical.

● Mario IW2HUZ holds the 144MHz antenna support while Andrea HB9DUR tightens the ropes.

● Andrea HB9DUR at the h.f. station.

● True Multioperator action on 50MHz. Aziz TA1E does the talking, Andrea HB9DUR does the logging.

● Aziz TA1E operating YM0KA on 14MHz s.s.b.

a Island

The three other members of our group had arrived one day earlier. The technical mastermind of the DXpedition was **Andrea HB9DUR**. Even though Andrea is only about 30 years old he has a long record of sucessful Amateur Radio activity on different bands and modes. Andrea had also somehow managed to persuade two Italian Amateur Radio operators join the DXpedition group. They were **Mario IW2HUZ** and **Oscar IK2AQZ**, both from Northern Italy.

The vertical antenna, of substantial height, sometimes proved to be better than a Yagi pointed in the right direction, which shows that the antenna gain figures are not everything! The angle of the main lobe is of greater value.

Licence Arranged

Aziz TA1E, who is the President of the **Turkish Amateur Radio Society** (TRAC), arranged a temporary 50MHz licence for our weekend of radio operation. Incidentially, there is still no general 50MHz permit in Turkey but things are changing quite rapidly. Twenty years ago Amateur Radio was not even legal in Turkey, today there are thousands of licencees, tens of repeaters, activity is high and the CEPT licence is valid. I took advantage of this fact and made hundreds of c.w. QSOs from Bozca Ada using my own callsign **TA0/SM0JHF**. The country is divided into call areas; TA0 are all the islands, TA1 is the European part north of Marmara Sea and so on.

Apart from the 50MHz station, which was switched on all the time, we also had a Kenwood TS-850 h.f. transceiver and a 500W amplifier - on the h.f. bands. Another set was standing-by for use on 144MHz. Andrea HB9DUR was anticipating tropospheric openings on 144MHz and also scheduled several Meteor Scatter (MS) sessions. He used his own Turkish callsign, **TA1ZK/0**, for the MS tests.

Aziz TA1E had a tri-bander for use on 14/21/28MHz and a folded dipole (called a T2FD) that was supposed to work on all bands. However, I tried it on some of the WARC bands and was not very impressed.

One day during the weekend I spotted a wire hanging from a tall tree, the remains of an old wire antenna. I used this wire with my automatic antenna tuner and the Icom IC-706 that I had with me. The wire turned out to be a very efficient radiator on 10 and 18MHz. Even, after years of being an active Amateur Radio operator I'm still pleasantly surprised by very simple arrangements.

Special Call

The callsign we used most of the time during our stay on Bozca Ada was **YM0KA**. The YM prefix is used for special event and contest purposes and the KA suffix is actually assigned to the Headquarters of TRAC; in Istanbul the callsign is normally TA1KA. (Please note all QSL requests for YM0KA should go to the Turkish QSL Bureau).

Bozca Ada island is very small but has played important roles in the past. It has been inhabited for at least 5000 years. Today it offers good beaches and crystal clear water, a lot of sunshine, crops yielding good wines and olive oil. It's never crowded and not exploited.

For Amateur Radio purposes the major part of the island is in locator square KM39. However, its western tip, dry like desert, with an old lighthouse and a row of wind power generators, is in locator KM29. A couple of years ago Aziz and Andrea organised a field day activity here during a world-wide v.h.f. contest. The group won the contest using the same YM0KA callsign.

In fact the callsign YM0KA has been used from Bozca Ada several times and I'm sure it is going to be used many times in the future. So listen out and if you hear the call, work it!

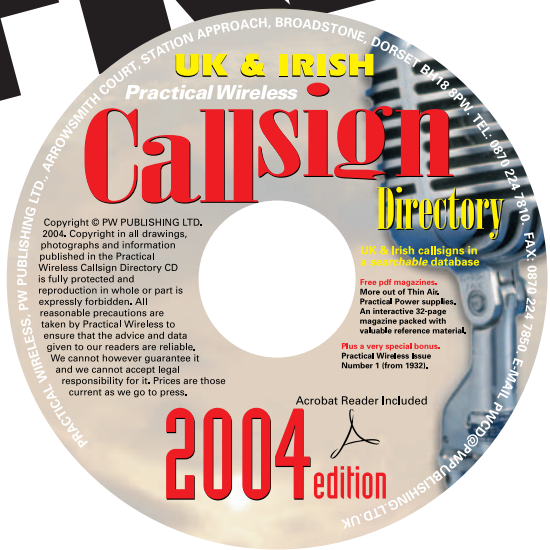
PW

● The long boom of the 144MHz Yagi on the roof.

● Oscar IK2AQZ working on the antennas.

● Andrea HB9DUR during his Meteor Scatter sked on 144MHz.

FREE



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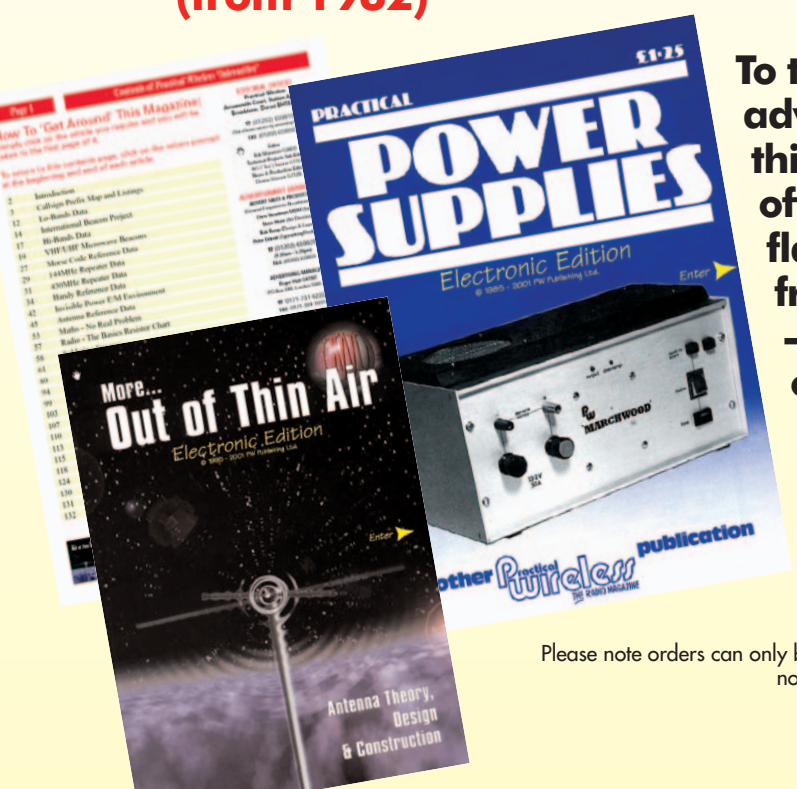

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Building A Low Cost RF Impedance Meter

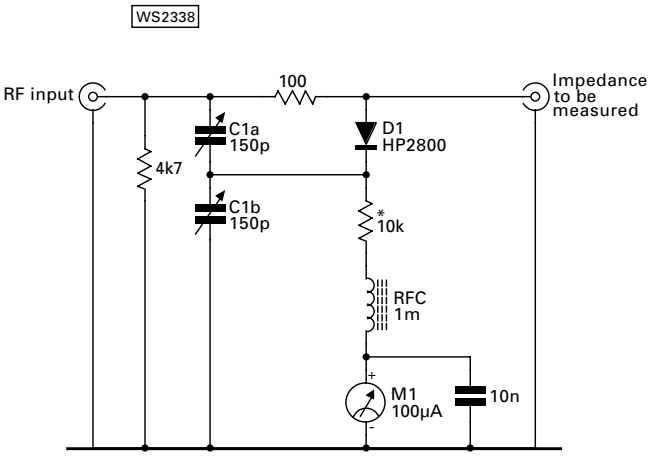
Geoff Sims G4GNQ enjoys being busy in his workshop. The inexpensive r.f. impedance meter described here is one of his most useful pieces of simple home-brewed test equipment. Try one for yourself!

Over the years I've often used the tried and tested method of tuning and trimming h.f. antennas using a dip oscillator supplemented by a noise bridge. However, the antenna performance has proved less than expected, possibly due to mismatch in either the feeder or antenna in question.

Having once used a friend's MFJ Antenna Analyser, I started thinking of a cheaper alternative. Two designs are available for determining the unknown impedance of a circuit under test. They are the resistive and capacitive networks. Both circuits work on the same principal of balancing known resistive values against the unknown, or 'X' value in a Wheatstone Bridge.

The Circuit

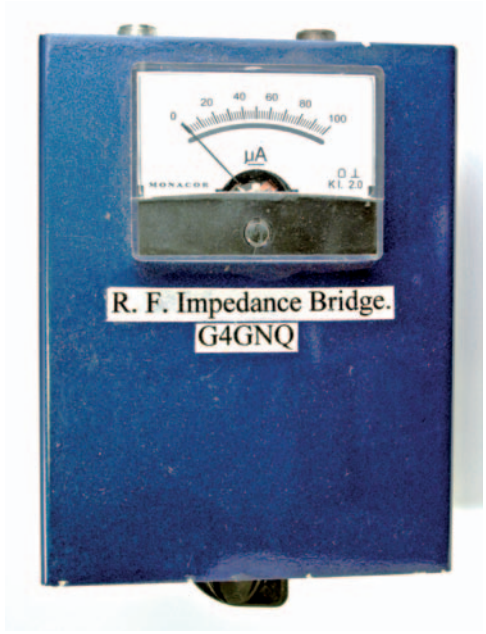
I chose the capacitive approach, and the circuit, **Fig. 1**, consists of a capacitive bridge utilising a differential capacitor as one half of the bridge network. The second half of the circuit is a known fixed resistor and the 'X' value to be measured.



● Fig. 1: Geoff Sims G4GNQ opted for the capacitive design for his meter. The circuit consists of a capacitive bridge utilising a differential capacitor as one half of the bridge network. (See text).

A diode is used to rectify the alternating current (a.c.) component resulting from any imbalance. A moving coil meter acts as the null detector indicator.

The principle of operation is as follows; The differential capacitor forms one half of the Wheatstone bridge, with the remaining sections being a 100Ω resistor, located in the transmission path, between the source generator and the unknown impedance to be measured.



● The low cost r.f. impedance meter prototype as built by G4GNQ.

By applying an r.f. signal to the input, then connecting the unknown impedance to the detector output, and by rotating the differential capacitor through 180° it's possible to null the circuit between 0 and 500Ω. **Note:** The usable frequency range is between 1 to 30MHz, with a reduced performance outside these frequencies.

Differential Capacitor

The layout is not too critical, however the differential capacitor **must be fully screened** from the operating control. (This is to prevent additional stray capacitance affecting the balance of the bridge). Additionally, the rotor must be isolated from the common earth point as this would prevent the circuit from operating.

Differential capacitors are not a commonly used component nowadays, and unlike a normal capacitor the overall capacitance value remains constant during rotation. However, the capacitance differentiates between the two sets of stator plates.

The main use of differential capacitors is in commercial impedance bridge circuits. However, I had no difficulty in obtaining the capacitor from Jacksons, (Mainline).

Building The Project

For the prototype I adopted the technique where all the components are mounted on one side of a double-sided printed circuit board (p.c.b.). The other side of this board forms the front portion of the screening box, see heading photograph and **Fig. 2**).

Prior to assembly, I suggest you draw the detector circuit onto the front p.c.b. board. Then drill a hole for the shaft where you mount the capacitor. Double check the design and then etch the board.

Solder the detector circuit components to the front board and then temporally fit the capacitor to ensure there is sufficient side clearance to attach all the other boards. At this stage you have to ensure that everything is squared up, as failing to do this will result in the capacitor shaft binding on the front supporting bearing.

You can now remove the capacitor to allow the soldering of the front panel p.c.b. to the main

board. This is initially achieved by soldering the two corners.

Check to see that the front is still square before running the solder along the whole joint. Then solder the two side screening assemblies onto the front board and the main p.c.b.

Refit the capacitor and then solder the wires to the detector circuit on the front p.c.b. acting as the front panel. Next, you should fit the rear board which is best achieved by using wire straps rather than trying to flow solder down the side of the board and then fit the top screening board using the same method.

Fitting The Meter

Pre-drill the box chosen to house the project, allowing the meter to be fitted and the control shaft to be slid in at the front. Next, mount the r.f. input and detector sockets on the rear of the box followed by the shaft bush assembly onto the front of the box.

When fitting the main p.c.b. into the bottom of the box - allow sufficient clearance between the shaft and the box front. **Remember the shaft forms part of the bridge circuit, therefore it must not be allowed to come into contact with the box front or the earth connection**. Attach the wires to the connectors keeping the wiring as straight as possible.

Fit the insulated extension shaft to the capacitor using a shaft coupler and finally connect the meter to the two remaining wires. This completes the construction stages and it's time to test.

If you now apply a small amount of r.f. to the input socket. **Note:** I suggest no more than 4mW, you should get a deflection on the meter if all is correct.

Rotate the capacitor until you have a maximum meter reading, this indicates the zero impedance point. Then you should rotate the shaft through 180° and the meter should null out - in doing so it will indicate maximum impedance.

Calibration Scale

To make the calibration scale I used stiff white card obtained from my wife's art box (Permission was granted!). Firstly, I drew a semicircle onto the card. I then temporarily attached card to the front of the case, **Fig. 3**, so the scale could be calibrated.

Note: It is preferable for the initial work to be completed with a sharp pencil. After the initial calibration you can remake the scale properly, before permanently attaching it to the front of the box.

Signal Generator

Next, you'll need either a signal generator or very low power transceiver. Being keen I constructed a signal generator covering the Amateur Radio bands specifically to drive this meter!

Important note: Calibration must be carried out at the lowest usable frequency to minimise the effects of stray capacitance affecting the final values. (You may find out that the bridge may not null out completely at 30MHz due to the surrounding stray capacitance caused by the wiring).

To start you should first

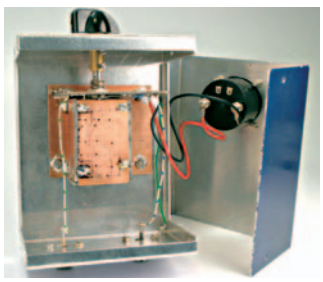


Fig. 2: The prototype used the technique where all the components are mounted on one side of a double-sided printed circuit board (p.c.b.). The other side of this board forms the front portion of the screening box. (see text).

obtain a maximum reading on the meter (this indicates the zero impedance of the circuit). Then apply a short circuit to the measuring point and the indication on the meter will return to zero. 'Rock' the shaft slightly either way to ensure you have the exact null point. When you've confirmed the point, it will indicate the zero impedance

Using known values of fixed resistors you can calibrate the scale similar to Fig. 3. I suggest that you start with the lowest impedance work upwards to around 100Ω.

The lower values should scale in a fairly linear manner. However once past 100Ω value, the scale becomes more logarithmic, due to the internal capacitive strays affecting the balance.

When calibrating ensure the connection to the test point is secure. (Use good quality coaxial cable otherwise you will affect the overall calibration results).

Fig. 3: Geoff G4GNQ temporarily attached a card to the front of the case, so the scale could be calibrated (see text).

Calibration Impedance

When using the meter, as I've already mentioned, the odd length of coaxial cable can change the calibration impedance.

For example, I connected around 300mm of 75Ω television coaxial cable to the impedance bridge and terminated this with a 47Ω resistor. The results were quite surprising.!

At 1.8MHz the impedance was as expected (50Ω). However, at 30MHz the value rose to 100Ω, way above the expected value. I then measured the d.c. resistance of the test circuit and found - as expected - 47Ω.

As well as finding the accurate impedance for any antenna at a known frequency, tuning and trimming also become much easier. As an example, I bought a second-hand three-element 14, 21 and 28MHz beam. Using the manufacturer's data I set the antenna element measurements according to the instructions.

The antenna actually resonated on 29.5MHz but the remaining bands were well off frequency. On 14MHz the 50Ω reading was 13.5MHz. The 21MHz band gave a reading of 20.6MHz for the 50Ω.

In both instances the dip for the mid-band frequency lay between 100 and 150Ω. So, tuning the antenna to each band was achieved very quickly indeed - saving my ageing legs!

Measure & Trim

The meter makes it quite easy to measure and trim odd lengths of coaxial cable to find out the quarter wavelength at a given frequency. Another really useful service is the indication whether or not that odd length of unknown coaxial cable in the spares box is useless for r.f.

Stub matching is very much easier as you'll always get a reading of resonance. The input impedance of a tuned circuit can also be found. You can also optimise the frequency range of an antenna balun.

For example, I found one of my 4:1 air wound antenna baluns was only effective between 7 and 14MHz. Outside this range, the input impedance varied between 90Ω at 3.5MHz to 20Ω at 30MHz.

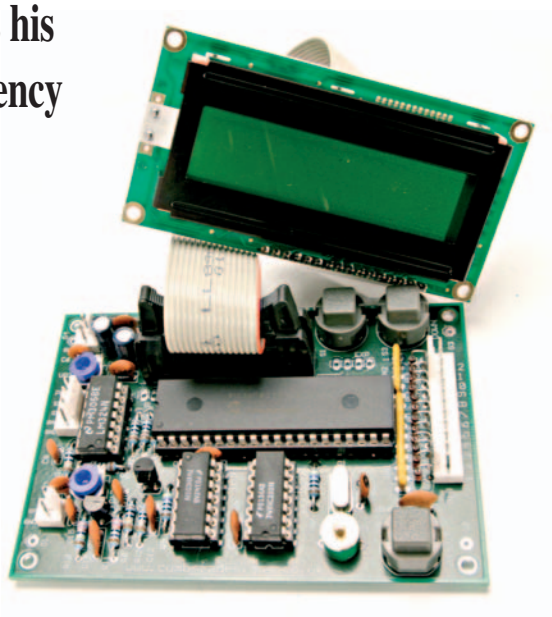
The downside is that the impedance meter **will not indicate** the presence of inductive or capacitive reactance. Despite this, you'll certainly obtain a good approximation because of the depth of the null on the meter.

If you connect around 1.5 metres of coaxial cable to r.f. input with the output un-terminated you'll notice the following: As you vary the input frequency, the null indicator will dip, indicating the multiple resonance of the cable.

I chose to paint the box with car lacquer (you can buy this, usually in spray cans, at one of the High Street motor accessory shops). This serves two purposes. Firstly, the box is easier to keep clean. Additionally, clear lacquer - correctly applied - provides good waterproofing for the scale. It also helps secure the card in place after the calibration process and the effort you've spent in producing a good project. Good detecting! **PW**

Cumbria Designs FD-01 Kit - A Review

Our technical editor 'Tex' Swann G1TEX/M3NGS gets his soldering iron out to build and look at a versatile frequency and information display from Cumbria Designs.



The FD-01 Display modules from Cumbria Designs can display frequency, mode, a transmit or receive state and an analogue of voltages that may represent an S-meter reading and a transmit output power. It could become the display for almost any home-brew transceiver, but I'll describe more of this later.

Fig. 1: The contents of the two main kit bags.

Fig. 2: The suggested tools assembled ready to start.

I must state that the fact that I'm presently an 'ex-pat' Cumbrian **will not, in any way**, influence me as to what I say about the FD-01 transceiver display kit from Cumbria Designs! However, I did become just a little nostalgic when looking at their website **www.cumbriadesigns.co.uk** to see 'Winter dusk from Scafell looking towards Great Gable and Skiddaw'. It's looking in the direction of the 'back-yard' of what I consider home.

But, getting back to the job in hand, what do you receive in the package that contains the parts of the project? Well the FD-01 kit contains the extra small unit, the LCDA kit, that makes interfacing the liquid crystal display (l.c.d.) unit to the cable that attaches to the main board of the project. The photograph, **Fig. 1,** shows what is in the package.

Contents

The kit was packed in several small 'black' bags and plastic tubes. The contents of the various anti-static packets and tubes contained the integrated circuits, and sockets for the project. These were accompanied by a strip of diodes, several resistors, and the shells and pins to make up several plugs for interfacing to the project.

Also in the kit I found two 'snap-lock' sockets, and a ribbon cable with the matching plugs already attached. These items are seen at the rear of the many items, Fig. 1. Finally, there was a two-line by 16 character l.c.d. unit.

Accompanying the components were the project's main printed circuit board (p.c.b.) along with a smaller simpler p.c.b. for the l.c.d. interface kit. last. Incidentally, these were some of the best quality boards I've seen with any kit. The final item, and probably the most important for most constructors, was an excellent 17-page A4 sized set of instructions. These instructions were both detailed and well laid out. They were printed on both sides of the paper and followed a logical progression for the builder.

A short introduction was followed by a section on preparing both the constructor and the various parts within the kit. The list of tools comes first, so assembling those recommended, **Fig. 2**, I continued reading, about the conventions used throughout the following instructions. Next I then read how to identify the various components and their values and how to achieve a good soldered joint, a point well worth reading no matter what your skill level!

Section three of the manual covers a slightly simplified (although thorough) description of the counter display circuitry. The digital counter is simply a display of either a direct frequency, or one with an offset. But I'll come back to this area of its capability later.

Construction Section

Moving on to section four of the manual, it was time to begin the construction. I started to follow though in the order described, placing each component in order. The components all have their markings shown in the instructions making it easier to identify the various items.

Over the years components have become much smaller and one item not mentioned in the list of tools (and one I personally recommend for everyone building kits) is a good magnifying glass with bright illumination, **Fig. 3**. My sight is fair, but components are becoming somewhat smaller and a tad more difficult to read these days without some help.

The resistors, fitted on the p.c.b. first, were five-banded types, and without the aid of a magnifying glass, I'd have had difficulty reading the values. Even so, just to make sure, I checked the value on a digital ohmmeter. There are two resistor array packs that have to be orientated correctly too. After fitting the i.c. sockets, the picture of **Fig. 4** shows progress up to that point.

Following the resistors, 12

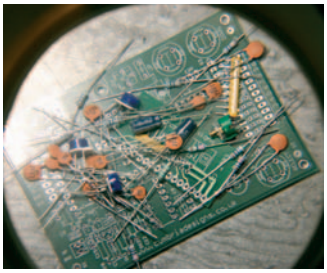


Fig. 3: A well illuminated magnifying glass is useful, if your eyesight is not as acute as it was.

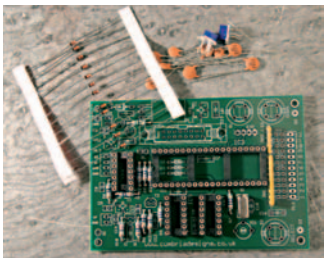


Fig. 4: After the resistors, sockets and crystal have been fitted.

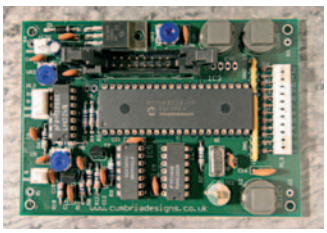


Fig. 5: The main board assembled, now to tackle the l.c.d. fittings assembly.

diodes have to be fitted in the control lines. I'll explain later about the functions of these lines. Three variable resistors, a few capacitors, and several sockets later I came to fitting the various semiconductors. This stage has both critical and static sensitive warning 'flashes' in the instructions, critical because the correct orientation must be observed to ensure that the project will work. And static sensitive as a replacement may, in the case of the microprocessor, be expensive, as well as leaving you with a non-working project.

Easy To Follow

At this stage you'll have finished the main p.c.b. **Fig. 5** and now you need to make up the small interface to the l.c.d. module. Once more the additional written instructions are informative and easy to follow. Clipping the supplied multi-way cable into the back of the l.c.d. module, **Fig. 6**, the other end of which is attached to the main p.c.b. and you have completed the kit building as shown in the heading picture.

At this stage, only one more two more leads remain to be made up before the constructor can carry out initial tests and checks. You'll have to make up a two way power supply lead and an r.f. lead for the counter input. A full description of how to make up the connectors is provided in the instructions.

Next I arrived at the testing section of the project. Even though I've been building kits and electronic projects for many years, there's always a slight dryness of the mouth, and a little trepidation at first switch on. So ... when I applied power, what did I find?

Initially there were no 'bangs' (a plus point for my construction) but the display showed nothing. A quick tweak of the display contrast 'pot' fixed that and a display with 'zero' frequency greeted me. Applying the output of an oscillator showed that I could get a reading **Fig. 7**. Then it was time to play!

Temporary Leads

Making up the temporary control leads, I started looking at the abilities of the display. At its simplest, the upper line of the l.c.d. shows the direct frequency read-out to a displayed resolution of 10Hz. Capable of measuring an input frequency of over 100MHz, at which an accuracy of around ±30Hz may be expected. The unit can also show a bargraph display of one of three analogue inputs (two of which may be compared to give a reading.

On the left of the top display line is an enunciator that can show either 'Tx' or 'Rx', while down in the bottom right of the display the mode of operation of the radio can be shown too. Three input lines control the display of one of eight modes ('blank', c.w., l,s,b,, u.s.b., a.m., f.m., d.s.b. and p.s.k.) in the lower right area of the display.

The left-hand side bottom line is given over to the display of an analogue value. This can be a simple S-meter level, an S-meter level with values, or just a level that could represent r.f. power or other functions such as automatic level control of audio (a.l.c.). Details are given in the manual to help integrate the unit into almost any rig.

Looking back to the display of frequency and here the measured frequency can have an offset added (or subtracted) before display. If the default of 9MHz is not what you want, then you can define your own value. A further 'trick' is that you can have a 'multiplier' worked into the displayed frequency.

Note: The multiplier function is useful when a crystal oscillator is followed by several multiplier stages, before the final output. The FD-01 can deal with both the transmit and the receive multiplications and offsets before displaying the effective transmit and receive frequencies. Clever stuff!

