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NEW IC-7800 In Stock!

The most advanced amateur band transceiver ever produced!

At last the Radio has arrived! It has the world's "quietest" receiver - and you get two of them! Plus 200 Watts output and a host of unique features including:

110dB dynamic range, +40dBm IP3, steep pre-IF roofing filters, Auto Hi-Q preselector, ultra low phase noise, multiple AGC loops, Digital "build-your-own" IF filter, Digital PBT, 4 x DSP units for receive and TX audio and band scope, 2 x receivers from antenna to stereo phones, spectrum analyser from 5kHz to 500kHz, 7-inch colour screen, external VGA socket, Internal RTTY/PSK31 - just add USB keyboard, Flash card storage, voice synthesizer, 200W out at full duty, wide-range speaker, DSP mic equaliser, DSP RF speech processor. digi voice recorder, 4 programmable antenna sockets, memory keyer etc. ***Free CD of off-air SSB signals exclusively available from W&S.***

Price** including Heil Classic Pro mic (HCLic) **£6589

ICOM IC-756 PRO II £1899 C

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.

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

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

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

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 £899 C

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 £729 C

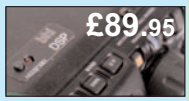
HF/50/144/430MHz Mobile Transceiver HF/6m 100W, 2m 50W, 70cm 20W. (13.8V DC) Developed on the FT-897 and FT-817 transceivers. Built-in features 32 colour display, spectrum scope, AM airband receive, built-in memory keyer, detachable front panel, DSP unit supplied.

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 £499 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 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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carriage charges: A=£2.75, B=£6, C=£10

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.

YAESU FT-2800M £159 C

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

ICOM IC-2200H NEW £199 B

The IC-2200H is the latest version of this popular high power 2m mobile rig. It has 207 memories inc 1 call channel & 6 scan edge memory channels.

*144 - 146MHz FM *65/25/10/5W RF o/p *CTCSS & DTCS *Green/amber display *Audio: 2.4W o/p *Tx 15A (65W) *Rx 1A (max audio) *Standby 0.8A *Power 13.8V DC *Size: 140x40x146mm

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.

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.

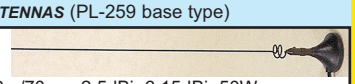
MOTOROLA T-5512 £69.99 B

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

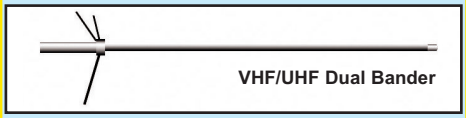
WATSON

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

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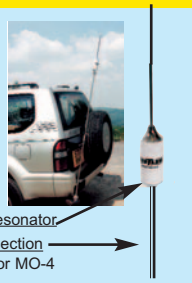
VERTICAL ANTENNAS

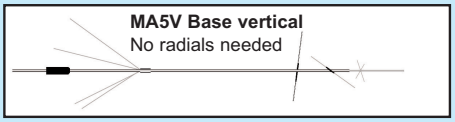
Hustler Mobiles

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**



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



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

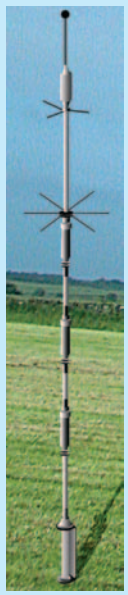
**1.8 - 30MHz *300W/30W/6W selectable *Cross needle meter *12V DC Ext. *SO-239 sockets *Tunes wire, coax, balanced line *Terminals & earth post *Size 160 x 150 x 60mm *Weight 870g*

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.

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.



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. 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. **£159.95 C**

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

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

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

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

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*
**Ferrite Bar Antenna AM*
**Built-in FM Antenna*
**Solar Power Panel*
**Hand Crank Dynamo*
** Spare bulb*
**Fitted Ni-Cad Battery*
** 3 xAA battery chamber*

CHECK OUR 2004 PRODUCT GUIDE FOR MORE DETAILS OF THESE PRODUCTS

Say goodbye to annoying QRM & QRN with DSP noise cancelling solutions from..... bhi

NES10-2 & NES-5 DSP SPEAKERS

NES10-2 £99.95 B

* Noise attn: 9-35dB
*Dip switch settings for 8 filter settings
* Handles up to 5W input
* Max 2.5W output
* Requires 12-24V DC at 500mA max
* Use mobile with cigarette lighter adaptor

Both these speakers have buit-in DSP noise filters, plug directly into 3.5mm speaker sockets and can be used with any receiver or transceiver. The NES10-2 offers 8 filter settings & a top-mounted on/off switch to select DSP and is equally suitable for base/mobile work, the NES-5 is the lower price plug & go model and is more suited for fixed channel work. Both units supplied boxed with a 1030-FPL fused DC power lead & full instructions.

NES-5 £79.95 B

* Noise attn: 20dB (typical)
* Audio i/p power 5W rms max
* Audio o/p power 2.5W rms max
* Audio connection: 3.5mm mono jackplug, 2m lead
* Requires 12-24V DC at 500mA max
* Size: 110x65x55mm
* Weight: 200g

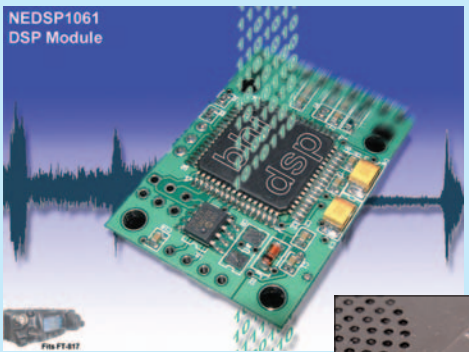
NEIM1031 NOISE ELIMINATING MODULE

£129.95 B

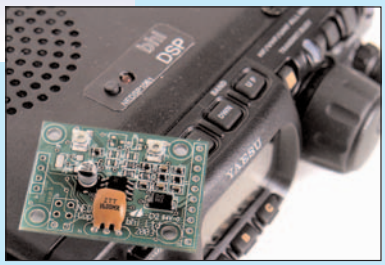
The NEIM1031 noise eliminating in-line module inorporates bhi's unique adaptive DSP noise cancelling technogy.
Supplied with ALD-001 3.5mm to 3.5mm 1.2m audio plug lead and 1030-FPL fused DC power lead and full instructions.

* *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*
* *Headphone power 2.5W RMS max*
* *Power 12-24V DC 500mA*
* *Size: 170 x 85 x 34mm*
* *Weight: 265g*

NEDSP1061 DSP MODULE



* 4 levels of noise cancellation (11-35dB)
* Single button operation
* Low distortion to audio signal
* Visual & Audible indication of DSP level
* Input & output signal level adjustment
* Small size - 27 x 37mm



A small PCB module that allows the bhi noise cancellation technology to be fitted into existing equipment. Different DSP levels are selected with a single button, along with visual and audible indication of which level has been slected. Controls are provided onboard to set the input & ouput levels from the DSP, to allow the matching of signal levels.

£89.95 B

This module is best fitted by us, there is a retro-fitting charge of £25 to existing models.

Fitting instructions already available are : FT817, TS50 & Generic

1042 SWITCH BOX

£19.95 A

No more swapping of wires! The bhi 1042 Switch Box allows up to six pieces of equipment to be connected to one bhi noise eliminating module/speaker or even to a standard extension speaker.

* 6x inputs: 3x Loaded (8 Ohms speaker level)
* 3x unloaded (headphone/line level)
* 1x output (to speaker/module) * All sockets 3.5mm mono
* includes 3.5mm mono to 3.5mm mono 1.2m lead & 3.5mm mono to 3.5mm mono 2.5m lead

WONDER WAND

Portable rig mounted antenna.

*Covers 40m - 70cm
*Easy to switch bands.
*Compact & easy to use.
*Handles up to 25 watts.
*Connects via integral PL259 connector
*Can be used with most QRP rigs.

£99.95 B

TCS

TCS - Tuneable Counterpoise for use with the Wonder Wand and other QRP Antenna

£59.95 B

Head Office & Southern Store: 22 Main Road, Hockley, Essex, SS5 4QS.
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Tel:01629 832375, Fax:01629 580020, E-mail:info@lowe.co.uk, Web:www.lowe.co.uk
Scottish Store: 20 Woodside Way, Glenrothes, Fife, KY7 5DF. Tel:01592 756962,
Fax:01592 610451, E-mail:jayceecoms@aol.com, Web:www.jayceecoms.com

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Editorial Department
☎ 0870 224 7810
Fax: 0870 224 7850

Editor
Rob Mannion G3XFD/EI5IWV
rob@pwpublishing.ltd.uk

Production Editor
Donna Vincent G7TZB/M3TZB
donna@pwpublishing.ltd.uk

Deputy Production Editor
Zoë Shortland
zoe@pwpublishing.ltd.uk

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

Art Department
☎ 0870 224 7820
Fax: 0870 224 7850

Art Editor
Stephen Hunt
steve@pwpublishing.ltd.uk

Layouts
Bob Kemp
bob@pwpublishing.ltd.uk

Typesetting
Peter Eldrett
peter@pwpublishing.ltd.uk

Sales Department
Fax: 0870 224 7850

Advertisements
Eileen Saunders M3TTO
eileen@pwpublishing.ltd.uk
☎ 0870 224 7820

Book Orders
Clive Hardy G4SLU
clive@pwpublishing.ltd.uk
☎ 0870 224 7830

Subscription Orders
Joan Adams
joan@pwpublishing.ltd.uk
☎ 0870 224 7830

Subscription Administration
(For all queries regarding exisiting subscriptions)
Kathy Moore
subs@pwpublishing.ltd.uk
☎ 01590 641148

Finance Department
☎ 0870 224 7840
Fax: 0870 224 7850

Finance Manager
Alan Burgess
alan@pwpublishing.ltd.uk

Finance Assistant
Margaret Hasted
margaret@pwpublishing.ltd.uk

Web Site
www.pwpublishing.ltd.uk

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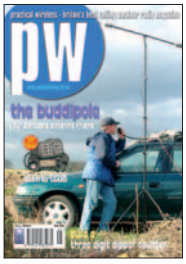
Cover subject



The Buddipole antenna system turned out to be a 'portable antenna friend' to **Kevin Romang G4SKN** during his review. Elsewhere **Richard Newton G0RSN** found the new Icom IC-E208 to be a good solid versatile transceiver. Enjoy!

Design: Bob Kemp
Photograph: Karen Romang M3KIR (main), Tex Swann G1TEX/M3NGS (inset)

May features

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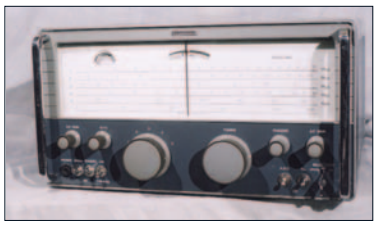

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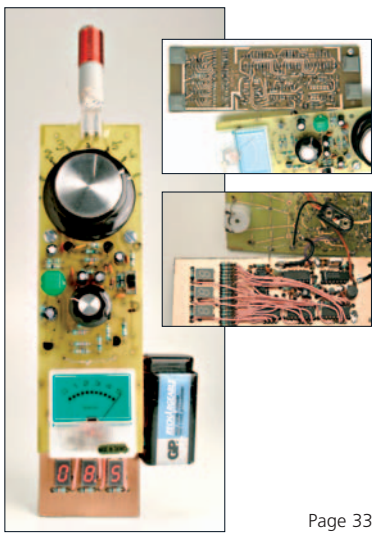

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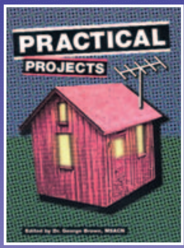
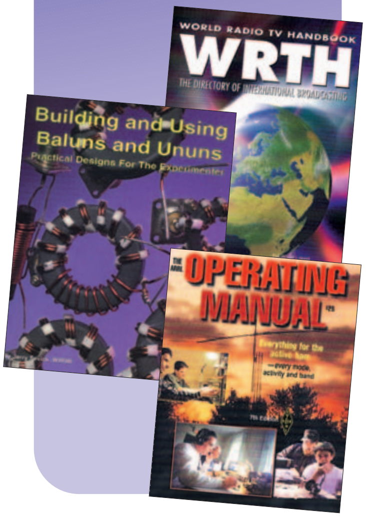
May regulars

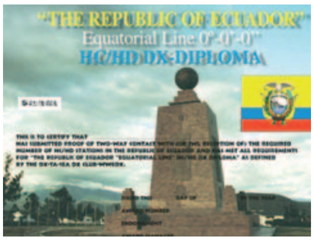
Page 70. The biggest and best selection of radio related books anywhere!

Buy of the Month!



Don't Miss Out!





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author info

Our Radio Scene reporters' contact details in one easy reference point.

VHF DXer
David Butler G4ASR
Yew Tree Cottage
Lower Maescoed
Herefordshire
HR2 0HP
Tel: (01873) 860679
E-mail: g4asr@btinternet.com

HF Highlights
Carl Mason GW0VSW
12 Llwyn-y-Bryn
Crymlyn Parc
Skewen
West Glamorgan
SA10 6DX
Tel: (01792) 817321
E-mail: carl@gw0vsw.freeserve.co.uk

Data Burst
Roger Cooke G3LDI
The Old Nursey
The Drift
Swardeston
Norwich
Norfolk NR14 8LQ
Tel: (01508) 570278
E-mail: rcooke@g3ldi.freeserve.co.uk
Packet: G3LDI@GB7LDI

Robin Trebilcock GW3ZCF
15 Broadmead Crescent
Bishopston
Swansea
SA3 3BA
Tel: (01792) 234836
E-mail: robin2@clara.co.uk

In Vision
Graham Hankins G8EMX
17 Cottesbrook Road
Acocks Green
Birmingham
B27 6LE
E-mail:G8emx@tiscali.co.uk

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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.

Most people who've met me, realise that I know I'm a bit of a Dinosaur! I don't like things to be changed too much - and I far prefer to be surrounded by things, services and people I know and appreciate. I'm also a firm practitioner of the "If it isn't broken...don't fix it" brigade!

Unfortunately, I believe the Government are mending things that aren't broken - in this case the Radiocommunications Agency (RA) and 'fixing it' by replacing the Agency's previously smoothly running wheel with a seemingly new square tyre!

Reflecting Ideology

Governments - whatever their political colour - like to change things to reflect their own ideology and this certainly seems to be the case with the demise of the Radiocommunications Agency. Of course, the RA had its problems and I had reason to be angry on occasions at the what I thought was unthinking Civil Service bureacracy at work. However, any of the small problems I had pale into insignificance when compared to the seeming indifference and impenetrability of the huge, continually mushrooming Ofcom replacement.

Come back RA - "we need you" and the skills of your Civil Servants (many with superb technical knowledge, and including some keen Radio Amateurs) is my earnest request!

Personally speaking, whatever the goodwill, technical expertise and admirable intention of its staff, I don't think that Ofcom - in the way it's been set-up - has any chance of working successfully. It's far too big and it's still growing! The remit of this gigantic **Q**uasi **A**utonomous **N**on **G**overnmental **O**rganisation - another QUANGO (and surely that's what it must be!) is already too unwieldy.

In essence Ofcom seems to be set-up to oversee much more than 'communications' as we know the word. Additionally, although I'm taking early teething troubles into account - this ponderous organisation already appears to be in confusion. I suggest the latter because my E-mail 'In-box' announces to me every day "You've Got Mail' and it's something new from Ofcom. When I check my mailbox I've often discovered that the same Press Release - almost identical in wording - has been written and sent by two totally separate authors based at Ofcom.

Very few of the E-mails I receive from Ofcom's Press Office involve radio communications, licensing or technical radio. Instead, the organisation seems much more involved in organising special committees to oversee broadcasting, including looking after the Gaelic radio services in Scotland about which I received an E-mail (to all my friends in Gaeldom...I think the committee seems sound!).

I think the flow of information from Ofcom, and the contents of E-mails and other PR notices clearly indicates that the overseeing of the technical side of its remit is minuscule. This is then backed up by the news that the tiny number of specialised technical staff there are working in Ofcom - won't be staying, and are in effect 'on loan' from the Civil Service. As Ofcom staff seemingly aren't counted as Civil Servants, the long serving RA technical staff have to consider their careers and pensions.

Certainly, any new organisation has its own teething problems. However, although I'm not not confident for their success - I fervently hope that Ofcom will mature into the efficient organisation which the RA became. Let's hope that enough technical staff are either retained or recruited.

Self Regulation

In the long term I think there can only be one result from the confused multi-purpose giant I think Ofcom has become, and that's self regulation of Amateur Radio. This seems a natural step because Amateur Radio brings little money into Government coffers compared to the worthwhile fees for other telecommunication users.

With the best will in the world, unless Ofcom have staff who understand - and want to understand our specialised hobby - we must be prepared to become our own regulators. In other words, the responsibility for running/administering our hobby will be passed over directly to Radio Amateurs. It's then that the Government (via its QUANGO) will be doing what it likes best - collecting the fees by doing the minimum of work for those (admittedly low) fees.

A crazy notion? No, not at all - just look at all those tax collectors - the shopkeepers - who work for the Government already (for free) by collecting the VAT we have to pay. A nice little 'earner' eh?

So, in the long run, I think Amateur Radio in the UK will be completely self-regulating. And, providing we are all prepared to work together - I'm sure we'll do it very well indeed!

Callsign CD

Due to the high demand for the FREE Callsign CD, as featured in the April issue, you may have yet to receive your copy. Please rest assured that all orders are being dealt with and fulfilled as quickly as possible and that your *PW* Callsign Directory will be dropping through your letter box very soon.

Leicester Show

Just my luck! Immediately after the April *PW* went to press we heard the **Leicester Show** date had been changed, after I had confirmed I was attending.

However, I've now got several busy weeks as the new Leicester dates are the **1 & 2 October**, with the **Rochdale QRP Convention** on the following Saturday **9 October**. So, I look forward to seeing you at either event. Incidentally, October 2nd is my birthday - and you're cordially invited to come and enjoy a slice of cake and a refreshing drink!

Rob G3XFD

practical wireless services

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

Subscriptions

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.

amateur radio waves

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

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

The Dragon Roars On 70MHz!

● **Dear Sir**

Inspired by the excellent *PW* articles on 70MHz, I gave a quick promotional talk to our local club on the potential of 4m in our area. Consequently there are several new stations now active on the band, with regular nets and a 'DX information exchange' channel to be set up too!

I've included the following brief article which has been sent for posting on the 4m website:

4m News Article From Rob MW0DNK, 3rd March 2004

Following a brief presentation on the possibilities of the 4m metre band by Rob MW0DNK to his local club, The Dragon Amateur Radio Club, in Anglesey, North Wales, several new stations are now operating on the band! Current stations QRV on the band include Rob MW0DNK (FM); Dave GW4JKR (FM); Steve GW0GEI (f.m., with s.s.b./c.w. coming soon); Patrick GW1SXN (FM); John MW0BER (FM); Kevin MW1CFA (FM); Chris GW1VLW (active for many years) with Rob MW0REH and Brian GW4KAZ, an old hand at 4m, joining us soon. Some stations are ideally situated to work Ireland and the North West of England and beyond with ease.

All stations will be keeping a watch on the UK f.m. calling frequency 70.450MHz, and keeping a keen ear on the Irish f.m. calling frequency 70.2625MHz. Initial tests on the band confirm that conventional propagation is indeed generous compared with 2m, with many stations operating simple antennas and low power with excellent results. Most stations have opted for Ascom SE550 transceivers, and would be interested to hear if any nets have been able to use selective calling by upgrading their software.

So, if you are in the area or visiting this summer, or based in Ireland and would like to work us - we all look forward very much to meeting you on the band.

As you'll see from the article above - we're very keen to work stations further afield, and also hope to make a few more friends in EI land, who, until now, will not have had much success in contacting too many stations in North Wales.

Everyone is delighted with the initial results, and the band seems to have many advantages over 144MHz. It's early days and we are all very much in the experimental stage, but I'm sure there will be some improvements over the next few months as we sort our antennas out!

Robert Law MW0DNK
Caernarfon
North Wales
E-mail: rob.law@lineone.net

Editor's comments: Congratulations on a splendid club initiative and effort Robert! You have *PW*'s full support and I'm delighted that readers are enjoying the 70MHz projects we're running. I also passed the information to our friends in the Irish Radio Transmitters Society for possible use on their weekly internet news service. (I thoroughly recommend readers to subscribe to the service and full details are on the IRTS website www.irts.ie/).

Incidentally, I took delivery of the first production (ready built) model of the G4CFY PW Whitcombe 70 to 28MHz receiving converter in early March for my main station use. Needless to say - I'm looking forward to working readers on 70MHz on Saturday 10 and 24th April (from 1300 local time to around 1600 hours).

Problems With ADENoIDS?

● **Dear Sir**

Congratulations for bringing advance information of the new ADENoIDS transmitter system in the latest - **April** - issue of *PW*. However, a major problem would seem to be with the "Jelly". Surely as it heated up it would revert to its constituent parts and cause a "Jam Up"? Although I suppose it would be possible to perform a QJX (**Q**uick **J**elly **E**xchange).

As the prototype suffered a 'sore throat' - it would be ironic if the production model crippled the existing rig manufacturers with Adenoids!

Obviously real hard graft went into preparing this article. A good word "Carbuncilliary". Here's to next April, 73!

Bill Graham GM3GDS
Lanark
Scotland

Editor's comment: We're pleased you enjoyed the article Bill! One of the very first responses came from another gentleman 'North of the border'. He said the ADENoID stood as much chance of working as his Laser Antenna from a previous April issue...inferring I have 'Bats in the Belfry! (Thanks, John Cunningham GM3JCC). You're all obviously on the ball in GM land! Finally, Wayne Enrico (the ADENoID author) tells me they're now working on Tellinium Oxide Negative Stimulation Laser (TONSiL) technology!

Morse Program

● **Dear Sir**

I'm writing regarding **Ray Goff G4FON's**, Morse program. As I've not seen any mention of it in the Radio Basics series.

The letters pages of the March 2004 issue of *RadCom* carried a letter from Ray Goff G4FON, publicising a Morse tuition program he had written using the 'KOCH' method.

I downloaded a copy from Ray's website and can't praise the program and concept enough, which, although is not new, I'd never heard of. The user starts off by running the program and becoming familiar with two letters, for starters, by sound and rhythm only and when one can maintain a 90% copy rate. Ray then suggests adding another symbol and following the original procedure.

There's no memorising opposites, no looking-up tables, get the receive side up to scratch before you need to get anywhere near a key. Ray has obviously put a great deal of thought and effort into the project and should be commended. Version 6 of the program can be found on Ray's interesting website at **www.g4fon.co.uk**

I've been following the Radio Basics articles on headphones with interest. As these articles have obviously aroused interest in headphones in general I would like to pass on a tip which originates from the earlier years of my career with the Post Office and BT regarding the dismantling and re-assembly of these earphone inserts

Although on their way out, many of the telephones in use at the time were of the 200 & 300 type, the earpiece of which used the same type of construction as the DLR range of headphones (and others).

It was impressed upon us, **very firmly**, that should the diaphragm be removed for any reason, it **must** be slid off sideways as opposed to pulling it straight off the pole faces against the force of the residual magnetism. Sliding the diaphragm of sideways prevents it from becoming bent or distorted which would decrease the efficiency of the earpiece quite dramatically.

Dave Williams G4BII
Bicester
Oxfordshire

Editor's reply: Thanks Dave, Ray G4FON's work sounds marvellous, I hope it encourages more people on to c.w. Thanks also for the advice on the earpiece insert diaphragms - I'll be careful next time I remove one to check for rusting (a common problem with older earpieces).

What Price Customer Satisfaction?

● **Dear Sir**

I'm writing to you on the subject

of "What price customer satisfaction"?

I found it interesting lately to witness the different approaches of British and American radio companies towards customer after sales. Now there are no names, so no cancelled advertising accounts, but I recently had cause to contact the UK main agent of a piece of test equipment to obtain a replacement control knob. The company, a very well known UK main dealer, said there would be a minimum £5 charge plus £1.50 postage and packing. When I challenged the minimum charge for what was basically a 50p item, I was told it was company policy and it was the cover the cost of picking and supplying the item.

I find this excuse totally undefendable, after all your local newsagent doesn't make a minimum charge for a box of matches simply because it costs the same to collect, store and process the transaction as a packet of cigarettes. Companies such as Yaesu UK and Kenwood Electronics UK Ltd. (through their agent Acoustic Services) operate a no minimum order policy on their parts after sales.

Fortunately for me the manufacturer is an American company and they would appear to rate customer satisfaction more importantly than their UK agent. A quick E-mail to the USA without even mentioning the problems I had with their UK agent, resulted in two knobs being sent to me free of charge and thanking me for purchasing their products, what a difference in attitude.

Len Paget GM0ONX
Kilmarnock
Ayrshire

Editor's comment: Although I'm pleased at your success Len, the direct approach doesn't always work. I've written to American companies on various matters and it seems to be the 'luck of the draw' whether or not I've got a reply or not. The correspondence situation seems just as variable as it is with British companies, but I'm pleased to hear of your success.

Thank You *PW*!

● **Dear Sir**

As a result of my E-mail query to you in December 2003, regarding an Instruction Manual for an Eddystone 888 receiver, I am more than delighted to let you know that the advertisement placed in *PW* on my behalf has produced instant response from **John Gomer G8UNZ** who lives in Colchester, not more than three miles from my brother.

The manual is an original multi-fold issue (A5 size folded) and in very good condition. My sincere thanks to you, and to John, for your most generous assistance .

Now to start on a restoration of a receiver I have long been seeking and came from an 'Old Timer' in Grahamstown only an hour's drive from Port Elizabeth here in South Africa .

Barry Jackson ZS2H
Port Elizabeth
South Africa

Editor: Take a bow....John G8UNZ! It was a pleasure to do our 'little bit' Barry.

The G5UM EF50 Receiver

● **Dear Sir**

Towards the end of 1947 when I was stationed at Burnham Wireless Telegraphy station I met **Gus G8PG** who was responsible for introducing me to the mysteries of Amateur Radio. As a result, I built G5UM's t.r.f. receiver using EF50s, etc., the relevant information was obtained from an article in *SWM*, published around that time.

Today, Amateur Radio is so largely conducted around 'black boxes' requiring very little skill and I propose to make a replica receiver as a project for my own satisfaction and possibly the basis of an article for *PW* in the future.

I write therefore to ask would it be possible to obtain from your office photocopies of the original article by G5UM, alternatively, could you advise the dates of the relevant issues of *SWM* that I might put a wanted advertisement under Bargain Basement in a future issue of *PW*? I assume you will have such information from when *PW* took over *SWM/SWL*?

Ian Wilks GW3FSW
Holywell
North Wales

Editors comment: A very interesting letter Ian. Please join me on the 'Topical Talk' page where the EF50 is this month's topic.

Licensed At Last!

● **Dear Sir**

You may remember that I wrote to you in December 2003 with the information that I had passed the RAE in 1983 and whether or not I could still apply for an Amateur Radio Licence. Following your advice I contacted the Radio Licensing Centre in Bristol and spoke to **Matt Tiley**. I mentioned that I had contacted *PW* and you had advised I contact them. As you suggested, he was most helpful. After producing the necessary documentation I am now the proud holder of the callsign M0DPM. So, as promised, I've written again to let you know how I got on. Thanks for your help and encouragement, keep up the good work at *PW*. Best regards.

Harry Jones M0DPM
Sutton in Ashfield
Nottinghamshire

Editor's comment: Well done Harry! Better late than never eh?

● 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.

April 18
The Yeovil & DARC's 20th QRP Convention
Contact: Derek M0WOB
Tel: (01935) 414452
E-mail: m0wob@tiscali.co.uk
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, 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 (near Cullomtoe, Devon, five minutes from J27 on the M5. Doors open 1030 till 1500. There will be numerous stalls, including Radio, TV, Gramophones 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.

April 18
The Cambridgeshire Repeater Group's Annual Rally
Contact: Paul Dyke G0LUC
Tel: (01462) 683574
Website: www.gb3pi.org.uk
To be held again at Bottisham Village College, Bottisham, which is six miles east of Cambridge, access is via A14 and A1303. Features include a large hall, car boot sale and a Bring & Buy. Doors open 1030 and admission is £1.50. There will be refreshments and a talk-in on S22.

April 25
The 5th Annual Radio & Electrical Equipment Sale
Contact: Doug G4LQY
Tel: (01543) 571269
To be held at the Aldridge Community Centre, Anchor Meadow, Middlemode Lane, Aldridge, West Midlands. Tables are £6 and admission is £1 (including free raffle). Doors open 1000. There will be a large car park, refreshments, RSGB book stand and much more.

April 25
The Lough Erne ARC's 23rd Enniskillen Amateur Radio Show
Contact: Herbie GI6JPO
Tel: 028-6638-7761
E-mail: hng@ntlworld.com
Held in the Killyhevlin Hotel, Enniskillen, Co. Fermanagh, Northern Ireland. Doors open at 1200. There is a big car park and good food. Admission is £3 and includes a free ticket for the raffle, with valuable prizes. There will be a Bring & Buy with no fee, Amateur Radio, Electronics, Computers, etc. Traditional large attendance expected from all over Ireland, north and south.

May 3
The Dartmoor Radio Rally
Contact: Ron G7LLG
Tel: (01822) 852586
Held at Tavistock College, Tavistock, Devon. This is a new location from last year, with plenty of space for traders to display their wares and visitors to see them and talk to old friends. There is access for disabled visitors, plenty of car parking around the college site, along with trade stands, Bring & Buy and refreshments. Doors open 1030 (1015 for disabled visitors). This location is ideal for picnics, so why not bring the family?

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.

Brownies Take to the Mic

Thinking Day On The Air

The annual Thinking Day on the Air event took place this year on 21 February with many Guiding Amateur Radio stations joining in from around the world in a bid to exchange greetings messages and forge friendships.

The Dorset special event station **G4VBP** was organised by 'Brown Owl' **Peggy Ganderton** for Verwood Brownie Pack. The station was run by **Peter M0PTR** and operated in the 7MHz band.

The Brownies who took part in operating GFVBP all successfully gained their Communicator Badges and they made contact with several other Thinking Day on the Air stations throughout the UK. The most local contact was with the Foxlease Guide Centre **GB2FOX** in the New Forest and the furthest away was with **OK1MSO**.

Well done to all who took part and who knows maybe some of the Brownies who took part will go on to become Amateurs of the future?

Brownies from the 1st and 4th Verwood, 1st Pimperne, 3rd Broadstone St. Johns' and 1st Ferndown Guides, Peter M0PTR, Dick G8VFH (retired Editor of *Short Wave Magazine*) and Peggy Ganderton watch with interest, as John G4FDS is busy on the microphone.

Can You Help?

Mr A. M. Dowson is looking for an instruction leaflet for the Cirkit Digital Multimeter type TM175 - circa 1991 manufactured by Cirkit Distribution Ltd. of Brockbourne, Herts. As far as Mr Dowson can recall the leaflet consisted of about eight folded pages detailing how to use the meter.

If you have a copy of the instruction leaflet that you no longer need or can copy for Mr Dowson please get in touch with him direct at: **'*Trift*', Jacks Lane, Turvery, Beds MK43 8DH Tel: (01234) 881073.**

RAOTA News

'Old Timers' Social

The Radio Amateurs Old Timers Association (RAOTA) are having a 'get-together' in May and invite you to join in...

The RAOTA committee is pleased to announce a social event for all RAOTA members. Taking place on 8 May at the Brunswick Inn on Station Terrace in Derby between 1200 and 1600hours the event promises a day of talk, excellent company and good food.

All members of RAOTA are welcome to attend with their spouse/partner as well as any friend who is interested in becoming a member of RAOTA. There will be a small charge (not more than £3 per person) to be paid at the door.

The event is being co-ordinated by **Ian Brothwell G4EAN** and so to help Ian with administering the event members are asked to let him know how many guests they will be bringing.

Ian Brothwell G4EAN
56 Arnot Hill Road,
Arnold,
Nottingham
NG5 6LQ
Email: ian@bartg.demon.co.uk

Rally News

The Show Will Go On!

Despite rumours to the contrary the Leicester Amateur Radio Show 2004 is go! Read on to find out more...

Due to the enormous success of the Superbikes Motorcyle Race event at the **Donington Park International Convention Centre** on the third weekend in September the Management at Donington felt that they could not cope with the additional volume of traffic generated by having the Amateur Radio show on the same weekend. Thanks to negotiations the date for the Amateur Radio event has been changed to **Friday 1 and Saturday 2 October** with the setting-up day on Thursday 30 September.

The organisers apologise for the change of date but there was nothing else that could be done in order for the event to continue. Further information can be found at **www.lars.org.uk** and as details become available they will be announced on these pages.

Enquires regarding stand bookings should be made to **John G4MTP, Tel: (01604) 790966, E-mail: g4mtp@lars.org.uk**, for Flea Market bookings please contact **John G7RXS, Tel: 0116-284 1517, E-mail: seniorja@aol.com** All other enquiries to **Geoff G4AFJ, Tel: (01455) 828273** or **E-mail: geoffg4afj@aol.com**

Programme For 2004

Scarborough Summer Special Events

The Scarbourgh Special Events Group have a busy summer ahead judging by their programme of events.

GB4RFA RFA *Wave Ruler* 1st - 2nd May
In 2002 the group commemorated the de-commissioning of Scarborough's adopted warship *HMS Fearless*. Her replacement will be the Royal Fleet Auxillary vessel *Wave Ruler*, which is the fourth vessel to be adopted by the resort and one of the most modern ships in the fleet, with a displacement of some 31,500 tonnes and a speed of 10 knots. The QSL card will show a full colour photograph of the ship.

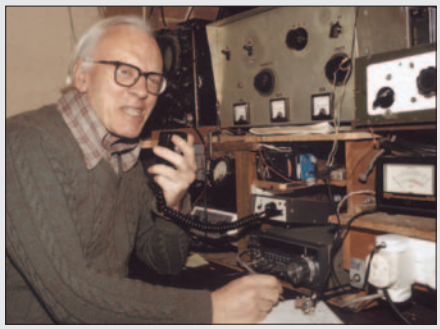
GB6JUN 60th Anniversary of D-Day June 5-6th
D-Day the 6 June 1944 saw the greatest air and seaborne invasion in history as operation Overlord was launched on the beaches and drop-zones of Normandy. The SSEG will represent the UK on the airwaves with this very special callsign, as a fitting commemoration of D-Day. Full colour souvenir QSL will be issued.

GB1SCA International Lighthouse Weekend August 21st-22nd
Annual operation from the lamp room at the top of Scarborough Lighthouse will take place to celebrate its 100th anniversary in 2004. A special full colour souvenir QSL card will be available for contacts made.

The group will also be active throuout the year in major international contests using the club contest call M0O and also on 144MHz f.m. most weekends as **GX0OOO/P** in support of the Summits On The Air organisation. Intermediate class demonstration station **2E0OOO** will be also be active on the QRP frequencies on June 17 for International QRP Day.

Silent Key

Les Moxon 'Mr Antenna' G6XN



(photo supplied courtesy of David Moxon)

Les Moxon G6XN - 'Mr Antenna' to generations of Radio Amateurs died in early March. Writing to PW Brian Grist G3GJX, President, Guildford & District Radio Society provides a suitable tribute.

Brian G3GJX writes: "Very sadly, I have to report that Les Moxon G6XN died last Wednesday 3 March 2004. He had been unable to continue to be active in Amateur Radio for some months due to the nature of his illness. At the time of his death he was being looked after in a Care Home in Tilford, Surrey.

As I expect you will know, Les was among the oldest Amateurs in the UK and was licensed in the 1920s. He was 95 when he died. His funeral was at Guildford Crematorium at 4.30pm on Wednesday 10 March.

To so many of us he was truly an antenna 'guru' and his name has been synonymous with Amateur Radio antenna designs for over 40 years. Indeed I understand that *PW* has just published an article which takes a fresh look at the Moxon Square antenna.

On a personal note - I remember visiting Les when he was 84 to get some advice on a portable 5-band vertical I had designed. We erected it on the little lawn at his house in Hindhead and he was soon telling me what I was doing wrong. I made the changes he suggested and have since used that same antenna with great success from dozens of different locations in the UK and overseas.

I'm sure you will want to publish this obituary in an early edition of *Practical Wireless* as Les was such a respected Amateur.

Brian Grist G3GJX
President, Guildford & District Radio Society

The Editor replies: Thank you for the tribute to Les Moxon Brian, we're pleased to publish it as a very small appreciation of G6XN's decades of work for the hobby. Our condolences go to his son David, and family. The many articles and antenna projects produced by Les will - I have no doubt - prove to be a continuing (and very appropriate) appreciation of his efforts on our behalf. **G3XFD**

First Foundations

Charlie Delta Candidates

The newly formed Charlie Delta Club have just completed their first Foundation Course and the six candidates who took it passed with flying colours!

The succesful 'Foundationeers' of the Charlie Delta Amateur Radio club would like thank **Barry G0OJR** for 'putting up with them' and for putting in the hard work of teaching them and getting them through the course. All future Foundation courses will be tutored by **Dave M0DCM.** Well done to one and all from everyone at *PW*!

The Charlie Delta Club meet at Woodcross Club, Woodcross Lane, Bilston, West Midlands every Monday from 8pm and everyone is welcome to visit. For more information on the club or on how to enrol for Foundation or Intermediate courses contact Dave M0DCM.

Dave M0DCM. Tel: (01902) 635244.
E-mail: m0dcm@blueyonder.co.uk
Website: www.cqdx.co.uk

From left to right starting at the back - Anthony, Karen, Robert, Richard, John, Andrew, at the front Dave M0DCM, Barry G0OJR and Geoffrey G7NZM.

All Change!

New Number News

We've got your number, have you got ours? - asks Martin Lynch & Sons.

Martin Lynch & Sons have changed their telephone number to **0845 2300 599.** The new easy to remember number will also only cost you the price of a local call from anywhere in the country, so dialling ML&S is now even cheaper than before. There's also a new FAX number: **0845 2300 339** and both numbers are effective now.

Martin Lynch, MD commented; "Our customers have dialled the same number for over 14 years, however, this time it will cost them less and the number has been chosen so it's easy to remember".

In addition to the new number Martin Lynch & Sons have also revamped their website **www.hamradio.co.uk** to offer customers a new, easily navigable site promoting Amateur, short-wave and scanner radio, as well as promoting the extensive range of stocked products available to purchase on-line, ML&S aims to offer a premier information resource for the discerning Amateur, short wave listener, scanner enthusiast, digital photographer and self-confessed gadget buyer. Customers looking for second-hand bargains will be pleased to know that the pre-owned equipment pages have also been given a facelift. So, you can now view the vast stock of used equipment and see pictures and specifications before deciding to buy.

For business users the new Corporate and Business Radio section of the website will be of great interest. Traditional short and mid-range p.m.r. solutions are covered in detail and more complex, leading-edge technology solutions, information and advice will be added shortly.

The new-look Martin Lynch & Sons website offers a totally secure environment for all on-line orders, 128-Bit on-line encryption ensures that each transaction is completed securely offering guaranteed safe shopping. Full details of the on-line security guarantee are available on the website.

Martin Lynch & Sons
Tel: 0845 2300 599 FAX: 0845 2300 339
Website: www.hamradio.co.uk

You Are Invited To...

The UCW/FISTS QRS Party

To encourage newcomers to Morse operating and as a contribution to the activities of the European CW Association, FISTS CW Club invites all licensed Radio Amateurs, especially members of EUCW clubs, to take part in the annual EUCW/FISTS QRS Party.

This event provides an opportunity for EUCW club members and non-members, to meet and exchange greetings with each other at a leisurely pace. At the same time it is an opportunity to make contacts qualifying for the prestigious Worked EUCW award. Although not a contest in the normal sense of the word, there is a contest element for those who thrive on a challenge, with awards for those who score the most points, and a merit award for the "Most Readable Morse Heard" voted for by other contestants.