These two pages in *PW* are definitely not enough to describe both the building and the operation of the innovative display module that is the FD-01 from Cumbria Design, but I've done my best. The FD-01 kit, costing £59.95+P&P, is available from **Cumbria Designs, The Steading, Stainton, Penrith, Cumbria CA11 0ES**. **PW**

Product

FD-01 Kit

Company

Cumbria Designs

Contact

The Steading, Stainton, Penrith, Cumbria CA11 0ES

Pros and Cons

Pros: Effective display of frequency, state and mode of operation of a radio. It's incorporation into any home-brew radio or transceiver can only make it better!

Cons: None that I can think of.

Summary

A very professionally created kit. It has a good manual, with well illustrated and easy to follow instructions. The project should be suitable for all but the absolute beginner and is at a price that is affordable.

Watch out next month for the chance to win your own Cumbria Designs FD-01 counter kit!

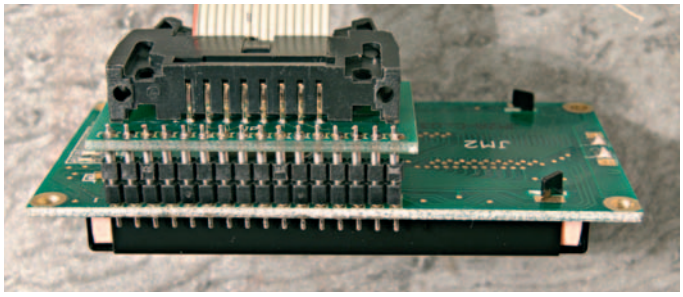


Fig. 6: A small additional p.c.b. makes connection to the l.c.d. module, with a pre-made flat ribbon cable easy.

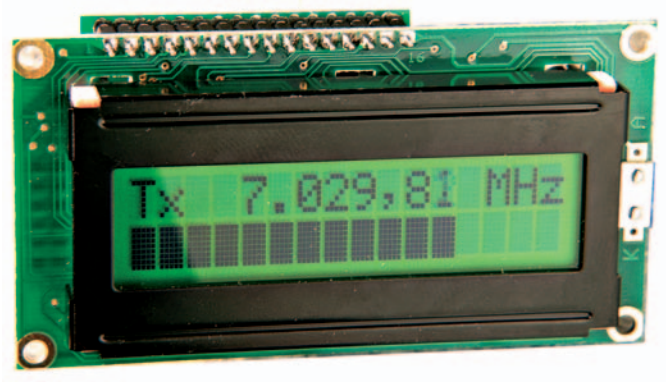


Fig. 7: To give you an idea of what the display can look like. Several other options are available.

The Vectis Run Part 4

By Rupert Templeman

It's January 1939. Travelling Wireless Technician-Salesman Alan Edwards is finding his latest trip to the Isle of Wight - the Vectis Run - is becoming extremely hazardous. He's soon in deep trouble!

It was only a short walk from Shanklin station to the large redundant Victorian Methodist church, which had become the headquarters for the Clarke's Wireless and Television shops. In fact, as Alan Edwards walked alongside his friend Mike Coley, the latter had bolstered the reputation that this innovative Island business was his best customer – by ordering five more television receivers even though they were over 100 miles from the Alexandra Palace transmitter.

The two friends had been chatting all the way since their train had lurched to an unscheduled stop at the Wroxall end of Ventnor tunnel. Alan's mind had been drawn away from the foreboding thoughts which seemed to hang round him like some dark cloud - while they discussed the problems of being so far from London and the difficulties for what Mike referred to as 'Viewers' of the new television service.

Alan smiled inwardly listening to his friend - who'd only rarely ventured onto the mainland and had certainly never travelled further away than Portsmouth or Southampton – using the American term. Everyone else used the semi-official term 'Looker-in'…but Mike always went his own way!

Rounding a corner they found themselves looking out into a cold and forbidding Sandown Bay. "No holidaymakers and sailing boats in sight in January" thought Alan, who then suddenly recalled the 'Dutch' tourists, before being quickly brought back to the present as his friend spoke. "By the time I get the workshop running Alan – the trade test transmissions will be on and we'll take a look at the received picture", Mike said over his shoulder as he began to run up the steps.

Alan was puzzled at Mike's sudden acceleration and was nonplussed at the odd behaviour of his normally plodding friend – that was until he saw an unusually stern looking Mr Clarke senior looking down from his office window. A quick look at his watch provided the answer - it was well after 8.30am. They were late and must have really dawldled as they chatted!

Mr Lake was watching too, and the General Manager greeted Alan as he entered through what was originally the imposing front porch of the church. Alan chuckled to himself as he realised that the entrance fitted the Manager's character very well indeed - it was imposing and rather ornate!

"Good morning Alan" said George Lake, "I need to see you regarding some faulty valve returns we've got…can you step into my office" he said, briskly turning and striding - almost marching - his way down the corridor towards his office.

On his guard - knowing full well that he might get the blame for any damaged valves, Alan reluctantly followed, but as he did so, a quick glance up towards the high roof of the old church showed that Mike Coley's workshop lights were on. "They certainly packed a lot of working space into this old church by building a mezzanine floor", he thought to himself as he followed Mr Lake into his cubby hole of an office.

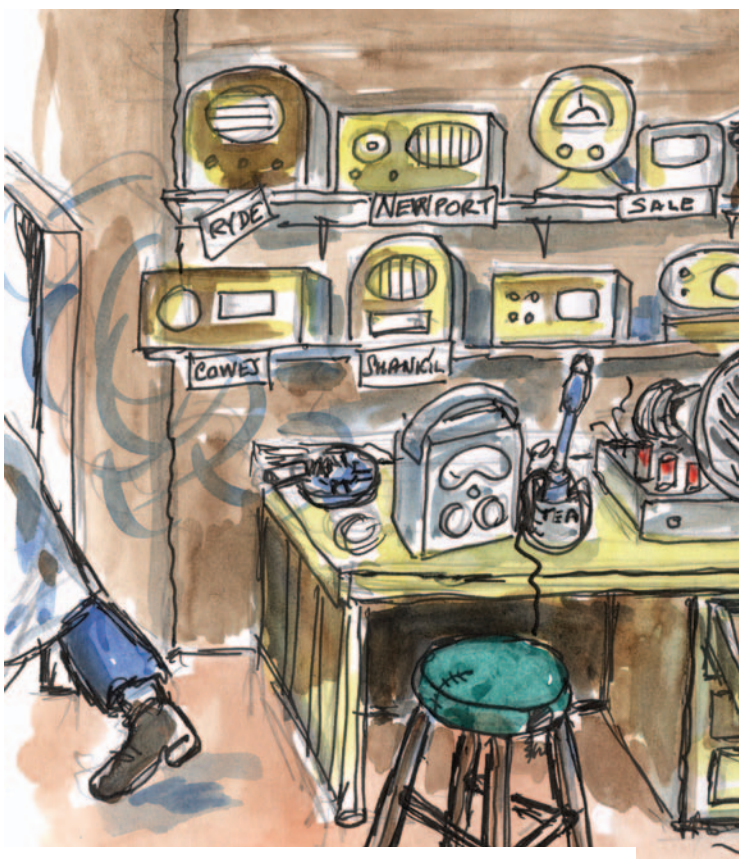
In The Workshop

Meanwhile, in the workshop Mike Coley had turned everything on and was waiting for the equipment to reach working temperature. Always wary of the danger from leaky electrolytic condensers he never risked putting his head above a chassis until a receiver had been working for a while. "Alan's okay there" he chuckled to himself; "there are advantages to wearing spectacles when exploding condensers splatter their contents all over the workshop".

Familiar 'trade test' music, accompanied by a strong pulsing buzzing sound made Mike look round and towards the televisor on the workbench. It had come in for a sound receiver fault originally, so he was alert to any possible problem. It had to be in first class order when it left the workshop.

The sun was shining brightly now and as his workshop window overlooked Sandown Bay he had to walk in front of it and partly block the light. He expected to see just a raster on the screen as the sound transmitter started up first on most days. To his surprise though, instead of the noise showing up as a dim snowstorm on the 12in screen, the test card from Alexandra Palace was already there to accompany the sound. Often he'd found that the sound transmitter was on without the vision signal, as the BBC Engineers in London carried out tests early in the day.

Although the televisor was the largest they'd sold, Mike



Switching on the televisor Mike saw that the strange, intermittent, pulsing type interference was already causing problems to the picture. Almost dropping the cigarette out of the corner his mouth, he flung caution to the wind and rushed out of the workshop to find Alan.

mildly cursed the dim screen. He was looking forward to handling more receivers with cathode ray tubes having fully aluminised internal reflectors. This type of tube, which was just becoming available, reflected a far higher percentage of the light output of the screen phosphor out from the viewing side. "Can't come quick enough for me", he grumbled to himself. Then, suddenly - the picture with the test card broke up - to be replaced by a jagged series of lines accompanied by a fairly low pitched buzz noise from the loudspeaker.

Dropping his soldering iron on to its rest Mike gasped – almost losing his cigarette from the corner of his mouth. "That's it - we've got the interference" he shouted. And, without a moment's hesitation – he flung caution to the wind and hurried out of the workshop to find Alan. "Mr Lake or not, this is important and Alan must see it for himself", this being uttered aloud as he literally fell down the wooden stairway and headed towards the Manager's office.

The look on Mr Lake's face as Mike burst into the office amused Alan. He thought the rather pompous Manager was about to blow an internal fuse. Lake wasn't well known for his understanding of Engineers or anything technical – he was a retired Army quartermaster type who only seemed to appreciate regimented lines of accounting calculations.

"What do you mean by rushing in like this Mike", he spluttered. How on earth do you expect me to get decent faulty valve returns for you if you come crashing in like a bull in a china shop"? The man's deeply reddening face showed his rising anger as his looked at his Engineer. "Well"? - he repeated - his voice rising almost to parade ground volume.

"Sorry Mr Lake" the breathless Mike managed to stutter with difficulty, catching his breath - wishing at the same time he could cut down on his *Woodbine*s. "Excuse me, but Alan's got to come and see what's on the screen of the televisor". The last few words were literally thrown over his shoulder as he unceremoniously dragged his friend out of the office and up the stairs.

The Visit

The two friends - with an extremely puzzled Mr Lake peering into the workshop - were staring intently at the televisor screen. "Those things will never catch on" Mr Lake said as he turned and walked way. "It's impossible to sit and watch while listening. The brain just can't manage to do all that at once"!

A brief smile flicked across Mike's face as his Boss disappeared. "Just look at that interference Alan" he said; "I wonder what on earth could cause that. It's so regular, a proper radio frequency transmission, not like the spark and splutter interference you get from the trams in Southampton and Portsmouth".

Alan, deep in thought glanced up at his friend with more than a hint of drama in his normally controlled tones. "I'm sure this is connected in some way with the strange foreign car, Pat Dunne's death and my problems he said. "I've got to go and see Pat Dunne's widow, I'm sure there's an answer there. I wonder where they lived"?

Increasingly concerned at his normally calm and studious friend's intentions Mike paused before answering. "He had the second railway cottage at Wroxall, only a short distance from the tunnel" he said. "That's why he always looked after that end of the track. However….", his voice tailed off as he realised Alan wasn't there, he'd seen his van arriving in front of the old church and had gone down to meet the man who'd driven it from Ventnor after starting the cold engine with the help of a freshly charged battery.

The man, perhaps expecting a cheery "Thanks", found himself pushed aside as Alan scrambled aboard. "See you later" he called as he jerked the grating gear box into reverse before turning the vehicle and taking the Wroxall road out of town via Shanklin and Sandford. Twenty pairs of eyes - the entire staff from Clarke's depot saw the battered old van disappear around the corner, almost knocking down a thin, dapper trench-coated, middle-aged man who was crossing the road. That man seemed "oddly out of place" to Mike Coley.

Mystery Deepens

Arriving at the railway cottages Alan found that although Mrs Dunne was understandably extremely upset and bereft, she was able to tell him a little more. Despite feeling deeply ashamed at bothering the newly widowed woman, Alan felt she knew something important.

He asked; "Do the words 'Verdun, and Lager' mean anything to you Mrs Dunne"? Her immediate reaction told Alan they did!

"Oh yes, Pat was attached to the French run prisoner of war camp near Verdun – the Lager he always called it. He'd learned German at school because one of the German Gardeners brought over by Prince Albert for Osborne Palace, had a son in the same class as him". She went on to explain that Lager was a common German name for prison, or something to do with a prison.

Mrs Dunne was then left staring at the receding figure of the strange young man who'd only just arrived unannounced, as he ran back towards the station. But instead of getting back into his old van she was surprised to see him striding, almost running, towards the tunnel entrance. And although only just after midday, the portal was already in deep shadow from the low winter sun.

Running towards the tunnel entrance…Alan suddenly felt very alone and extremely exposed. He didn't really feel the heavy, crushing blow on his neck and shoulder, although he did hear the grunt of breath from the man who had swung the cosh.

With a confusion of colours flashing in front of his eyes, and sudden, numbing pain, his last memory was of his face hitting the steel rail and the rumble of an approaching train.

To be continued….

The PW Whitcombe 70 to 28MHz receive converter, as designed by Tony Nailer G4CFY. Full details on the various kits available can be found in the information panel at the end of the article.

Get converted an

In the first of his designs for readers, Tony Nailer G4CFY presents the PW Whitcombe 70MHz down converter. With an i.f. output at 28MHz, it should prove very useful and there's a kit on offer too!

The idea for this project follows on from the Radio Basics article by **Rob Mannion G3XFD** in the November edition of *PW*. It's a joy to revisit a converter design and apply the knowledge and experience gained since my first design of a 144 to 28MHz converter which was published in October 1978.

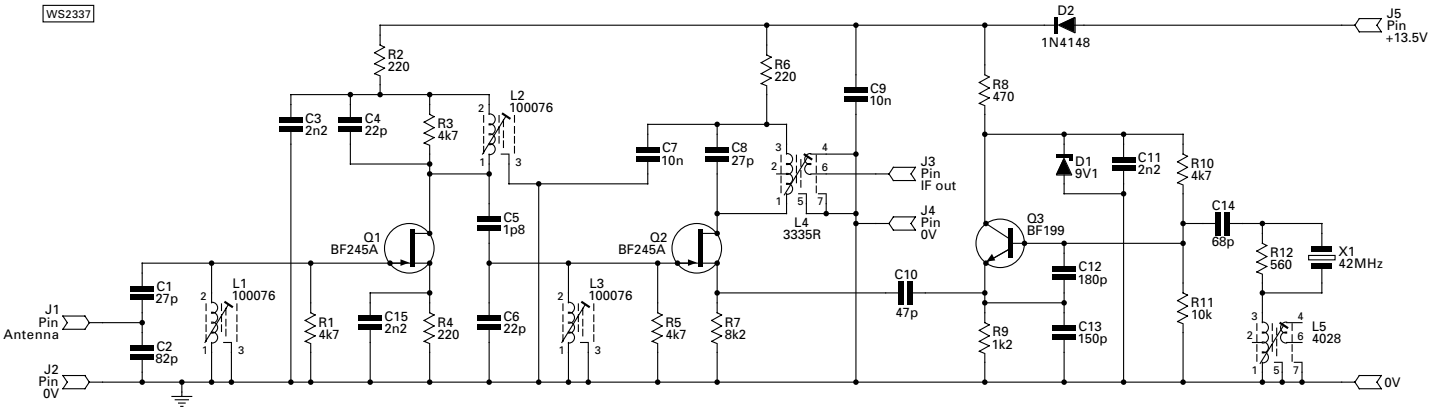
Much has changed in receiver sensitivity and noise figures during the elapsed 25 years and the specification of the receive converter has changed accordingly. My design goals were; A noise figure, less than 4dB, with a conversion gain of about 10dB and a low spurious output local oscillator. It also had to use easily obtained components and require minimal alignment.

The Design

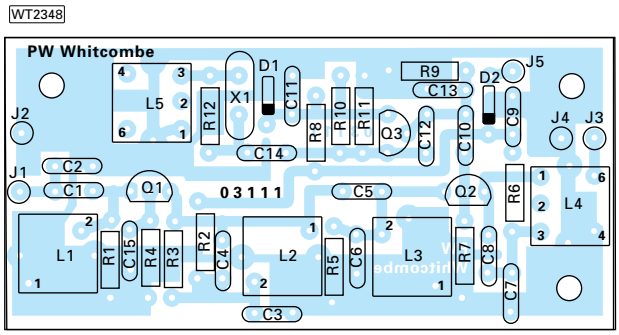
When it came to the design my thoughts were to try and make a converter using just two junction field effect transistors (f.e.t.s.) in the signal handling stages. This was because f.e.t.s are good at strong signal handling with low cross-modulation and also provide relatively low gain.

Modern m.o.s.f.e.t.s. have such high gain factors in the guise of 'forward transconductance' that gains in excess of 30dB for an r.f. amplifier are normal.

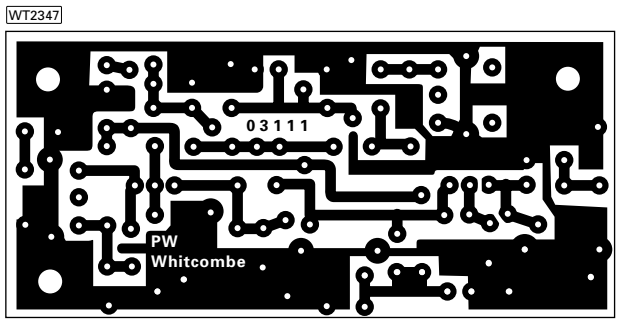
Continuing with the design, the mathematics of mixing proves that the output of a passive mixer will always be at least half the amplitude of the input signal. Active mixers then make up much of this by giving amplification at the output frequency. Using an f.e.t. in common source with the local



● Fig. 1: Circuit of the PW Whitcombe 70 to 28MHz receiving converter. (See text).



● Fig. 2: Component side diagram of the PW Whitcombe p.c.b. , showing component placing guide (see text).



● Fig. 3: Copper track side of the PW Whitcombe p.c.b. (see text).

...d receive 70MHz!

oscillator fed to the source should provide somewhere between -6dB and 0dB conversion gain.

Firstly, I needed a local oscillator which was easy to align and required the minimum of signal multiplication. I chose the impedance inverting Colpitts oscillator configuration using a series resonant third overtone 42MHz crystal, Q3 in **Fig. 1**.

The Colpitts arrangement relies on a tuned circuit consisting of a coil L5, a coupling capacitor C14 and two feedback capacitors in series, C12 & C13. The signal between the coil and the capacitors is passed through the crystal X1 acting in low impedance series mode. The pass-band of the crystal (being very narrow) defines both the frequency of operation of the tuned circuit as well as the signal purity.

A single transistor is used in common collector (or emitter follower) mode with the collector clamped to d.c. and a.c. with a zener diode and a low impedance capacitor C11. Output is taken from the emitter and consists of a high level of 42MHz, possibly 2V peak-to-peak, together with a much lower level of second harmonic on 84MHz.

The mixer stage was now constructed using a common source f.e.t. with input tuned to 70MHz and the output tuned to 28MHz. Initially, the source resistor was a 10kΩ trimpot and the local oscillator was fed to the source via a 47pF capacitor C10.

The trimpot was then adjusted for best mixer action with a signal of 300µV applied to the input. Best action occurred with a value of 8.2kΩ giving a conversion gain of -2dB. (I found, large changes of resistance value produced only small changes of conversion gain).

To meet the required specification I then needed around 12dB gain in the pre-amplifier stage. From experience, I knew the common gate configuration was low gain but inherently stable, whilst the common source was high gain and often unstable.

A common gate amplifier was created but only gave a stage gain of 7dB. Not enough. A common emitter stage was then made and sure enough it gave very high gain, over 20dB but was unstable.

Stability was improved by damping both the input and drain tuned circuits with 3.3kΩ resistors. The required gain was achieved, so initial development was now deemed complete.

Prototype Board

A prototype printed circuit board (p.c.b.) was then made for the converter and was assembled using another set of components. The gain achieved for the whole converter was measured at 12dB, but the bandwidth was too narrow due to the combined *Q*s of the mixer input and output tuned circuits.

Continued on page 42

FT-897

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Model Number	Power	Freq. Range	Display	Price Each
SX100	3KW	1.6 - 60 MHz	30W / 300W / 3KW	£109.95
SX200	200W	1.8 - 200 MHz	5W / 20W / 200W	£79.95
SX400	200W	140 - 525 MHz	5W / 20W / 200W	£89.95
SX600	200W	1.0 - 160 MHz * 140 - 525 MHz	5W / 20W / 200W	£139.95
SX1000	200W	1.8 - 160 MHz * 430 - 1300 MHz	5W / 20W / 200W	£189.95

SX20C

Diamond SX20C and SX40C Watt meters. The Diamond SX20C and SX40C are compact Watt meters featuring cross needle meter for measuring power and SWR simultaneously.

Model Number	Power Settings	Freq. Range	Size	Price Ea.
SX20C	30w & 300w	3.5 - 150 MHz 3.5-30 / 50-54 / 130-150 MHz	3 5/16' W x 3 5/16' H x 3 3/4' D	£74.95
SX40C	15w & 150w	144 - 470 MHz	3 5/16" W x 3 5/16" H x 3 3/4"	£69.95

SG-230 Smartuner Only £359.95

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- Frequency range: 1.6-30 MHz
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- Power rating: 3-200 watts PEP maximum: 12VDC.
- VSWR (Typical): 2:1
- Tune power: 3 watts nominal
- Weight: 8 Lbs.
- Dimensions: 16Dx12Wx3H
- Supplied with 9 ft. cable for coaxial and DC power

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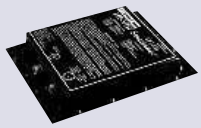

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- Frequency range: 1.0- 60MHz
- Power rating: 100W PEP maximum or CW 60W HF and 100W VHF
- SWR: Less than 1.3 to 1
- Tune power: 3 watts minimum- 100 watts maximum
- Weight: 3 Lbs.
- Dimensions: 11.5Dx9.5Wx1.7H
- Supplied with 9 ft. cable DC power.
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- Waterproof of immersion of two feet, half hour

SG-239 Smartuner Only £189.95

The new SG-239 fits the coupler requirement of the many low cost HF transceivers on the market, including among others, the Yaesu FT-817, FT-897, Kenwood TS-50 and Icom IC-706.

Performance features of the SG-239 are far ahead of its low price. The unit will work with silent receiver tuning or within the range of 1.5 to 200 watts with a high power transceiver. It has 170 memory bins, with fast, accurate tuning via independent sensors, including VSWR, phase, magnitude, low impedance, and forward sensing. Other couplers only sense the VSWR for a proper match - the SG-239 does it all and does it fast. And, if you recall the tuning setting from memory, tuning is even faster.

SG-237 Smartuner Only £299.95

WOW! This is tiny! If size and weight are important to you then check out the SG-237 from SGC. This product is designed with high density surface mount components on a 4 layer PCB, providing high efficiency, reliability and performance. The unit is fully waterproof (under 2 ft of water over 24 hour period). The PCB is mounted on a sturdy chassis plate which provides an excellent electrical and RF ground system. The case is waterproof and protects the complete unit.

Specification:

HF Frequency Range:	1.8 to 60 MHz
Power Input Range:	3 to 100 watts (PEP) o* 40 watts max. on CW
Input Impedance Range:	45 to 55 ohms
VSWR: (Typical)	Typically less than 1.4:1
DC Input Requirement:	+13.8 VDC (nominal)
DC Operating Range:	+10.5 to 18 VDC
Input Current: Average:	300 milli amps
Random set time:	Typical: less than 2 seconds
Recurrent set time:	Typical: less than 10 milliseconds
Memory Capacity:	170 locations
Antenna Length:	Minimum length of 7 ft. - 3.5 to 60 MHz Minimum length of 23 ft. - 1.8 to 60 MHz
Installation:	Any position
Operating Temperature:	-35° to +70°C
Size:	9L x 7W x 1.85H inches (22.9L x 17.8W x 4.7H cm) PCB 6L x 5.5W x 1.2H inches (14L x 15.24W x 3.05H cm)
Weight:	2 pounds (PCB 1.25 pounds)
Case Construction:	ABS plastic cover on an anodized aluminum base
Control Cable:	Shielded 4 conductor RG-58 coax with PL-259 connector
Control Cable Length:	9 feet in length

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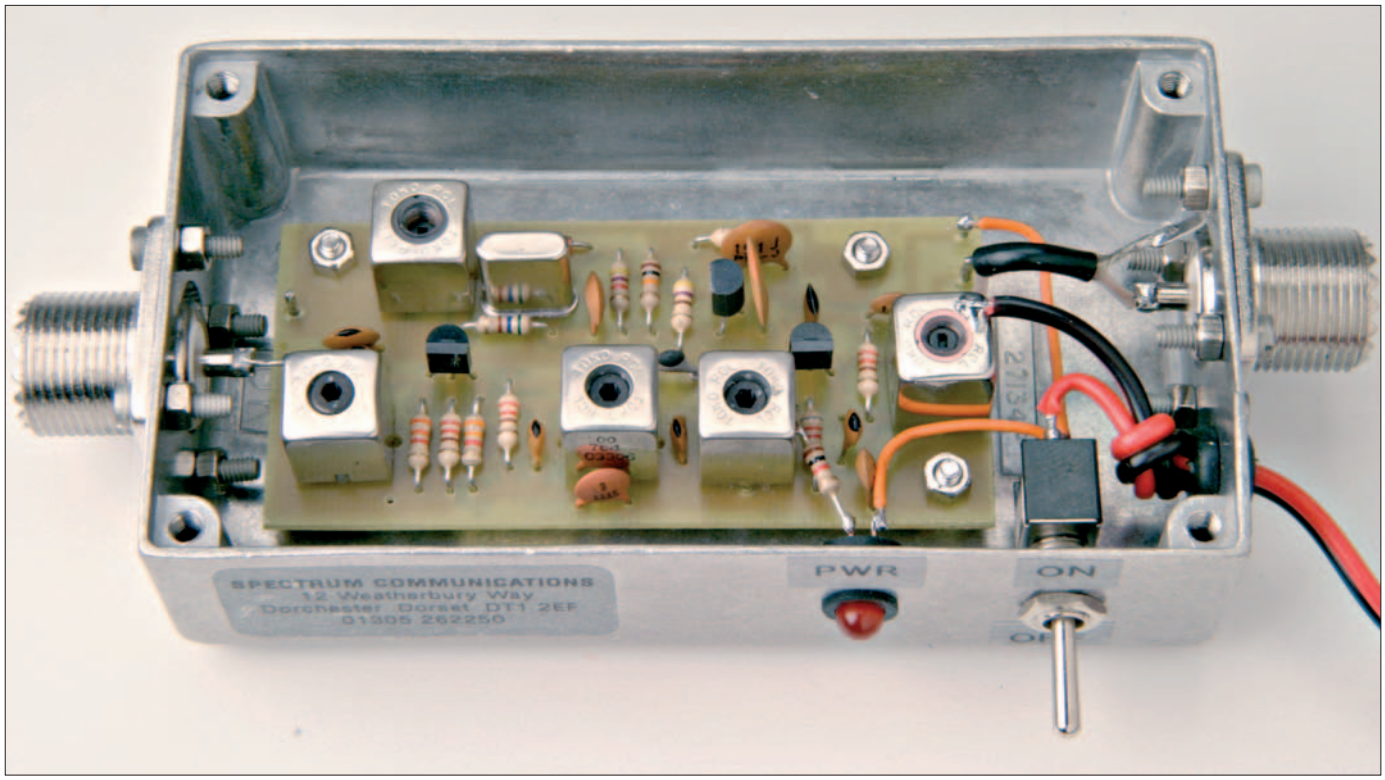


Fig. 4: The completed prototype converter assembled in an aluminium die-cast box (see text). There has since been a little redesign of the p.c.b. for that presented in the overlay of Fig. 2.

The mixer input was then damped and the bandwidth again tested. I then found it was too wide and the gain was down to 8dB! Values of damping resistors were increased to 4.7kΩ and a gain of 10dB was achieved within the required pass-band.

Originally I'd intended to use BF245A f.e.t.s. as their noise figure quoted in various books was 1.5dB, whilst the BF256A was shown as 7dB. I had the latter to hand, and used them in the design. Later reference to a January 1978 edition Mullard technical handbook provided graphs of both types.

The BF256A when operated at 5mA drain current in the range 10 to 100MHz with a source impedance of 1kΩ produced less than 1dB noise figure. However, the BF245A was nearly 1.5dB in the same configuration.

In practice the man-made and galactic noise figure is about 4dB on 70MHz, so either device will work really well. Indeed, the converter will provide a system limited by external noise with downlead feeder losses of up to 3dB.

Full Testing

Full testing of the converter using a signal generator and spectrum analyser showed that with the input unconnected the r.f. stage would oscillate. This could be stopped by detuning coil L2, the gain then dropped to 7dB. (It's probably unnecessary to do this because the unit doesn't function anyway with its input disconnected).

With L2 detuned, and with 300µV input signal on 70.5MHz, the signal outputs at the i.f. port were:

A: 28.5MHz 700µV.
B: The 42MHz local oscillator at 60mV.
C: 70.5MHz at 200µV
D: 84MHz (second l.o.) at 75µV.

This is extremely clean for a receive converter with an unbalanced mixer and fully satisfies the original design specification.

Final Version

The p.c.b. layout was then modified to the final version shown in the accompanying component side diagram, **Fig. 2**. The underside p.c.b. (copper track side) is shown in **Fig. 3**. The diode, D2 provides protection against reverse supply connection and also will act as a fusible link in case of a short circuit anywhere on the board.

The prototype p.c.b. was fitted into a diecast box with SO239 connectors, **Fig. 4,** and in the heading photograph. A future version will probably have coaxial connectors and power input on the rear of the box.

Provided the converter is built without mistakes, or solder splashes or dry joints, it should function quite well without adjustment. The oscillator will function within 2kHz of the desired frequency but should be accurately set using by adjusting L5 whilst monitoring a frequency counter attached across R7.

The tuned circuits in the signal path can be aligned using any signal on the band. **Note:** It's worth adjusting L2 and L3 twice as the coupling provides some interaction.

PW

Buying The Whitcombe Kit

The kit of parts together with the p.c.b. kit costs £20 plus 50p P&P. It's also available ready built with aligned p.c.b. for £30.50 plus 50p P&P.

The p.c.b., parts and hardware kit costs £34.00 plus £1.50 P&P. Built and boxed costs £61.50 plus £1.50 P&P.

All are available from: **Spectrum Communications, 12 Weatherbury Way, Dorchester, Dorset DT1 2EF. Tel: (01305) 262250. Cheques payable to A.J. & J.R. Nailer**.

Antenna Workshop

So how do you improve your Amateur Radio station? Ian Keyser G3ROO maintains you should always start with the antenna - as he explains in this article, especially written to give you an overview of common antenna types.

I'm no guru on antennas but after 50 years of experimenting, I've just about tried every known design and in doing so, have come to understand the basics of antenna design. I think that most of us have **Les Moxon G6XN**'s book *Antennas for all Locations* as a 'Bible', but for the beginner this may prove to be too heavy a tome to start with! So, this article is written to give an overview of common antenna types but no designs are included as these are readily available in magazines and handbooks.

There are two configurations of antennas, those mounted vertically and those mounted in the horizontal plane. Which type each antenna is, will be immediately apparent when you look at them! Vertical antennas are vertical in construction and horizontal are horizontal. They, in the vast majority of cases, radiate vertically or horizontally polarised signals as their name implies.

But polarisation is not important at this stage, it's sufficient to realise that horizontally polarised signals are received better on horizontally polarised antenna and vertically polarised signals are better on vertical antennas. This is more important on v.h.f. as there is usually very little polarisation twisting between transmitter and receiver. On h.f. this is rarely the case, once the signal has been reflected from the ionosphere, the angle of polarisation can be anything!

Ground Mounted

Vertical antennas can take two forms, ground mounted systems and those which are elevated. It is important to differentiate between these as those ground mounted only have (or need) half their elements. The reason for this must be understood before we proceed. The easiest way to visualise a ground mounted system, is to take a mirror and place it flat on a table. Now take a pencil and stand it upright in the centre of the mirror and think of this as a vertical antenna.

From a short distance away, look back at your little 'antenna farm' and you will see your vertical pencil and, reflected within the mirror, another inverted pencil 'under the ground' of your mirror. This is your missing element that is present in an elevated system! Of course, the mirror is a near perfect light reflector and the ground is a relatively poor reflector of radio signals. That implies that we have to do our utmost to make sure that our ground will reflect the signals to the best of our ability. Earthing is a very important subject and will be covered to a greater extent later.

So, which measurements do we use in antenna design? Should we measure in feet and inches or in metres. I maintain that in designing antenna systems, it's far more practical to 'measure' in fractions of wavelengths. This enables us to easily convert any design into actual measurement for any frequency we desire.

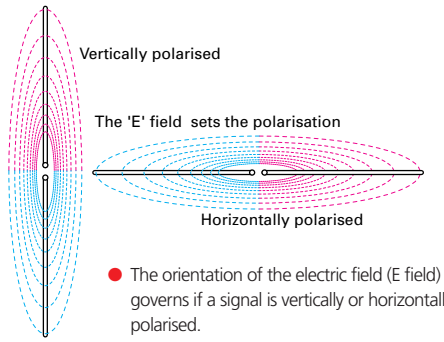
To convert frequency (in MHz) to its wavelength, divide the figure 300 by the frequency (in megahertz) to get the wavelength in metres. Of course, the opposite holds good as well, divide 300 by the wavelength (in metres) to get the frequency in MHz. You'll see other figures used for wavelength to imperial (feet and inches) conversions in articles, but the results will be almost the same.

It's important to realise that a resonant free space antenna will be a different length to ground and elevated system antennas above ground due to the influence of ground and objects nearby. In general terms an antenna near ground or other object will be physically slightly shorter at resonance.

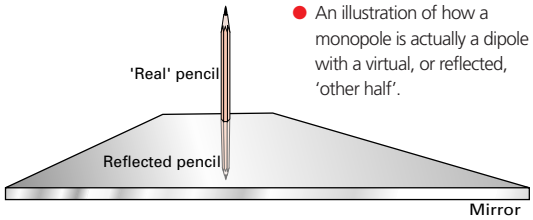
Dipoles And Loops

Generally speaking antennas fall into the two further categories of dipoles and loops. Immediately I can imagine hearing cries of 'what about verticals and inverted L antennas'. In both these cases, these come under the category of dipoles with their second element as a 'reflection' in the ground. Dipoles are fed in the centre and have an overall length of half a wavelength, however, they can be used with any odd number of half wavelengths.

Antennas are balanced systems and must be fed accordingly. Connecting coaxial cable directly to the centre of a dipole should not be considered as the system will not operate as expected. In practice, it can very easily increase the chances of causing TVI (but that is another topic!). Dipoles must always be fed with a balun (BALanced to UNbalanced transformer) at the centre.

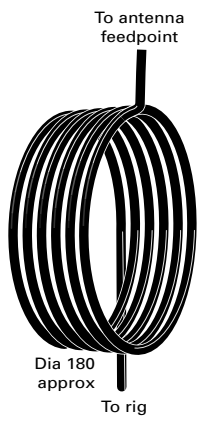


● The orientation of the electric field (E field) governs if a signal is vertically or horizontally polarised.

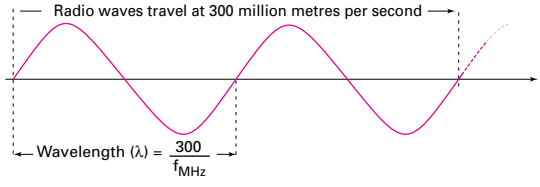


● An illustration of how a monopole is actually a dipole with a virtual, or reflected, 'other half'.

● (right) A balun may be created from several turns of coaxial cable, formed into loops with a diameter of around 150-200mm.



● (below) As radio and light wave travel at 300 000km/s then dividing 300 by the frequency in megahertz gives the full wave length directly in metres.



continued on page 44

A balun can be either a properly designed unit or just simply of a 'choke' form, to reduce currents flowing down the braid of the coaxial cable. I often use a choke balun for experimental purposes, but I consider the effect it will have on any results. Any permanent system will include a balun. A choke balun can consist of six turns of coaxial cable wound up forming a coil about 150-200mm in diameter. This can be held together with pvc tape and mounted on the centre insulator.

The problem with coaxial cable, is its integration into an antenna system. Most antennas are balanced and require the balun. This adds cost and losses to a system, the two things as amateurs we try to avoid. Also if the outer pvc sheathing of the coaxial cable is damaged, water will get in and render the coaxial cable useless after the first few drops of rain.

The other alternative is to use twin feeder, which has many advantages over coaxial cable though it has a few disadvantages. The advantages are lower cost, many times greater lifetime and can even be home constructed if we are dealing with high impedance line. Low impedance lines, such as 75Ω feeders, cannot be home constructed due to the close spacing.

Feeder Disadvantage

One of the twin feeder's disadvantages is that it has to be kept clear of other objects, but in practice that is easy to achieve. It's even possible to use twin feeder up a tower and around a rotator to feed a beam antenna. We tend to think of twin feeders to be low loss systems, but do not fall into this trap! High impedance twin lines generally have far lower loss than coaxial cable systems, but medium grade 75Ω twin feeder can have a loss in excess of 10dB per 100m at 28MHz!

Wherever possible I use twin feeder and if the antenna system matching unit (a.s.m.u.) doesn't have a balanced output, then I'll use the expensive balun in the dry environment of the shack.

Loop antennas are, in general, more complex as they must have an overall length of one wavelength, otherwise feed problems become very complex. They can either be mounted horizontally or vertically. Note though, that a vertically mounted loop fed on one of its sides will radiate a vertically polarised signal. But feed the same antenna on either the top run or bottom side and it will radiate a horizontally polarised signal.

To confuse things further, a horizontal loop will radiate a horizontally polarised signal if mounted reasonably high, but if mounted very close to a groundplane, the polarisation will be predominantly vertical! The so-called 'magnetic loop' is a self resonant circuit and I am not at all sure if we shouldn't consider these as a separate category.

Polar Diagrams

You will no doubt have seen an antennas' polar diagram (or plot) in magazine articles and wondered what they are! There's nothing magic about them at all. They are just lines joining points in space of equal signal strength, drawn with the antenna as in the centre. These lines enable us to see the direction of maximum radiation and other directions where there is little or no radiation. The further the line is from the centre the stronger the signal will be in that direction. The polar diagram of a dipole antenna in free space is like a big 'doughnut' with a tiny centre hole and the antenna poked through its centre.

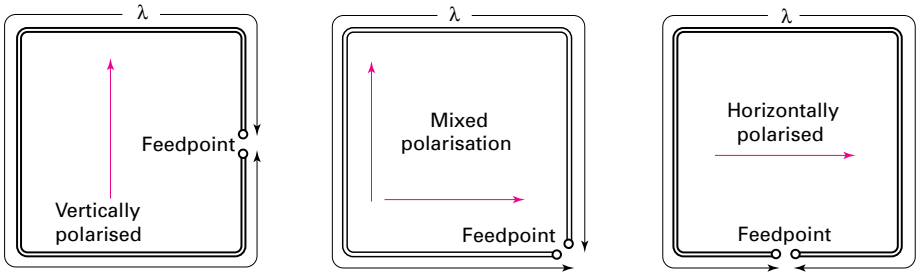
If the dipole is now brought close to the ground, as in a typical Amateur installation, the doughnut will become distorted. However the modified polar diagram will still indicate the direction of maximum radiation. This enables us to predict which parts of the world we are most likely to be able to contact and those we will have little chance.

By adding extra lengths of wire of the correct length and spacing from the dipole we are able to distort the diagram even more, forcing the radiation from an unwanted direction into a wanted direction. By this method we can increase the gain of the antenna in a wanted direction and so increase our signal strength.

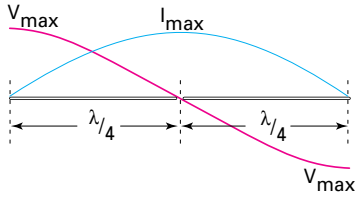
An added advantage to increasing our signal in one particular direction, and often even more important, is that we also receive signals less strongly from the unwanted directions and so experience less interference. The old adage 'If we cannot hear 'em, we cannot work 'em' is very true!

Beam Antennas

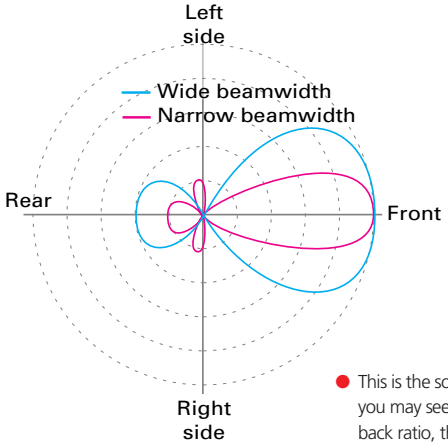
Beam antennas can be either vertical or horizontal, ground mounted or elevated. The idea is to place radiating elements so that in one required direction, the radiated signals will be in phase and so reinforce the



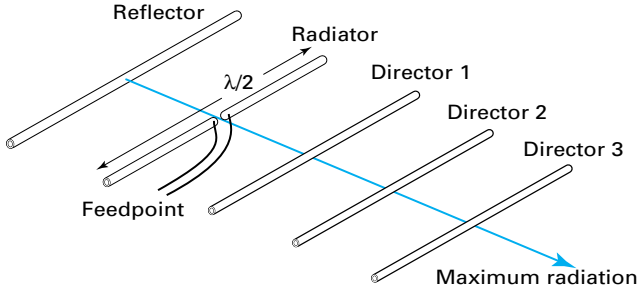
● Full-wave quad loop antenna have their polarisation predominantly decided by their feedpoint.



● With a half-wave dipole high voltage points (of opposite polarity) exist at each end of the antenna, with a current maximum near the centre, or feed point.



● This is the sort of antenna polar diagram that you may see in books. The greater the front to back ratio, the more directional an antenna is.



● A commonly seen beam antenna. This Yagi-Uda array, is normally just known as a 'Yagi antenna'.

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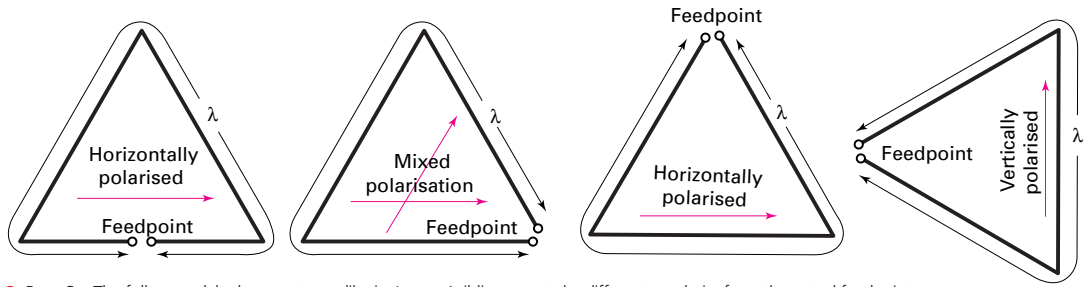

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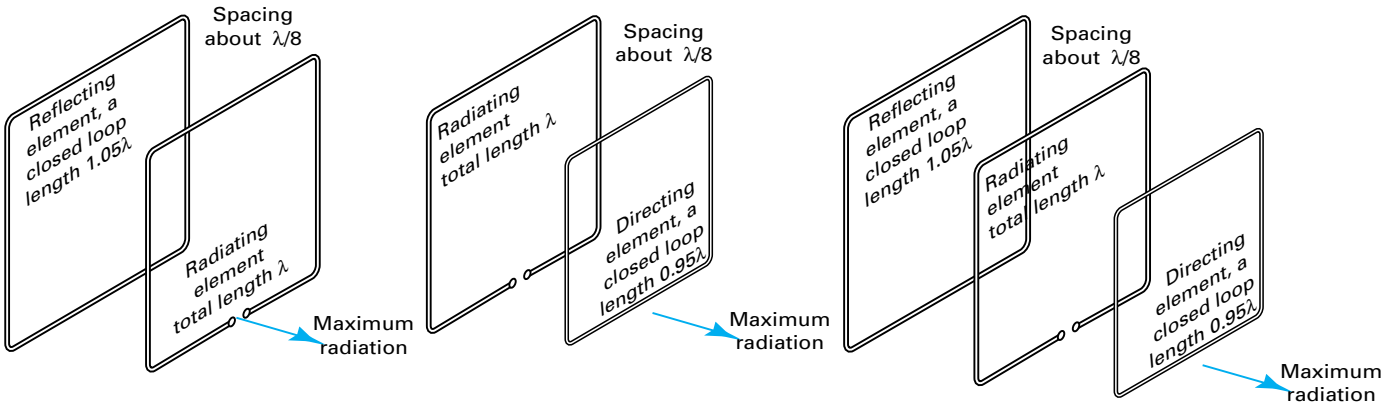

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A balun can be either a properly designed unit or just simply of a 'choke' form, to reduce currents flowing down the braid of the coaxial cable. I often use a choke balun for experimental purposes, but I consider the effect it will have on any results. Any permanent system will include a balun. A choke balun can consist of six turns of coaxial cable wound up forming a coil about 150-200mm in diameter. This can be held together with pvc tape and mounted on the centre insulator.

The problem with coaxial cable, is its integration into an antenna system. Most antennas are balanced and require the balun. This adds cost and losses to a system, the two things as amateurs we try to avoid. Also if the outer pvc sheathing of the coaxial cable is damaged, water will get in and render the coaxial cable useless after the first few drops of rain.

The other alternative is to use twin feeder, which has many advantages over coaxial cable though it has a few disadvantages. The advantages are lower cost, many times greater lifetime and can even be home constructed if we are dealing with high impedance line. Low impedance lines, such as 75Ω feeders, cannot be home constructed due to the close spacing.

Feeder Disadvantage

One of the twin feeder's disadvantages is that it has to be kept clear of other objects, but in practice that is easy to achieve. It's even possible to use twin feeder up a tower and around a rotator to feed a beam antenna. We tend to think of twin feeders to be low loss systems, but do not fall into this trap! High impedance twin lines generally have far lower loss than coaxial cable systems, but medium grade 75Ω twin feeder can have a loss in excess of 10dB per 100m at 28MHz!

Wherever possible I use twin feeder and if the antenna system matching unit (a.s.m.u.) doesn't have a balanced output, then I'll use the expensive balun in the dry environment of the shack.

Loop antennas are, in general, more complex as they must have an overall length of one wavelength, otherwise feed problems become very complex. They can either be mounted horizontally or vertically. Note though, that a vertically mounted loop fed on one of its sides will radiate a vertically polarised signal. But feed the same antenna on either the top run or bottom side and it will radiate a horizontally polarised signal.

To confuse things further, a horizontal loop will radiate a horizontally polarised signal if mounted reasonably high, but if mounted very close to a groundplane, the polarisation will be predominantly vertical! The so-called 'magnetic loop' is a self resonant circuit and I am not at all sure if we shouldn't consider these as a separate category.

Polar Diagrams

You will no doubt have seen an antennas' polar diagram (or plot) in magazine articles and wondered what they are! There's nothing magic about them at all. They are just lines joining points in space of equal signal strength, drawn with the antenna as in the centre. These lines enable us to see the direction of maximum radiation and other directions where there is little or no radiation. The further the line is from the centre the stronger the signal will be in that direction. The polar diagram of a dipole antenna in free space is like a big 'doughnut' with a tiny centre hole and the antenna poked through its centre.

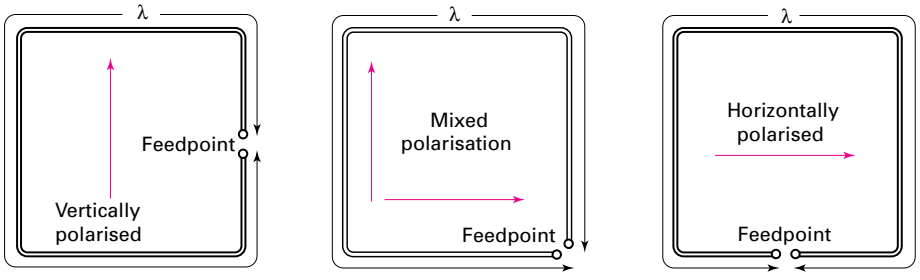
If the dipole is now brought close to the ground, as in a typical Amateur installation, the doughnut will become distorted. However the modified polar diagram will still indicate the direction of maximum radiation. This enables us to predict which parts of the world we are most likely to be able to contact and those we will have little chance.

By adding extra lengths of wire of the correct length and spacing from the dipole we are able to distort the diagram even more, forcing the radiation from an unwanted direction into a wanted direction. By this method we can increase the gain of the antenna in a wanted direction and so increase our signal strength.

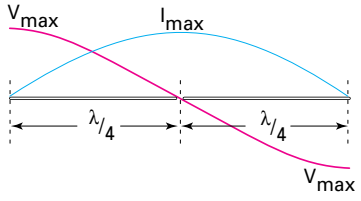
An added advantage to increasing our signal in one particular direction, and often even more important, is that we also receive signals less strongly from the unwanted directions and so experience less interference. The old adage 'If we cannot hear 'em, we cannot work 'em' is very true!

Beam Antennas

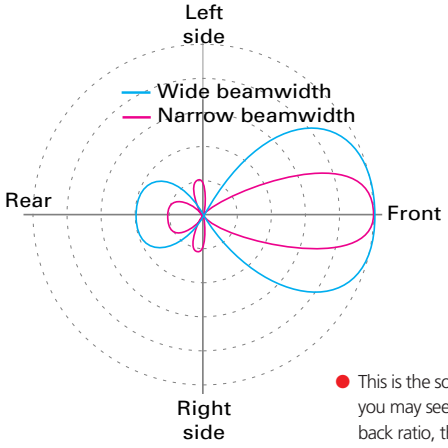
Beam antennas can be either vertical or horizontal, ground mounted or elevated. The idea is to place radiating elements so that in one required direction, the radiated signals will be in phase and so reinforce the



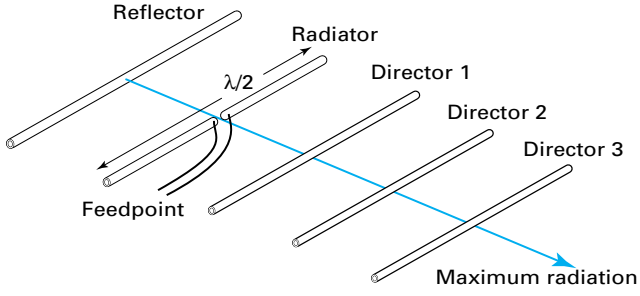
● Full-wave quad loop antenna have their polarisation predominantly decided by their feedpoint.



● With a half-wave dipole high voltage points (of opposite polarity) exist at each end of the antenna, with a current maximum near the centre, or feed point.



● This is the sort of antenna polar diagram that you may see in books. The greater the front to back ratio, the more directional an antenna is.