Taking part is more important than winning, providing fun for all in a non-stressful introduction to a contest-like event for beginners and an opportunity for more experienced operators to put something back into the hobby by helping and encouraging those less experienced in c.w. operating.

Feedback on the event can only be obtained from contestants' reports so, whatever your level of experience and even if you only have time to make a few contacts, please make an effort to send in a log.

Dates/Times
From 00.01UTC on the fourth Sunday in April, for one week, to 23.59UTC on the following Saturday. For 2004, the dates will be Sunday 25 April to Saturday 1 May.

Mode
CW only

Frequencies
All bands, except WARC bands. Non-QRP stations are requested to avoid calling CQ on the popular QRP frequencies.

Keys/Speeds
Any type of key or keyer may be used, but no keyboard sending or pre-programmed messages from computers or keyers allowed. Maximum speed 14 words per minute (70 cpm). The speed of a QSO should be at the speed of the slower station.

Call
CQ QRS/EUCW. Stations may be worked or logged once each day in each band used.

EUCW Clubs
Listen out for members of the following clubs, taking part in the EUCW/FISTS QRS Party: AGCW-DL (Germany); Benelux-QRPC; BTC (Belgium); CFT (Belgium); CT-CWC (Portugal); EACW (Spain); EA-QRPC (Spain); EHSC (Extremely High Speed Club); FISTS; FOC (First Class Operators); G-QRP; GTC (Greece); HACWG (Hungary); HCC (Spain); HSC (High Speed Club); HTC (Switzerland); INORC (Italy); I-QRPC (Italy); ITC (Italy); MCWG (Macedonia); OE-CWG (Austria); OHTC (Finland); OK-QRPC (Czech Republic); RTC (former GDR); SCAG (Scandinavia); SHSC (Super High Speed Club); SP-CWC (Poland); UCWC (Russia); UFT (France); U-QRQC (Ukraine); VHSC (Very High Speed Club); YL-CW-GP (Germany); 3A-CW-G (Monaco); 9ACWG (Croatia).

Club Membership
Entrants who are members of more than one EUCW club should take part in the QRS party as a member of only one of those clubs.

Classes
A - Members of EUCW clubs using more than 10W input or 5W output power.
B - Members of EUCW clubs using QRP (10W input or 5W output, or less).
C - Non-members of EUCW clubs using any power.
D - Shortwave listeners.

Exchanges
Class A & B, RST/QTH/Name/Club/membership number
Class C, RST/QTH/Name/NM (ie, not a member)
Class D, Log information for both stations.

Scoring
Class A/B/C - 1 point per QSO with own country, 3 points per QSO with other European countries.
Class D - 3 points for every complete logged QSO.
Multiplier, all classes: 1 multiplier point for each EUCW-club worked/logged per day and band.

Logs
To include date, UTC, band, call worked, info sent, info received and score claimed for each QSO.

Summary
To include entrant's full name, call, address, EUCW club, Class entered, multiplier claimed, total points claimed, station details, including type of key/keyer used, power used, comments (if any) on the event, up to three votes for "Most Readable Morse Heard" (only one vote per station) and signature of entrant. E-mailed logs and summaries are acceptable, provided they follow the same format as detailed above.

Awards
A) A certificate will be awarded to the three top scorers in each class.
B) A certificate of merit will be awarded to the operator receiving most votes for the "Most Readable Morse Heard", provided the operator nominated has also submitted a log. If the recipient of the most votes has not submitted a log the certificate of merit will be awarded to the qualifying entrant with the next highest number of votes. In the event of a tie multiple certificates will be awarded, endorsed "Shared Award".
No correspondence can be entered into. The Contest Manager's decision shall be final in making all awards.

Entries
Send logs and summary no later than 31 May 2004 to:
FISTS/EUCW Contest Manager
R. Kimpton M5AGL
15a Buckden Road
Brampton
Huntingdon
Cambs
PE28 4PR
E-mail bobm5agl@btopenworld.com

Oldham's Wicked Ladies

GB2OWL Takes to the Air

The Oldham Amateur Radio Society took part in the this year's Thinking Day on the Air, which was run from the club's meeting premises at the Royton Air Training Corps using the callsign GB2OWL (Oldham's Wicked Ladies).

Twelve year old short wave listener Rosanna checks Guide's Morse sending (with Bert G7JUL, on far right, looking on).

Fourteen year old Elizabeth M0LIS operating GB2OWL v.h.f. station.

The Oldham club set up an extensive array of equipment for the Thinking Day event, which included two separate h.f. stations. One was for the 14/21 and 28MHz bands and made good use of the club's new 60ft h.f. tower and Tri-Band beam to work stations around the world. The other using the club's G5RV antenna operated 3.5 and 7MHz to contact other Thinking Day On The Air stations across the UK.

The club's v.h.f./u.h.f. tower was still awaiting planning permission so the v.h.f. station operated on 144MHz f.m. using an omni-directional antenna. This station was run by 14 year old **Elizabeth M0LIS** who had only recently passed her City and Guilds RAE. The site is very good for v.h.f. operation so a strong signal was put out across the North West and at times there was a 'pile-up' of stations calling in.

In addition to the three transmitting stations a separate h.f. receiving station was set-up where the Guides and Brownies could get experience of tuning stations in under the watchful eye of **Bert G7JUL**.

An activity that generated a lot of interest was sending Morse using an oscillator. One of Oldham club's younger members, 12 year old short wave listener, **Rosanna** supervised those sending and made sure they got their dots and dashes right!

A good time was had by all and about 70 Brownies and Guides attended the event and all gained their communication badge as a result. The groups that took part were: St. Annes Brownies, St. Saviours Brownies and Guides, St. James Brownies, Trinity Guides and Brownies and Fitton Guides.

The Oldham club meet every Thursday at 1930hours in the Air Training Corps, Park Lane, Royton and also run Foundation and Intermediate courses. For further information please contact the secretary **Mike Crossley M1CVL**:
Tel: (01706) 367454
E-mail: M1CVL@thersgb.net Website: www.oarc.zen.co.uk

Irish Amateur Radio

European Union Radio Amateur Celebration

The Irish Radio Transmitters Society is pleased to announce a weekend of Radio celebrations.

An Event Sponsored by the **Irish Radio Transmitters Society (IRTS)** takes place on 1 and 2nd May 2004 to mark the expansion of the European Union as ten additional countries join on 1 May. The Irish Government, which will hold the Presidency of the Union on that date has nominated ten Irish cities to be 'twinned' with the new member states.

The IRTS will activate ten Special Event Stations in the twinned cities – each with the **EI25** prefix and a suffix representative of the new member state. For example, **EI25HA** will be the station located in the city twinned with Hungary, **EI25ES** will be the city located in the city twinned with Estonia and so on. In addition, the IRTS HQ station, **EI25EU**, will be co-ordinating the event from Dublin. It's planned to have activity on a variety of bands and modes and a special Awards program is planned.

More details can be found on the IRTS website at **www.irts.ie** or are available from **Paul EI2CA**, E-mail: **paul@lotm.ie**

Wakefield DXpedition

Operation Inner Farne Isle

The North Wakefield Radio Club will be operating from the island of Inner Farne activating their callsign GX4NOK/P.

Using the callsign **GX4NOK/P** members of the Wakefield club will be active during daylight hours on 17 & 18th April 2004 from Inner Farne Island (IOTA: EU-109). The club hope to be operating on 7, 10, 14 and 18MHz, as well as putting on a digimode station and 144MHz.

The exact operating frequencies will be listed on the club website at **www.g4nok.org** together with information about the Farne Islands and the stations. The North Wakefield Radio Club would like to extend their thanks to the National Trust for giving permission for the activation to take place and to the Leeds Amateur Radio for sponsoring the QSL card.

Tynemouth's Youngest

M3 Success for Alistair

Members of the Tynemouth Amateur Radio Club have recently welcomed their youngest member to the fold.

Alistair McGann achieved his M3 call in December 2003 at the age of 10. Alistair now boasts the callsign **M3HSI** and is a very keen Radio Amateur regularly attending club meetings.

Members of Tynemouth ARC meet at 1900hours on Fridays at the Linskill Centre, Linskall Terrace, North Shields, Tyne & Wear and are always keen to encourage new members. Contact: **G. Thompson G0SBN** for more details.

amateur radio clubs

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

DORSET

South Dorset Radio Society
Contact: Carol Hodges 2E1RBH
Tel: (01305) 820400
E-mail: carolonfraggle@tiscalli.co.uk
The South Dorset Radio Society meet at Chickerell Church Hall, Chickerell, Weymouth on the second Tuesday of the month. Doors open 1930hours, so why not go along and join in? **April 13**: SDRS AGM; **May 11:** Talk on APRS/PSK3 by Martin Poynter-Smith. Refreshments are available during the meetings.

HERTFORDSHIRE

AYLESBURY VALVE RS
Contact: Roger Piper G3MEH
Tel: (01442) 826651
E-mail: roger@g3meh.fsnet.co.uk
Website: http://www.avrs.mandarinsolutions.co.uk/
Covering Aylesbury Vale and the surrounding areas the Society meets on the second Wednesday of each month at the home of **Roger Piper G3MEH**, in Wigginton near Tring, Hertfordshire HP23 6EN. Meetings usually start at 2000hours but please telephone to check before travelling any distance. If Morse practice is detailed in the Events column this normally starts at 1930hours and lasts for 30 minutes. Non members are welcome but please telephone beforehand to confirm space availability.

MIDDLESEX

RADIO SOCIETY OF HARROW
Contact: Jim Ballard
Tel: (01895) 476933
E-mail: G0aot@blueyonder.co.uk
The Radio Society of Harrow meets at 2000hours every Friday at The Harrow Arts Centre, Uxbridge Road, Hatch End, Middlesex. Forthcoming meetings to look out for include: **April 16**: 'An Introduction to VHF Contesting' by **Roger Piper G3MEH**; **23rd**: 'So now you want to learn Morse?' and **24th**: International Marconi Day. Why not go along and join in?

SURREY

COULSDON ARTS
Contact: Andy Briers G0KZT
Tel: (01737) 552139
E-mail: cats@briersa.fsbusiness.co.uk
Website: www.qsl.net/cats
The Coulsdon Amateur Radio Transmitting Society meet on the second Monday of the each at St. Swithun's Church Hall, Grovelands Road, Purley at 2000hrs to 2200hrs. Check out the website for more details.

WEST YORKSHIRE

Wakefield & DRS
Contact: Rick G4BLT
Tel: (01924) 255515
Website: www.wdrs.org.uk
The Wakefield & District Radio Society meet on Tuesdays at 2000hours at the Ossett Community Centre, Prospect Road, Ossett (near Wakefield), West Yorkshire. Forthcoming meetings include: **May 4:** Fish 'n' Chip supper - Wetherby Whaler; **11th:** 'Contest Operating' a talk by John G4RCG. **18th:** On the air, preceded by committee meeting & **25th:** DF Aerial practice.

Keep those details coming in!

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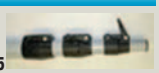

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doing it by design

This month Tony Nailer G4CFY looks into the biasing and design of transistor amplifiers. As usual, there's something to build and a kit is available too!

Welcome to the second of my series and an introduction to the 'practical' design of the transistor amplifier. There are literally thousands of different types of transistors covering widely different parameters. They can be grouped as *npn* or *pnp*, and as low, medium, and high power, and further as either l.f., h.f. or v.h.f. types.

I'll now consider an *npn* device in common emitter configuration, which is typical of probably 95% of practical applications. The *pnp* form is similarly used but with the transistor and bias networks inverted between the supply rails.

Small Signal Audio

Let's first look at the design of a small signal audio amplifier, with a gain of 20x times (20x). A transistor is a device which provides current amplification. This means that small changes of current flow from emitter through to the base cause large changes of current to flow from emitter through to the collector. The ratio of collector and base currents is known as ß (Greek beta) or also H_{fe}, the gain factor. So ß = I_c/Ib.

The simplest of bias circuits is shown in **Fig. 1**. It has the great disadvantage that transistors with different current gains will result in the voltage at the collector being at wildly different voltages between ground and positive supply.

The ideal bias network should set up the transistor conditions to be relatively impervious to changes of transistor types within the group. For example, *npn*, low power, low frequency. The most effective configuration is shown in **Fig. 2**.

In practice, the base to emitter connection acts like an ordinary silicon diode and when forward biased will have about 0.65 to 0.7V across it. In normal small signal voltage amplification stages a good rule of thumb is to choose the voltage across the emitter resistor to be twice the base emitter voltage, i.e., 1.4V. This means the base voltage should be 1.4 + 0.7 = 2.1V.

The collector voltage should now be set at halfway between the emitter voltage and the supply rail. So, if the supply rail is 13.5V and the emitter is 1.4V, the collector should be about 7.4V above 0V.

In order for the base point to be held firmly, the bias resistor current I1 flowing through resistors R2 & R1 is chosen in low frequency applications to be 10 times the base current. Let's now consider the common BC548 transistor with a current gain ß of say 200. If we choose a collector current I_c of 2mA then the base current Ib will be 2mA/200 = 10µA.

As I1 is 10 times Ib it will be 100µA. Now it all works out as follows;- The voltage across R2 is the base voltage 2.1, the current flowing through it is 100µA (or 0.1mA). Using Ohm's Law R = V/I, R2 = 2.1/0.1mA. Multiplying top and bottom by 1000 gives 2100/0.1 = 21,000Ω (21kΩ).

The resistor R1 has a voltage across it of supply minus base volts; 13.5 - 2.1 = 11.4V. It has the resistor bias current 100µA plus the base current 10µA flowing through it, total 110µA, or 0.11mA. Its value now as before R1 = 11.4/0.11mA. Multiplying top and bottom by 1000 gives,

11,400/0.11 = 103,636Ω.

Common Values

Looking at the calculated values, they are clearly 'very near' to common resistor values of 22kΩ and 100kΩ. So we'll choose these and go back to re-calculate the base voltage.

However, to keep the mathematics simple I'll ignore the base current for this calculation.

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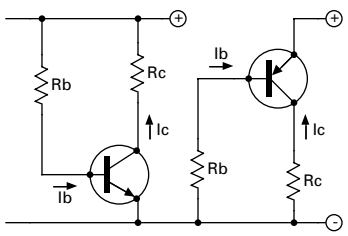

Fig. 1: The simplisitic biasing of *npn* and *pnp* transistor.

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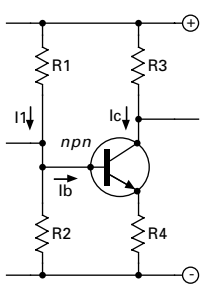

Fig. 2: This form of biasing gives more definable voltage levels for the amplifier.

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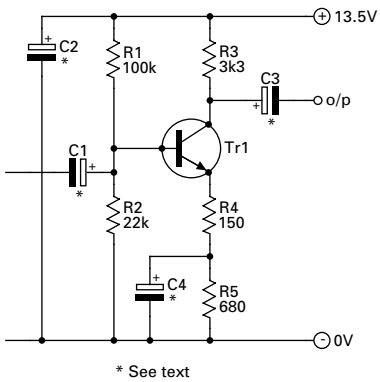

* See text

Fig. 3: In this diagram both the d.c. and a.c. voltages gains are defined.

Firstly, R2 has the same ratio to the total resistance R1+R2 as the base voltage Vb has to the supply voltage Vs. Mathematically this is R2/(R1+R2) = Vb/Vs. Using the magic of transposition of formula we get Vb =R2xVs/(R1+R2)
Vb = 297kΩ/122kΩ = 2.4V.

The effect of the extra 10µA of base current through R1 will reduce this to around 2.25V.

To achieve a collector voltage of 7.4V (determined earlier) the resistor R3 will have 13.5 - 7.4V across it at a collector current Ic of about 2mA.
R3 = V Ic = 13.5-7.4/2mA
R3 = 6.1 / 2mA = 6,100/2 = 3kΩ.

If we choose a value of 3k3 (3.3kΩ) for the resistor, to keep the voltage at the same point we need a collector current I_c of 6.1/3k3 = 1.848mA.

Now it's time to turn to the emitter circuit. Here, the emitter voltage will be 0.7V below the base, so is 2.25-0.7 = 1.55V. The emitter current Ie flowing through R4 will be the sum of the base and collector currents 0.01mA + 1.848mA = 1.858mA.R4 = 1.55V / 1.858mA.

Multiplying top and bottom by 1000 gives R4 = 1,550/1.858 = 834Ω.

Setting the Gain

At low frequencies the gain of a stage can be calculated quite accurately as the collector resistance divided by any un-decoupled emitter resistance. The resistance, R4, in our circuit is presently undecoupled. In addition there is a resistance from the transistor emitter called Re which is equal to 26Ie(mA). In this case Re = 26/1.858 = 14Ω.

The collector load resistor R3 calculated previously and then selected is 3300Ω. For a gain of 20, the undecoupled emitter resistance has to be 3300/20 = 165Ω.

There's 14Ω in the transistor emitter so we could use another 150Ω to total 164Ω.

The total emitter resistance calculated for the d.c. conditions is 834Ω, from this we should subtract 150, leaving 684Ω. The resistor R4 has now been split into R4 and R5, with standard values of 150 and 680Ω respectively, **Fig. 3**.

The 680Ω will be decoupled to audio frequencies using an electrolytic capacitor. The 150Ω will remain undecoupled together with the internal emitter resistance to set the gain at around 20x.

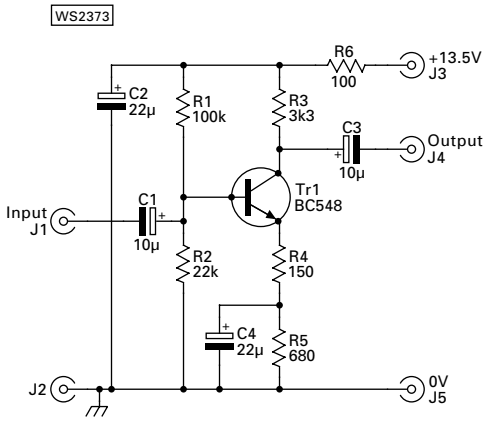

Fig. 4: Adding another resistor (R6) improves the rejection of power line ripple. See text for detail.

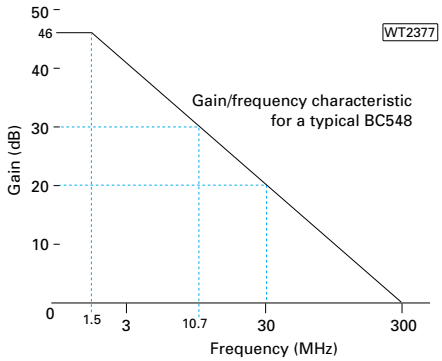

Fig. 5: Diagrammatic representation of a transistors gain versus frequency. The Ft figure represent the frequecny at which the current gain has fallen to 1.

New Circuit

A new circuit, **Fig. 4**, includes input and out capacitors, a supply rail and an emitter decoupling capacitor. The secret of coupling-capacitor values is that their reactance should be lower than 10% of the impedance they feed from and into.

In general, small signal low frequency transistors have input and out impedances between 1kΩ and 10kΩ. So we should make Xc = 100Ω or lower at the lowest operating frequency. At 300Hz, Xc = 1/(2 x F x C).

By the magic of transposition of formula, C = 1/(π * F * Xc), Farads.

In this case C = 1/(2π * 300 * 100) = 1/188,495.56, Farads.

On my calculator C = 0.0000053F = 5.3µF. We could use 6.8 or 10µF.

The secret of decoupling-capacitor values is that they should be somewhere between 1Ω and 1% the impedance of the point they are decoupling, at the middle of the operating band. The supply line has resistors of about 3300 connected to it so it needs decoupling with a value of between 1 and 33Ω.

The decoupled emitter resistor R5 is 680Ω, so the decoupler should be between 1 and 6.8Ω.