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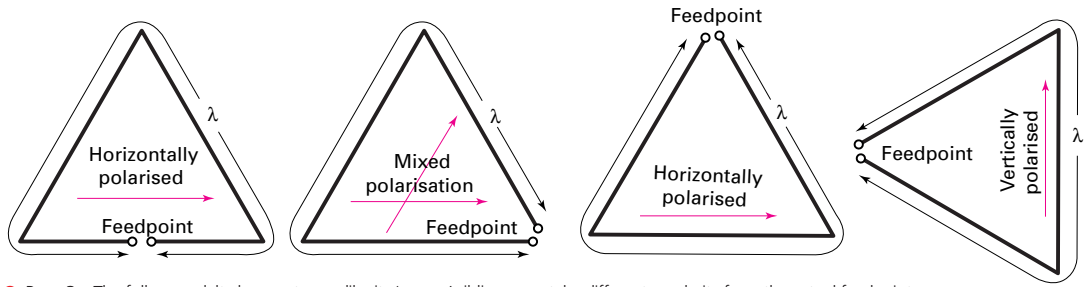

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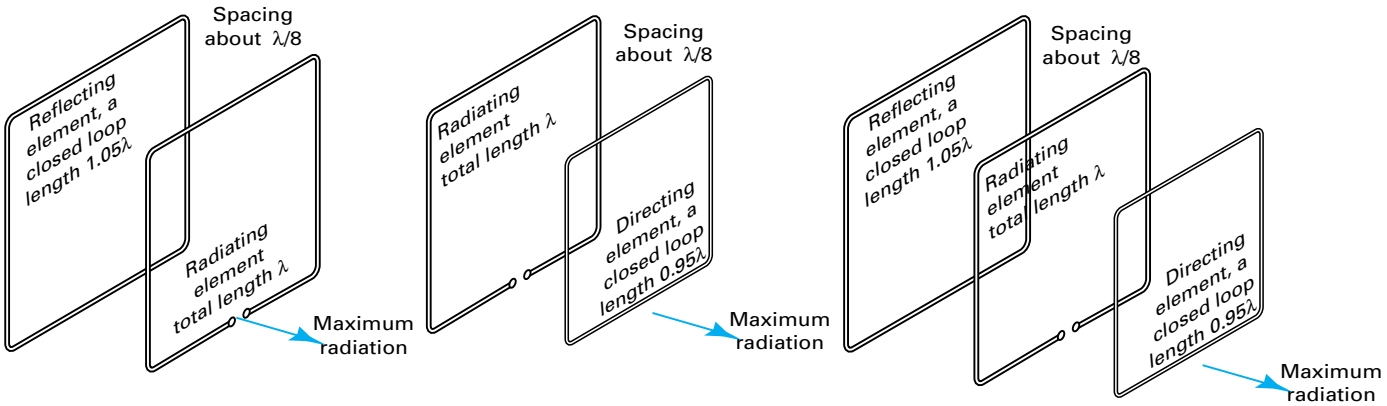

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valve & vintage

Charles Miller continues his amusing and often enthralling look back at his post Second World War days in the radio and television servicing trade. It seems as though his life insurance premiums must have been quite high if he met many rampaging bulls!

The *Miller Memoirs* continue onwards from the January issue where Charles was about to receive the unwelcome attentions of an angry bull:

I waited not to discover from whence the bull had come or why it had selected me as a potential victim! Instead I executed a powerful leap into the back of the van, slammed the doors behind me and then scrambled into the driving seat to make a getaway that Juan Fangio himself would have been proud of.

As I roared off I saw in the rear view mirror the bull, having been robbed of one target, change course and pound off down the lane where sat the unsuspecting picnickers. It must have been an interesting moment for them when this snorting beast broke in upon their tranquil tea break and I often ponder upon the outcome. Incidentally, should anyone know, please tell me.

Arrival Of ITV

With the arrival of ITV to the Midlands in February 1956, my work expanded rapidly and soon I was employing a number of part-timers in addition to Dennis and Ken. We were turning over so many repairs that it also became necessary to acquire another van.

Somehow or other I learned of a Ford 10cwt vehicle for sale. This led to my meeting the vendor on a wet night outside the Wolverhampton Wanderers' football ground and I'm here to tell you that this is far from an ideal circumstance in which to purchase a motor vehicle!

Based in part on the Ford Model C car of 1937, the van - FFD281 - had the same transverse springing, 30.1 b.h.p. side-valve engine and three-speed gearbox, allied in this case to a rear axle of prodigious ratio which provided a top speed of about 50m.p.h.

● The arrival of ITV in the Midlands was made possible by the Lichfield Independent Television Authority's transmitter. The kit TV makers advertising in *PW* at the time soon made receivers available. Incidentally, The ITA, which then became the Independent Broadcasting Authority, eventually fragmented into the Independent Television Commission before finally being swallowed whole - along with the Radiocommunications Agency and many other technical bodies - by the newly activated and voracious Ofcom 'Quango'. (Quasi-autonomous non governmental organisation).

Having had one Ford of dubious ancestry I should have known better, but I paid out £60 for this heap. It went immediately to work in a small branch I'd opened in another town which was operated on a part-time basis by a friend who was also a serving Police Officer (this was probably highly improper if not actually illegal, but it's a long time ago now).

My friend ran the Ford for several months at a ruinous rate of petrol consumption until he discovered that the pilot jet was missing altogether from the carburettor. It was also extremely reluctant to start, even with a fully-charged battery (6V of course) the starter would make only a feeble effort to crank the engine, of which more later.

Eventually, the Ford came back to join the Austin and was taken over by Dennis. He then proceeded to customise it by fitting aircraft landing lights in place of the old headlamps and by sundry other smaller modifications.

One of the modifications involved his drilling a hole in the near-side wing. However, so engrossed was he in getting the location correct - he omitted to notice that his one finger was precisely under the vital spot!

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The drill went straight through the wing, his finger and out the other side, but as I've mentioned before, the hospital accident department was handily only across the road from the workshop. They seemed to be quite intrigued, never before having had to deal with someone who had drilled a neat one-eighth-inch hole through a finger.

Unfortunately, the drill incident wasn't the only time that the Ford drew my friend's blood, for on another occasion it performed impromptu dentistry upon him. And at this point it's worth mentioning that Dennis possessed an excellent right front incisor which we were known to refer to as his 'onion-spearer'.

One dark evening Dennis left the workshop to make a delivery in the Ford whilst Ken and I continued work on some other repairs. We then heard the van door open, followed by some colourful language and then the reappearance of Dennis holding a handkerchief to his mouth.

Apparently the van door had shot open with considerable force and knocked his onion-spearer clean out. Before we knew what we were doing he had dragged us outside to search around with torches for the missing fang.

Eventually Ken rebelled. "What are you going to do with it if you find it"?, he demanded reasonably enough..."Stick it back in with Bostik"?

Dennis reluctantly saw the sense of this and went off to do his delivery without further ado. I suppose that in similar circumstances nowadays someone would sue someone else for vast sums of money, but in those days it was taken as just "one of those things".

That Ford van served us for about five years until it really was in too bad a state to soldier on. Somehow or other I found someone willing to offer £30 provided it was delivered to his home address.

The address turned out to be one of a squalid group of old Army huts in the grounds of a burned-out stately home which had been taken over by squatters. We already knew that one of them was, at the time, presently on bail on a charge of inflicting Grievous Bodily Harm on his wife with a meat-axe!

Considerable Trepidation

So, it was with considerable trepidation that Ken and I undertook the job of delivering the van. It was, of course, at night and in pouring rain, and as per usual the Ford only grunted when the starter switch was pressed.

Fed up, we put another 6V battery in series with that on the vehicle whereupon it started instantaneously. It was only then (and after all the trouble we'd had) that we investigated the starter motor and discovered that someone had erroneously fitted a 12V version!

I drove off into the night in the Austin with Ken following me in the Ford. He had no idea of the way and had to follow me closely. The Ford's vacuum operated windscreen wipers were bad enough at the best of times but were totally unable to cope with both the rain and the spray that the Austin sent up as I drove through endless puddles.

To make matters even worse, the radiator in the Ford began to boil and the inside of the windscreen kept steaming up. Ken was just about all-in when his nightmare drive was nearing its finish but the Ford had reserved one extra treat for him.

As we pulled up in the centre of the group of huts its radiator, goaded beyond endurance, finally blew up with a shattering roar which fetched out every man-jack of those squatters, amongst whom, I was unpleasantly aware, must be the meat-axe wielding GBH merchant.

I accepted a down payment of £15 from the Ford's new owner and Ken and I departed at speed. I never received the other £15 nor did I ever ask for it. I don't believe in pushing my luck! **PW**

The Two Step Transmitter's Here - thanks to Audio Stimulation

The Two Step Transmitter is here - thanks to Audio Stimulation, writes solid state physicist Wayne T. Enrico. Reporting from America's famous 'Silicon Valley' Wayne describes the miracle of the Acoustically Driven Emission No Injection Device.

Hi! It's a pleasure to be writing for the Ham Radio magazine *Practical Wireless*, describing our work here at the XtalTek Inc. research center in the heart of 'Silicon Valley. Although readers in England might not have heard of us, our company supplies much of the man-made 'grown' silicon crystal for use in the semiconductor business. We're not so well known in our own right, because up until recently other manufacturing facilities have processed our crystals into everything from large scale integration (l.s.i.) chips, right down to the humble m.o.s.f.e.t.

Recently our own 'ship has come into harbor' because we've now mastered the complex technique which has become known as the **Acoustically Driven Emission No Injection Device**. Referred to by the unlikely - but appropriate - acronym of ADENoID technology, the new solid state, two-stage radio frequency transmitter has arrived.

Ham radio enthusiasts – I know from working with them - have a sense of humor, so it's worth mentioning that we all enjoyed playing around with the words for the acronym. In the end the Solid State Inc. 'think tank' came up with ADENoID because the term represents just how the system works, and also provided everyone with a good laugh! We had to bear in mind one very important point - if you want people to recognise your product you choose a name they'll remember!

Oscillating Crystal

The heart of the ADENoID technology is the well known crystal oscillator. The first really efficient frequency stabilized Ham transmitters used the piezo-electric properties of the crystal to provide steady signals. Because they were 'Rock Steady' - here in the USA the term 'Rockbound' was soon coined to identify crystal controlled oscillators on the Ham bands.

During my Third Grade school days at Benton Harbor in Michigan - yes my Dad did work at the Heathkit plant - we had interesting Science Fair projects which often led to expeditions on the shores of Lake Michigan to search for rocks. My Dad, although not a Ham himself, knew just where to gather lumps of carbuncilliary crystals. During our lab trials everyone in the Third Grade upwards was able to choose a crystal, grind and polish it before mounting the finished crystal between smooth electrically conducting plates.

After flushing away the grinding paste under the cold water faucet the crystals were dried. Once installed in the plates we demonstrated how we could develop electricity by squeezing the plates. Next, using a simple three tube amplifier the Third Grade were able to use the crystals as simple microphones. As you say in England - "It was jolly good fun".

Science Fairs at Public Schools***(see below)** in the US are supported by everyone. All the students work together to produce projects. Naturally, my own projects were often linked with crystals and Ham Radio. My enjoyment of the technology led me on to do a Master's Degree on Mineralogy, before doing further post graduate work on Crystal technology. As ever, any natural interest the student has in their subject helps - and I was helped by my absorbing interest, guided by my Dad.

So, instead of my Mineralogy course taking four semesters - I graduated in three thanks to my support from Dad. That's how I became a Research Physicist at XtalTek Inc. working in the center of the world's greatest experimental area for the semiconductor industry.

***Note:** The term 'Public Schools' in the USA really does mean public, in contrast to our own system. Such a school in the UK would be termed a 'State School'. **Editor**.*

Simplified Prototype

Let's now look at the technology, starting from the microphone end of the schematic. The diagram, **Fig. 1**, shows a simplified prototype ADENoID unit. In practice it's much smaller than shown, due to the electro-physical phenomenon of Reflective Wave Frequency Dependency (RWFD).

The acronym RWFD hides a very simple and helpful physical action. In practice it means - with careful choice of crystal length and position of the end plates - it's possible to make a crystal oscillate at a much lower frequency than its physical size would indicate.

Basically, the length of the actual crystal unit determines the frequency range over which it will operate. As shown in the diagram, the two top electro-strictive plates (when electrically charged by a timing 'clock' frequency) enable the main crystal to oscillate over a band of frequencies in variable oscillator fashion. Bandwidths of 200kHz can be achieved at the moment.

Frequency modulation is applied to the ADENoID by the use of an Analogue to Digital (A to D) converter, fed from a microphone. The resultant converted audio is 'sampled' and the resultant digitised 'sample' of the analogue waveform is presented to the crystal face via the f.m. modulation input electro-strictive plates/pads (e.s.p.) - of gold, bonded in a molecular fashion - to the crystal's sides. The f.m. input pad nearest to the end of the crystal, by stretching and contracting the crystal by only a minute fraction, only deviates the generated main carrier in a minimum fashion. Whereas those e.s.p.s towards the center of the crystal - corresponding to higher voice frequencies - influence the deviation to a higher extent.

In other words, the bandwidth of the f.m. is controlled by the e.s.p. emplacements. For narrow band frequency modulation (n.b.f.m.) only six of the input points are required. For wide band f.m (w.b.f.m.) all 12 of the electro-strictive input points (e.i.p.) are used.

Audio To RF

Of course, for the r.f. engineer the most interesting question on the new ADENoID technology is just how does this advanced

technology is just how does this advanced American product actually work? How does it generate modulated radio frequency directly from audio without separate oscillator, multiplier, driver and p.a. stages – not forgetting the modulator! Fortunately, in concept the idea is extremely simple indeed as you can see by looking at the physical diagram in Fig. 1.

Note: Because of Pending American Patent Office License Applications, the actual placing of the electro-strictive inputs (the most critical elements in the technology) have been moved for clarity, and for patentee protection, on the advice of my Senior Development Vice President, **H. A. (Hiram) Gruenruck**. My thanks go to **R. T. (Randy) Schrieber** for the helpful physical schematic.

In Fig. 1, the end plates (molecularly fused gold plates - literally 'sown' into the surface of the crystal lattice) are fed at both ends simultaneously with high power audio, and this 'drive' can conveniently also be the modulation. The high level of the audio stimulation then 'shocks' the crystal into oscillation at a frequency decided by the resonant length, and the e.s.p. (v.f.o.) top plates, as previously described.

Once the ADENoID is stimulated and oscillating with an applied audio input of 100W, the r.f. output can be expected to be in the region of 95W, the 5% loss resulting from mechanical considerations within the crystal. The r.f. output of the crystal is then taken from one of the e.s.p.s (center Fig. 1) which is bonded to the crystal structure to form a dielectric coupling device. Hams may well know this as 'capacitive coupling'. (The plate on the other side is 'grounded' to provide a full circuit.

With so much power generated in a small area (a complete, 7MHz ADENoID unit provided with heat-sinking could be only around two inches long, and half an inch wide) cooling was originally a major problem. But this has now been overcome by suspending the prototypes in a viscous, electrically insulating, non-capacitive liquid which has the remarkable property of conducting heat away very rapidly indeed. It's strange stuff with the consistency of a dull grey-colored 'Jelly'* but it works well.

Once the heat is absorbed by the jelly, it's radiated into the surrounding space by heat-sinking fins, molded onto the outer casing of the block. Even with the heat-sinking, a 100W capable transmitter unit would fit - with space to spare – in a six piece gum pack!

***Translation note:** 'Jelly' is what we could call 'jam' here in the UK. Conversely, what we know as 'Jelly' (popular at children's parties, etc.) is known as 'Jello' in America. **Editor**.*

Great Engineering - But?

Sure, the ADENoID technology is great engineering - but how useful is it in practice? In answering that question - put to me by the *PW* Editor during our many E-mail consultations - I can say that 'It remains to be seen', as large scale production is only about to start in our Californian plant.

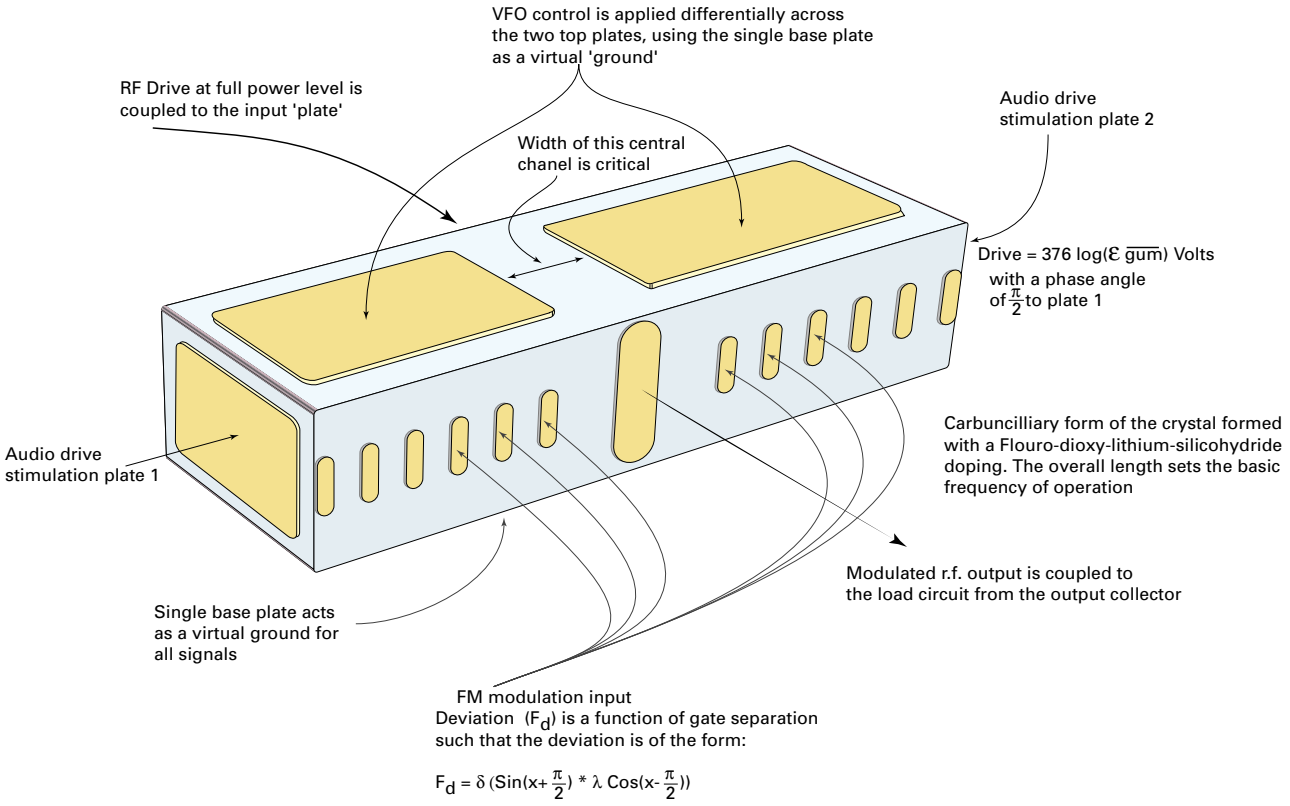
Much labor has gone into developing the ADENoID crystals, but we have many ideas how they can be used. Obvious applications include miniaturised, rugged h.f. transmitter-receiver units.

The main use - and advantages - of ADENoID technology for Hams would be the building of simple two stage transmitters. You might say "Hey, developing 100W of audio is quite an exercise" but my reply would be - "surely it's easier to generate than by using a v.f.o. and multiple r.f. stages"?

With the high power audio modules available for public address systems - it should be an easy task for what you Hams call 'home-brew'. On this point, it's worth noting that in our research center we actually borrowed a p.a. system module from our Janitor! (A Medical Student working his summer vacation). It proved very effective, but we fractured the first ADENoID unit by over-driving it. Recovering from his annoyance when he found we'd hijacked one of his amplifiers and had damaged our prototype ADENoID the Janitor said dryly..."Serves you right...I think you've given it a sore throat"!

We've a lot more development to do on the ADENoID technique yet - but it will be on the market soon. I'm proud to have been involved in the work, and to share it with friends in England.

Just think, the story started out many years ago on the shores of Lake Michigan...not far from Benton Harbor, the home of Heathkit. Another great American innovation, following in the innovative Heath company tradition. **PW**



● Fig. 1: In his article, Solid State Inc. Physicist Wayne Enrico describes the theory and practice behind the latest Acoustically Driven No Injection Device (ADENoID) technology. This diagram shows how the prototype simple one block, two stage radio frequency transmitter works in principle. At the present stage of development both amplitude and frequency modulation are possible with the ADENoID technology, and s.s.b. is being developed with the aid of high power filters.

A Simple Matching Unit

Not all antennas match perfectly on all bands. To counter the problem Stefan Niewiadomski has created a low-cost antenna matching unit for low power transmitters or receivers.

The simplest type of antenna used by a beginner when short wave listening is a random length of wire, this is often called a 'long wire', connected directly to the low impedance input of the receiver. Such a wire tends to have a relatively high impedance compared to the typical 50Ω input impedance of most receivers and this mis-match will result in power loss and a reduction in signal strength.

The best way to cure the power loss is to use an antenna matching unit (a.m.u.) between the long wire antenna and the low impedance receiver input. In this position the a.m.u. will translate the high impedance of the antenna down to a value that's more useful to the receiver. An a.m.u. also provides a high degree of selectivity to the desired signal, helping to reject possible image and other general interference.

The design described here allows a wide range of wire lengths to be matched to the low impedance (usually 50Ω) input of a receiver. The cost of the unit has been kept as low as possible by the minimum use of variable capacitors. Additionally construction has been kept simple by not using a tapped inductor in the impedance matching network.

The design also incorporates a device that allows the unbalanced receiver input (coaxial socket) to be used more effectively on a balanced antena, such as a doublet (often known as a dipole). This 'magnetic' component is known as a balun. In this mode, the unit will accept balanced antenna inputs, which often have impedances in the 400-600Ω range, and match these to the unbalanced low impedance receiver input.

Beginners in the hobby can be put off projects because of the need to wind inductors. So, I've tried to use as many pre-wound inductors as possible and this design needs only two simple inductors and one balun transformer that need winding. With only a few turns, on small toroids, they should present no problems even to a beginner. All the other inductors are off-the-shelf components.

Skeleton Circuit

Have a look at **Fig. 1**, which shows the skeleton circuit of a commonly-used impedance matching network. In commonly available radio literature this is often called a 'transmatch' configuration. By varying C1, C2 and L, a wide range of antenna impedances can be matched to the 50Ω receiver input.

In practice capacitor C1 is usually a single gang tuning capacitor with its frame (and shaft) isolated

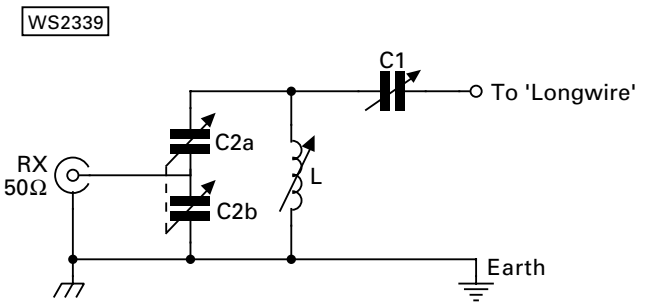


Fig. 1: A simple wide-ranging impedance matching unit. See text for more detail.

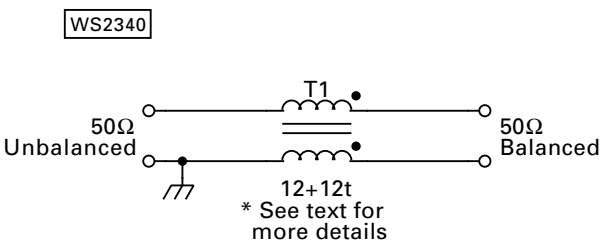
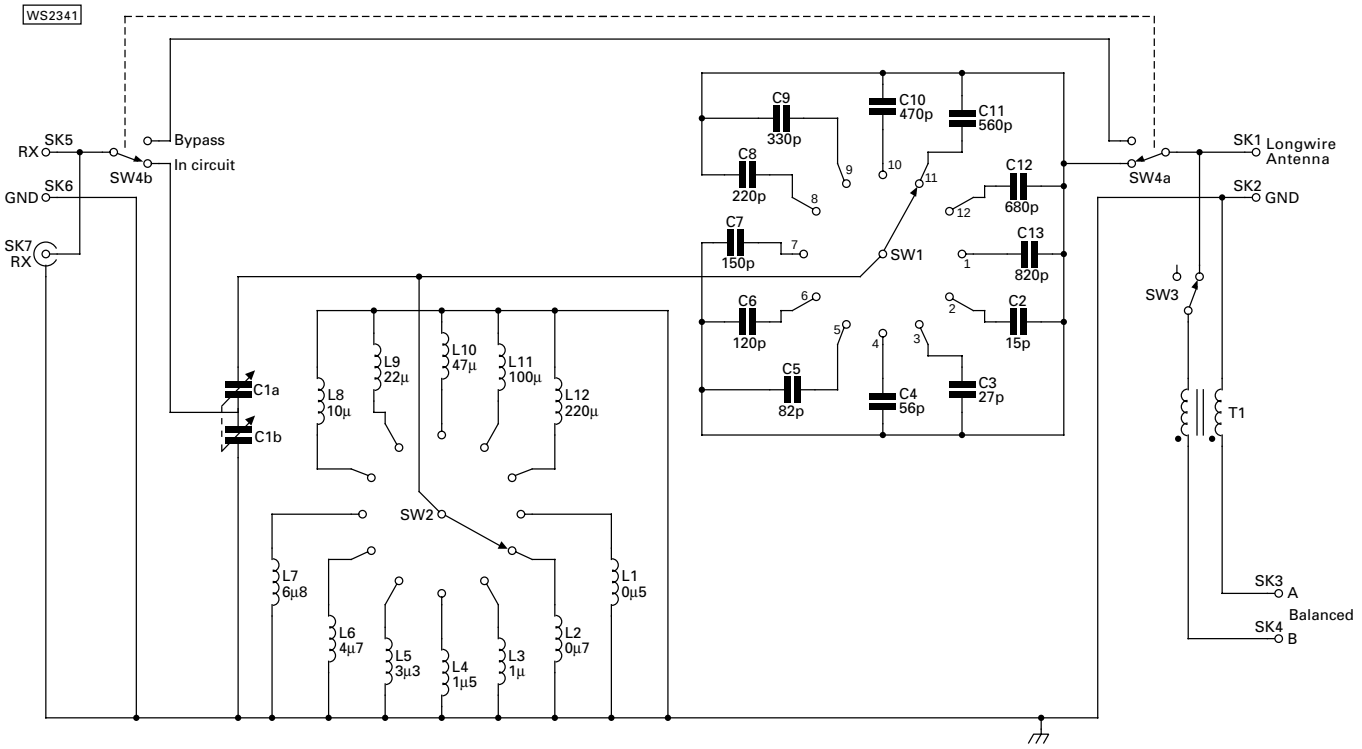


Fig. 2: An in-line Balun with no change of impedance through it (see text).