Using the formula C = 1/(2π * F * Xc), Farads and giving Xc the value of 1µ, we get C = 1/(2π * 2000 * 1), Farads, at a centre frequency of 2kHz. C = 1/6283.2 Farads.

On my calculator C = 0.000159 Farads, or 15.9µF. (I would actually recommend 22µF).

To finish off the circuit I have added resistor R6 up to the positive supply rail with a value 100x the reactance of the supply decoupler C2. This means that any noise at audio frequencies from the power supply lead will pass through 100Ω and then be shunted to ground by the 1Ω of C2. This provides a 100:1 supply line noise attenuation, or 40dB.

Circuit Built

The circuit was built by soldering the components together in mid air above a piece of copper clad board which is used as the 0V and signal earth. A signal of 200mV p-p at 1kHz was applied to the input, and both input and output monitored on a Tektronix 465B oscilloscope. The output signal was 4V p-p which corresponds exactly to a gain of 20.

To determine the bandwidth of the amplifier the signal generator was swept down in frequency until the output fell to 0.707 of 4V, which is 2.8V and corresponds to the -3dB point. This occurred at 43Hz and would have been mainly defined by the value of C4. A larger value of C4 would have lowered the -3dB roll off frequency.

Next, the generator was swept upwards in frequency and the peak output level monitored until it fell again to 2.8V, which was at 290kHz. This high frequency point would have been determined partly by the capacitances in the transistor and partly by the electrolytic capacitors (as the had passed series resonance, becoming inductive).

Almost any npn transistor with a gain factor (ß or H_{fe}) of 100 or more will function well in the circuit I've just described. It will consume about 2.5mA from a 13.5V supply, providing a gain of around 20 from say 50Hz to 250kHz.

Data Books

Data books and most good component supply catalogues list transistors by operating voltages as well as H_{fe}, fT, maximum power, and package pin-outs. They usually quote the collector current for the H_{fe} specified. The RS catalogue, for example, quotes for the BC548 an fT of 300MHz and an H_{fe} of 110-800 at 2mA Ic.

The fT is the frequency at which the gain of

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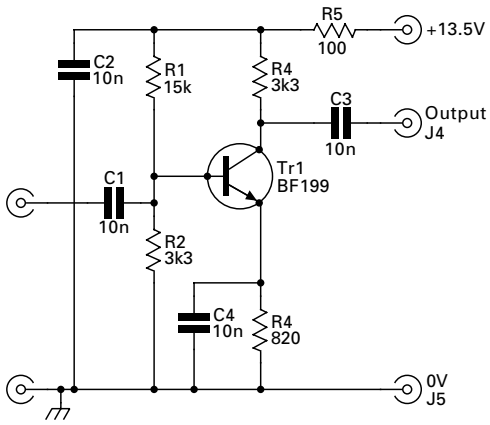

Fig. 6: The final design of the r.f. amplifier. See text for details.

the device has fallen to one. That is, the same out as is put in. fT is referred to as the gain/bandwidth product. It's a good guide as to the useful frequency range of the device as an amplifier.

With the figures quoted above, I'll assume that a particular device has a gain of 200 at low frequencies and an fT of 300MHz. If we then divide the fT by the gain we get 1.5MHz. This tells us that the gain of the BC548 will be a near constant value of 200 from 0Hz to 1.5MHz and then drops linearly until unity at 300MHz.

Using these two points of 1.5 and 300MHz we can now predict the usable gain at any frequency up to 300MHz. For example at 30MHz it should be 300MHz/30MHz =10x, at 9MHz it will be sixth of gain at 1.5MHz i.e., 200/6 = 33 x, at 10.7MHz 200/7.1 = 28x.

Note: For A pictorial representation of this, with voltage gain expressed as dBs, please see **Fig. 5**.

Modified Circuit

Next, I modified the previously designed circuit to cope with the higher base current occurring at lower gains by changing R1 to 15kΩ and R2 to 3.3kΩ. To provide coupling and decoupling at higher frequencies I replaced all the electrolytics with 10nF ceramics.

In order to find the maximum gain capability I used C4 to directly decouple the emitter to 0V. The final circuit and values are shown in **Fig. 6**.

A Hewlett Packard 8640B generator was used as the signal source and the Tektronix 465B oscilloscope used again to monitor input and outputs. A signal at 500kHz and 200mV p-p was applied to the input, and the output was measured to be 3V p-p, a gain of 15x.

The signal generator was then swept up in frequency until the output of the amplifier fell to 0.707 of 3V (which is 2.1V p-p). This occurred at 4.6MHz. Substitution of a BF199 r.f. transistor in place of the BC548 produced exactly the same gain and roll-off.

Generally speaking, r.f. transistors have useful gains at much higher collector currents than for a.f. devices. In order to achieve a high impedance in the collector circuit without the penalty that a large resistance would cause to the collector voltage level, coils are used.

The design of tuned amplifiers is worthy of separate treatment which I hope to address in due course. I hope you'll join me then!

Parts Availability

PCB AMP1 50Hz - 250KHz, £1.50. PCB & parts £2.75, P&P 50p
PCB AMP2 250KHz -1MHz, £1.40. PCB & parts £2.50, P&P 50p
PCB AMP2 1MHz - 4.5MHz, £1.40. PCB & parts £2.50, P&P 50p

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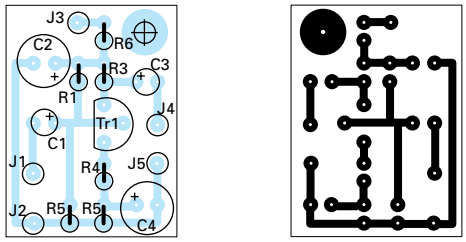

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Fig. 7: The p.c.b. and overlay for the audio amplifier of Fig. 4.

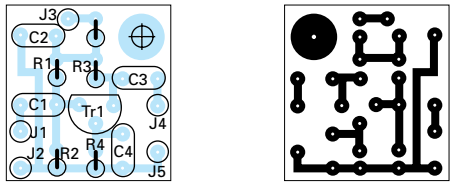

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Fig. 8: the p.c.b. and overlay for the r.f. amplifier of Fig. 6.

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X-7	7 ele 10, 15, 20m	SPECIAL ~~£699.95~~	£599.95

MOBILE PENETRATOR

1.8-30MHz (200W PEP) mobile antenna – no ATU required. Length 102" (52" collapsed). Fits 3/8 mount (SO239 feed point)

OUR PRICE £139.95 delivery £10.00

New improved 'Wire Penetrator' 1.8-60MHz end-fed wire antenna (45ft long) £159.95

Q-TEK PENETRATOR

"WE'VE SOLD 100s ALL OVER EUROPE"

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

ONLY £179.95 delivery £10

SEND SAE FOR LEAFLET

Q-TEK COLINEARS (VHF/UHF)

P&P £10.00

X-30 GF 144/70, 3/6dB (1.1m) glassfibre	£39.95
X-50 GF 144/70, 4.5/7.2dB (1.7m) glassfibre	£54.95
X-300 GF 144/70,6.5/9dB (3m) glassfibre	£69.95
X-500 GF 144/70, 8.5/11dB (5.4m) glassfibre	£149.95
X-627 GF 50/144/70, 2.15/6.2/8.4dBi (2.4m)	£69.95

Q-TEK YAGIS

Delivery £10.00

2m	5ele (boom 63"/10.5dBd)	£49.95
2m	8ele (boom 125"/13dBd)	£64.95
2m	11ele (boom 156"/13.5dBd)	£94.95
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
4m	5ele (boom 128"/11.5dBd)	£69.95
6m	3ele (boom 72"/8.5dBd)	£59.95
6m	5ele (boom 142"/11.5dBd)	£79.95
70cm	13ele (boom 76"/14.9dBd)	£46.95
70cm	13ele crossed (boom 83"/14.9dBd)	£79.95

NEW 80-10M TRAP DIPOLE KIT

Covers 80-10m (1Kw PEP) 102ft long (34m).

Complete kit (requires feeder) ..... £69.95 del £7.50

DELUXE G5RV

P&P on either full/half size £6.50

Multi-stranded heavy duty flexweave wire. All parts replaceable. Stainless steel and galvanised fittings.

Double size - 200ft (160-10m) £84.95

Full size - 102ft (80-10m) £42.95

Half size 51ft. (40-10m) £36.95

Choke Balun — Inline balun for G5RV ..... £24.95 P&P £3

STANDARD G5RV

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

Half size 51ft (now includes heavy duty 300Ω ribbon) ..... £24.95 P&P £6

Q-TEK INDUCTORS

80mtr inductors + wire to convert ½ size G5RV into full size. (Adds 8ft either end) ..... £24.95 P&P £2.50 (a pair)

DIPOLE CENTRE PIECES

Open wire	£5.99
SO-239	£5.99

300Ω HEAVY DUTY FEEDER

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

BALUNS & TRAPS

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
20 mtrs	Traps	(a pair)	£25.00 P&P £4
5.35MHz	Traps		£25.00 (a pair)

1kw Handling

CAROLINA WINDOM

CW-160S	(160-10m) 40m long	£139.00 P&P £8.50
CW-160	(160-10m) 80m long	£134.95 P&P £8.50
CW-80	(80-10m) 40m long	£99.95 P&P £8.50
CW-80S	(80-10m) 20m long	£119.95 P&P £8.50
CW-40	(40-10m) 20m long	£94.95 P&P £8.50

MOBILE ANTENNAS

P&P £8.50

DB-770M	2m/70cm (3.5 - 5.8dB) 1m PL-259	£24.95
DB-7900	2m/70cm (5.5 - 7.2dB) 1.6m PL-259	£39.95
PL-62M	6m + 2m (1.4m) PL-259	£19.99
PLT-20	20m mobile whip (56" long)	£24.95
PLT-40	40m mobile whip (64" long)	£24.95
PLT-80	80m mobile whip (64" long)	£24.95
PLT-259	PL-259 converter for above	£5.95

NEW NOISE FILTER!

A superb TDK 'snap fix' ferrite clamp for use in Radio/TV/ Mains/PC/Phone etc. *Simply close shut over cables and notice the difference!* Will fit cables up to 13mm diameter. Ideal on power supply leads/mic leads/audio leads/phone leads.

On thin cable simply wind cable round clamp 1-to-2 times. Simple yet effective!

OUR PRICE: 2 for £10 (p&p £2.50)

DOUBLE THICK FERRITE RINGS

A superb quaility ferrite ring with incredible properties. Ideal for "R.F.I". Width 12mm/OD35mm.

6 for £12.00 12 for £20.00

P&P £3.50

COAX BARGAINS

Genuine high quality coax

MILITARY SPEC

RG-213 Mil spec x 100m.

ONLY £69.95 P&P £10

RG-58 Mil spec x 100m.

ONLY £35.00 P&P £10.00

Coax stripping tool (for RG-58) £4.50

SP-350 STATIC PROTECTOR

Designed to reduce static build-up during electrical storms. (Gas discharge fuse is replaceable). DC-500MHz (SO-239 sockets). PWR up to 400W.

£24.95 P&P £2.50

LOW LOSS PATCH LEADS

£2.50 P&P

Connectors	Length	Price
PL-259 - PL-259	0.6m	£5.99
PL-259 - PL-259	4m	£9.99
BNC - BNC	1m	£6.99
BNC - BNC	5m	£10.00

COPPER ANTENNA WIRE ETC

Enamelled (50m roll)	£12.95 P&P £5
Hard drawn (50m roll)	£13.95 P&P £5
Multi-Stranded (Grey PVC) (50m roll)	£11.95 P&P £5
Flexweave (H/duty 50 mtrs)	£30.00 P&P £5
Flexweave H/duty (18 mtrs)	£15.95 P&P £5
Flexweave (PVC coated 18 mtrs)	£18.95 P&P £5
Flexweave (PVC coated 50 mtrs)	£40.00 P&P £6
Special 200mtr roll PVC coated flexweave	£99.00 P&P £10
Copper plated earth rod (4ft)	£13.00 P&P £6
Copper plated earth rod (4ft) + earth wire	£18.99 P&P £6
New RF grounding wire (10m pack) PVC coated	£12.50 P&P £5

NISSEI PWR/SWR METERS

RS-502 1.8-525MHz (200W) ..... £79.95 P&P £5

RS-102 1.8-150MHz (200W) ..... £59.95 P&P £5

RS-402 125-525MHz (200W) ..... £59.95 P&P £5

RS-3000 1.8-60MHz (3kW) Incls mod meter £79.95 P&P £5

RS-40 144/430MHz Pocket PWR/SWR ..... £34.95 P&P £2

DL-30 diamond dummy load (100W max) ... £26.99 P&P £3

COAX SWITCHES

(P&P £4.50)

2 way CX-201 (0-1GHz) SO239	£19.95
2 way CX-201 'N' (0-1GHz) 'N'	£24.95
4 way CX-401 (0-500MHz) SO239	£69.95
4 way CX-401 'N' (0-500MHz) 'N'	£79.95

NEW EASY FIT WALL PULLEY

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

MAST HEAD PULLEY

A simple to fit but very handy mast pulley with rope guides to avoid tangling. (Fits up to 2" mast).

£8.99 + P&P £2.50

30m pack nylon guy rope (4.4mm)	£12.50
132m rol nylon guy rope (4.4mm)	£40.00

ALUMINIUM POLES

All measurements approx

2" x 1.5m length	2mm wall thickness	£12.50 P&P £10
2" x 2.4m length	2mm wall thickness	£19.99 P&P £10
2" x 10'	Collection only 2mm thick	£24.99 P&P N/A
2" x 20'	Collection only 2mm thick	£39.99 P&P N/A

TELESCOPIC MASTS

Approx lengths

6 section telescopic masts. Starting at 2½" in diameter and finishing with a top section of 1¼" diameter we offer a 8 metre and a 12 metre version. Each mast is supplied with guy rings and steel pins for locking the sections when erected. The closed height of the 8 metre mast is just 5 feet and the 12 metre version at 8 feet. All sections are extruded aluminium tube with a 16 gauge wall thickness.

8 mtrs £109.95 12 mtrs £149.95 *Carriage £12.00.*

Tripod for telescopic masts £89.95

CAR BOOT MAST SET

Once they've gone, they've gone! 5 section (15') 4.5m 1¼" slot together mast set. Collapsed length 0.92m (3') makes this ideal for travelling.

£24.95 Del £10.00

2 for £44.95 del £10.00 — 3 for £64.95 del £10.00

SWAGED MAST SET

4 x 5' lengths of approx 2" extruded (16 gauge) heavy duty aluminium, swaged at one end to give a very heavy duty mast set.

OUR PRICE £44.95 Del £10

2 for £79.95 Del £12.50

3 for £109.95 Del £15.00

NEW 20' (approx) SLEEVED SLOT TOGETHER MAST SET

A heavy duty-sleeved, mast set that will tightly slot together. 4 x 5' (2" dia) 16 guage heavy duty aluminuim tubes (dim. approx).

£49.99 Del £10.00.

TWO FOR £90.00 DEL £12.50

METAL WORK & BITS

P&P available on request

2"	Mast base plate	£12.95 P&P £5
6"	Stand off	£6.95 P&P £5
9"	Stand off	£8.95 P&P £5
12"	T&K Brackets	£12.00 P&P £8
18"	T&K Brackets	£18.00 P&P £8
24"	T&K Brackets	£20.00 P&P £8

10mm fixing bolts (needs 8mm hole)	£1.40 each
U bolts (1½" or 2")	£1.20 each
8 nut universal clamp (2" - 2")	£5.95
2" - 2" cross over plate	£10.95
3-way guy ring	£3.95
4-way guy ring	£4.95
2" mast sleeve	£9.95
1½" mast sleeve	£8.95
Standard guy kits (with wire)	£24.95 P&P £6
Heavy duty guy kits (with wire)	£29.95 P&P £6
Ground fixing spikes (3 set) powdered coated	£24.00 P&P £8
30m pack nylon guy 4.4mm/B/load 480kg	£12.50 P&P £3
132m roll nylon guy (4.4mm)	£40.00 P&P £7.50
Self amalgamating tape (roll)	£6.50
'Nylon' dog bone insulators	£1.00 each
Chimney lashing kit	£12.99

HAYDON Communications

SHOWROOM & MAIL ORDER:
Unit 1, Thurrock Commercial Centre,
Purfleet Industrial Park,
Juliette Way, Aveley,
RM15 4YA

TEL: 01708 862524 FAX: 01708 868441
Open: Mon-Fri, 8.30am-4.00pm.
Sat: 8.30am-12.00pm.

W. MIDLANDS SHOWROOM
Unit 1, Canal View Ind. Est., Brettel Lane,
Brierley Hill, W. Mids. DY5 3LQ
Open: Mon-Thurs, 9.30-4.30pm.
Fri: 9.30-3.30pm. Sat: 9.30-1.00pm
TEL: 01384 481681

Mail order: 01708 862524

NEXT DAY DELIVERY TO MOST AREAS, £10.00

NO MAIL ORDER TO MIDLANDS BRANCH

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PRICES SUBJECT TO CHANGE WITHOUT PRIOR NOTICE. PLEASE VERIFY BEFORE ORDERING. E&OE.

hf specials

IC-756 PROII

Experience the most advanced DSP ever created for amateur radio.

ALL FOR ONLY **£1649.00**
WHILE STOCKS LAST

TS-480SAT

New HF + 50MHz, 100W. Ideal for home or car use. Includes auto tuner.

OUR PRICE **£949.00**

TS-480HX - 200W version (no ATU)
OUR PRICE £999.00

ALINCO DX-70TH

100W HF + 6m transceiver.
RRP £699.99

LATEST UK VERSION

DX-70TH plus version:- DX-70TH + MS-1228 power supply £599.00

OUR PRICE **£549.00**

hf radios for less than you think

NEW ICOM IC-7400

HF+6m+2m, All mode, 32bit DSP for outstanding signal enhancing.

OUR PRICE **£1199.99**

IC-7400 + PS-300 .....£1279.00

IC-7400 + SP-21 + SM-20.....£1279.00

ICOM IC-706II G

LATEST UK MODEL

Now on its 3rd generation, this classic all-band transceiver is still our No. 1 best seller. HF + 6m + 2m + 70cm.

2 year Icom warranty

£749.99

IC-706II G plus version:- Ic-706II G + MS-1228 power supply .....our price £799.99

ICOM AH-4

HF + 6m wire tuner:- outdoor "waterproof" pully auto tuner. Connect to your suitable Icom radio and away you go. (Minimum wire length may apply). It is alway recommended that a separate earth spike is fitted outside when using a remote wire tuner.

WHILST STOCKS LAST **£199.99**

KENWOOD TS-2000

New all mode multibander: HF/50/144 /430 optional 1200MHz.

Or with 23 cm fitted £1749.00

OUR PRICE **£1499.99**

PS-53 matching PSU £229.00
SP-23 matching speaker.....£68.95
MC-90 DSP desktop mic.....£179.95
MC-60A desk mic.....£119.95

KENWOOD TS-870S

STILL OUR No1 SELLER!

TRUE IF DSP TRANSCEIVER
When only the best will do!
Incl's ATU.

OUR PRICE **£1279.00**

PS-52 matching power supply £229.00
MC-60A Desk mic £119.95
MC-90 DSP desktop mic £179.95
SP-31 matching speaker.....£79.95

KENWOOD TS-570DGE

INCLUDES ATU

In our opinion, the best HF Transceiver below £1200.

OUR PRICE **£795.00**

PS-53 matching power supply £229.00
MC-60A Desk mic £119.95
MC-90 DSP desktop mic £179.95
SP-23 matching speaker.....£68.95

YAESU FT-857 NEW

LATEST UK VERSION

The ultimate HF excitement in a small package. HF + 6m + 2m + 70cm. Incl's digital signal processor unit.

Incl's optional DSP unit **£699.00**

FC-30 auto antenna tuner £219.95

STOP PRESS:- FT-897 £799.00 while stocks last

YAESU FT-817

LATEST UK VERSION

100kHz-440MHz (with gaps). All mode transportable. Includes nicads/charger. O/P:- up to 5W. ~~£799.00~~.