Fig. 3: The Balun is mounted directly onto the rear-mounted terminal posts. See text for more detail.



● Fig. 4: The a.m.u. uses switched component 'variables' rather than more expensive real variable ones. See text for more detail.

from ground. The other variable capacitor, C2, is often a dual gang component, again completely isolated from ground. The variable inductor, L in Fig. 1, may be a 'variable' inductor using a switch to select the tapping points.

Another form of variable inductor is a rotary inductor, often caller a 'roller-coaster', in which a wiper on the wire on the inside of the coil gives a continuously-variable inductance value. It's this variable inductor which usually gives the most problems when constructing a practical a.m.u. not to mention usually costing a great deal of cash!

With the above described difficulty in mind, in the design described here, the variable inductor has been replaced by a switched range of inductors, chosen to allow matching to wire antennas at frequencies from 500kHz to 30MHz.

Reduced Costs

To reduce costs even more, I've dispensed with the single gang tuning capacitor, (C1 in Fig. 1), substituting a series of switched capacitors, that I'm sure will be found in most 'junk-boxes'. If bought new, suitable variable capacitors can also be expensive.

If you want to experiment with balanced feeders and antennas, a balanced-to-unbalanced broadband transformer (usually abbreviated to 'Balun') needs to be used. The skeleton circuit of **Fig. 2** shows how this can be simply implemented with a few bifilliar turns on a ferrite toroidal core.

Using a suitable ferrite material, this type of winding on the ferrite core gives a reasonably broad-band (2-30MHz) transformer that needs no adjustment or tuning over this relatively broad frequency range. The ferrite core and material used for core an FT-50-43, with bifilliar (wound together side-by-side) winding, **Fig. 3**.

The diagram of **Fig. 4** shows the complete circuit of the a.m.u. The long wire antenna connects to SK1. A ground connection, tied to SK2, will help reduce noise. S4 switches the a.m.u. in and out of the signal path from antenna to the receiver that's useful for making a comparison between the signal strength with a direct connection to the antenna and via the matching units. If several antennas are available, then another switch and more antenna sockets could be added to select them without having to fiddle with connections on the rear panel.

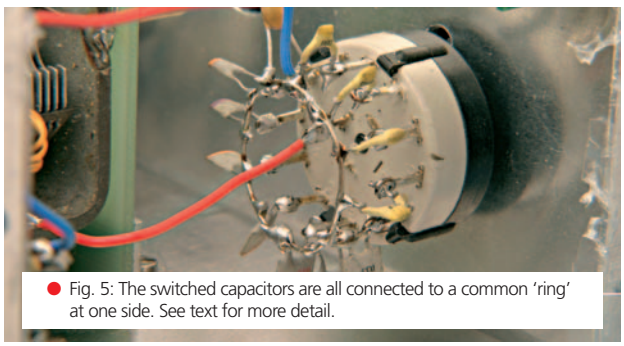
The 'variable' capacitor, formed from S1 and its associated capacitors C2-C13, emulates C1 in Fig. 1, but avoids the use of an expensive variable capacitor. If in your junk-box however, you have a 300 or 500pF variable capacitor, then it can be used instead.

Switched Capacitors

If you intend using a variable capacitor in place of the switched capacitor bank, then remember that you need to ensure it is isolated from the metal chassis and case. A piece of insulated material mounting plate and shaft extension should be used.

The switched inductor bank formed around S2 and its associated inductors (L1-L12), **Fig. 5**, emulate L1 in Fig. 1. The range of 0.5 to 220µH allows operation from about 30MHz down to about 500kHz. Only L1 and L2 must be hand wound on small powdered-iron toroids with only a few turns, the other inductors, L3-L12, are Toko pre-wound components. I used Toko 7BS coils because I had them to hand, but Toko 7BA style can also be used, **Fig. 6**.

Variable capacitor, C1a/b is a 500+500pF dual gang unit, which is the most expensive item if you have to buy it. I've found that old valved or transistor radios, that may be picked up cheaply at junk sales, are often a good source of these components. Solid dielectric (sometimes called Dilecon) variable capacitors are also suitable for receive applications.



● Fig. 5: The switched capacitors are all connected to a common 'ring' at one side. See text for more detail.

The Balun, T1 may be switched in and out of circuit by S3 and balances the two feeder lines from the antenna, connected to SK3 and SK4. It performs a 1:1 impedance match making no other impedance changes at the antenna feedpoint. I felt that the Balun winding connected to the antenna terminals might

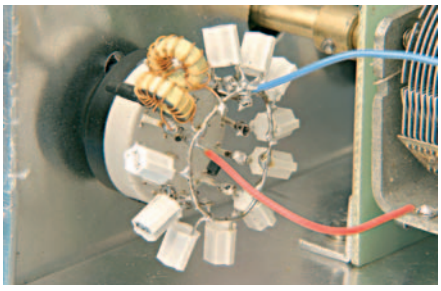


Fig. 6: The fixed value inductors are all connected to a common 'ring' at one side. See text for more detail.

Fig. 7: The back panel showing the BNC socket rather than the more common SO239.

result in signal loss so, I added S3 to enable it to be switched out of circuit. (Using only coaxial feeders, all these components can be omitted.).

The two terminal posts, SK5 and SK6, allow a twisted-pair connection to be made to the receiver's antenna and ground terminals as shown in Fig. 3. Though most often receivers have an SO239 socket antenna input, but my version has a BNC socket, **Fig. 7**.

Winding Coils

Now to winding the various coils and balun, T1, which is wound on an FT-50-43 ferrite toroid. Cut two 150mm lengths of approximately 0.56mm (24s.w.g.) enamelled copper wire (e.c.w.) and twist them loosely together. Then wind 12 turns, of the two wires together, on the toroid. Trim the ends of the wires to about 30mm, to be finally trimmed when mounted in the case.

L1 is 13 turns of 0.56mm e.c.w. wound on a T37-6 (yellow) toroid and L2 is 15 turns of the same sized wire on the same type toroid. Try to keep the windings fairly regular and spread the wire around most of the toroid. Trim the ends to approximately 10mm and remove the insulation and tin the ends before mounting on S2.

With a unit like this, there is no need for a p.c.b. and once the major components have been mounted on the case, they can be wired up point-to-point with insulated wire. If a metal case is used for the unit, then C1 needs to be isolated from the case. I mounted C1 on a piece of single-sided p.c.b. material with all the copper etched off.

The overall layout of my prototype is shown in **Fig. 8**. The balun, T1, is shown suspended between SK2, SK3, SK4 and S3. An earth tag is fixed to the rear panel: SK2 and SK6 and any other grounded connections are soldered to it.

The capacitors, C2-C13, are mounted directly on S1, with the common ends of the capacitors tied together with a ring of tinned copper wire. Similarly, L1-L12 are mounted directly on S2, again with the common ends connected together.

The legends I've used on both the front and rear panel layouts, were created on the computer, printed out and stuck onto the panels. These were then covered with sticky-backed clear plastic. The controls and sockets were then carefully mounted on the panels.

I found the setting of S1 to be fairly uncritical (hence the use of switched capacitors) so I keep it at maximum capacitance (820pF) most of the time. Switch S2 is set so that the inductance in circuit is suited to the frequency range used. As a starting point I found the following settings best for the major Amateur Radio bands. Other frequencies between these bands can be interpolated from the table below:

Band	Coil	Value
28MHz	L1	0.5µH
21MHz	L2	0.7µH
14MHz	L4	1.5µH
7MHz	L6	4.7µH
3.6MHz	L9	22µH
1.8MHz	L11	100µH
MW band	L12	220µH

Familiar Operation

So, how do you use this a.m.u.? I found the best way to get familiar with the operation of the a.m.u. was to tune to an a.m. broadcast station just outside of the Amateur bands, for example in the 75, 41, 31, 25, 19, 16 and 11m broadcast bands. Because a.m. signals have a continuous carrier they register a steady reading on a receiver's S-meter and so the peaking effect of adjusting C1 and S1 in the a.m.u. is more obvious than with s.s.b. or c.w. signals.

Once peaked on the a.m. signal, you can re-tune to the nearby Amateur band where only a slight adjustment of C1 will be needed to peak the new signals. You will soon get familiar with the settings for the various bands. By switching the a.m.u. in and out of circuit with S4 the effect of the a.m.u. can clearly be heard and seen on the receiver's S-meter. On my set-up the a.m.u. made a couple of S-points difference on most signals. So, it's well worth the effort of building the unit and adjusting it when tuning around.

Transmitter Use

You may ask, can I use the a.m.u. for a transmitter? In reply, I can say that this configuration of a.m.u. is entirely suitable for matching transmitters to random length long wire or balanced antennas. **Note: the only concern is that the components used, particularly C1 and the switched inductors, can handle the power flowing through them** (this is important).

For power levels up to about 20W a receiver-type variable capacitor can still be used for C1, but for higher power transmitters, a capacitor with much wider spaced vanes will need to be used. It's well worth looking for surplus units on junk stalls at exhibitions. When bought new, wide-spaced variable capacitors can be expensive as well as being bigger ... meaning a bigger case will aslo be needed.

The existing toroid-wound L1 and L2 inductors should be changed to T50-6 cores and L3-L12 changed from standard Toko coils to T50-6 (yellow) or T50-2 (red) toroids for transmitter powers up to 20W. The type–6 (yellow) toroid material is suitable for use from 10-30MHz, whereas type-2 (red) material is typically used in the 1-10MHz range. C2-C13 would need to be changed to silver mica types to the powers.

So there you have it, a simple cheap antenna matching unit! **PW**

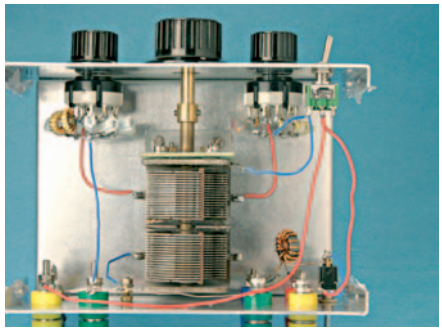


Fig. 8: The overall layout of Stefan's prototype. Care must be taken to ensure that the variable capacitors are isolated from the chassis.

Capacitors		Inductors	
C1	Twin-gang 500+500pF	T1	12 bifilliar turns on an FT-50-43 toroid
C2	15pF Ceramic		
C3	27pF Ceramic	L1	0.5µH (13t on a T37-6 toroid)
C4	56pF Ceramic	L2	0.7µH (15t on a T37-6 toroid
C5	82pF Ceramic	L3	1.0µH (Toko)
C6	120pF Ceramic	L4	1.5µH (Toko)
C7	150pF Ceramic	L5	3.3µH (Toko)
C8	270pF Ceramic	L6	4.7µH (Toko)
C9	330pF Ceramic	L7	6.8µH (Toko)
C10	470pF Ceramic	L8	10µH (Toko)
C11	560pF Ceramic	L9	22µH (Toko)
C12	680pF Ceramic	L10	47µH (Toko)
C12	820pF Ceramic	L11	100µH (Toko)
		L12	220µH (Toko)
Knobs, sockets and other hardware to suit.			

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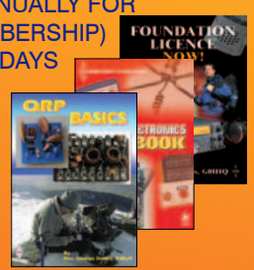

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carrying on the practical way

"Making the simple complicated is commonplace; making the complicated simple, awesomely simple, that's creativity".
Charles Mingu (Jazz bassist)

This month the Rev. George Dobbs G3RJV tackles the problems of good sensitivity on simple receivers, which is often accompanied by poor selectivity. The variable audio filter - using an op-amp - he's come up with should prove very useful!

For many years I've been building simple and sometimes complex QRP receivers and transceivers. Many of the simpler designs have good sensitivity but poor selectivity. Plenty of stations can be heard, but there are problems in distinguishing between them on a crowded band. This is especially so of the simpler direct conversion receivers.

In a superhet receiver, the intermediate frequency (i.f.) stages may be used for filtering. However, in direct conversion receivers, there's direct transfer from the radio frequencies to the audio frequencies so the obvious place to increase selectivity is within the audio stages. The commonest way to achieve this is to introduce an active audio filter to sharpen the required audio frequencies.

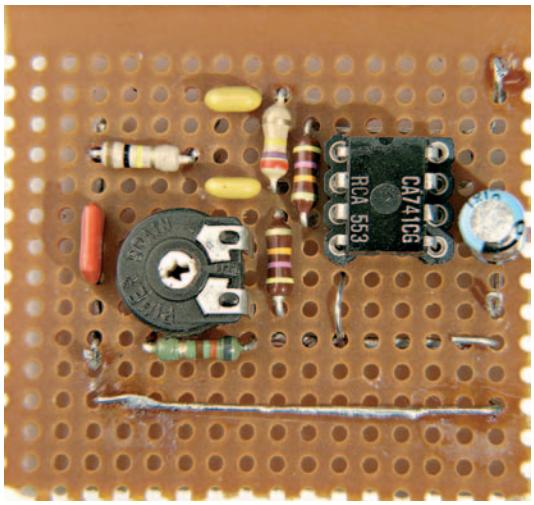
Noble History

There's a noble history of active audio filters in Amateur Radio literature. As some readers may know, **Martin F. Jue** the founder of **MFJ Enterprises** began his commercial life by producing a kit for an active audio filter - and starting his business in a rented room.

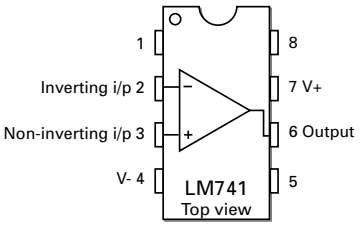
I recall Martin's filter well; I bought one and used it often. The path for MFJ Enterprises was uphill from those humble beginnings. And, like many such filters, the original MFJ audio filter kit was based on the use of operational amplifiers (op-amps).

The op-amp is perhaps the most versatile integrated circuit (i.c.) available to the Amateur Radio user. It was developed many years ago for use in analogue computing. Those were the days……(so say some!).

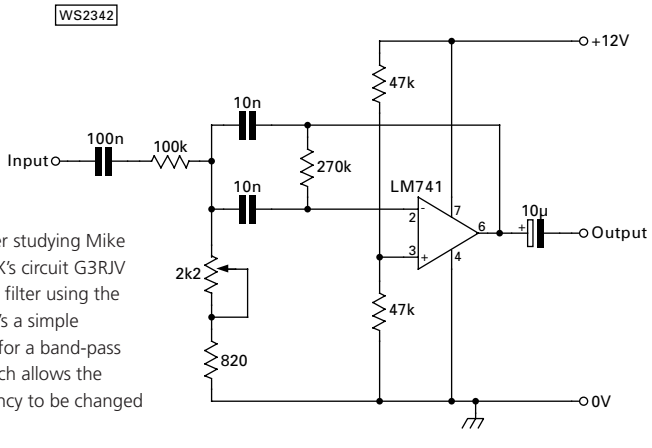
In the early 1960s I was employed, for a while, by a company manufacturing titanium dioxide paint bases. The pride and joy of the research department was an analogue computer. Variables were introduced as voltage changes and the output information was read on a simple voltmeter. Since that time op-amps have become workhorses in analogue electronics.



● This month George G3RJV describes an interesting little op-amp audio filter which is the result of the design work of Mike Martell N1HFX. The filter works well and George encourages readers to "have a go" themselves.



● Fig. 1: The pin layout for the 741. If the voltage goes into pin 2 it becomes an inverting amplifier and if the voltage goes into pin 3 it becomes a non-inverting amplifier (see text).



● Fig. 2: After studying Mike Martell N1HFX's circuit G3RJV built an audio filter using the circuit here. It's a simple arrangement for a band-pass c.w. filter which allows the centre frequency to be changed (see text).

Basic Op-amp

The basic op-amp is the 741 which is still used in many circuit applications. In effect the 741 is a 'linear amplifier' with the main purpose of amplifying a weak signal. It has two inputs, **Inverting (-)** and **Non-Inverting (+)** and one output.

The inverting amplifier reverses the polarity of the input as the input voltages rises, the output's value falls. The output polarity remains the same with the non-inverting amplifier input.

The pin layout for the 741 is shown in **Fig. 1**. If the voltage goes into pin 2 it becomes an inverting amplifier and if the voltage goes into pin 3 it becomes a non-inverting amplifier.

The gain of the amplifier can be varied by introducing feedback between the output and the input of the amplifier. A feedback loop can also be used to control the frequency response of the amplifier.

Very often, active audio filter circuits have several op-amp stages, frequently using i.c. chips which contain more than one op-amp. Recently, when reading a New Zealand Amateur Radio magazine, I found a reference to a single op-amp variable frequency audio filter.

The article referred to the work of **Mike Martell N1HFX** and his projects webpage. After studying the N1HFX circuit and a couple of hours at the work bench, I built an audio filter using the circuit shown in **Fig. 2**. It's a simple arrangement for a band-pass c.w. filter which allows the centre frequency to be changed.

The feedback loop between the output (pin 6) and the input (pin 2) uses resistor-capacitor network to control the band-pass frequency. A variable

resistance allows adjustment of this frequency. The control alters the filter '*Q*' and the centre frequency at the same time, so the bandwidth remains almost constant.

An experienced c.w. operator might compare the circuit's operation with the action of old-time high impedance headphones. These were often constructed using diaphragms which resonated around the usual frequency of a Morse signal. (I even remember tales of old Morse code operators clipping bits of metal from headphone diaphragms to make them more resonant at the desired frequency).

Building Variety

Such a simple circuit could be built in a variety of ways. My prototype was built on a small piece of Perfboard; the plain insulated board with a matrix of holes at 0.1in spacing. An almost no-cost option would be to build it point to point 'ugly' style of a ground-plane of printed circuit board material.

The values shown in the circuit should put the centre frequency in roughly the range 500Hz to 1kHz. This is a useful working range for c.w. signals.

I also choose to make the variable resistance a pre-set control and keep it on the board. Other constructors may wish to use a potentiometer and have a centre frequency control knob.

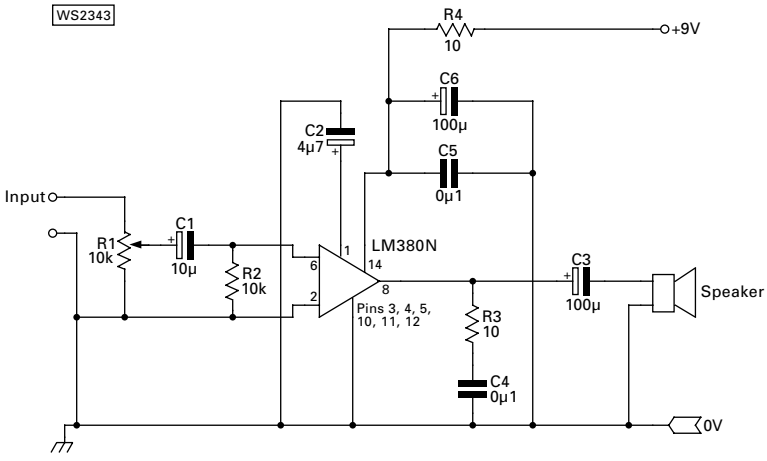
Personally, I think that there are some advantages in having an easily variable control for dodging interference and varying the sound of the signals. (I lament the exclusion of b.f.o. frequency controls on many items of modern amateur radio equipment). Not only were these useful in easing fatigue when listen to Morse code signals, where the pitch could be varied, but they often helped in crowded listening conditions. 'Tweaking' the pitch of a signal can be a useful reception aid.

Where To Fit?

So, where should this little filter be installed in a receiver? In answering that question, ideally it ought to be wired within the audio stages at a point of relatively high impedance.

The simplest case direct conversion receiver with just a mixer and an audio i.c. as the only amplification stages could take the filter just before the audio chip (i.c.). Alternatively perhaps it could be wired directly on the back of an audio gain (volume) control? Another possibility, if there's an audio pre-amplification stage, the filter might fit well between that and the final audio amplifier.

Note: The filter's input impedance is not a good match to the usual receiver headphone or loud speaker socket. Despite this, my initial testing of the prototype was to simply plug it into the headphone socket of one of my simpler receivers. It worked well enough to suggest that the filter could be built into a stand-alone unit by adding an audio amplifier. This would give a small unit which could be plugged into any simple receiver.



● Fig. 3: The circuit shows the amplifier G3RJV used in his test set-up. It's the basic arrangement for an audio amplifier using an LM380N audio i.c. (see text for further comments).

Audio Amplifiers

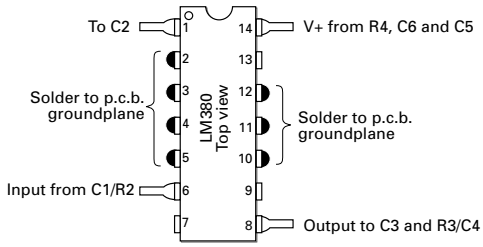
A whole range of small audio amplifiers could be used on the output of the filter and I've actually shown many suitable circuits in previous editions of this column. The circuit, **Fig. 3**, shows the amplifier I used in my test set-up. It is the basic arrangement for an audio amplifier using an LM380N audio chip.

The LM380 is usually available for under a £1. The extra component count is low and it makes for a cheap stable amplifier.

Incidentally, I prefer the LM380 to the often used LM386. It provides more output (up to 2W) and doesn't have the stability problems of the LM386.

So, I just pulled a previous built LM380 amplifier off my shelf for the prototype tests. As it happened it was built using 'ugly' construction techniques.

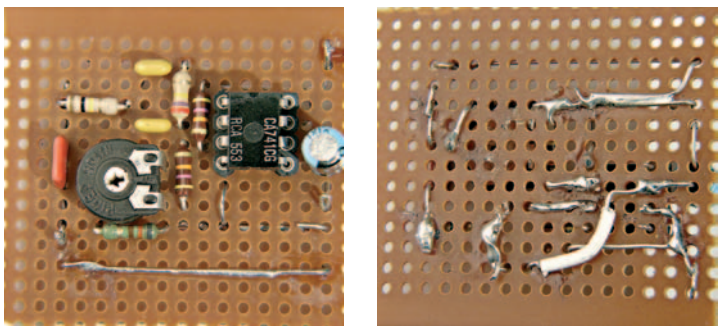
The LM380 lends itself well to these techniques because of the pin layout; Pins 2, 3, 4, 5, 10, 11 and 12 are all connected to ground. In fact they form a heat sink for the device. These pins may be directly soldered to a ground-plane made from a piece of printed circuit board (p.c.b.) material. Using the 'ugly' style technique the other pins are splayed out parallel to the copper surface and the components are arranged around the chip.



● Fig. 4: George G3RJV suggests that when using the 'ugly' lay-out technique, a simply sketched diagram like this shows how to arrange the parts with the grounded points soldered directly to the copper board (see text).

I've included **Fig. 4** to show how I lay out such boards. A simple sketch like this shows how to arrange the parts with the grounded points soldered directly to the copper board.

I always make such a sketch when using 'dead bug' assembly technique (where the chips are mounted on their back with the pins pointing upwards). Why? The answer is it's all too easy to mistake the pin order in dead bug construction and a few minutes with a pencil makes this less likely.



● Fig. 5: Top-side and under-side of the Perf board filter project (see text).

So - here's a useful little filter for simpler receivers for you. It can be built into the receiver or built as an outboard unit ready to use with a variety of receivers. Try it out for yourself!

PW

VHF DXER

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REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

DAVID G4ASR TAKES A LOOK AT RECENT DEVELOPMENTS ON THE 70MHZ BAND

Some years before his death the well known v.h.f. DXer **Jack Hum G5UM** wrote a brief history about the 70MHz band. Jack explained that prior to the Second World War in 1939 the UK Radio Amateur had held an allocation at 56 Megacycles at what was then known as 'ultra high frequencies'.

In 1945 the allocation was resumed and UK Amateurs were allocated 58.5 to 60MHz but this was only available for little more than three years. This was because BBC television required the band with one TV station operating on 45MHz and another scheduled to operate right in the middle of the Five Metre band.

Around this time the Radio Society of Great Britain (RSGB) started lobbying the authorities for an allocation above Band I television looking for something to replace 'Five'. Indeed there was and it was called 'Four'. Initially a small 200kHz band from 70.200 to 70.400MHz allocated in November 1956. The RSGB continued to make a case for more spectrum at 70MHz and the band was gradually widened to the 500kHz allocation we have today between 70.000 to 70.500MHz.

The initial 200kHz bandwidth available amply accommodated the few who tried their hand at the new band. Much of Four was taken up with wide-band amplitude modulated (a.m.) 'phone transmissions as telephony communication using frequency modulation (f.m.) was years away.

It was soon found that a.m. didn't travel far and the use of Morse (c.w.) was always a strong feature of the Four Metre band. This enabled stations with modest power to enjoy almost nation-wide range and with the introduction of s.s.b. telephony similar inter-UK paths were easily worked. Nowadays most two-way communication is accomplished using Morse, s.s.b. or f.m. telephony.

In the UK the band is allocated with Secondary status. It is available on the basis of non-interference to other services outside of the UK. The power limit is 160W (22dBW) and permitted modes are Morse, telephony, data, facsimile (FAX) and radio teletype (RTTY).

At the bottom of the band between 70.000-70.050MHz you'll find the beacon sub-band. Narrowband modes (in common with all v.h.f., u.h.f. and microwave bands) are also found at the bottom of the allocation between 70.050 to 70.250MHz. This is where c.w. and s.s.b. inter-UK and DX activity will be found.

Listen on and around 70.200MHz, the combined c.w. and s.s.b calling frequency. Four Metres is unique in that it still has an a.m. calling frequency on 70.260MHz. This is located in the 'All Modes' sub-band between 70.250 to 70.294MHz.

A large chunk of the band, 70.294-70.500MHz, is allocated to channelised operation where both telephony and digital modes exist. These are n.b.f.m. channels with 12.5kHz spacing and in this sub-band area you'll find f.m. telephony, packet radio, FAX and RTTY.

EARLY DAYS ON FOUR METRES

In the early years only the United Kingdom (G, GD, GI, GJ, GM, GW), British Sovereign Bases in Cyprus (ZC), Gibraltar (ZB) and Eire (EI) had access to the Four Metre band. Around this time the authorities in Cyprus (5B) granted permission for a beacon 5B4CY to operate on 70.114MHz.

In the 1980s the station of 5B4AZ was active on the 70MHz band but he has not been QRV for some years. (Recently the station of 5B/G1JJE has been worked from the UK on both the 50 and 70MHz bands). Apart from the summer months when Sporadic-E (Sp-E) propagation was prevalent UK Radio Amateurs enjoyed virtually interference-free use of the band.

In eastern Europe (Czechoslovakia, Poland, etc.) f.m. broadcast stations also used the 70MHz band and their wide band signals would often wipe out the entire Four Metre band for Amateur Radio contacts. These Sp-E lifts, which became evident early on in the history of Four Metres, raised hopes that overseas administrations would see fit to give the band to their nationals but at the time none did.

For most of the time the 70MHz band was peculiar to the British although several enterprising European operators (and VE1ASJ in Canada) equipped themselves with 70MHz converters and were able to enjoy cross-band contacts with stations in the UK.

A few years ago (in my capacity as the RSGB v.h.f. Manager) I submitted a paper to the International Amateur Radio Union (IARU) conference urging other Region 1 v.h.f. managers to approach their administrations in seeking access to the 70MHz band. At recent tri-annual conferences in Lillehammer and San Marino I submitted further papers regarding the 70MHz band. Prompted by this, a number of administrations within IARU Region 1 have now granted Radio Amateurs access to the band.

INTERNATIONAL ACCESS

In 1998 Slovenia (S5) signed up to the CEPT agreement obtaining access at 40 and 70MHz. Their Four Metre allocation of 70.000 to 70.450MHz is based on the UK band plan with a maximum power output of 100W. Incidentally, the allocation between 40.660-40.700MHz is for propagation beacons only.

Slovenia is located at an ideal distance from the UK for a number of propagation modes including aurora, meteor scatter and Sporadic-E. Many Slovenian stations are now active on the 70MHz band and some of them operate on f.m. as well as c.w. and s.s.b. and therefore can be worked on converted private mobile radio (p.m.r.) sets.

Last year on 13 May the station of **Ivan S51DI** made 30 contacts on f.m. and s.s.b. with UK operators including several new Ascom owners who could hardly believe their ears! Since these openings may be sudden and of brief duration it is especially important to keep the calling frequencies clear of local contacts. It would be sensible to keep overs short and leave gaps to allow distant stations the chance to call in.

Ivan also comments that in addition to the usual calling frequencies he finds it worthwhile to check 70.2625MHz as he has worked a number of EI and G stations on this channel. This frequency may have come into use because anyone using a.m./f.m. synthesised equipment would only be one 12.5kHz step away from the a.m. calling channel. A beacon S55ZMB (JN76) operates on 70.029MHz running 5W into a 4-element Yagi and is often heard in the UK during summer months.

On 19 December 2003 the Official Gazette of the Republic of Croatia (9A) announced that effective from 26 December

an allocation between 70.000-70.450MHz has been granted to radio amateurs. The modes of c.w. (A1A), s.s.b. (J3E), RTTY (F1B) and packet/data (F2D) have been allowed with a power limit of 10W output.

Zeljko 9A2EY was one of the first Croatian stations to become active on the 70MHz band. He was using a home-made transverter running 8W output into a dipole antenna. Operating from Sljeme mountain (JN75) near Zagreb he made tropo contacts with the stations of S51DI (JN76), S53X (JN65), S54M (JN86), S57LM (JN76), 9A3AB (JN75), 9A4EP (JN75) and 9A4QV (JN75) for best DX of the day at 171km.

Bo OZ1DJJ/OX3LX reports that in August 2003 he sent an application to the authorities in Greenland (OX) requesting access to the 70MHz band. On 19 September he was informed in writing that Amateurs in Greenland can now use 70.000-70.500MHz with an output power of 1kW!

Jon Dam OY9JD is now operational on 70MHz c.w. and has a permit from the Faroe Islands National Telecom Agency to use the following three frequencies on c.w. only, 70.025, 70.050 and 70.100MHz with a power output of 25W. He prefers to operate on 70.100MHz and is looking forward to working some stations soon via aurora or Sporadic-E propagation.

Jon was assisted onto the band by **Rupert G4XRV** who provided a 20W transverter and 5-element Yagi. On his way back from visiting OY9JD, he stopped off in the Shetland Islands (IP90) and made the first GM to OY contact on the 70MHz band. Rupert was only running 5W output from a Cirkit transverter and a 3-element Yagi.

Ivan Stauning OZ7IS (the Danish v.h.f. Manager) passes on the news that from 1 February 2004 Radio Amateurs in Denmark (OZ) are now allowed to use segments in the 70MHz band without a special permit.

A few stations with permits had been active on the band since July 2003. The allocated band segments are 70.0125-70.0625MHz, 70.0875-70.1125MHz, 70.3125-70.3875 and 70.4125-70.4875MHz with a power output of 25W. As the c.w./s.s.b. calling frequency 70.200MHz is not available in Denmark the frequency 70.100MHz has been nominated instead. Beacons are allowed in the band 70.0125-70.0500MHz and OZ7IGY has been operating on 70.021MHz since November 2003.

South Africa (ZS) has for two years had an allocation between 70.0 to 70.3MHz with a maximum power of 400W output. Their band plan has DX sections for c.w. and s.s.b. modes between 70.030-70.150MHz and 70.200-70.300MHz. The 9000km path between the UK and South Africa is particularly interesting as both ends lie at the extremity of the trans-equatorial zones.

A contact over this t.e.p. path is definitely on the cards and should take place when conditions are particularly good on the 50MHz band. The opening will probably occur in a few years time during the month of October. Keep a look out for the beacon ZS1FOR (JF96) operating on 70.002MHz which runs 15W to vertical dipole.

FUTURE AUTHORISATIONS

At the beginning of 2004 there were 16 DXCC countries (EI, G, GD, GI, GJ, GM, GW, OX, OY, OZ, ZB, ZC, ZS, S5, 5B, 9A) active on the 70MHz band and by the end of the year there could well be a few more. In December 2003 **Markus OH2MFE** reported that the Communications Regulatory Authority in Finland (OH) were making positive noises about a 70MHz amateur band and that he expects a new licence schedule during 2004 which may include a 70MHz allocation.

Johan Hansson SM0TSC has been negotiating with the authorities in Sweden (SM) to follow the lead of their Scandinavian cousins. He mentions that he has been issued with a permit to run a beacon SJV900 on a frequency of 70.3125MHz. Johan is aware that this frequency is used for packet links in the UK and also allocated in Denmark for similar purposes. However, this is the only frequency available in Sweden at this time. The beacon is expected to be activated later this summer. Johan is hopeful that a 70MHz allocation will become available in a few years time and sees the beacon as a useful step in that direction.

Richard Hill S05GB writes from Poland (SP) that the Polish Shortwave Union (PZF) is finalising talks with the telecoms regulator (URTiP) and sometime in 2004 they will probably get an allocation on the 70MHz band. According to **Costas SV1DH** new regulations in Greece (SV) means there is a good chance of obtaining a 70MHz temporary licence.

Finally, the station of **Clive Hennesey GM4VVX** reports that in June 2003 he made a cross-band 70/50MHz contact with the Portuguese station of CT1DHM. Clive was informed that the Portuguese station had applied for a permit for a spot frequency within the 70MHz band and was hopeful that a permit would be issued this year.

If you want more details of 70MHz activity point your Internet browser at **www.70mhz.org** The website created by **Stewart GM4AFF** and **Allan GM4ZUK** and maintained by **Ross G6GVI** has details of international allocations, band plans, active beacons, contests, equipment and station reports.

DEADLINES

Apologies to all readers that sent in reports during January and February. Unfortunately, I suffered hard drive failures on two computers and lost all E-mails and even this column which had to be completely rewritten!

Could the station who sent me details of his 50MHz results made during 2003 please resend them. Good luck with the DX and please send me your activity reports to the address by the last weekend of the month. See you again next month.

73 David G4ASR

● Colin Redwood G6MXL/P operating from the Purbeck Hills, Dorset during the 70MHz contest in January 2004.

HF HIGHLIGHTS

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REPORTS, INFORMATION AND PHOTOGRAPHS TO ME PLEASE BY THE 15TH OF EACH MONTH.

I had two photographs sent in by readers this month and the first was from **Alex Shillito G2FRY** in Nottingham and shows the indoor antenna he uses with great success attached to the side of a wardrobe. This wardrobe is also home to all his radio equipment which includes a Yaesu FT-101E. It may give some of you one or two ideas for making a discreet shack if you are having difficulty operating on the h.f. bands or have antenna restrictions!

The second photograph is from **Tom Kelly EI2AJ** in Dublin, Ireland and shows his shack, which is home to an Index QRP Plus and Icom IC-706 Mk1 as well as a MFJ-948 a.t.u.

DX NEWS

Onto some DX news and to **Jonathan Rudy N0NM** who is operating as DU9/N0NM from Davao City, Mindanao in the Philippines and can regularly be heard on 1.8MHz. Look for him to show up on 1828.3 during the US East Coast sunrise and his own sunrise. He has said that noise levels on the band are still high, but he has still managed to work many European stations. You can get a QSL card via **John Eshleman W4DR, 1818, Manakintown Ferry Road, Midlothian, Virginia VA 23113, USA.**

Richard Brokenshaw M5RIC will be active from Guernsey as **MU2Z** during this year's CQ WPX SSB Contest over the weekend of the 27/28th March as a Single-Op/All Band/High Power entry. He will be active before and after the contest as **MU5RIC/P** and if you work him you can QSL via the homecall. Further details of the very popular CQ contests can be found at **www.cqmagazine.com**

LIGHTHOUSE ACTIVITY

Look out for **Steve Bryon G0SGB** who will be active as **EA/G0SGB/P** and **CT/G0SGB/P** between March 19 and 25th from various lighthouses in Spain and Portugal mainly on s.s.b. and around 14.264MHz and other bands as time and band conditions allow. He will also be in Gibraltar using the callsign **ZB/G0SGB/P** between March 20 and 21st from the Europa Point Lighthouse. Any QSL cards go to Steve's home callsign.

DXPEDITIONS, LIGHTHOUSE ACTIVITY & MORE, TAKE IT AWAY CARL...

CLIPPERTON ISLAND

A DXpedition will take place on or around March 8 to Clipperton Island. A multi-national team of experienced operators will leave San Diego, California aboard a ship bound for Clipperton Island and will be operational for 8 to 10 days. An Internet website and callsign will be announced just prior to the team's departure and were not available as I put this column together.

Clipperton ranks high on the most wanted DX lists world-wide so now will be a good time to work them as activity is planned for bands 1.8-28MHz. They will be using c.w., s.s.b., RTTY, p.s.k. and also AO-40 (c.w. and s.s.b.) using five stations with amplifiers and beams or vertical antennas.

Icom America has agreed to sponsor the Clipperton DXpedition and will be providing all the transceivers. The team is being led by **Dave Anderson K4SV** and the group consists of an International team of operators from several countries including **Neil King VA7DX**, **Gerard Jobcot F2JD**, **Bob Grimmick N6OX**, **Arnie Shatz N6HC** the teams doctor and **Hiro Miyake JF1OCQ** though several more operators are expected to join shortly.

If you would like more information please contact Dave via E-mail at **K4SV2@Charter.net** All QSL requests should go via **Cresson Donbar K4YL, 4908 4th Avenue Circle NW, Bradenton, Florida, USA**.

● Steve Bryon G0SGB will be active as EA/G0SGB/P and CT/G0SGB/P in Gibraltar using the callsign ZB/G0SGB/P from the Europa Point Lighthouse.

● CO8LY QSL card.

SPECIAL EVENT STATION

The special event station **OX2KAN** will be operating from Greenland until the end of the year. Look out for **Allan Glasdam OX3KV (OZ8A)** who will use this special callsign to celebrate the 175th anniversary of the Kangaatsiaq municipality.

Activity is expected to be on all the h.f. bands although the mode used will mainly be c.w. Allan is only using a G5RV antenna right now, but once the snow has thawed he will be putting up more antennas. The OX2KAN station will also be active from NA-134 from some of Greenlands North West coastal islands. All QSL requests should go via the OZ Bureau or direct to **PO Box 551, 3955 Kangaatsiaq, Greenland**.

NEW QSL MANAGER

A new QSL manager **Nenad Stevanovic VE3EXY** has announced that he is now taking over all QSL requests for **Nikola Hacko VK1AA** (ex.VK2ICV). This includes the following callsigns, VK9LX, H44XX, H40XX, VK9LX/9, VK1AA/2 and VK1AA/4. All future DXpeditions will probably also be covered and at the moment, Nenad has blank QSL cards for VK9LX, H44XX and H40XX operations.

Cards for VK9LX/9, VK1AA/2 and VK1AA/4 are still in the process of being printed. Nenad states direct requests are more

or less answered immediately and there is already a huge backlog of bureau requests. Nick was not a member of the VK QSL Bureau, so if you did request a card via that route it probably never made it through the system.

DX CREDITS

The ARRL DXCC Manager **Bill Moore NC1L** has just announced that that the following operations are now approved for DXCC credit. They include TO4E and TO4WW (Juan de Nova/Europa) from 25 November to 21 December 2003 and several stations operating from Iraq. YI9ABL starting in December 2003 and YI/N2OBM, YI3Q, YI9YMA and YI9ZF all starting in January this year. Other operations include 5X2A in Uganda from July 2003 and in Afghanistan YA4F starting in September 2003 until 1 April this year and finally YA8G from 14 December 2003 to 31 January this year.

YOUR REPORTS

Propagation this month has been described as varying between pretty poor and fairly good according to our reporters. I must say that when I have been able to operate conditions have been pretty grim on most bands. However, looking at the reports received there has been some nice DX worked and from most parts of the world, which does say something for those who were prepared to search for it!

The first of our reports comes from **Eric Masters G0KRT** in Worcester Park, Surrey who used his Yaesu FT-817 QRP transceiver and 22m end-fed antenna on 3.5MHz working DJ9IE (Germany) 2015, OK2WH (Czech Republic) 2033 and ON5GL (Belgium) at 2210UTC.

THE 7 & 10MHz BANDS

Moving to the 7MHz band and with better conditions Eric worked a huge number of stations including PA7XG (Netherlands) 0857, OK2WH (Czech Republic) 1618, HA8LKB (Hungary) 1650, DL6YYM (Germany) 1708, LZ2VP (Bulgaria) 1715, EA6/DL1CC (Balearic Islands) at 1930UTC.

On to 10MHz now and a report from **Quentin Cruise GW3BV** in Aberystwyth who used PSK31 to work SP3IQ (Poland), OE5KBO (Austria), SM2GSR (Sweden), DL3CVO (Germany), CT1XK (Portugal) and EA4IA (Spain) using a Kenwood TS-570 and 25W into a half-size G5RV.

THE 14 & 18MHz BANDS

In Dumfries South West Scotland **Jim Pedley GM7TUD** found 14MHz in reasonable shape working s.s.b. stations F6HQP/P (France) at 1037, OH1/IZ0FKE (Finland) at 1454, EA5KV/P (Spain) at 0835, CT1GPQ/P (Portugal) at 1042 and 9A4KF/P (Croatia) at 1127UTC.

Also on this band was **Martyn Medcalf M3VAM** in Chelmsford, Essex who used his Icom IC-746 with a SGC237 tuner and 8.2m of wire working LA1YKA (Norway) 0947, HB9FAX (Switzerland) 1042, EA3FEB (Spain) 1141, SM5RX (Sweden) 1202, OZ0JX (Denmark) 1247, S52GP (Slovenia) 1258, RA3OH (European Russia) 1321US4IXQ (Ukraine) 1654 and VE9GLF (Canada) at 1718UTC.

- Tom Kelly EI2AJ's shack, which is home to an Index QRP Plus and Icom IC-706 Mk1 as well as a MFJ-948 a.t.u..

- The indoor antenna that Alex Shillito G2FRY uses with great success attached to the side of his wardrobe.

Martyn's 18MHz contacts included OH9AR (Aland Island) 0931, IK8WEJ (Italy) 1034, CT1BOL (Portugal) 1055, HF9FM (Poland) 1305, and VO1BE (Canada) at 1431UTC. Still using PSK31 was Quentin GW3BV who logged OK1HEH (Czech Republic), ES8RD (Estonia), DG1VL (Germany) and RU3QR (European Russia).

All c.w. man **Ted Trowell G2HKU** on the Isle of Sheppy in Kent said: "It's been a pretty poor month for finding the rare ones as far as I could tell so I decided to use more QRP and just see what I could work on the bands using 4W! I use an Icom IC-721S which I don't think has ever been available here. Power output will go down well below 1W if required and has a maximum power output of around 8W with a following wind!".

The 4W did well as Ted found TF3CW (Iceland) at 1700UTC which was followed slightly later by 70W contacts with CO8LY (Cuba), K7ZZ (USA) in Turner, Oregon and HI7/OE1DIA (Dominican Republic). The rig for these 'higher power' contacts was a Ten-Tec Omni-V and the antenna a full-size G5RV.

THE 21 & 24MHz BANDS

On the 21MHz band Ted used QRP once again at 1600UTC to find several stations 'across the pond' like W4UX (USA) in Owensboro, Kentucky and VE2DQO (Canada). Upping the power to 70W again TI3M (Costa Rico) made the log before the band closed around 1730UTC.

Martyn M3VAM also operated here and found EA7ERJ (Spain) 1132, UR5TA (Ukraine) 1204, EU2MM (Belarus) 1228, VE3KZ (Canada) 1401, SV3FUO (Greece) 1423 and 9A5KV (Croatia) at 1437UTC.

Back in Scotland Jim GM7TUD logged a huge amount of stations on this band including CP6XE (Bolivia), KG4AS (Guantanamo Bay), KP2L (Virgin Islands), V31MD (Belize), ZP5AZL (Paraguay), C56/G0VUH (Gambia), TJ1GA (Cameroon), YS1EJ (El Salvador), TR8CA (Gabon) and G4RCG/HI9 (Dominican Republic) between 1239 and 1546UTC.

Onto 24MHz now and **Rob Hastings M3AHH** who uses a Kenwood TS-50S, MFJ-945E tuner and inverted Carolina Windom 80 Special from his home in Chelmsford, Essex. Mixed conditions found PY2VA (Brazil), YO4PX (Romania), US7IGF (Ukraine) and LZ2KV (Bulgaria) between 1252 and 1339UTC.

THE 28MHz BAND

The 28MHz band has not been at its best for a while but still has a few surprises for those prepared to listen out for openings. Jim GM7TUD found the best time to operate was between 1400 and 1545UTC where he found some decent signals from CE6TBN/8 (Chile), C56/G0VUH (Gambia), D2BB (Angola), P49MR (Aruba), ZF2AH (Cayman Islands), DU1/GM4COK (Philippines), HC8/G4IUF (Galapagos Islands), XE3VW (Mexico), TJ1GA (Cameroon), G4RCG/HI9 (Dominican Rep), VP8KF (Falkland Islands), C6AGN (Bahamas) and 9G5BF (Ghana). It goes to show that a quiet band does not mean there is no DX to work. Try putting out a few 'CQ' calls for a change and see just what you can work!

SIGNING OFF

Well yet another month has simply flown by! It certainly looks like all of our reporters have had an interesting time on the h.f. bands judging by their reports. As usual it was difficult to fit in all the DX you have worked but I hope that I have managed to squeeze you all in! Keep up the good work. My thanks go to **Tedd Mirgliotta KB8NW** editor of the *OPDX Bulletin* for the DX information. Until next time have a good DX filled month.

73, Carl GW0VSW

DATA BURST

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ROBIN GW3ZCF LOOKS AT ELECTRONIC QSLING, *SKYSWEEPER LITE* AND DX CLUSTER MONITOR PROGRAMS

Just after my January 2004 Data Burst was published, I received an E-mail from **Mick G3RYZ**, part of whose QSO with GW3COI appeared in my screenshot of CWGet. John had checked back in his log and found that he was running 5W to a W3DZZ. That demonstrates how good c.w. is as a low power mode – Mick was a good Q5 at this QTH!

LOGBOOK OF THE WORLD

When writing in my last Data Burst about the electronic QSL service, eQSLcc, I mentioned that electronic QSLs are not yet accepted for the majority of DX awards. For the last few months the American Radio Relay League (ARRL) has been piloting a totally different approach, which doesn't involve the exchange of any QSL, paper or electronic. Instead, the ARRL has established a massive database into which stations the world over are invited to upload their logs (which must, of course, be computerised).

The logs must be in ADIF or Cabrillo formats, which are supported by the vast majority of modern logging programs. Stations wishing to send in their logs must first download the ARRL's Trusted QSL software (which is free) from the Logbook of the World (LoTW) site and request a digital certificate. This is attached to every log file which is submitted and authenticates the log as genuine. US stations can be authenticated from the FCC database, but non-US stations need to send photocopies of their Amateur Radio licence and an official identification document.

The LoTW will accept logs going back to 1945, though I suspect that very few Amateurs will have gone to the trouble of entering all their old paper logs into computerised logging programs. My own computer log goes back to 1995 and realistically, it's unlikely that you will be able to verify many QSOs before that date. In order to encourage as many stations as possible to submit their logs into the archive, there is no charge for uploading.

Once you are registered as a user you can log on and view the stations who have uploaded details of QSOs with you. There must be a match between date, time (within 30 minutes) and mode with the details in your own log. You can see your current status at present for ARRL sponsored awards – DXCC, WAS, VUCC and WAC – but it is the ARRL's intention to provide support for other award-giving bodies in the future.

So, what does it cost to obtain credits for awards? This is, of course, where the ARRL need to recover the overheads for providing the service. The more credits you apply for, the lower the unit cost. Payment is by credit card and ranges on a sliding scale from $11.25 for 50 credits (22.5c each) to $75 for 500 (15c each).

Having a free QSL bureau in the UK, you can eventually obtain paper confirmation of your QSOs for the cost of the envelopes you deposit with your sub-manager, but it may take several years to collect the cards you need. If you QSL direct the costs spiral and LoTW would represent an enormous saving compared with all the airmail stamps, IRCs or dollar bills!

At present the system is very new and probably only a minority of Amateurs will have submitted logs. However, it's anticipated that the vast majority of DXpeditions will upload their logbooks, so LoTW may well be the best way of getting prompt confirmation of that rare prefix that you have been chasing for years.

It's very early days yet to assess how it will take off. The ARRL need to acquire a critical mass of operators uploading logs before it can be considered a serious alternative to conventional QSLs for qualifying for awards. But given time it may well become a very useful adjunct to the existing bureau and save money on direct QSLs. I'll be watching its progress with interest.

SKYSWEEPER LITE

I recently received an interesting piece of software to review, *Skysweeper Lite,* which is a slimmed down version of a program, which its originators, Skysweep Technologies in Finland, describe as a professional tool. Even the Lite version, which is aimed at the Amateur market, is incredibly versatile, allowing coding and decoding of c.w., RTTY, PSK31, PSK63, PSK125, MFSK16 and a double speed variant, 2MFSK16.

An extensive range of user adjustments is available, both to the display characteristics and also to the various d.s.p. filtering and decoding parameters. All very useful for the professional user wishing to design a system from scratch, but perhaps slight overkill for the Amateur who is primarily interested in communications.

The most unusual feature of the display is

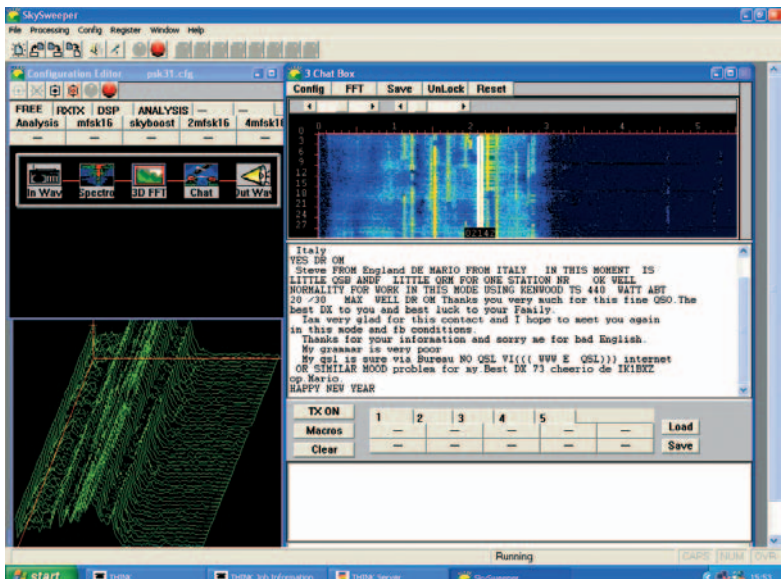

Fig. 1: The Fast Fourier Transform window of the *Skysweeper Lite* program is shown bottom left in this screenshot.

the Fast Fourier Transform (FFT) window, bottom left in the screenshot, **Fig. 1**. It displays the received frequency spectrum in the receiver passband and redraws it at user definable intervals, moving down the screen at about 30 degrees from the vertical. The result gives you a graphic display of the stations currently on the band for the previous few seconds and quickly shows you if a new station starts transmitting, but to my eyes the display was rather a jumble.