OUR PRICE **£469.00**

Optional case.....£20.00

FT-817 + MS-1228 PSU ~~£604.00~~.....£519.00

ATAS-120

Superb ready to use (with suitable Yaesu Tcvr) fully automatic antenna (40-70cm). No ATU needed - PL-259 fitting. Ideal mobile antenna (or base with counterpoise kit).

OUR PRICE **£229.00**

Counterpoise kit (for home use) £69.00
Universal boot mount £24.95

power supplies

NISSEI PS-300

Features: ★ Over voltage protection ★ Short circuit current limited ★ Twin illuminated meters ★ Variable voltage (3-15V) latches 13.8V ★ Additional "push clip" DC power sockets at rear.

One of the only linear power units in this magazine that has "over-voltage protection"

SUPERB VALUE AT **£99.95** Delivery £10.00

NISSEI MS-1228

28A at 13.8V yet under 2kgs. (H 57mm, W 174mm, D 200mm approx). Fully voltage protected. Cigar socket & extra sockets at front/rear. Ultra slim.

RRP ~~£79.95~~

OUR PRICE **£69.95**
Delivery £10.00

'Smallest version to date' now with cigar socket.

vhf-uhf radios, etc. – never a problem

YAESU VX-2E

Tx:- 2m/70cm.
Rx:- 0.5-999MHz.
Includes battery (Li-/on) + charger.

OUR PRICE **£159.00**

ALINCO DJ-596

2m + 70cm Handie. Includes: (NIMH) Battery/Charger. High + narrow switchable. High power (4.5W) OP as standard. Alpha Numeric channeling. INCL'S FREE REMOTE MIC.

SUPERB VALUE **£169.95**

Optional case £15.99

KENWOOD TH-F7E

Transceiver & scanner 2m/70cm Tx (5W). Rx:- 0.1-1300MHz, all mode (incl SSB). Incls:- Lithium ion battery & charger.

INCL'S FREE REMOTE MIC. **£249.00**

Optional case £19.99
TH-D7E MkII 2m/70cm + TNC £299.99

YAESU VX-7R

Yaesu heavy duty tribander 50/144/430MHz. (Lithium ion battery) high power (5W) as standard. Includes charger.

OUR PRICE **£289.00**

Optional case £16.99

YAESU FT-7800

Yaesu's latest high spec, low cost mobile. 2m/70cm 50W-2m/40W-70cm.

Incl's wideband receive

OUR PRICE **£229.00**

YAESU BARGAINS

FT-1500M 2m.....£149.99
FT-8900 Quad bander..£329.00
Quadra amp.....£3399.00
FT-8800 2m/70cm.....£269.00
VX-2E.....£159.00

ICOM IC-2725

OUR PRICE **£265.00**

Optional extended receive available which includes AM airband

ICOM BARGAINS

IC-910H 2m/70cm.....£1099.00
IC-910X 2m/70/23.....£1199.00

we have an incredible range of accessories

SGC TUNERS

MAC-200

New auto tuner 1.8-54MHz (200W) wire, vertical, dipole. You name it. (5 selectable outputs).

OUR PRICE **£319.95**

Connect a wire and away you go!

SGC-230 (HF-200W) ATU £329.95
SGC-237 HF+6m Tuner £289.95
SGC-239 Mini Tower (1.8-30MHz) £179.95
SGC-231 HF + 6m £339.95
Smart lock - fits SGC-230 ..... £59.95

MFJ PRODUCTS

MFJ-259B

HF digital SWR analyser + 1.8-170MHz counter/resistance meter.

ONLY **£249.95** P&P £6

MFJ-269	160-70cm analyser	£315.95
MFJ-949	300W ATU + dummy load	£149.95
MFJ-969	HF + 6m ATU	£179.95
MFJ-962D	1.5kW versa tuner	£249.95
MFJ-901B	Superb versitile ATU	£84.99
MFJ-16010	Random wire tuner	£56.95

UK VERSIONS

YAESU G-450C

Heavy duty rotator for HF beams, etc. Supplied with circular display control box and 25m of rotator cable. GC-038 Lower mast clamps £25.00

GC-065 2" Thrust bearing £48.00.

OUR PRICE **£315.00** P&P £10.00

G-650C £359.00
G-1000DXC £499.95
G-5500 (azimuth/elevation) rotator £499.99

AR788 *NEW MODEL*

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

OUR PRICE **£44.99**

AR-201 ..... Thrust bearing for above only £13.99

D-308B DELUXE DESK MIC

(with up/down). Many amateurs using this mic (over 4000) have expressed extreme pleasure with it's performance. Includes 8-pin round Yaesu mic lead.

£49.95 P&P £6.00

Yaesu 8 pin round to modular adapter (FT-100, etc.) £19.99
A-08 8 pin "Alinco" round £9.95
K-08 8 pin "Kenwood" round £9.95
I-08 8 pin "Icom" round £9.95
IM-08 Modular phone "Icom" £9.95
KM-08 Kenwood modular lead £9.95

when it comes to gadgets - we're rarely beaten

WMR-928

Digital touch screen weather station. Includes remote (cable free) rain collector, wind meter, thermo/hydro sensor. The ideal professional weather station. (PC linkable). RRP ~~£499.00~~.

OUR PRICE (subject to availablity)

£299.99

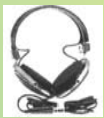
New SGC ADSP-2

A superb digital signal processor built into a compact speaker. Simply connect to your receiver on short wave – feed with 12V & SIT back & listen – you'll hear the difference. SGC have excelled themselves with this product.

£99.95 P&P £5

ADSP-2 PCB unit (goes in-line with speaker feed) £89.95

KENWOOD HS-5



Superb padded professional communications headphones. Designed specifically for SWL. 1/4" jack.

PRICE **£56.99** Del £5.00

KENWOOD HS-6

A professional lightweight pair of dedicated short wave listening headphones. 1/4" and 3.5mm jack.

PRICE **£36.99** Del £5.00

SUPER-GAINER RH-9090

SMA 40cm flexible whip that is ideal as replacement.

OUR PRICE **£26.95** P&P £1.50

SUPER-GAINER RH-9000

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

OUR PRICE **£21.95** P&P £1.50

TH-887 headset

Quality headset that will fit most hand portable and most HF & VHF/UHF tcvrs via optional interface. Supplied with two pin molded plug-will fit Alinco/Yaesu/Standard/ADI/Icom hand-helds.

TH-887K Headset for Kenwood £24.95

OUR PRICE **£24.95** P&P £3.50

BARGAIN WINCH

500kg brake winch.

BARGAIN PRICE

OUR PRICE **£59.95**

Del £8.50

Winch wall bracket £19.99
Extra heavy duty "hanging pulley" £14.50

we've always been known for short wave receivers

REALISTIC DX-394

★ Superb performance SW receiver ★ 0.2-30MHz (all mode) ★ Selectable tuning steps (down to 100Hz) ★ 240 or 12V ★ Digital S-meter ★ Attenuator ★ Key pad entry ★ 160 memories ★ Noise blanker.

Send SAE for review

OUR PRICE **£199.95** P&P £10

OUR BEST SELLING LOW PRICED RECEIVER

HD-1010 optional headphones £9.99

AOR AR7030

A superb top of the range HF receiver. This product has certainly proved itself in both the commercial and domestic markets.

OUR PRICE **£699.99**

AR-7030 + version £849.00

JRC NRD-545 DSP

The ultimate short wave receiver with DSP - for the real perfectionist.

OUR PRICE **£1299.00** Del £10.00

NVA-319 Extention speaker £189.00
CHE-199 VHF/UHF converter £269.00

SANGEAN ATS-909

A superb performance all mode synthesized world receiver with true SSB and 40Hz tunning for ultra clean reception. The same radio is sold under the Roberts name at nearly twice the price. Other features include RDS facility, 306 memories and WFM.

Optional 240V Power Supply £16.95

Send SAE for data sheet

£139.95 (P&P £10)

SONY SW-100E

★ Miniature portable all mode SW receiver ★ Station presets for 50 frequencies ★ Single side band system ★ Synchronous detector ★ Tuning in 100Hz + 1kHz steps ★ Includes compact antenna/stereo earphones/carrying case.

★ STAR BUY ★

Optional 240V Power Supply £24.95

£159.95 P&P £10

scanners - you name it, we've probably got it

ALINCO DJ-X3

Micro-handy scanner. 100kHz-1300MHz. 700 memories/stereo FM (earphones)/attenuator/bug detector. AM/FM/WFM/Selectable tuning steps (incl's 8.33kHz).

OUR PRICE **£99.95** Del £10.00

Soft case £15.99
Cigar power lead £19.99
PC interface £42.95

Optional battery pack and drop in charger £39.99

ICOM IC-R5

New pocket hand-held scanner (0.1-1310MHz) AM/FM/WFM. Superb high-speed scanner featuring alpha tag and much more.

OUR PRICE **£149.99**

Del £10.00

BATTERIES AND CHARGER INCLUDED

Optional soft case £17.99
Optional cigar lead £19.99

UNIDEN UBC-780XLT

New comprehensive scanner (25-1300MHz) Alpha Tag, PC clonning control. Smart scanner + trunk track facility. Includes power supply.

OUR PRICE **£279.99**

Del £10.00

Software 780XLT £34.99

ICOM IC-R8500

Next generation wideband receiver for the true perfectionist. 0.1-2GHz. (All mode).

Includes free power supply.

OUR PRICE **£1099** Del £10.00

SP-21 extention speaker £74.99
Voice synth board £34.95
IC-R8500 + SP-21 + voice synth £1189.95

DESKTOP SCANNERS

AOR AR-5000A ..... our price £1499.00
Fairhaven RD-500VXT ..... our price £699.99
AOR AR-8600 MkII ..... our price £589.00
Yaesu VR-5000 ..... our price £535.00

HAND-HELD SCANNERS

MVT-7300EU ..... our price £199.99
Alinco DJ-X10 ..... our price £269.99
MVT-7100 ..... our price £199.99
Alinco X-2000 ..... our price £419.99
AOR AR-8200 MkIII ..... our price £379.00
Yaesu VR-120D ..... our price £115.00

The Icom IC-E208 seems to be dwarfed by its microphone. Such is progress - but this microphone is also rather special! (see text).

The Icom IC-E

Richard Newton G0RSN is happiest when 'playing' with a new transceiver. So, *PW* gave him the opportunity to try out the latest offering from Icom. As usual with Icom equipment...he thoroughly enjoyed the job!

The Icom IC-E208 is a twin band transceiver covering the 144 and 430MHz Amateur bands. I describe it as a 'twin band rig' instead of dual-band as it will only operate on one band at a time (a dual-band rig would be able to operate fully duplex).

The Icom IC-E208 not only offers access to the two Amateur bands, but also offers considerable extended receive coverage of Marine band, Airband, v.h.f. and u.h.f. p.m.r. frequencies along with the ability to receive signals both in f.m. and in a.m.

The IC-E208 is a good-looking transceiver, as you can see from the heading photograph. When I opened the box the rig struck me as being really well made...it just oozes quality.

What's In The Box?

When it arrived, I found the transceiver was supplied with a cable for the remotely controlling the detachable control head, **Fig. 1** and **2**, an Icom HM-133 multi-function DTMF microphone and a power lead. There's also a mobile mounting bracket and microphone hook plus a very easy-to-read, comprehensive handbook.

The rig itself is compact, measuring approximately 141 wide x 40 high x 185mm deep, not including protrusions. It's almost all heat sink! (But it also has a small cooling fan, see **Fig. 3**).

There are connection sockets for a PL259 coaxial antenna plug, a 3.5mm jack plug for extension speaker (this doubles as the programming/cloning lead socket) and a 6-pin mini DIN plug for 1200 or 9600bps data. On the front panel there's a socket for an 8-pin modular microphone plug.

The Icom IC-E208 offers a potent high power setting of 55W on 144 and 50W output on the 430MHz band. Both bands share a 15W mid-power and a 5W low power setting.

I was pleased to see a good range of power settings. As a mobile operator I appreciate having the opportunity to deliver a powerful signal when required, but feel it's just as important to be able to drop the level when power is not needed. It was also great to see a mobile rig that offers a 5W setting.

The Icom IC-E208 continues the theme of versatility by offering a removable control head. However, the rig is still a compact unit even when it's in 'one piece' so to speak!

As a keen mobile operator I find that the ability to detach the control head on a transceiver is extremely useful when faced with the modern car interior. And in fact I did remotely mount the head for the purposes of the review, but more about that aspect later.

The detachable head, Figs. 1 and 2, is very compact. It's also well designed with a large tuning rotary knob and excellently thought out and sensibly arranged controls. The band control is a large button in the centre of the main control knob, while the volume and squelch controls are on easy to access rotary controls.

Functions useful to a mobile operator such as monitoring of the input frequency and power selection are easy one button presses. It just seemed to me that all the controls I would want are there to hand.

Display Size Excellent

The display size, heading photograph, is excellent! Without compromising on the compact size of the head Icom have still managed to get a good size display, which can easily be seen. The operator can even choose whether this is to be backlit with a yellow, amber or green light.

I was also impressed with the memory allocation on the IC-E208. I can say this because the transceiver offers the operator access to 500 memories which can be divided across five banks - even if a bit of organisation is required. Memories can also be given alphanumeric names on an individual basis.

In addition to the 500 memories the user can have five pairs of programmable scan limit

Fig. 2: The powerful IC-E208 is a remarkably compact rigs - clearly demonstrated as the detachable front panel poses in G1TEX's hand!

208 Twin Band Mobile

memories. This is where the keen type can designate that the radio scans only between two given frequencies (let's say the repeater output segment of the 144MHz band for example).

Also on offer are two **Call** channels, one for the 144 and one for 430MHz. These are one-button press instant access channels that can be used to store your local chat frequency or perhaps the calling frequency.

Scanning Arsenal

The Icom IC-E208 also has a veritable arsenal of scan options. These include **Band scan**, **Bank scan**, **Memory scan** and **Priority Watch**. The operator can choose a timed resume with adjustable monitoring times, or have the rig resume only when the signal disappears.

Suffice to say that should the user want to monitor a set of frequencies, it would be difficult to imagine that they couldn't find a scan configuration to suit their needs. This is excellent, considering the rig isn't a scanner but is primarily a twin band transceiver, albeit with a considerable additional frequency coverage.

Fig. 1: The IC-E208 shown with the control head detached, ready for remote installation (see text).

Microphone As Standard

A big plus point for the Icom IC-E208 as supplied in the UK is that it's supplied as standard with the Icom HM-133 multi-function DTMF microphone (heading photograph). What an asset! - it allows virtual complete control of the rig from the microphone, allowing a myriad of functions to be literally at the fingertips.

The user can change power setting, manually input frequencies, move the v.f.o. up and down in frequency and select between v.f.o. and memories. It's also possible to switch between duplex and simplex, increase and decrease the volume, scan and even adjust the squelch levels. The list is almost endless, but basically all I need to explain is the operator can almost entirely control the rig from the microphone!

One function that I found to be 'just brilliant' when operating mobile was the ability to latch the press-to-talk (p.t.t.). This is a very easily accessed function, which means that you have instant 'hands free' operation. With the function activated I only had to press the p.t.t. button once and release it. The rig went into transmit, it will then stay in transmit until you press the p.t.t. switch again.

I used this to great effect when mobile, just laying the microphone on my lap or hanging it on the dash, those I spoke to reported that the audio quality did not suffer at all even with the microphone lying in my lap.

However, to remove the possibility of accidental transmission I found it best to set the time-out facility. This means that after a period (designated by the operator), the rig will stop transmitting automatically. If, like me, you tend to chat a bit, it's best to set it with that in mind. **Note:** don't make it too long though...as that would defeat the object of the safeguard.

Repeater Tone Access

One thing that I did not find quite so convenient was the access to the 1750Hz tone for access to my local repeater on 145.625MHz as it's a secondary function operation. In fact I actually found it easier to do a whistle into the microphone. Indeed I seemed to be able to get within the required frequency quite well with a little practice!

Despite my minor criticism, the Icom IC-E208 offers everything you would expect to see on a modern rig. It gives full CTCSS, DTMF and DCS functions for squelch control, repeater access and paging.

One interesting little function that I don't remember seeing on other v.h.f./u.h.f. mobile rigs before is an r.f. attenuator. This useful feature is adjusted by using the squelch control.

The squelch control will operate normally up to the 12 o'clock position, after which it becomes an r.f. attenuator. Although helpful, I would imagine that this would be more useful when using the rig as a base station from the shack rather than during mobile use. (If you don't want this feature then it's easily disabled).

Configured By Menu

Like most modern rigs, the Icom IC-E208 can be configured by a set of menu settings. And in practice the transceiver has two menus: A menu entitled **Initial Set** includes functions such as auto power-off settings, settings controlling the cooling fan and data speed. **Note:** these are the settings that Icom feel will be seldom changed, the menu is accessed when powering up the rig.

The functions most likely to be configured by menu sets more frequently, are in a far more accessible menu set. They include things such as display

Continued on page 26

Product

Icom IC-E208 v.h.f./u.h.f. transceiver

Company

Icom UK Ltd.

Contact

Sales
Tel: (01227) 741741

Pros and Cons

Pros *The Icom IC-E208 combines simplicity with performance.*

Cons *Difficult to access repeater tone burst control.*

Price

£329.99 inc. VAT

Summary

This transceiver was a joy to use; no frills, no bells, no whistles just a good solid rig with a sensible array of standard and advanced features. It represents excellent value for money in my book.

Supplier

*My thanks go to **Icom UK Ltd., of Sea Street, Herne Bay, Kent CT6 8LD,** for the loan of the review transceiver.*

dimmer and colour, repeater CTCSS tones and DCS tones, tuning steps and memory name access.

With the number and variety of features I've mentioned, it's reasonable to assume that many people will see this rig as a real choice for the shack as opposed to the car. With this in mind I decided to use the rig in both situations and see how it performed.

I went for the easy option first, setting the IC-E208 up in my shack. Bearing in mind it draws 12A on the high transmit power setting I connected it to the 20A power supply. I then connected the rig to my WX2 dual-band antenna (this is about 7.7m (25ft) above ground level (a.g.l.) at home, and my home is only about 24m (80ft) above sea level (a.s.l.).

Despite the low a.g.l. and a.s.l. measurements the Icom IC-E208 did very well as a base station and as a receiver. I enjoyed several contacts all within a 20km (12.5 miles) radius, all with excellent reports and strong signals. Had there been more stations around I'm sure the rig would have easily got me further afield. Despite this it's quality and not quantity that matter and I had several 'quality' contacts.

Firstly, I spoke with **Nigel M0CPU** in Verwood, about 8km (miles) away from me, unsurprisingly he reported my signal as "60 over 9".....even on the 5W setting. He also made the comment that the Icom IC-E208 had "super fine audio".

Nigel was using an Icom IC-910 and a Watson W300 dual-band collinear. The received audio on the Icom IC-E208 was also good quality, even with the rig's internal speaker.

The next contact was with **Jim G6IZQ** in Barton on Sea, about 20km (12.5 miles) away. When Jim first called I could only just hear him down in the noise. And although I did get his name and callsign, it was a struggle. Then he came up to 5 and 5.

Jim told me that he was using a Yaesu FT-290 MkI. When he first called up he was using it 'barefoot' (that is to say with no linear and putting out about 2W into a loft antenna). Then he put the linear on line, transmitting at around 17W. I was somewhat impressed as the Icom IC-E208 had even heard the 2W level signal!

Jim told me that he had received me on his hand-held transceiver when I was using high power talking to Nigel, but when I dropped to low power he had almost lost me and had gone to the 290 on the loft antenna. Jim reported, "Well Richard the modulation seems good and the deviation seems fine as well". I had a very enjoyable chat with both Nigel and Jim and thanked them for their time.

I also spoke to my Father-in-Law, **Terry G7VJJ** just down the road from me, in Bournemouth. Terry reported that the audio from the Icom IC-E208 was "very nice, lovely sound"!