Skysweeper Lite decoded PSK31 very effectively as **Fig. 1** shows. In this case I selected a waterfall display for the main tuning window, but a fully configurable spectrum display is also available. Tuning is by double clicking on the required signal, but I found that if you did not immediately lock onto the signal the tuning would jump from station to station on a crowded band. If you do lock onto the signal all is well unless the station is drifting slightly – when locked, there is no a.f.c. to compensate. Similar comments apply to the other modes I tried, RTTY and MFSK16.

Transmitting was more of a problem. *Skysweeper Lite* does not automatically net onto the receive frequency. Instead, you first have to read the receive frequency from the receive window, click on Config, click on TX, type in the required transmit frequency, click OK twice and then, if the other station is still there, start the QSO!

Another feature that I found irritating was that, when configured to turn the transmitter on and off via a COM port on the computer, the settings were not retained when the program was shut down. So, each time you use the program, you have to set up your control parameters all over again. At first I wondered if I was missing something, but I have had word from Finland that these matters will be looked into in the next version.

In summary, *Skysweeper Lite* is potentially a very powerful program, but not yet ready for Amateur use. However, the designers seem prepared to listen to suggestions so the next version may well answer many of the points raised. It might be worth keeping an eye on their website.

DX CLUSTER MONITOR

Many of you will be familiar with the DX Cluster, which lists reports from spotting stations all over the world who send in details of DX stations currently operating. It's a very useful way of seeing what activity is taking place and which bands are open and on many occasions I have worked a rare DX station having been alerted to its presence on the cluster.

There is a very nice free program available by **Peter VE3SUN**, which presents the information from the cluster in a very useful and flexible way. In addition to listing cluster announcements as they come in, it can show DX spots on a great circle map centred on your home location, so if you have a beam you know where to point it. Recent announcements have the date and time printed in red, whilst those spotted by operators near your own QTH (you can choose the distance) are printed in blue. Double click on a callsign you are interested in and QTH information is displayed from qrz.com. You can click a button to be connected to one of the standard time laboratories and reset your computer clock.

The WWV values for Solar Flux Index and other propagation indices are shown on the toolbar and further details from WWV are displayed in a selectable window. The main display window is shown in **Fig. 2** with the latest spots shown on a great circle map beside it. There are many other features, too numerous to list, so download it and see for yourself!

TRANSMIT FREQUENCY OFFSET

Have you ever noticed, when working p.s.k. or m.f.s.k, that the station you are calling comes back to you on a slightly different frequency? If you net onto the new frequency and the same thing happens next time, you can soon walk a considerable distance up the band! If it's a one-off, the fault is probably with the other station, but if it happens nearly every QSO it's most likely to be a problem at your end. Assuming you have not accidentally left your r.i.t. on, the fault is most likely to lie with the soundcard of your PC. Some computers have a different timebase for play and record, and no matter what software you use there will always be a mismatch between transmit and receive frequencies.

If this is your own situation, it may well be worth investing in the excellent multimode program *MixW2* by **Nick Fedoseev UT2UZ**. I have reviewed this software before, but one of its lesser known features, which I did not previously mention, is the ability to adjust the clock speeds independently for transmit and receive. The adjustment is visible in the window, which is displayed when you click Configure – Sound Card Settings.

Of course, you can adjust the clock speeds by trial and error, obtaining reports from other stations, but it is far more accurate to use a patch lead with a jack at either end to join together the input and output from your soundcard which you use to connect to your transceiver (in my case, it's Line In and Line Out). Go to Soundcard Settings, make sure the clock adjustments for transmit and receive are both set to zero, and tick the duplex box. Then press Ctrl+Shift+T to start the tuning dialogue, when a single tone should appear on your waterfall.

Use the slider to adjust the audio output to yellow to red and after a few moments the transmit/receive rate in p.p.m. appears in the dialogue box. If this settles to, say, minus 500p.p.m. you need to return to the Sound Card Settings window and adjust your transmit clock speed so that it is 500p.p.m. lower than the receive speed. Now your transmit and receive frequencies should line up perfectly.

Don't forget to uncheck the Full Duplex box before you close the window.

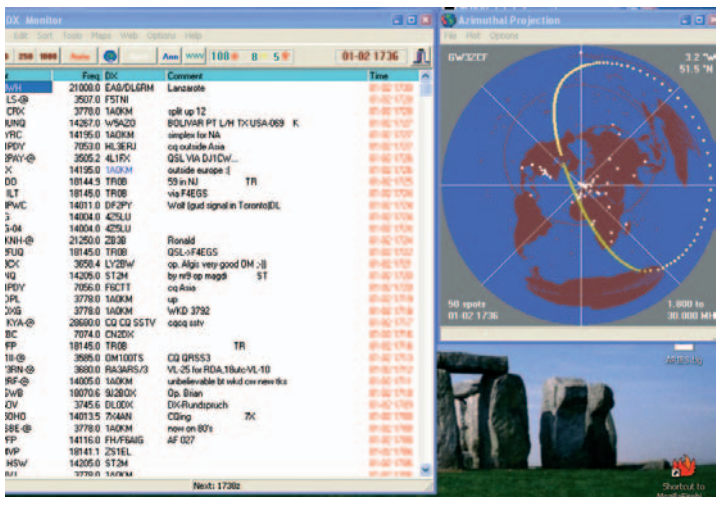

Fig. 2: The main display window of the DX Cluster Monitor (see text).

These hints for using *MixW2* were posted by **Mark N5RFX** on the MixW reflector run by Yahoo. I tried it on my own laptop (laptops are notorious for inadequate soundcards) and was delighted to discover that in my case the mismatch in clock speed settled down to about 0.05p.p.m., corresponding to less than 0.001Hz between transmit and receive - I can live with that!

Well, as they say at the end of the Tom and Jerry cartoons, that's all folks! See you next time.

73, Robin GW3ZCF

URLS FEATURED THIS MONTH

Program	Address
Logbook of the World	http://www.arrl.org/lotw
Skysweeper Lite	http://www.skysweep.com
DX Cluster Monitor	http://www.benlo.com/dxmon.html
MixW2	http://www.mixw.net

IN VISION

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GRAHAM G8EMX GIVES DETAILS OF THE BATV BGM AND PASSES ON THE SAD NEWS OF THE DEATH OF ATV STALWART G8CGK

In Vision has to be written well in advance of publication, so this is the earliest opportunity I've had to sadly report that last year ended tragically for Amateur Television with the loss, on 20 December 2003, of one of its pioneers – **Grant Dixon G8CGK**. Grant was just a boy of 11 when he constucted his own radio receiver in 1927, then in 1929 he bought the first issue of *Practical Television,* which inspired him to build a 30-line disc Baird TV receiver.

As the TV years rolled on, Grant went on to experiment with colour filters in front of a cathode ray tube as a TV display and a colour camera, using a synchronous spinning colour filter wheel in 1953. Two years later this equipment produced the first colour transmissions by Amateurs world-wide and was reported by the national Press.

Grant was a stalwart member of the British Amateur Television Club (BATC), joining it in 1950, just a year after the club was formed and only two years later became the club's first Chairman, a position he held for ten years. On stepping down as Chairman Grant remained on the BATC committee until 1983, when he was granted Life Membership of the club. Grant was an outstanding television engineer, innovator and a lifelong enthusiast for television, ATV and the BATC.

BIENNIEL GENERAL MEETING

The Biennial General Meeting of the BATC will take place at Shuttleworth College, Old Warden, Bedfordshire on **Sunday 9 May** and **Paul Marshall G8MJW** has notified the committee that, after many years in the job, he wishes to stand down as BATC Secretary. Traditionally, the Club Secretary is a key responsibility and Paul explains what this means within the BATC: "Basically, you're almost honour bound to organise, or at least be the prime mover in, the BGM/Rally. You're also a point of contact for all sorts of enquiries, not to mention taking telephone calls from Australia at 0300 in the morning, unintelligible queries just as you've sat down to tea, all part of the job"! So, let's hope a new volunteer comes forward at the BGM.

I have two suggestions for the future structure of the BATC's committee. These are that the club appoints or seeks volunteers for a Transmitter Officer and a Receiver Officer.

The Transmitter Officer would design and keep up-to-date a low-power (around 1W) 24cm (1270MHz) ATV transmitter, to be available in kit form from the BATC at rallies or via the club's Membership Services. As an ATV transmitter, it would be properly designed to handle a standard video waveform with minimal distortion or compromise, or as near as could be achieveable for an amateur design. The power would be kept low to avoid expensive power devices. This officer would seek replacements and redesign if any component became obsolete. The transmitter would only be available as a BATC unit, not sold by the officer him (or her) self.

The Receiver Officer would copy the 'job description' of the Transmitter Officer but for a properly designed ATV receiver. Again, the club would not be looking for superb sensitivity, or intricate alignment, just enough to get a beginner going on ATV.

The reason I have suggested these posts is that, at present, the BATC cannot offer these essential items from within the club. New members or ATV enquirers have to be referred to surplus units, independent advertisers, or individual private suppliers who do not advertise. I really think that a large international club should be able to do better than this and have met and spoken with visitors to rallies who expressed an interest in these suggested committee positions.

But will they step forward at the BGM I wonder? If **you** can help, please get in touch with me at **G8emx@tiscali.co.uk**

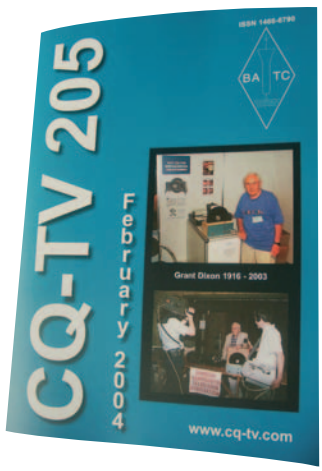
REPEATER NEWS

Viv Green G1IXE has provided an update on what is probably the UK's most supported ATV repeater – **GB3ZZ**, Filton, Bristol, Viv says: "We had a slight problem with 'ZZ in the exceptionally hot weather last year when the shack temperature reached 45°C, causing some instability. Three **additional** fans were installed and some hardware repositioned. **Brian Kelly GW6BWX** has been developing new logic to provide additional video inputs and this is nearly ready for installation. We have also provided a 2.3GHz receiver for a trial period, so the weather satellite receiver has been temporarily removed".

This news comes from the Severnside ATV Group newsletter *P5*, December. The Sevenside group also has a new and more reliable website, go to **www.stvg.co.uk** to take a look.

BROADCAST TELEVISION

Meanwhile, broadcast television continues to develop. New technologies are being announced regularly and one of the latest is a massive development of the 'old' cathode ray tube (c.r.t.) technology! The physical dimensions and construction of the final display device are being 'driven' by the demands for widescreen (28in or larger screen diagonal); flat, square visual area and – critically - shallow depth to reduce final set size.



● The BATC's latest *CQTV* magazine honours the late Grant Dixon on its front cover.

Current solid state display technologies – liquid crystal, thin film transistor and plasma achieve good results but at a significant cost above the c.r.t. and need complex pixel addressing circuits without managing to really achieve the excellent image precision of the long-established 'tube'. Then along comes a a major c.r.t. development, which promises to seriously compete with these newcomers!

Making extensive use of Computer Aided Design (CAD) with each component (guns, deflection yoke, shadowmask, etc.) a principal manufacturer has produced conventional tubes that achieve a 32in widescreen with a 125 degree deflection, reducing the tube's critical front-to-back distance to 35cm. And of course, the presently unbeatable image quality of the scanning electron beams. So, long live heaters and extra high tension, it seems....

That's all for this time so, until the June issue stay 'in vision' and keep your news coming. Cheerio for now.

Graham G8EMX

RADIOWORLD SECOND HAND LIST

MAKE	MODEL	DESCRIPTION	PRICE
Adonis	AM-805G	Desk Microphone, with Built In Compressor, and VU Meter	£70.00
AEA	PK-232MBX	TNC	£125.00
AEA	PK-900	TNC	£200.00
AEA	PK-96	TNC	£90.00
AKD	6001	6m FM Transceiver	£135.00
ALAN	HQ-2000	2kW 26 - 30MHz SWR / Watt Meter	£25.00
Alinco	DJ-G5EY	Dual Band Handheld	£199.00
Alinco	DJ-X10	Wide Band Receiver	£200.00
Alinco	DJ-X3	Handheld Scanner	£99.00
Alinco	DR-150	2m Transceiver with Air-and Receive	£150.00
Alinco	DX-70	HF & 6m Transceiver	£399.00
Alinco	DX-70TH	HF & 6m Transceiver (100W Output)	£475.00
Alinco	DX-77E	HF Base Station	£399.00
Ameritron	QSK-5	Amplifier Switch / Pre Heat	£200.00
Ameritron	RCS-4X	4 Way Switch	£99.00
AOR	AR-3000A	Wide Band Receiver	£450.00
AOR	AR-3030	HF Receiver, Including PSU	£350.00
AOR	AR-7030	Top Receiver	£550.00
AOR	AR-7030+	HF Receiver	£625.00
AOR	AR-8600	Base Scanner / Receiver	£425.00
AOR	AR-8600mkII	Base Scanner / Receiver	£499.00
AOR	AR-950	Communications Receiver	£89.00
AOR	ARD-2	Decoder	£200.00
AsCom	4 Metre	4 Metre, FM Transceiver, Including PSU. Base Station	£99.00
Comet	CD-270D	SWR Power Meter	£49.00
Cubic	CDR-3550	State of the Art 20 - 1300 MHz Digital Receiver	£4,999.00
Daiwa	CL-22		£20.00
Daiwa	CN-1001	Auto ATU	£99.00
Daiwa	CN-103L	2m / 70cms Cross Needle SWR Meter	£40.00
Daiwa	CN-540		£20.00
Daiwa	DK-210	Electronic Keyer	£60.00
Daiwa	LA-20		£99.00
Datong	ASP	Automatic Speech Processor for FT-817, FT-77 etc.	£70.00
Datong	FL-2	Filter	£60.00
Datong	FL-3	Filter	£75.00
Datong	RFA	Broad Band Amplifier	£20.00
Diamond	SX-100	SWR & Power Meter - 1.6 - 60MHz	£65.00
Drake	SW-8	World Band HF Receiver	£375.00
Fairhaven	RD-500VX	Wide Band Receiver	£525.00
Global	AT-1000	Manual Short Wave Tuner	£50.00
Hunter	750	Linear Amplifier	£599.00
Icom	AT-150	Auto ATU - IC-735 etc.	£175.00
Icom	BC-30	Battery Charger	£25.00
Icom	CM-35	Mains Battery Charger	£20.00
Icom	IC-2100H	2m FM Mobile Transceiver	£150.00
Icom	IC-2710H	Dual Band Mobile	£225.00
Icom	IC-271E	2m Multimode Transceiver - 25W	£299.00
Icom	IC-32E	2m / 70cms Handheld Transceiver	£99.00
Icom	IC-451E	70 cms Base AC	£299.00
Icom	IC-471E	70cms Multimode Transceiver	£299.00
Icom	IC-490E	70cms Mobile Transceiver	£250.00
Icom	IC-505	50 MHz Multimode Transceiver	£275.00
Icom	IC-575A	50 MHz Multimode Transceiver	£450.00
Icom	IC-7100	25 - 2000 RECEIVER	£575.00
Icom	IC-720A	HF & FM Transceiver	£400.00
Icom	IC-735	Base Or Mobile Transceiver	£399.00
Icom	IC-740	HF Base Transceiver	£350.00
Icom	IC-7400	HF / 6m / 2m Built In ATU	£999.00
Icom	IC-746	HF / 6m / 2m Built In ATU	£875.00
Icom	IC-746pro	HF / 6m / 2m Built In ATU Latest DSP Radio	£999.00
Icom	IC-756	HF / 6M All Band Transceiver	£950.00
Icom	IC-756pro	High Class Transceiver	£1,400.00
Icom	IC-821H	Dual Band Base - All Mode	£599.00
Icom	IC-910	2m / 70cms Base Transceiver	£999.00
Icom	IC-E90	Tri-Band Handheld	£220.00
Icom	IC-R2	Handheld Scanner	£99.00
Icom	IC-R5	Handheld Scanner	£125.00
Icom	IC-R10	Handheld Scanner	£229.00
Icom	IC-R70	HF Receiver	£299.00
Icom	IC-R7000	MINT CONDITION!!! Receiver	£550.00
Icom	IC-R71E	Receiver	£325.00
Icom	IC-R72	Receiver	£350.00
Icom	IC-R75	Receiver (With DSP Unit)	£499.00
Icom	IC-T21E	2m Handheld Transceiver	£60.00
Icom	IC-W2E	2m / 70cms Handheld Transceiver	£140.00
Icom	PS-55	Power Supply Matching IC-735	£100.00
Icom	RC-7000	Remote Control	£40.00
Icom	SP-20	External Speaker	£99.00
JPS	NIR-10	Noise / Interference Reduction Unit	£99.00
JRC	JST-245	HF 50MHz 1500w AC Base Transceiver	£1,295.00
JRC	NRD-525	HF Receiver	£375.00
JRC	NRD-545	DSP Receiver	£899.00
JRC	NRD-L2000	1kW Linear Amplifier Solid State (VERY RARE!!!)	£1,600.00
Kamtronics	KAM	Multimode TNC	£140.00
Kent	RA	Morse Paddle Key	£40.00
Kenwood	23cms	23cms Module for Kenwood TS-790E	£299.00
Kenwood	AT-230	ATU for TS-830S etc	£130.00
Kenwood	BC-15	Rapid Charger	£35.00
Kenwood	HS-5	Headphones	£25.00
Kenwood	MC-80	Desk Microphone	£40.00
Kenwood	PS-10	Power Supply for TR-9130 etc.	£40.00
Kenwood	PS-31	Power Supply (TS-870, TS-850, etc)	£135.00
Kenwood	PS-430	Power Supply	£100.00
Kenwood	PS-50	Power Supply	£145.00
Kenwood	R-2000	Receiver Including Converter	£275.00
Kenwood	R-5000	Receiver	£499.00
Kenwood	R-5000	Receiver With VHF Converter	£600.00
Kenwood	R-600	Receiver	£175.00
Kenwood	SP-430	Speaker	£45.00
Kenwood	SP-930	Speaker with Built In Filters	£65.00
Kenwood	SW-100E	SWR Meter	£25.00
Kenwood	TH-215E	2m Handheld Transceiver	£99.00
Kenwood	TH-235	2m Handheld Transceiver	£85.00
Kenwood	TH-47E	70cms Handheld Transceiver	£80.00
Kenwood	TH-79E	2m / 70cms Handheld Transceiver	£175.00
Kenwood	TH-F7E	Dual Band Handheld	£199.00
Kenwood	TL-120	Low Drive Linear Amplifier 100W HF	£150.00
Kenwood	TM-241E	2M Mobile Transceiver	£120.00
Kenwood	TM-251E	Mobile Transceiver	£140.00
Kenwood	TM-255E	2m Multimode Transceiver (Fair Condtion)	£299.00
Kenwood	TM-255E	2m Multimode Transceiver (MINT)	£395.00
Kenwood	TM-451E	70cms Mobile Transceiver - Data Ready	£175.00
Kenwood	TM-V7E	Dualband Mobile	£299.00
Kenwood	TR-2400	2m Handheld Transceiver	£50.00
Kenwood	TR-751E	2m Multimode Transceiver	£250.00
Kenwood	TS-450S	HF Base / Mobile	£499.00
Kenwood	TS-50S	HF Mobile / Base Variable Power	£425.00
Kenwood	TS-570DGE	Mobile / Base HF Transceiver	£675.00
Kenwood	TS-790E	Dual Band Base - All Mode	£750.00
Kenwood	TS-850SAT	HF Base Station with Built In ATU	£699.00
Kenwood	TS-950SD	HF 150W DSP Base Station	£1,200.00
Kenwood	TS-950SDX	Kenwood's Flag Ship	£1,650.00
Kenwood	VC-10	VHF Converter	£99.00
Kenwood	YG-455CN-1	270Hz CW Crystal Filer	£100.00
Kenwood	YK-88C-1	500Hz CW Narrow Filter	£40.00
Kenwood	YK-88CN1	270Hz CW Filter 8.83MHz	£40.00
Kenwood	YK-88S-1	2.4KHz SSB Narrow Filer 8.83MHz	£40.00
Kenwood	YK-88SN	1.8K SSB Filter	£40.00
Kenwood	YK-88SN-1	1.8KHz SSB Narrow Filter 8.83MHz	£40.00
Lowe	HF-225	HF Receiver	£175.00
Lowe	HF-350	HF Receiver	£295.00
MFJ	MFJ-1272B	TNC / Mic Switch	£20.00
MFJ	MFJ-1278	TNC All Mode	£175.00
MFJ	MFJ-207	HF SWR Analyser	£50.00
MFJ	MFJ-722	CW / SSB Filter with 5 Watts Amp	£59.00
MFJ	MFJ-784DSP	DSP Tunable Filter	£140.00
MFJ	MFJ-921	VHF 200 Watt ATU	£50.00
MFJ	MFJ-941E	Versa Tuner	£89.00
Microwave	28/144	28 / 144 MHz Transverter	£125.00
Microwave	MOD-144/30	30 Watt Amplifier	£79.00
Microwave	MML-144/100-S	100W 2m Amplifier	£99.00
Microwave	MML-432/50	50 Watt 70 cms Amp, with Built-In-PreAmp	£85.00
Microwave	Pre-Amp	Low Noise RF Switched Pre-Amp	£25.00
Midland	PowerPack	CB Power Pack (BOXED)	£50.00
Nissei	TM-3000	1.6 - 60MHz, 10W / 3kW, SWR Meter	£49.00
OptoElectronics	MiniScout	Frequency Counter	£129.00
PacCom	TNC-320	TNC	£90.00
Pres. Lincoln	10 METRE	10 Metre Multimode	£175.00
RadioShack	Pro-60	200 Channel Handheld Scanner (30MHz - 999MHz, WITH GAPS)	£99.00
RevCo	RS-2000	60 - 519 MHz Home Base Scanner	£79.00
Revex	V-540	SWR Meter	£25.00
Sangean	ATS-909	World Band Receiver	£130.00
SGC	SG-2020	HF Transceiver	£450.00
Sommerkamp	FT-290R	2m Multimode Transceiver	£150.00
Sony	SW-100E	FM/SW/MW/LW Portable Receiver	£90.00
Spectrum	RP-6S		£20.00
Standard	C-156E	2m Handheld Transceiver	£125.00
Standard	C-500	Dual Band Handheld	£99.00
Standard	C-510	2m / 70cms Handheld Transceiver	£125.00
Standard	C-510E	Dual Band Handheld	£99.00
TenTec	RX-350	HF Receiver	£999.00
Tokyo	HL-30V	2m - 25W Amplifier	£75.00
Tokyo	HL-35V	2m Power Amplifier with Pre-Amp	£89.00
Tokyo	HL-37V	Linear Amplifier	£60.00
Tono	T-777	Communications Terminal	£120.00
Transverter	QM-70	28/144 Transverter	£100.00
Trident	TRX-200	Latest Scanner	£175.00
Trio	TR-9000	2m Multimode	£199.00
Trio	TR-9130	2m All Mode Transceiver	£250.00
Uniden	UBC-860XLT	Base Scanner / Receiver	£99.00
Uniden	UBC-9000XLT	Base Scanner	£199.00
Welz	AC-38M	200W Mobile Matching Network	£50.00
Welz	CH-20A	Antenna Switch	£15.00
Welz	CH-20N	Antenna Switch	£15.00
Welz	CT-150	Dummy Load	£50.00
Welz	SP-15M	SWR Meter	£35.00
Welz	SP-380	SWR & Power Meter 1.8 - 500MHz	£30.00
WinRadio	WR-1550E	Trunking Software	£450.00
Yaesu	ATAS-100	Yaesu Active Tuning Antenna System	£175.00
Yaesu	FL-2025	Amplifier	£90.00
Yaesu	FP-30	Power Supply - FT-897, FT-857	£189.00
Yaesu	FP-700	Power Supply	£100.00
Yaesu	FP-707	Power Supply Unit	£80.00
Yaesu	FP-757GX	Power Unit for FT-757	£300.00
Yaesu	FR-101	HF, 2m, 6m Base Transceiver	£399.00
Yaesu	FRG-8800	Receiver Including Converter	£399.00
Yaesu	FRT-7700	Antenna Tuner for FRG-7700	£60.00
Yaesu	FRV-7700	Converter for FRG-7700	£60.00
Yaesu	FT-100	HF / 6m / 2m / 70cms Mobile Transceiver	£499.00
Yaesu	FT-1000MP	HF Base Station with Built In ATU with DSP	£1,199.00
Yaesu	FT-1000MPmkV	200W DSP HF Transceiver	£1,800.00
Yaesu	FT-1000MPmkV-Field	Top HF Radio - AC	£1,500.00
Yaesu	FT-101ZD	HF Base Transceiver	£275.00
Yaesu	FT-1500M	2m 50W Mobile Transceiver with DTMF Microphone	£129.00
Yaesu	FT-221R	2m Multimode Base Station	£200.00
Yaesu	FT-2600M	Mobile VHF / FM Transceiver	£120.00
Yaesu	FT-290RmkII	2m Multimode Mobile Transceiver	£225.00
Yaesu	FT-41R	Handheld Transceiver	£120.00
Yaesu	FT-50R	Dual Band Handheld	£150.00
Yaesu	FT-5100	Dual Band Transceiver	£199.00
Yaesu	FT-51R	2m / 70cms Handheld Transceiver	£199.00
Yaesu	FT-690R	6m Multimode Mobile Transceiver	£199.00
Yaesu	FT-707	HF 100W Transceiver	£275.00
Yaesu	FT-7100M	2m / 70cms Mobile Transceiver	£220.00
Yaesu	FT-726R	6m / 2m / 70cms / HF Transceiver	£575.00
Yaesu	FT-726R	2m / 70cms / HF Transceiver	£425.00
Yaesu	FT-730R	70cms Mobile Transceiver	£120.00
Yaesu	FT-736R	2m / 70 cms Base Transceiver	£575.00
Yaesu	FT-736R	6m / 2m / 70cms Transceiver	£650.00
Yaesu	FT-76R	70 cms Handheld Transceiver	£99.00
Yaesu	FT-790R	70cms Multimode Transceiver	£175.00
Yaesu	FT-790RmkII	70cms Multimode Transceiver	£250.00
Yaesu	FT-8100R	2m / 70cms Mobile Transceiver	£220.00
Yaesu	FT-817	Mobile HF, VHF, UHF Transceiver	£450.00
Yaesu	FT-840	HF Base / Mobile Transceiver	£399.00
Yaesu	FT-920AF	HF / 6M Base Transceiver	£899.00
Yaesu	FTV-1000	200 W Transverter	£475.00
Yaesu	FTV-430MHZ	Module for Transverter	£99.00
Yaesu	FTV-707	2m Multimode Transverter Including Module	£125.00
Yaesu	FTV-901	Transverter including 2m Module	£165.00
Yaesu	FTV-902DM	Transverter	£225.00
Yaesu	KP-100	FRG-100 Key Pad	£25.00
Yaesu	MH-35	Speaker Microphone	£10.00
Yaesu	MMB-16	Mounting Bracket	£20.00
Yaesu	MW-1	Remote Control Microphone & Infra-Red	£60.00
Yaesu	NC-29	Battery Charger	£30.00
Yaesu	NT-29	Charger	£30.00
Yaesu	SP-55	Mobile Speaker	£15.00
Yaesu	SP-980	Speaker	£60.00
Yaesu	System 600	HF Commercial Radio	£600.00
Yaesu	VR-120	FM / WFM / AM Receiver	£99.00
Yaesu	VR-500	Yaesu Handheld Scanner	£149.00
Yaesu	VR-5000	Top Class Base Scanner	£450.00
Yaesu	VX-1R	Handheld Transceiver	£120.00
Yaesu	VX-5R	Triband Handheld	£220.00
Yaesu	VX-7R	Triband Handheld	£240.00
Yaesu	XF-114SN	2KHz SSB Filter	£60.00
Yupiteru	MVT-3300	Handheld Scanner	£99.00
Yupiteru	MVT-7100	Handheld Scanner	£129.00
Yupiteru	MVT-7300	Multiband Handheld Scanner	£199.00
Yupiteru	MVT-8000	Base / Mobile Scanner	£199.00