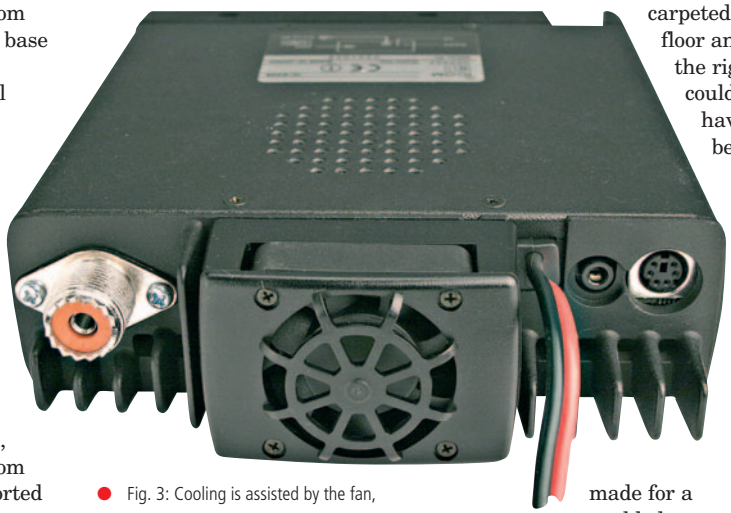


Fig. 3: Cooling is assisted by the fan, mounted between the single antenna socket and the 13.8V d.c., data and audio connections (see text).

Marine & Air

I then decided to see how the receiver side faired on the air and marine bands. On the bands I was impressed with the quality of the a.m. reception.

I listened to the local airfield at Bournemouth International Airport (Hurn) and could hear the low power departure information continuous loop transmission with no trouble at all. **Note:** This service always serves as quite a good indicator of a rig's ability on air band. The Icom IC-E208 compared very favourably with a dedicated air band receiver in my shack.

The Icom IC-E208 also compared favourably with other receivers on the marine band. This is another hobby of mine as we live so close to the Channel and the port of Poole.

In The Car

The final stage was to see how easy it was to install and use in the car. My wife, **Diane M3HJN**, volunteered to help with this stage, she offered to chauffeur me while I tried to get some mobile contacts.

It didn't take long to fit the rig in our Nissan Micra and I used the detachable head to full advantage. I installed the main rig under the driver's seat and the head sat on the dash just below the ashtray.

I'd brought out the power lead to pop it into the cigar lighter socket. I used Velcro to secure the main body of the rig to the carpeted floor and the rig could have been made for a moulded recess under the seat! Incidentally, the detachable head unit is not supplied with any kind of bracket, so the good old Velcro came into its own again.

The microphone plugs into the main unit, which was under the seat. Fortunately, the microphone happily reached from under the seat up into the passenger or driver's side with cable to spare.

The whole installation process took about half an hour. Despite this, I have to say the installation was not perfect but it worked well!

So off we went mobile, Diane at the wheel and myself on the microphone. Our first contact was with **Lou G1ULZ**. We first tied up on the local repeater, **GB3SC**. But knowing Lou does not live far from where we were I pressed the **MONI** button to check him on the input, and as he had a 'crashing' signal, we went simplex.

Lou gave the Icom IC-E208 a favourable report saying, "Sounds Okay Richard, no problem at all, Q5 copy". Lou was also kind enough to give me a contact on the 430MHz band; this too got a favourable report.

Steve G1YNY/M was next, only a few miles away but mobile-to-mobile was going to be a good test of the Icom IC-E208. Steve was using a Kenwood TMD-700E on full power, I was receiving him very well indeed. I started on 5W and only had to go to the full 55W when we started to get separated both by distance and topography.

Steve said, "Superb signal Richard, perfect signal", but did say that he thought it just a bit on the 'toppy' or 'high tone' side. (I have to say I prefer a signal with high tone when mobile, as it seems to cut through the ambient noise of driving more effectively than a mellow or base audio).

Les 2E1ICM from Bournemouth then called me. Again Les was not very far away but was operating a loft antenna and low power. We exchanged very favourable signal reports and Les said, "No problems with the audio, beautiful signal here".

The final test was a little later on when I had the opportunity to work Diane on 145.250MHz and asked her for a report. The Icom IC-E208 gave a very good account of itself, Diane said, "sounds good, very clear". Praise from Diane is praise indeed!

The Next Generation

In conclusion, I think that the Icom IC-E208 is part of the next generation mobile/base station rigs that we've seen different examples of recently; going back to simple-to-operate equipment with versatile functions and features.

Icom have definitely improved on excellence in my book. The Icom IC-E208 combines simplicity with performance. This transceiver was a joy to use; no frills, no bells, no whistles just a good solid rig with a sensible array of standard and advanced features. It represents excellent value for money in my book.

PW

radio basics

This month Rob Mannion G3XFD continues with his suggestions and ideas on equipping your workshop. This time Rob advises you on suitable test equipment and he assures everyone – you don't need to be rich to have a well equipped workshop.

In this month's Radio Basics G3XFD explains how anyone - even those with little experience - can equip their workshop with some excellent items of second-hand test equipment similar to those in the photograph. They were on sale at the Bournemouth Radio Society's (Kinson) Radio Rally on Sunday 14 March. Photograph courtesy of Tex G1TEX.

As far as I'm concerned the Radio Amateur can never have too much test equipment! In fact, you can justify 'having too much' (in the view of your family anyway) by allowing a slow, but steady trickle of test equipment to pass through your hands as it's bought, used and then passed on to other enthusiasts.

With the approach I'm going to recommend, I feel sure Radio Basics (RB) readers will benefit in many ways. By following my suggestions I hope you'll be encouraged to buy some of the excellent test equipment bargains, which are often (shamefully, as they're not always over-priced) left unsold at rallies and shows. Personally speaking, I think they are sometimes left unsold because many enthusiasts are either too embarrassed to ask questions such as 'What does it do"?, or 'What can I do with it"? And even if you're not sure what you're looking at - I'm sure there's someone around who can help and advise. That's one of the reasons why I encourage everyone who can possibly do so - to join a local club.

It was my first club - the old **Southampton RSGB Group** who first helped me understand what a Dip Meter was and what it could do. Back in the late 1950s the club bought a Heathkit Dip Meter kit to build (in front of an admiring general public) at the annual Southampton Show. The meter then became a useful club 'loan' instrument and I very soon learned how good it was, and then built my own. However, the moral here is – get a friend to help you learn about something new!

The Test Meter

My first test meter wasn't glamorous at all – it was a Second World War surplus type. Extremely basic, it was an RAF issue unit, having a large meter and a switch at the top to select the two voltage ranges. Two terminals were provided for the test leads, and an external battery provided the supply for resistance testing. It lasted me for many years before being given away to another beginner.

Nowadays digital multmeters are so cheap and reliable you may consider it's not worth buying a moving coil needle and scale (analogue scale) type. However, I thoroughly recommend that you do buy a good quality moving coil meter. If you do, it's possible to get the 'best of both worlds'; the digital meter will be extremely accurate indeed, and the moving coil analogue scale type can demonstrate to you 'dips and peaks' in a fashion not possible with a digital type. Both forms of instruments can give false impressions- and it's best to have access to either in my opinion.

The instrument shown in **Fig. 1**, is one of my favourites. It's a very old - but extremely reliable and rugged meter. It only cost me £1 and replaced one which was stolen from the back of my car (along with many other items on tools) when I stupidly left the rear door open after returning from a school radio club - while going to answer the telephone! Mandy – my Labrador, followed me indoors thinking it was tea time. The rest is history – and a load of treasured tools went.

If Mandy had stayed in the car, as she usually did until she knew I was unlikely to leave without her (although she was friendly to everyone few people dare to approach a car with a dog in it!) I wouldn't have then lost my original AVO 8, along with my first AVO Multiminor.

Incidentally, the latter meters often turn up at Silent Key sales, and although immediately recognisable as an AVO product (the black Bakelite casing is a real trademark) unusually for that manufacturer the casing was 'letterbox' rectangular. The Avominor also has a number of wander plug sockets for selection of the various test Ω/V/mA ranges, rather than a rotary switch. Ideal for beginners - and a nice compact and portable meter - if you ever see one for sale I recommend you buy it!

Note: All the older AVO test mesters are prone to losing the white composition in-fill material used to make the letters stand out (as can

Fig. 1: The AVO multimeter - very old nowadays perhaps - but incredibly rugged and with many superb features. This Model 8 Mark III cost £1 at the Leicester Amateur Radio Show, and the only problems it had (the loss of white lettering-infill in the engraved markings, as can be seen from the photograph) is easily overcome. The most expensive item G3XFD had to buy for the meter was a specialised battery which cost £2 (see text).

be seen in Fig. 1). Nowadays, the problem is easily remedied by using white typing correction fluid, or a soft white art pencil to refill the engraving marks. (If you've got your own favourite method - let me know!).

Signal Generators

A basic signal generator is really essential in the workshop and **Fig. 2** shows a favourite of mine, bought in 2003 at the Junction 28 QRP Rally at South Normanton in Derbyshire. Although possibly up to 60 years old - this instrument is a delight to use and has an attractive, practical, easy-to-read analogue scale

A real bargain at £15, the generator does drift of course and only covers from 100kHz to 120MHz - but that's ideal for the average constructor. Especially if you don't already have one in your workshop! So, please don't pass the old timers by - even if it requires help to work again, you'll learn a lot by getting it going!

Fig. 2: A radio frequency signal generator is often considered as one of the most desirable items of basic test equipment required by radio enthusiasts. Although models incorporating digital frequency read-outs can cost as much as £500 on the second-hand market - G3XFD suggests there is no reason why a simple, older but still reliable signal generator cannot be used. When you can afford to upgrade your test equipment you can pass it on to friends – and the funds raised can go towards your next purchase. This old (but reliable) Tripolet Inc. American made signal generator dates from the 1940/early 1950s requires a 240 to 110V step-down transformer. It cost Rob £15 and covers 100kHz to 120MHz (see text).

The Universal Bridge

The 'universal' bridge, **Fig. 3** is – in my opinion one of the most helpful instruments a keen constructor or electronics enthusiast can have in their workshop. I've already 'waxed lyrical' on this subject when I discussed the design and construction of the RB Bridge in *PW* Jan and Feb 2002. I strongly reccommend you read the articles, and if you don't want to build one yourself…look out for a secondhand bridge, as in Fig. 3. With this instrument you'll be able to accurately identify unkown resitance, capacitance and (**extremely useful indeed**) inductance values.

A recent purchase, the Wayne Kerr Universal Bridge, cost me £14 at a rally. Unusually (they're often missing) it came complete with the low range adapter (low impedance) head, enabling very low capacitance, resistance and inductance measurements to be carried out.

No instruction manual was provided, but a request to readers for help soon brought a good quality photocopy my way! (*PW* readers are so helpful!). The Wayne Kerr website provided an address later - and within six months I had the full manual, complete with the red 'Classified Secret' stamp marked on the cover!

Next month I plan to encourage you to consider buying an oscilloscope. I'll also talk a little more about using your test equipment to advantage, and how you can read about your new treasures in various specialised books. In the meantime – good hunting!

PW

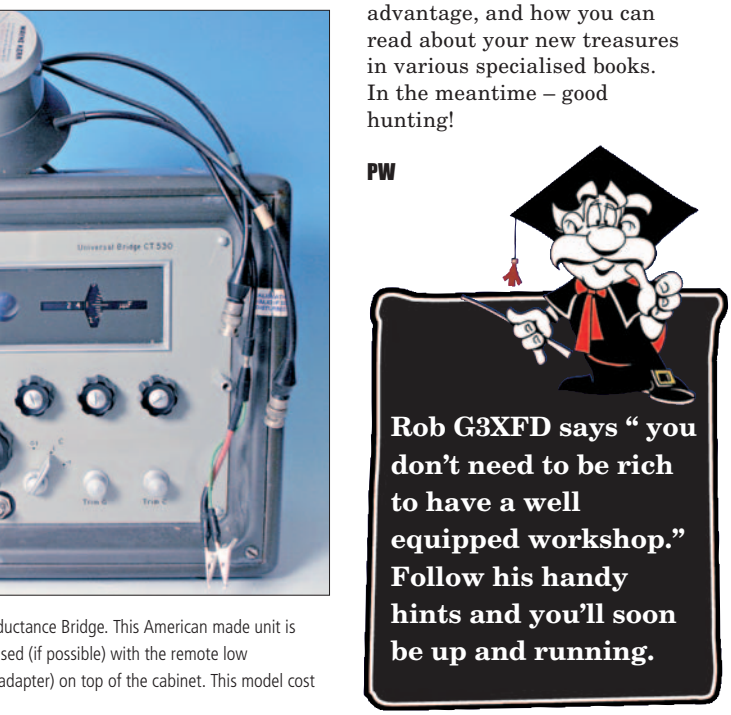
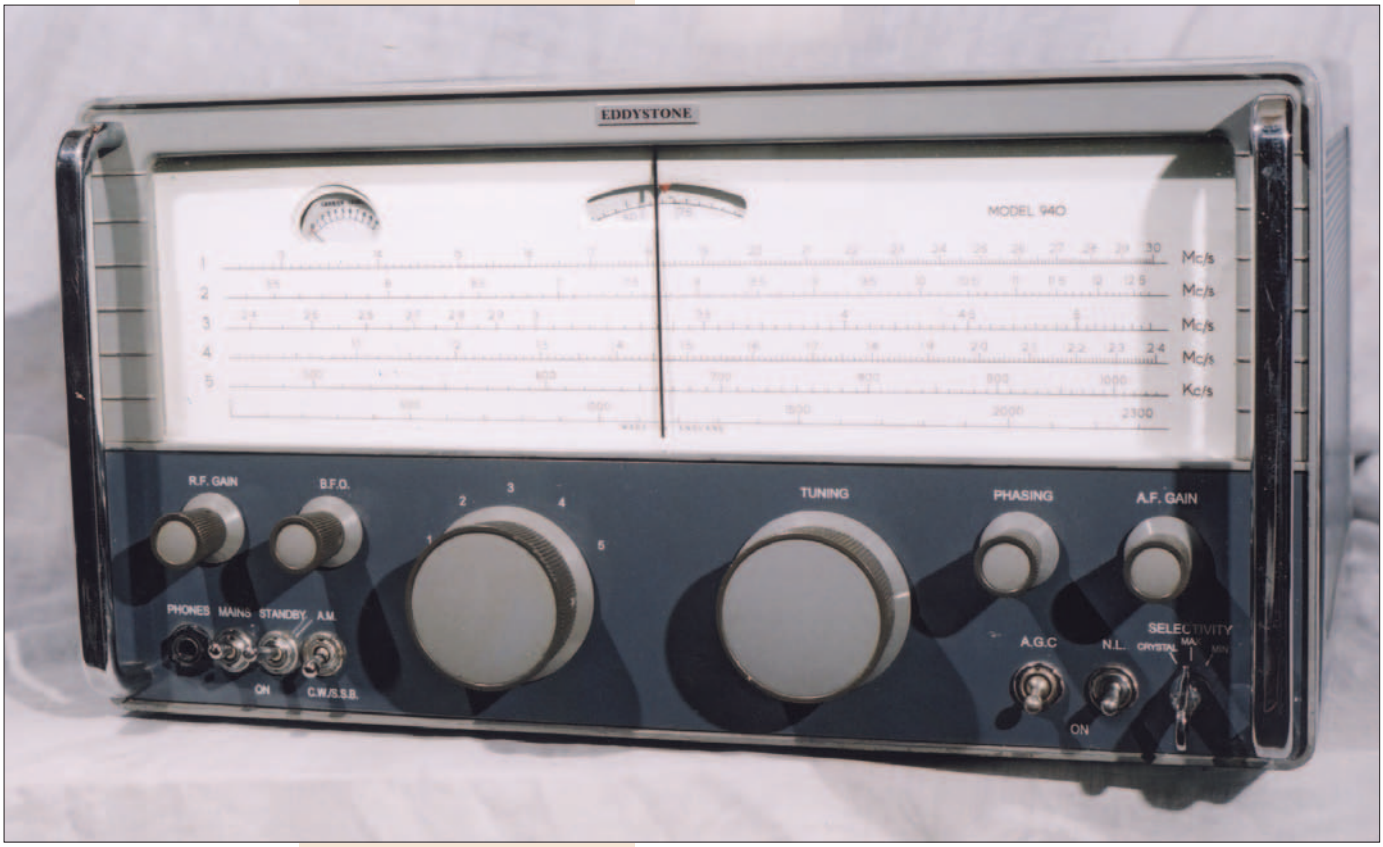


Fig. 3: A Wayne Kerr Universal Capacitance/Inductance Bridge. This American made unit is extremely useful, and should always be purchased (if possible) with the remote low capacitance/inductance head (low impedance adapter) on top of the cabinet. This model cost G3XFD £14 at a QRP rally (see text).



The Eddystone 940, showing the large easy-to-read tuning scale (see text).

Ben Nock G4BXD - whose writing is firmly associated with the 'It's A Classic' series, looks at the Eddystone 940 communications receiver. Ben reminds us it was "The last of the line....nearly"!

It's A Classic!

The Eddystone Communications

The Eddystone 940 communications receiver was considered to be the last of the line....until recently that is! It was the last valved set made by Eddystone, being produced from 1962 until 1970. That was with the exception of the 830 which, it has recently been discovered, was produced until 1973.

As with all Eddystone receivers, the 940's construction is solid and robust, see heading photograph. It has elegant styling in its C style case, together with a huge easy-to-read tuning scale and well laid out controls.

The Eddystone 940 is a standard single-conversion superhet, tuning 480kHz to 30MHz in five ranges with a standard intermediate frequency (i.f.) of 450kHz. It has a Cascode radio frequency (r.f.) amplifier, a further r.f. stage and two i.f. stages.

The set employs 13 valves in total, including the rectifier and voltage stabiliser valves. It also offers a form of S-meter, a noise limiter and a crystal filter.

The r.f. amplifier stage uses an ECC189 vari-mu (variable gain) double triode in series cascode configuration. This helps the receiver to maintain an excellent signal-to-noise characteristic through the entire tuning range. The input to this stage is fully tuned with facilities for using

balanced or unbalanced antenna feeds. Careful consideration to the mechanical layout and structural make-up of the stage is employed to ensure stable operation across the tuning range.

The second r.f. stage uses a 6BA6 vari-mu high gain pentode once again with fully tuned circuits. Correct operating bias for these stages is derived from a dropper combination and is controlled both by a manual gain control and automatic gain control (a.g.c.) derived from the detector stage.

Two antenna inputs, A1 and A2, and a 'ground' (earth) terminal are provided on the rear apron of the set. Balanced antennas are connected to the two terminals while an unbalanced feed - such as coaxial types - are connected to terminal A1 and ground, the second antenna terminal is also grounded.

The local oscillator, a 6C4 triode, operates on the high side of the received signal, that is (signal frequency +450kHz) and is powered from a stabilised voltage source. A measure of temperature compensation is achieved using suitable capacitors within the tuned circuits of this stage.

The local oscillator and r.f. stages feed a 6AJ8 triode

940 Receiver

heptode mixer circuit with the triode section being unused. The output from the mixer is passed through a double tuned i.f. transformer to the i.f. amplifier stages.

All the tuned circuits associated with the front-end of the receiver are housed in a sturdy diecast chassis offering excellent screening and stability. All the coils not in use are shorted out by the range switch to prevent unwanted absorption.

The i.f. amplifier section of the 940 employs two 6BA6 vari-mu pentodes. The first stage being connected to the manual gain control and both sections connected to the a.g.c. voltage.

The cathode of the first i.f. stage, along with those of the r.f. stage, are connected to a muting switch which, when operated, raises the bias on these valves and cuts off reception. Additional contacts on the switch are brought out on the rear wall of the set for connection to a transmitter or such.

Two selections of i.f. bandwidth are provided by switched windings on the i.f. transformers. However, in addition to the seven tuned circuits in the i.f. signal path, there's also a crystal filter which can be switched in and adjusted from the front panel via a phasing control.

The relative carrier strength meter is connected to the second i.f. stage screen supply and provides for some form of signal strength measurement. (The meter simply being calibrated 0 to 10).

Two detector stages are used in the Eddystone 940, a standard series diode circuit for amplitude modulation (a.m.) and a product detector for c.w. (continuous wave) or single sideband (s.s.b.).

A 6AL5 double diode serves as the a.m. detector and the a.g.c. detector. The recovered audio is passed to the mode switch via the only semiconductor in the set, a silicon diode, used as the noise limiter.

The product detector uses a 6BE6 operating as beat frequency oscillator (b.f.o.) and mixer stage. This stage is housed in a screened can with a front panel control providing the small shift in b.f.o. frequency needed between upper or lower sidebands. Incidentally, this stage is fed from the stabilised voltage source.

The audio amplification stages employ a 12AU7 double triode as an audio pre-amplifier feeding the second triode operating as a phase splitter. This stage then feeds two 6AM5 pentode valves in a push-pull output stage which provides for an excellent quality of reproduction.

The output transformer has two windings for the standard Eddystone 2.5Ω speaker connection and an additional 600Ω output. The front panel headphone jack is capacity coupled, in a very simple arrangement, to the anode of one of the output valves.

Two spring-loaded terminals at the rear allow easy connection of the loudspeaker, Eddystone types 906 and 935 being the recommended models. Connection to the 600Ω winding involved removal of the case and connection of a suitable lead to the terminals on the transformer (a suitable hole being provided in the rear wall of the sets chassis). Provision is available for injecting audio from an external source into the output stages of the set via contacts on the rear.

The power supply for the 940 is of conventional design. A multi-tapped transformer, with an input 110 or 200/240V a.c. primary. The rectifier uses a 5Z5G or GZ34 diode with a separate feed from the h.t. being stabilised using a VR150/30 type.

Manufacturer's Published Specifications

Frequency coverage	
Range 1:	12.7 to 30MHz
Range 2:	5.4 to 12.7MHz
Range 3:	2.4 to 5.4MHz
Range 4:	1.03 to 2.4MHz
Range 5:	480kHz to 1.30MHz
Selectivity (i.f.):	50kHz centre frequency, minimum 4kHz, maximum 10kHz, Crystal 400Hz (all at -6dB).
Image rejection:	1MHz -90dB, 8MHz 75dB, 20MHz -40dB
Sensitivity:	3µV for a 15dB sig/noise ratio, 50mW a.f. output.
Audio:	3.5W into 2.5Ω, distortion not greater than 5% at 1W into 2.5Ω.

Eddystone Ease

As with all Eddystone sets, I felt immediately at ease with the receiver, tuning is a joy. All the controls can be adjusted smoothly. There's no fiddling for minute switches as on modern sets, and the listener can sit back and let the tonal quality wash over them!

Despite my appreciation of the 940, there are the odd points to note with the set. Firstly, there's no provision for a crystal calibrator. Even if there was, there is no means of adjusting the calibration externally, neither electrically via a trimmer say or mechanically via a cam or such.

Secondly, the S-meter could have had a calibrated scale. And thirdly, the noise limiter (certainly while I've been using the set) seems ineffectual.

The tuning rate is very good (99 turns of the main tuning knob are needed to cover from end-to-end of the dial). However, as the range covered in each band is non-linear an actual figure of frequency per revolution is not possible. Suffice it to say, it's still a very good tuning rate.

On the subject of range coverage, it's a shame that such an imposing set as the 940 has a non-linear scale. To illustrate the problem, on the highest range the scale width for 1MHz of coverage at the low end, provides over 3.5MHz of coverage at the high end.

The Model 730 for instance, while still provided with a non-linear scale, does have a better tracking record. Operating the receiver from my shack - using a 35 metre long wire with various antenna tuning units - the 940 proved to be a capable receiver.

I wouldn't go as far as to say the 940 is an excellent set, there is warm-up drift and it even continues to drift after that. The sensitivity is only quoted as 3µV when new, so after 30 years wear on the components, leaking capacitors and resistors going 'high' (high resistance), you can hardly expect the quoted 3µV .

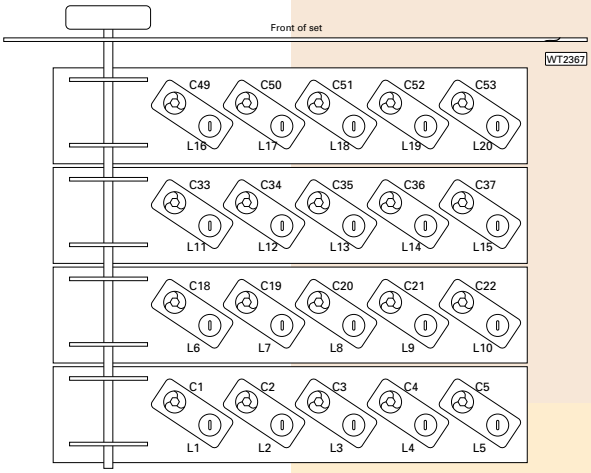
True, the first station I heard on 14MHz was a VK5, then most of Europe and later signals from the USA were received. So the set does receive, how well it receives is another matter!

I found the crystal filter ideal for use on c.w. signals but the audio output when switched to the product detector was lower than I would have expected. It may well be of course that the set is not up to specification and that a good alignment would work wonders, (I've still to

Range	Frequency	First RF	Second RF	Mixer
1	27.0MHz	C1	C18	C33
	13.5MHz	L1	L6	L11
2	11.5MHz	C2	C18	C34
	5.8MHz	L2	L7	L12
3	4.8MHz	C3	C19	C35
	2.5MHz	L3	L8	L13
4	2.2MHz	C4	C20	C36
	1.1MHz	L4	L9	L14
5	950kHz	C5	C21	C37
	500kHz	L5	L10	L15

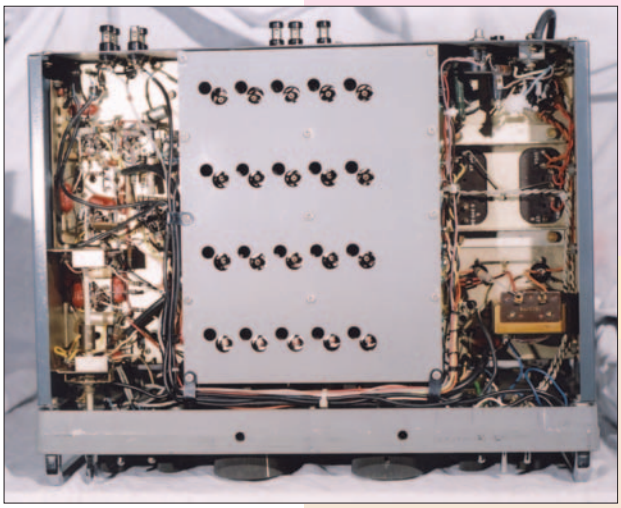
Range	C (freq)	Trim	L (freq)	Core
1	27.0MHz	C49	13.5MHz	L16
2	11.5MHz	C50	5.8MHz	L17
3	4.8MHz	C51	2.5MHz	L18
4	2.2MHz	C52	1.1MHz	L19
5	950kHz	C53	500kHz	L20

● Figs. 1, 2: The r.f., mixer and oscillator frequencies, together with trimmers and coils (see text).



● Fig. 3: Lay-out of coils, trimmers with associated reference figures. For the L and C references please see Figs 1 & 2 (see text also).

● Underside view of the main chassis showing (donimant, centre) the coil pack and alignment adjustment access holes (see text).



undertake that procedure).

Alignment should be quite straightforward to anyone with some previous experience. If you do not have experience I suggest you ask someone who has. I have included the r.f., mixer and oscillator alignment frequencies and associated trimmer and coils along with their location in the r.f. unit **Fig. 1**, **Fig. 2** and **Fig. 3**.

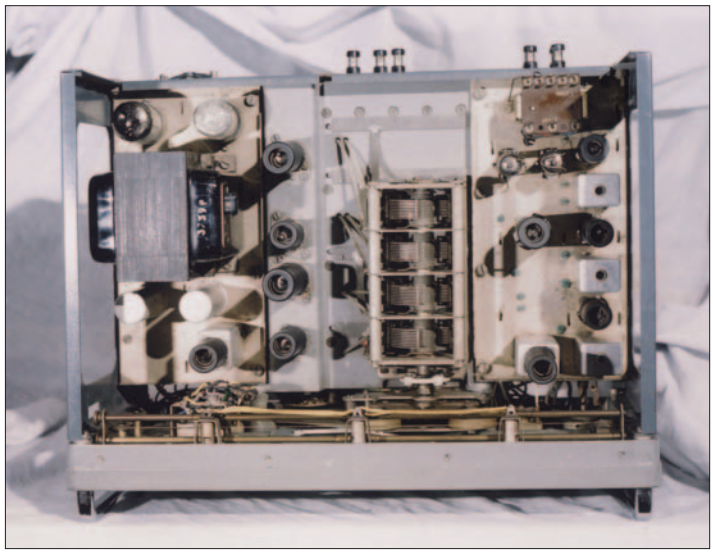
The alignment of the i.f. stages should be done at 450kHz by first disabling the local oscillator (achieved by shorting out the section of the tuning capacitor closest to the front panel). Inject the i.f. signal at the mixer capacitor, which is the next one in the ganged unit, adjusting the level as you peak the cores of the various transformers.

All the cores are adjusted to their outer peak position except T1 which is in the front right corner of the set. This transformer has its bottom core set to the inner peak.

components as already existed in stores! It went on the market at £106 and was very popular world-wide among well-heeled s.w.l.s as well as some 'economy' professionals.

One item which should be mentioned is that C62 (across the l.o. gang) is the main temperature compensator (negative temperature compensation ceramic tubular 5pF 350V). This has been found to be the cause of excessive drift after 30/40 years. It becomes too negative and at the h.f. end of each band this drift is very noticeable, although not really so at the l.f. end. Difficult to get a replacement? I don't know who has them any more.

The noise limiter is only suitable for impulse noise (i.e. car ignition, which was still a problem in most of Eddystone's market in the 1960s). Emphasise that the second aerial terminal ***must be strapped to the earth terminal*** *if the set is used with an end-fed type of aerial, otherwise the primary coupling circuit is o/c. The 99-turn knob gives a logging-scale of 32ft. The 730/4, with which you made a comparison, and was just about being phased out when the 940 came along, cost £230 by comparison with £106.*



● Internal photograph of the Eddystone 940, chassis top view. The complex tuning mechansim is at the bottom, and the power supply is to the left. The four gang main tuning capcitor is shown in the centre (see text).

Eddystone User Group

My thanks go to **Graeme Wormald G3GGL**, the Editor of the Eddystone User Group Magazine for the following comments on the Eddystone 940.

Here's a little more background on the '940: The set was designed in a very short time in 1961-2 (by ***Bill Cooke GW0ION****, then Chief Engineer) to fill a market gap in the range between the 840C universal a.c./d.c. 7-valve model at £58 and the 830 super-duper 15 valve double-superhet series at £275. It was made to use as many*

So, there it is - the Eddystone 940 is a very nice receiver, its capable of some sterling service for the listener and operator alike. The large clear dial and clean lines make it a set that could even sit in a living room without too many complaints from the family!

PW

A Three Digit Counter
Just Right For The PW Dipper!

Tim Walford G3PCJ presents the promised three digit frequency counter to accompany the 'Dipper With A Difference' project published in the March issue.

This counter project has been designed mechanically to fit immediately below the Dipper, which was described in the March 2004 *PW*. In an electrical sense, it has been designed to show either the frequency as XY.Z MHz, or to indicate only the three kHz numbers of the actual input frequency.

The latter choice of read-out makes it suitable for a tuning read-out on direct conversion receivers. Furthermore, it can also correctly show the kHz figures for a superhet project, provided the intermediate frequency (i.f.) is a whole number of MHz!

The design uses direct drive light emitting diodes (l.e.d.s) and discrete c.m.o.s. logic to avoid the two common problems associated with low cost counters - interference from the counter circuits and a lack of 'understandability', which leads directly to difficulty in commissioning and repair!

Note: A full kit is available for this counter, as well as for the Dipper - see information panel at the end of article for details.

Principle Of Operation

Let's now take a look at the principle of operation. The block diagram is shown in **Fig. 1**, with the full circuit in **Fig. 2** and **Fig. 3**.

A 4.096MHz crystal oscillator, IC2, provides the timing reference with its fundamental and all harmonics outside any Amateur band. This is divided down internally to produce the main reference at 1kHz so that a count duration of half of its period (0.5mS) will produce a least significant display digit showing the 100s of kHz when the input frequency is divided by 50.

With three main counters and displays, the readout will then be **XY.Z MHz**. The input signal is then amplified and squared up in the digital inverters IC3B and C; these normally feed a divide by 10 counter in IC4B and then a divide-by-five pre-scaler in IC4A. The maximum input frequency is about 50MHz.

The divide-by-five pre-scaler is allowed to operate for the 0.5mS gate open duration by the control logic IC3A, D and E, with the output feeding the least significant main counter stage IC5. The main counters (IC5, 6, 7) are fairly complex chips, which count up (or down for subtractive superhet rigs!) with carry and borrow signals to adjacent stages, store the result and decode it ready for driving the common cathode l.e.d. displays.

Three Counter Stages

There are three main counter stages, each associated with a 0.3in wide x 0.5in high 7-segment l.e.d. The latter are mounted on the unit's printed circuit board (p.c.b.) when used with the Dipper, as in **Fig. 4**. The control logic also provides the other signals for storing the count value and resetting of the main counters.

When the counter is to show the kHz only figures of the incoming signal, a longer counting duration is needed. If the main reference is instead divided down to 100Hz with the input signal only divided-by-five, then the least significant display digit will show the units of kHz. This alternative scheme is achieved by swapping the divide-by-ten stage IC4b, from the input signal path into the reference path as shown by the dotted lines in the block diagram.

Unfortunately, it's not possible to make the change with a multi-pole switch. This is due to the unwanted stray capacitance that would be introduced leading to a lowering of the upper frequency limit. So, you have to make your mind up beforehand and hard wire it with short links on the p.c.b.

The input signal path still has a divide-by-five pre-scaler before the slower main counters. So, the maximum input frequency is still roughly 50MHz.

When used with the Dipper, the unit can run off the timer supply so

The frequency counter used in conjunction with the PW Dipper (inset), although it has many other uses (see text). Full kits are available for both projects.

CONTINUED ON PAGE 34

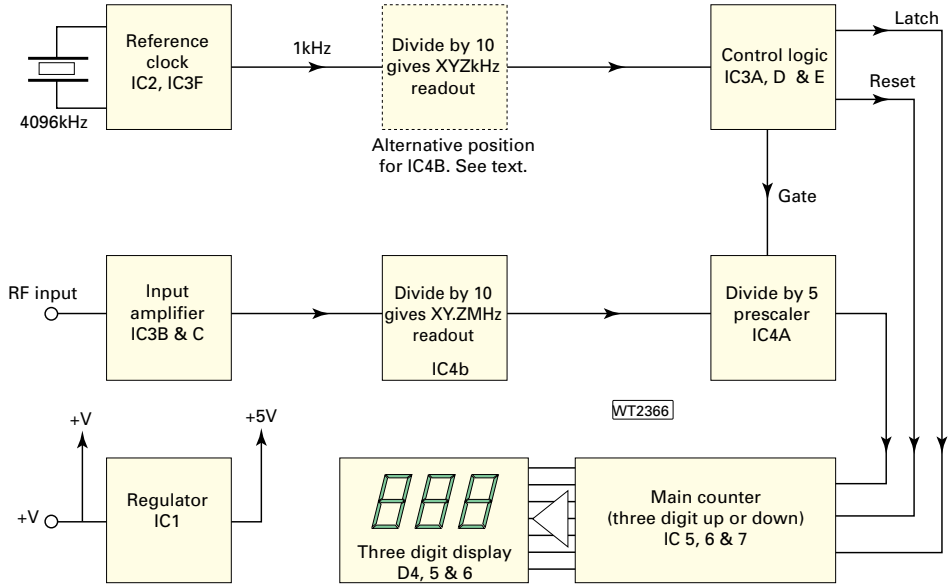


Fig. 1: Block diagram of the frequency counter project (see text).

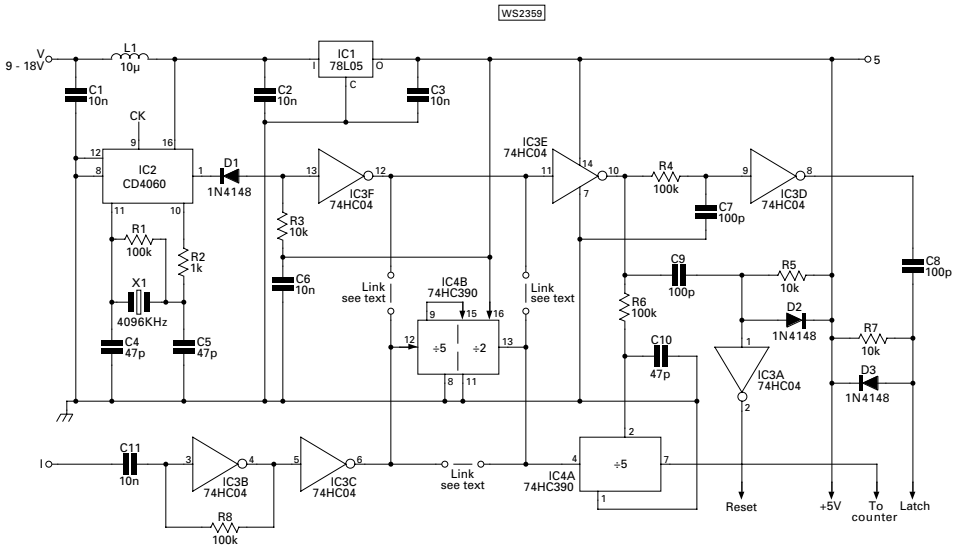


Fig. 2: The full circuit of the frequency counter (see text) control and input shaping.

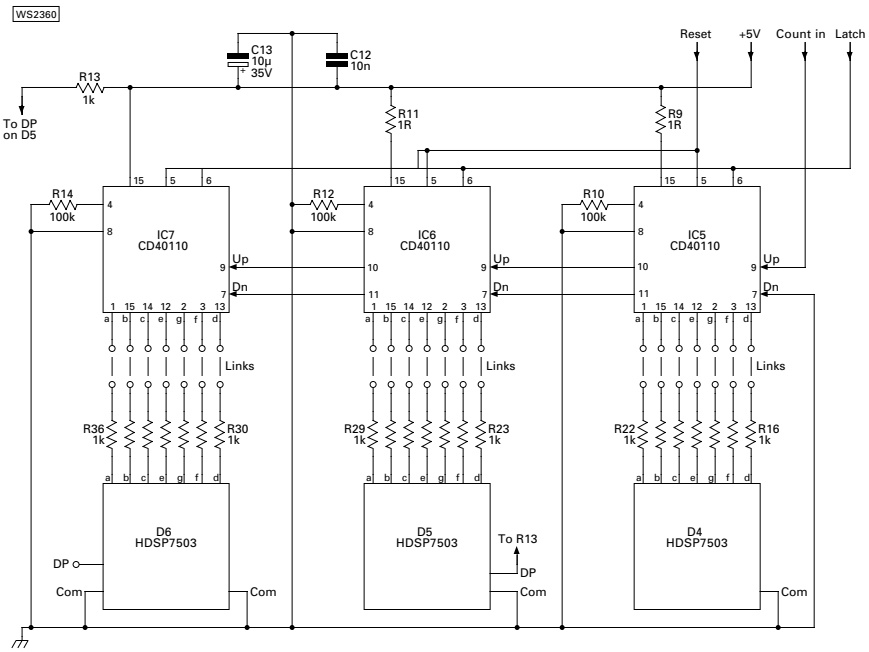


Fig. 3: The circuit of the counter/display section of the project.

that the battery is not flat next time you need it! But remember - the higher consumption does shorten battery life appreciably and you might prefer to operate both units from a bench supply.