Trader's Table

The equipment for sale on this page is secondhand or ex-demonstration

THE SHORTWAVE SHOP
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ICOM IC275 VHF ALL MODE BASE TCVR....£325
ICOM IC745 HF TRANSCEIVER....£295
ICOM IC 706 MK2G HF/VHF/UHF TCVR....£595
ICOM IC706 MK1 HF/VHF TRANSCEIVER....£475
YAESU FT726 50/2/70cm TRANSCEIVER....£495
YAESU FT747GX HF TRANSCEIVER....£225
YAESU FT102 HF TRANSCEIVER....£185
TENTEC PARAGON HF TRANSCEIVER....£395
KENWOOD TS680 HF+6MTR TCVR....£425
KENWOOD TS850SAT HF TCVR....£795
KENWOOD TS850S HF TCVR....£695
KENWOOD TS2000X HF to 23cm TCVR....£1599
KDK 2030 VHF MOBILE TRANSCEIVER....£75
KENWOOD 9130 VHF MULTIMODE....£195
KENWOOD TM251E VHF MOBILE....£99
PALATAR KH-6 50Mhz HANDHELD TCVR....£65
ALINCO DR 150 VHF MOBILE TCVR....£95
ALINCO DR 430 UHF MOBILE TCVR....£95

RECEIVERS
ICOM IC8500 HF VHF UHF RECEVER....£799
ICOM IC-R75 HF+50MHZ RECEIVER....£495
ICOM IC R71E HF RECEVER....£395
JRC NRD 535 HF RECEIVER....£525
JRC NRD 525 HF RECEIVER....£345
PRO 2042 VHF UHF BASE RECEIVER....£155
KENWOOD R600 HF RECEIVER....£175
LOWE HF 125 HF RECEIVER....£135
LOWE HF 225 HF RECEIVER....£245
AOR AR3000A+ HF VHF UHF RECEIVER....£395
AOR AR8600 WIDE BAND RECEIVER....£495
AOR AR8000 HANDHELD RECEIVER....£245
YUPITERU MVT7300 H/H RCVR....£185
YUPITERU MVT7100 H/H RECEIVER....£145
YAESU FRG100 HFRECEIVER inc K/PAD....£295
YAESU 9600 WIDE BAND RECEVER....£299
YAESU FRG 7700 HF RECEIVER....£125
HITACHI WS1 WORLDSPACE RECEIVER....£95
REALISTIC DX394 HF RECEIVER....£85
BEARCAT 9000XLT BASE SCANNER....£185
BEARCAT UBC120XLT. H/H SCANNER....£95

ACCESSORIES
KENWOOD BC15A CHARGER/TH28/78....£39
GLOBAL AT2000 SWL ANTENNA TUNER....£55
KENWOOD PS15 5A POWER SUPPLY....£135
TIMEWAVE DSP599ZX DSP UNIT....£149
MFJ 931 ARTIFICIAL EARTH UNIT....£89
KENWOOD MC60 BASE MICROPHONE....£75
YAESU FP707 POWER SUPPLY....£85
WATSON SUPER SEARCHER....£65
MFJ 9593 ACTIVE ANTENNA UNIT....£85
TIMEWAVE DSP59PLUS DSP UNIT....£149
KANTRONICS KPC3 PACKET TNC UNIT....£95
PIKO PACKET PACKET TNC....£90
TINY 2 PACKET TNC UNIT....£95
OPTO SCOUT....£149
NRD RTTY BOARD FOR NRD 525/535....£95
NRD RTTY TUNING INDICATOR UNIT....£35
SGC 230 SMART TUNER....£235

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NEVADA
023-9231 3090

ADI AR-146 2m VHF Mobile....£90
Alinco DJ-SR1 PMR 446 Transceiver....£50
Alinco DJ-SR1 PMR 446 Transceiver....£50
Alinco DRM06 6M FM Transceiver....£129
Icom IC-T8E 6M/2M/70CM Handi....£199
Trio TS700s 10w All mode 2m Base Tx with Ext VFO....£299
Yaesu FT-1500M 2M Mobile Transceiver....£129
Yaesu FT-5100 2M/70CM Mobile Transceiver....£199
Yaesu FT51R 2M/70CM Handheld Transceiver....£149
Yaesu FT-726R 6M/2M/70CM Base Transceiver....£499
Yaesu FTL2014 VHF PMR Transceiver....£50
Yaesu VX5R Triband Handheld Radio....£199
Yaesu VX-5R+ACC 6M/0CM Handi + VC25 Case Mic....£249
Yaesu VX7R (Black) 5w Triband H/held Transceiver....£225
Alinco DJX10 Handheld Scanning Receiver....£225
Alinco DJX3 Handheld Scanner c/w accessories & book....£159
Uniden Bearcat 3000XLT Handheld Scanning Receiver....£139
AOR AR-8600MK2 Wideband Base Receiver....£475
AOR AR-8600MK2 Wideband Base Receiver....£475
Icom ICR-71E HF Receiver....£399
Icom R75DSP 0-60Mhz Receiver w/psu & dsp unit....£525
Realistic DX394 HF Receiver....£99
Videologic DRX-601ES DAB Tuner....£159
Yaesu FRG-8800V HF Receiver + VHF Converter....£325
Alinco DR-M03 10M FM Mobile Transceiver....£149
Icom IC-7400 HF/6M/2M100W Transceiver....£1095
Kenwood TS-870S 100W HF Transceiver....£899
Realistic HTX-100 10M SSB/CW Mobile Transceiver....£115
Yaesu FT-840+MD-100 100W HF Transceiver+Base MIC £499
Yaesu FT897 HF/UHF/VHF Base/Portable Transceiver....£795
Skipmaster SK-45000 Base Microphone (CB)....£45
Zetagi HP202 CB SWR/Power Meter....£20
Zetagi M27 Antenna Matcher....£20
Zetagi M27 Antenna Matcher....£20
Amdat ADC-60 Frequency Standard Clock....£99
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CX-201 2 Way Antenna Switch....£12
CX-201N 2 Way Antenna Switch 'N'....£15
Daiwa AF606K Active Filter....£39
Dewsbury S/TUTOR Supa Tutor/Morse Tutor....£25
Elmic CONTROLS Noise Limitor....£10
Kent Brass Key Hand Key....£30
Maldol AH-212 2M/70/23CM Handi Antenna....£15
Maldol EX-104 2M/70CM Mobile Antenna....£15
Maldol HS-702 2M/70CM Handi Antenna....£10
Maldol HS-790DN 2M/70CM Duplexer....£18
MFJ 784B DSP Tunable Filter....£139
MML144/40 2M 40W Amplifier & PreAmp....£59
Mutek TLNA 432UB 70CM Pre-Amp Module....£12
Sadelta Bravo Plus Base Microphone (CB)....£29
Sadelta Echomaster Base Microphone (CB)....£45
Tokyo Hi-Power HL-63U 70CM 50W Linear Amplifier....£129
Tono Q-550 Data Terminal....£69
Yaesu ADMS-1C Programming Software....£15
Yaesu FC-700 Antenna Tuner 100W PEP....£95
Yaesu MD100A8X Base Microphone....£89
Yaesu MD-1B8 Yaesu Desk Microphone....£79
Yaesu MH-35 Speaker/Mic....£19
Yaesu SP-55 Mobile Speaker....£15
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Kenwood SP940 matching speaker for TS940S....£99
Global AT2000 SWL ATU....£79
Paccomm Spirit2 9600 baud TNC....£99
Garmin Street pilot mint european base maps....£299
Watson 30-35amp PSU with meters....£89
Datong FL-3 multimode filter....£99
Uniden all band lazer radar detector....£199
MFJ949E 300watt tuner with dummy load....£125
Kenwood MC-90 DSP desk mic for TS570/870....£129
Heil HM-10 dual insert studio quality mic....£99
Watson WMM-3 multimode data decoder....£45

VHF/UHF TRANSCEIVERS
Icom IC229 50watt 2m mobile....£125
Yaesu FT8800 2m/70cm latest dualband mobile....£279
Kenwood TMG 707E 2m,70cm 50 watt....£199
Yaesu VX5R 6M,2M,70CM handi, last new unit....£249
Kenwood TM255E 2m 45watt multimode,mint....£399
Kenwood TR751E 2m 25watt multimode mobile....£349
Icom ICT8E 6m,2m,70cm tri-band handi,nicads....£229

HF TRANSCEIVERS
Yaesu FT1000MP auto ATU, DSP mint....£1349
Yaesu FT890 auto ATU,100watt....£499
Yaesu FT990AC built in PSU,auto ATU mint....£849
Yaesu FT857 HF to 70cms Demo model....£699
Kenwood TS690SAT HF+6m 100watt auto ATU....£699
President Lincoln 10m Amateur transceiver new....£199
Kenwood TS570D top class, DSP,auto ATU....£599
Yaesu FT-900AT 100watt all mode detachable head....£549
Yaesu FT920 HF+6m 100watt auto tuner mint....£899
Icom IC728 0-30mhz FM board fitted boxed....£449
Kenwood TS440SAT 100watt 100mem auto ATU....£499
Kenwood TS940S built in PSU auto ATU....£699

SHORTWAVE RECEIVERS
Lowe HF250E remote control....£339
Grundig YB400 AM,FM,SSB shortwave portable....£89
Lowe HF225 0-30mhz keypad option bowed mint....£269
Sony SW55 portable receiver all mode 0-30mhz....£199

SCANNERS BASE/MOBILES
Uniden Bearcat 220XLT 66-956mhz....£99
AOR5000 0-2600mhz all mode, boxed....£1099
AOR8000 0-1900mhz all mode....£199
Yaesu VR5000 0-2600mhz all mode....£499
Bearcat 3000XLT 25-1300mhz nicads, as new....£149
Bearcat 780XLT 25-1300mhz trunk tracker Demo....£279
Icom IC7100 25-2000mhz all mode 1000memories....£499
Alinco DJX2000 top of the range 0-2000mhz mint....£349
AOR 8200 0-2036mhz 1000memories mint....£299
Bearcat UBC278cxl base scanner 100mems demo....£139
AOR 8600 0-2040mhz....£455
Yupiteru MVT7100 0-1650mhz nicads etc....£169

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Alinco DR-M03SX x2 10m FM Mobile 28-29.7MHz 10W....£159.00
SGC SG-2020 QRP Transceiver SSB,CW 20W 12V....£449.00
SGC SG-2020ADSP QRP Transceiver SSB, CW 20W + DSP filter 12V....£449.00

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ADI AR-147 2m FM Mobile 50W CTCSS 40Ch....£149.00
AKD 6001 6m FM Mobile Channelised 25W....£99.00
AKD 7003 70cm FM Mobile Channelised 3W....£99.00
Alinco DR-M06T x2 6m FM Mobile 10W CTCSS....£139.00
Icom IC-229E 2m FM Mobile 25W....£149.00
Icom IC-229H 2m FM Mobile 50W with 20Ch....£199.00
Icom IC-2100H x2 2m FM Mobile 55W 113ch. + CTCSS....£169.00
Icom IC-3230H 2m,70cm FM Mobile 50W, 35W Full Duplex....£249.00
Kenwood TM-451E x2 70cm FM Mobile 35W 2m RX, Full Duplex....£249.00
Kenwood TR-751E 2m All Mode Mobile/Base 25W....£249.00
Yaesu FT-2600M 2m FM Mobile 60W....£169.00
Yaesu FT-8100R 2m,70cm FM 50W,35W Full Duplex + Remote Head....£279.00

VHF/UHF HAND HELD TRANSCEIVER
ADI AT-400 70cm FM Battery box 420-465MHz RX....£99.00
Alinco DJ-190E 2m FM H/Held....£95.00
Alinco DJ-580 2m/70cm FM H/Held Full Duplex Airband RX....£145.00
Alinco DJ-596E 2m/70cm FM with DTMF keypad....£149.00
Alinco DJ-G5 2m/70cm FM with wide RX....£169.00
Icom IC-A22E Airband H/Held + NAV/COM & headset adapter....£249.00

SHORTWAVE RECEIVERS
Grundig YB-400 Portable Receiver with FM stereo and SSB....£69.00
Kenwood R-5000 100kHz-30MHz All Mode Receiver Mains....£499.00
Lowe HF-225 x2 30kHz-30MHz All Mode Receiver 12V....£249.00
Lowe HF-250 30kHz-30MHz Receiver 12V PC Compatable....£329.00
Sanyo DSB-WS1000 Portable/Base "WorldSpace" receiver 6V + psu....£119.00
Sony ICF-SW55 x2 Portable Receiver with FM stereo and SSB....£179.00
Steepletone MBR-2000 Portable FM Stereo,MW & SW Radio 20ch....£35.00
Yaesu FRG-8800 150kHz-30MHz All Mode Mains....£299.00

SCANNERS MOBILE/BASE
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SCANNERS HAND HELD
Alinco DJ-X1 100kHz-1300MHz AM,FM,WFM 100Ch....£99.00
Alinco DJ-X3 100kHz-1300MHz AM, FM, WFM 700Ch + 8.33kHz step....£89.00
AOR AR-8200 530kHz-2040MHz All Mode 1000Ch....£249.00
Opto R-10 30MHz-2GHz FM Interceptor....£129.00
Opto R-11 30MHz-2GHz FM Nearfield Receiver....£199.00
Yupiteru MVT-3300 66-1000MHz (with gaps) AM, FM 200Ch....£89.00
Yupiteru MVT-7300 x3 521kHz-1320MHz All Mode + 8.33kHz step....£229.00

STATION ACCESSORIES
AEA PK-232MBX PakRat Dual Port Multimode Data Controller (P.Sale)....£70.00
AKD WA-1 120-450MHz VHF Wavemeter....£29.00
Datong ANF CW Automatic Notch Filter....£69.00
Datong ASP Auto Speech Processor....£95.00
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JPS NTR-1 DSP Noise Reducer....£99.00
Kantronics KAM Plus Multimode Data Controller with Pactor, Dual Port....£199.00
Kantronics KPC-9612 x2 Dual port Dual speed Packet TNC Controller....£229.00
Linear Amp Explorer 1200 10-160m Linear 10-130W in, 100-1300W out (RMS)....£995.00
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Opto 3000A + 10Hz-3GHz Frequency Counter....£289.00
PacComm TNC-220 HF/VHF Dual Port 9k6 Packet TNC....£69.00
SEM QRM Eliminator Interference Reduction Unit....£69.00
SGC PowerClear DSP Audio Filter with 5W Amp, Band Pass Filter....£199.00
SML SWR-25 3.5-150MHZ 100W SWR,PWR meter....£29.00
Vectronics AT-100 0.3-30MHz Active SWL Antenna 10dB gain....£59.00
Watson WAT-2 500kHz-30MHz SWL ATU....£39.00
Watson WMM-1 Multimode Modem....£49.00
Welz SP-15M 1.8-150MHz SWR,PWR meter 200W....£39.00

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Garmin EMAP-EU GPS "street map" upgradable + PC cable & 16Mbit card....£289.00

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BC221 frequency meter, £20. Tel: Birmingham 0121-475 8647.

Drake R-4B, £180. Drake MS-4 speaker, pristine condition, original packing, £60. Yaesu FF-501 low pass filter, £15. Headphones, £5. AVO8 Mk6 leads and case, £50 - postage extra. Pascal on (02871) 352804 after 1800 please.

Eddystone slide rule dial and 110 to 1 reduction drive, scale unused, excellent condition, price, £50 plus postage. Peter, Burnley. Tel: (01282) 439275.

Electronic keyer, 5-35w.p.m. Iambic. Programmed PIC with auto-sleep, plus easy to build details, very few extra components needed, £10 inclusive. E-mail: chick@chickene.freeserve.co.uk

Fairhaven RD500VX, unused, £450 o.n.o. MFJ-267 dummy load s.w. wattmeter, £30. MFJ464 Morse Reader keyer, £30. Datong Morse keyboard, model MK, £20. Tel: E. Yorks (01262) 606212 anytime.

Kenwood AT-230, excellent a.t.u., £90 o.v.n.o. RM40 26-30 amplifier, 35W, new, unused, £18, boxed. Wanted Icom HM-7 mic. (for IC-730). Dave, Fife. Tel: (01383) 839616.

MFJ-403P pocket c.w. keyer with built-in Iambic paddle, as new, in perfect condition, £40 inc. post. Stan G0BPQ, QTHR. Tel (01254) 240802.

MFJ-969 roller inductor tuner, boxed, manual, as new, £90. Tel: Alsager on (01270) 875507.

Military radio GRC9 c/w LV80 amp, choice of two, one with vehicle mountings, £195. Tel: Spalding (01775) 766398 after 1900.

Murphy, model A30, 1936, AC superhet ultra, model 26, 1936, AC superhet Bush, v.h.f. 72 1958?, AC superhet Philips B5G64A, 1954/5, AC superhet Columbia no. 201 portable gramophone, Sangamo western model 575 portable test set, Bakelite case. Keith M1CCE, North Cornwall. Tel: (01840) 770048.

Realistic DX300 h.f. receiver, excellent condition, mains or battery, digital frequency display, etc., already becoming a collectors item, £90 or swap for good 30A p.s.u. Mike, Durham. Tel: 0191-389 2822 or mobile (07958) 049026.

Silent key sale: Kenwood TS-50 h.f. transceiver, £400 o.n.o. CDE heavy duty rotator, £100. KR500 elevation rotator, £100. Packratt 232 data terminal (no cables), £50 P&P extra. Michael, Tunbridge Wells. Tel: (01892) 723703.

Test equipment, HP432B, 478A, 8481A, 5300A, 5320A, E2373A, Fluke 8600A, Thandar TG101, attenuators, terminations, LP filters, Narda coupler, s.a.e. for full listings and prices. Swan, 118 Upland Drive, Plymouth PL6 6BG.

Yaesu FRG-100 RX, under two years old, £250. Kenwood 751E 2m (144MHz) multi, £275. Realistic scanner PRO-2006 plus discone, £175. Alinco 6m (50MHz) DRM06TH 20W plus 1/2 wave vertical, £100 - all boxed with manuals. Tel: Somerset (01278) 781513.

Yaesu FRG-8800, a.m., c.w., u.s.b., l.s.b., etc., very clean, with manual, £200, also 2000 a.t.u., £40. Tel: (01608) 663745.

Yaesu FT-902DM transceiver and matching FV901DM synthesised scanning v.f.o., like new, original boxes and packing, unsed, £500 plus Russian (valved type) transceiver in transit box, covers 36-45MHz, with accessories, good, £160. Tel: (01872) 862291.

Yaesu YO-100 monitor scope, £100. Yaesu FV-101Z v.f.o. Yaesu FTV-250 2m (144MHz) transceiver, £80. FT-101, £80. Chris G7GJZ, Somerset. Tel: (01278) 786621.

Exchange

Yagi rotator and controller with antenna position indicator, all leads, excellent conditon, exchange for good h.f. receiver or transceiver, must collect or transport. Tel: (01254) 831510.

Wanted

1155 RX, good condition, aluminium case, d.f. circuit intact with all valves, no mods, good price paid, also Q5er RXs, AR88 and TCS12 RX wanted, good price paid, carriage paid. Peter G8CKM on (01939) 290118 or E-mail: peterparker2@lineone.net

Antenna analyser MFJ-259B, also Kenwood station monitor SM230. GW3FSW on (01745) 570538.

Any Weyrad transistor i.f.s, P50s, OSL coils, ferrite rods, coils and printed circuit board PCA1 from the 1960s. Dave, Hull. Tel: (01482) 507244.

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other models considered, also seeking Plessey PV78B converter/keyer for my RTTY collection. Tel: (01482) 887938.

Control unit for Cornell dubilier antenna rotor AR-22XL - can anybody help please, good price paid. Mick G1ZLD on (01787) 475671.

Datong AD370 active antennas. Tony Rigby G8MPG, E-mail: 113670.225@compuserve.com

Datong AD370 active antenna, with or without p.s.u. G8MPG, E-mail: 113670.225@compuserve Tel: 00 33 556 266291.

Eddystone EC10 receiver MkI or MkII - dead or alive. Tel: (01737) 244471 or E-mail: chrisg4.byz@virgin.net

Eddystone receivers, adapters, loud speakers, accessories, any condition considered, can collect anywhere, also looking for any Racal or KW equipment, will pay good prices, cash available now! Steve G8EBM, Derby. Tel: (01335) 360755, E-mail: g8ebm@arrl.net

For Second World War German Torneb receiver, output transformer (pos. 75) h.f. choke (pos. 73) and outer case. Neil G8LIU, Uxbridge. Tel: (01895) 230006.

Handbook or very good photocopy for Signal 530 v.h.f. airband receiver scanner, all expenses paid and postage. George on (01443) 437345.

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TS-940 for spares, also Drake TR4 transceiver, please E-mail with details. E-mail: tony.dolby@wanadoo.fr or tony_ffivevby@hotmail.com

Service information for Phillips Pye 6000, made in Holland, 1960s, all expenses paid. Tel: Surrey (01372) 467264.

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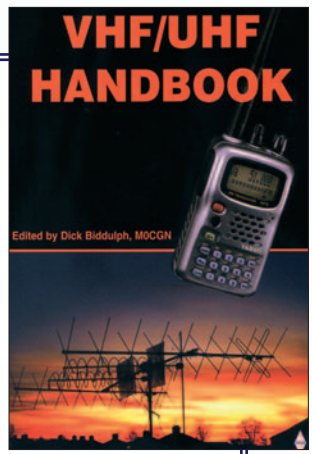

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topical talk

A Great QSO on 14MHz

As you may have read in Keylines, Rob Mannion G3XFD temporarily became GI3XFD on the weekend of 24/25th of January. Joining Jeff Smith MI0AEX in his shack for a photograph...they enjoyed a great QSO on 14MHz!

It's a rather different Topical Talk this month as I've pleasure in showing you a photograph which launched a QSO on 14MHz, and another photograph which came from the other end of the QSO in Austria. It all started when **Jeff MI0AEX** turned on his main rig, **Fig. 1** and we found ourselves on the same frequency as **Neville Brinnen** (From Mablethorpe in Lincolnshire) **OE3/G3VDV** calling "CQ". That explained...I'll let Nev tell the rest of the story:

"Whilst on a visit to my old friend **Guenter OE3PGW** at his home in Heidenreichstein, Northern Austria, which is close to the border with the Czech Republic, I was able to operate his fine station, **Fig. 2**. I've kept a regular sked with Guenter for over 30 years, since the time my sister worked in Vienna as an au pair.

We have visited each other many times over the years, and it underlines just what a fantastic hobby Amateur Radio is, that close personal friendships can develop as the result of a QSO. I've picked up a passable amount of German, and we now keep our skeds in German or English.

It was while I was calling "CQ UK" looking for friends back home that I was called by Jeff MI0AEX with his very strong signal, and found out - from GI3XFD who was in the shack with him - that Jeff had just been inaugurated the evening before as the new President of the RSGB.

Naturally, I was very pleased to be one of the first contacts Jeff had whilst in his new role, and delighted to have the opportunity to congratulate him and wish him every success in his two-year office as President".
73 from Nev G3VDV.

Thanks for helping to make a really tropical 'TT' Neville - and it all came about because I wanted a photograph! It was great to talk to you and we look forward to another QSO.

PW

- Fig. 1: Jeff Smith MI0AEX enjoys listening to Nev OE3/G3VDV from an extremely cold Northern Austria. Altogether it was an enjoyable QSO - brought about by the need for a shack photograph!

- Fig. 2: Nev G3VDV (signing OE3/G3VDV) operating from Guenter OE3PGW's shack, with Guenter standing alongside his friend after working MI0AEX.

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