Building The Counter

Now it's time to consider what's involved in building the project starting with the counter's p.c.b. This is laid out with two main sections; the left-hand part (from on top) with its six integrated circuits is 80 x 50mm and the display section (40 x 50mm) which includes the l.e.d. segment resistors. They can be left together, **Fig. 5**, or separated if the displays are to be mounted on a front panel.

There so many connections (about 22) linking the display resistors to their driving chips, that it's not possible to connect them by copper tracks and also keep the displays relatively close together for ease of viewing. There are no restrictions on these wires since they carry only d.c. - they only change when the frequency is changed – unlike multiplexed l.e.d. designs!

If the displays are to be front panel mounted, the easiest arrangement is to attach the many segment resistors directly to the individual display pins. You can then route the bundle of wires by any convenient path to the main logic p.c.b.

The counter input signal should be kept short to minimise stray capacitance. Apart from this consideration there are no mounting restrictions and no access is needed for adjustment. (The tolerance of the reference frequency, without any trimming, is more than adequate for only a three digit display.)

Assembly & Testing

Electrical assembly and testing is best done in stages. I suggest that the constructor starts with the supply aspects, which include good filtering to prevent any digital 'noise' getting back into any associated receiver.

The counter can be powered by a 9 to 18V supply. The reference oscillator should be assembled first and runs off the main incoming supply. All other sections use the internally generated 5V supply. Final voltage and continuity checks prior to use, can be done with a multimeter.

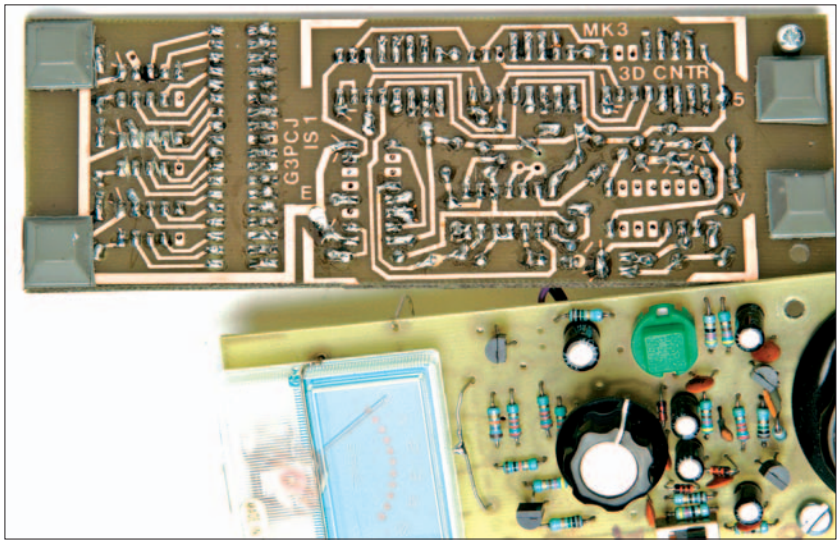


Fig. 4: The counter's printed circuit board (see text).

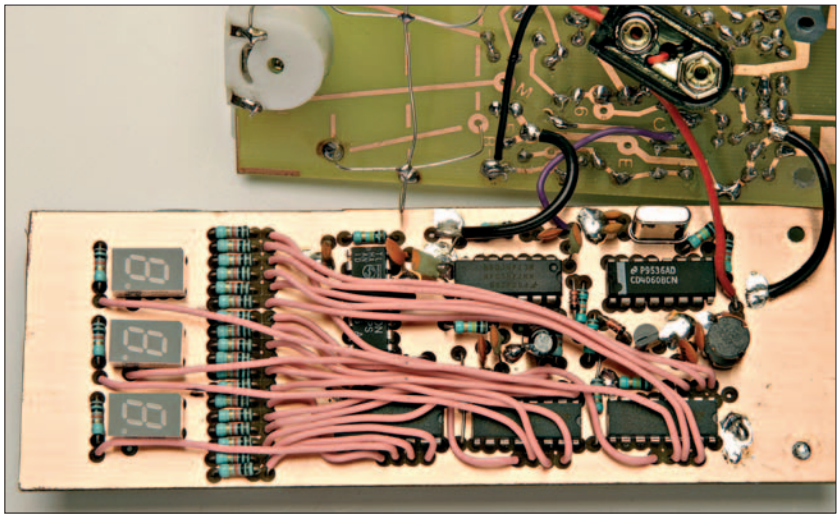


Fig. 5: The counter p.c.b. is laid out with two main sections; the left-hand part (from on top) with its six integrated circuits is 80 x 50mm and the display section (40 x 50mm) which includes the l.e.d. segment resistors (see text).

Obtaining Your Counter Kit

A complete kit for the three digit counter is available from Walford Electronics. The kit includes the 50 x 160mm p.c.b., three 0.3in wide displays, and all parts to build it as shown in **Figs. 4** and **5**. The counter kit price is £35. It can be directly attached to the Dipper, which also uses a 50 x 160mm p.c.b. (this kit costs £44). If ordered together, the price is discounted to £74. Post and packing is £2. Please send your orders with a cheque direct to; **Walford Electronics, Upton Bridge Farm, Long Sutton, Langport, Somerset TA10 9NJ**. Further information is available on their website at **www.users.globalnet.co.uk/~walfor**

The next step is to build the input section and control logic; these are tested with the help of the reference clock acting as a known input. The input sensitivity is about 50mV RMS in mid range.

The input amplifier is a pair of digital gates biased into their linear region by a feedback resistor and should be driven from a low impedance source to prevent oscillation. (Random readings without any input are usually due to these gates oscillating!).

Having got the control logic working, you can now add the first stage of the main counters, the associated l.e.d. display, segment resistors and wiring - see Fig. 5. Take care since there are many holes and the pattern is not the same for each display! See if it shows the correct number for the known input frequency!

If all looks sensible, then it's time to fit the other two main counter stages, l.e.d.s and resistors/wires. Check the result again - if it seems wrong, then a signal generator (whose frequency can be increased slowly) will show up any erroneous segment wiring as an irregular counting sequence or partially correct looking numbers. Unintentional shorts often show up as consecutive numbers having the same erroneous illuminated segments!

The Display

The standard arrangement produces a display of **XY.Z MHz**, which suits the PW Dipper very well for most h.f. work. Incidentally, this display format is also suitable for low cost signal generators without a digital read-out.

When extra resolution is required, IC4b is moved to the reference signal path by cutting three tracks and substituting four short wire links. When this has been done, any input signal above 999kHz will have its MHz digits 'overflowed' to the left (out of sight) leaving the display showing the kHz part of its frequency correctly. This is ideal for a low cost frequency read-out on direct conversion and single band superhet rigs.

Note: You could add extra display digits permanently wired to show the missing MHz digits if you considered this necessary.

Your receiver's local oscillator should drive the counter input, through a buffer circuit for isolation and to obtain a low source impedance. For a simple superhet, provided the i.f. is a whole number of MHz, the kHz figures will be correct and the erroneous MHz figures will be out of sight!

Note: Strictly speaking, there is a small error because of the normal 1.5kHz offset of the carrier oscillator from the central frequency of the i.f. filter.

Better Served

A multi-band superhet is better served by a five digit counter that takes in local oscillator (l.o.) and carrier insertion oscillator (c.i.o.) signals. For non-integer MHz i.f. superhet receivers, the easiest approach is to make the receiver itself produce a little r.f. and count the actual r.f. output frequency.

The counter can also work with subtractive superhet receivers, where the r.f. is lower than the l.o. frequency, by making the main counters stages count down instead of up. This change is done by cutting a couple of tracks and swapping them over with short wire links.

Adding a counter to your rig, or the Dipper, certainly makes it look much more attractive! I hope you enjoy building the project and the useful facility it provides.

PW

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Count on us!

The Vectis Run Part 5

By Rupert Templeman

It's January 1939. Travelling Wireless Technician-Salesman Alan Edwards has found his monthly visit to the Isle of Wight, 'The Vectis Run', to be extremely dangerous indeed - and the plot thickens!

Deeply unconscious, Alan Edwards didn't hear the rumble of the approaching four carriage Ryde to Ventnor train. It was slowing to a crawl, observing a temporary speed limit before moving off again into the tunnel. The driver and fireman were peering into the gloom ahead, rather than down at the shadowy trackside.

Just as the locomotive's wheels were approaching Alan's head – still on the running rail – his body was jerked back from danger. With a hiss of steam and an eerie glow from its firebox, the engine rumbled slowly by, missing them by inches. The man in the long trench-coat, who had rescued Alan from certain death then watched the winking red tail light on the last coach disappear in the tunnel's darkness. Then he beckoned to another man, who had just half-slid, half fallen down the steep sided cutting.

Gesturing towards the tunnel signal and its telephone, the second man made his way towards it and briefly spoke into the handset. Moments later he crossed the track to assist his trench-coated colleague half drag the comatose Alan up the cutting's steep sides. Pushing their way through thick undergrowth, the men were soon in a field.

There, on the north west slope of St. Boniface Down, a non-descript Hillman saloon car was waiting with a driver. After carefully manoeuvring Alan into the car, the vehicle then slowly bumped its way over the field towards a nearby lane. As it did so, the last thin rays of the setting afternoon sun were spearing over the distant Chillerton Down and the high ground of West Wight.

Unfamiliar Voices

The unfamiliar voices calling to Alan were demanding something. As he gradually regained consciousness, the voices became more insistent. He didn't want to wake up, felt very ill and just wanted to sleep. Then however, a much more familiar voice demanded instant attention.

"Wake up Alan, this is important - it's Mike – I'm here and you're safe", the familiar voice said.

Alan reluctantly, and very slowly, opened his eyes. He felt terrible, but the first thing he saw was a blurry faced Mike Coley, the ever-present *Woodbine* literally hanging from his lower lip. "That's Mike' he thought reassuringly, wanting to go back to sleep.

"Come on Alan," said one of the unfamiliar voices. "We've got you safe, the Doctor's here to treat your head wound"!

Turning his head slowly, Alan painfully raised himself from what seemed to be a hard, long leather-clad sofa, to look into the stranger's face. Strange though it was, the face was lean and friendly, with a military bearing, somewhat accentuated by the short bristly style moustache.

Mike spoke again; "You nearly ran this man over when you left the workshops Alan. He's got something to tell you, and believe me, you'll find it almost as unbelievable as I did"!

Still fuzzy-minded, Alan sat up - wondering just what his friend was trying to say with the convoluted use of belief and unbelief. "I'm just not up to this he thought" and blurted out aloud - "Leave me alone, I'm going back to sleep –I don't feel well"!

The sudden splash of water was freezing. It penetrated Alan's ears, eyes, mouth and trickled down his shirt-front. It also made him sit up straight - fully awake and unusually angry. "What the dickens….."? he said, looking fiercely towards Mike, who was standing next to the man holding a now empty water jug in one hand and a Doctor's stethoscope in the other.

"Sorry about that Alan" said the trench-coated figure sitting beside him. "But we need your full attention. You've just been rescued and my colleagues and I need your help on a matter of national importance"!

Trench-coat went on to explain that Mike Coley had also been brought to the secret location on the Island. This was because Alan would then realise he was safe, and so that they could be both briefed.

Alan, with his mind quickly returning to its normal quick-wittedness sat up and looked directly at Trench-coat. "Who are you Sir"?, he asked. "Why am I here?"

"You can call me Mr Jones"- Trench-coat said, "And my colleague you can call 'Prickles' at the moment". Turning as he spoke, they all looked over to the other military-type who was still extracting Gorse bush thorns from his hands, arms and face.

"Got these rescuing you old chap" he said with only a slight hint of amusement. You really did nearly cop it didn't you? If the Colonel……"

The shout of anger from Trench-coat drew attention to both Mike Coley and Alan that they'd almost learned something they shouldn't have done. However, having shouted to stop his colleague, 'Mr Jones' smiled again, sat down and looked directly at the friends who were now sitting together.

"I'm afraid Alan" continued Mr Jones, "that I owe you an apology, as it was me who put your life in danger. I should have

intervened before. Even though Lake was supposed to be watching over you".

"Lake"? The incredulous question was voiced from Mike and Alan at the same time. "Is he something to do with this? We thought the man was a retired idiot from the Army or Civil Service"!

Mr Jones laughed quietly, "Yes, he's one of ours. He was put there to watch over the situation with the engineers, televisors, special valves and wireless technology. Although he's not a scientist - he's good at evaluating the situation".

By now both jaws had dropped. Even the half-smoked *Woodbine* had fallen from Mike's lip onto the floor.

'Mr Jones' continued. "Although I can't tell you the whole story, you're involved so much now I must brief you as far as I can. Inadvertently you've both stepped into a secret of major importance, and foreign interest in a wireless technique, which could help our country during the next war. Yes, you may look surprised, but war's inevitable now and already our potential enemy is trying to probe our secrets".

"But what's it go to do with television, the Island, Mike and I, and the death of Pat Dunne"? Alan almost demanded. "And just who, or what are you 'Mr Jones'?

The last question clearly showed Jones that the two friends would have to be told more than he wanted to tell them.

Under Observation

'Mr Jones' started to explain and began by telling Alan he'd been under observation ever since he'd attended a television course at the Marconi factory in Chelmsford in 1937. It seemed as though his Island visits had also attracted attention. The Chelmsford factory was also where some of specialised wireless equipment for the Isle of Wight secret installation was being made.

Alan learned that 'Jones' and his colleagues had become increasingly concerned when his company had sent him to Philips' factory in Eindhoven. "The secret equipment we're trying to protect uses the same valves and many of the techniques used in television" he said, refusing to be drawn further.

Alan interrupted. "But what has this all got to do with Ventnor Tunnel and especially Pat Dunne? Why was he killed?

Looking grim as he replied Mr Jones said - "Pat Dunne was actually one our of men. He'd been in Military Intelligence during the Great War. Speaking German, he was very useful and working for the Post Office Telephones & Telegraphs before the war - he had much technical knowledge. He helped interrogate captured German Technical Officers. And we think it was one of these former prisoners who killed Pat, in an effort to ensure the safety of his own mission".

Jones continued; "Actually, the tunnel pays a part in this by actually being underneath the secret wireless installation. Although we're not sure how, we think the man we're after, actually heard of the mining work going on above the tunnel. That's why we spread the rumour of the ghosts, to encourage the men to think of the supernatural rather than the miners working above them".

"Because of the very tight security, the signalman on the afternoon shift until the last train was also one of our men. The telephone link was used by them, and Pat to check every day, that everything was secure.

Recently the Germans even sent one of their Zeppelin airships to fly over the English coast. We think the airship, which flew over the Island, Southampton, and over to the North Sea was looking out for special installations.

Shortly after that - the man you came across in the Dutch registered Citroen, re-appeared in the Philips factory. Although supposedly a television engineer, we think he's a highly skilled German Military Scientific type".

Startled, Alan interrupted. "Why" he said, "Do you think that"?

● There, not far from the tunnel, and under the north west side of St. Boniface Down, a non-descript Hillman car was waiting with a driver.

Face From The Past

'Jones' looked at Alan and Mike. A pained look spread across his thoughtful face. "The more I tell you, the more danger you're in. However, as I'm going to ask you to further risk your lives, you must be told".

"Pat Dunne did - unbeknown to anyone else – contact his colleague at the Ventnor end of the tunnel. His message although garbled was understood. It appeared that as he was about to use the telephone, and was heading towards it, when a train drew almost to a standstill. Looking up, he saw a face from the past - a former German Military Electrical and Telephone Engineer from the War.

"Pat didn't think he'd been seen, but as the train pulled away, the man had probably jumped from the other side of the non-corridor train, and hid until the last coach had entered the tunnel. While Pat was talking on the telephone his assailant struck and moved his body to where a train would hit him and left. However, Pat regained his senses just long enough before dying of his injuries, to start the message again – hence the 'Lager & Verdun' you know of".

Looking directly at Alan, 'Mr Jones' continued: "You nearly had the same treatment Alan. While at Pat Dunne's cottage you realised the significance of the tunnel telephone and the possible German connection didn't you"?

"Yes Alan replied – I wanted to call on the telephone and see who I ended up talking to. I was beginning to feel that some of the railway men involved were rather more than they seemed"!

'Jones' adopted an authoritative tone to his voice. "Your attacker thought the same, he almost killed you but was disturbed by the approaching train. But he didn't know we'd been alerted by our Mr Lake and were close behind you. We need your help, we've got to ask – are you both prepared to see this thing through to the end – whatever the risk? Although you'll operate alone…my department won't be far away and with luck we'll find out what our 'visitor' knows, and who sent him. Will you help"?

Without a moment's hesitation Alan and Mike together replied with a firm "Yes". Alan then continued alone: "Hang the consequences – our country's future could be at stake".

But in accepting 'Mr Jones' handshakes, Alan and Mike had no inkling of what was to come. Neither, unfortunately, did the British Secret Service.

To be continued....

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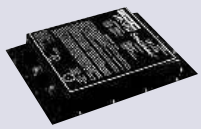

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A Transmitter-Receiver For The LF Bands

By Frank Rayer G3OGR

Advice On Building Classic Projects

This particular project proved to be extremely versatile for a young G3XFD. Indeed, it was so useful I actually built two versions - one for mobile use on 1.8MHz only and another for fixed station work and capable of operating on both 1.8 and 3.5MHz.

Neither of my projects used the original Denco coils, the reason for this being that I was never able to obtain what was required. Even in the 1970s some Denco coils were difficult to obtain. My mobile version used a home-brewed permeability tuning controlled v.f.o. and also used inductors I'd wound for 1.8MHz coverage using my dip meter.

All the main tuning inductors were home-brewed, except for the i.f. transformer. I arranged for the i.f. to be based on 1.6MHz as the Electroniques range of i.f. transformers were still available at that time. It was a simple matter to re-arrange the circuitry and tuning to produce the necessary 1.6MHz i.f. Selectivity was improved - along with a useful increase in signal gain - by providing positive feedback on V8, the i.f. amplifier. This can be easily achieved by providing a variable amount of capacitive feedback from output to input. 'Regeneration' or 'feedback', call it what you will, is then carefully controlled by adjusting a 30 to 75pF (for example) variable capacitor. However, my preferred method was to see a fixed amount of feedback capacitance between the input and output, and vary the stage gain. (This can be conveniently achieved by varying the screen voltage, by using a 100kΩ (wire wound) variable resistor in place of R25.

Generally speaking, this project is so easy to build that - even nowadays - it can be built from junk box components. My original main station version used a chassis and matching case. Nowadays, with the v.f.o. perhaps built into a die-cast aluminium box, the project could be built using p.c.b. material as the chassis.

My mobile version was originally powered by a surplus 230V 130m.a. h.t. rotary converter! Even on today's crowded bands, this project will provide the builder with a great deal of fun and provided you include a good quality low pass filter in the r.f. output (for any fixed station installation) you shouldn't have any troubles. I hope you enjoy your version - whatever valves, inductors or i.f. frequencies you choose to use!

Editor.

Rob Mannion G3XFD writes; "It's again my pleasure to present another of the 'Classic Projects' previously published in *PW*. The featured transmitter-receiver first appeared in 1970 and comes from the prolific author Frank Rayer G3OGR and proved to be extremely versatile indeed". (Please see the information panel for further advice).

The project as published in June/July/September 1970 issues of *PW;*

This project incorporates all the required circuitry for transmission and reception and with internal power pack and speaker, offers a neat 'one box' station for regular use, or for /A (alternative address) working. The equipment described runs the full permitted power (10W) on the 1.8MHz band and can easily be modified to cover 3.5MHz.

Anyone who has used a transmitter at this relatively low power level will have found that results are generally surprisingly good. Many receiver S-meters are calibrated at about 6dB per S-point, so if 150W input gives an S9 contact, 10W input will give about S7, which ought to be quite acceptable. But first, is the complete circuit and brief notes on the function of each stage will make its working clear.

The Circuit

The circuit, **Fig. 1**, is best explained by starting with the transmitter r.f. section. Here, V1 is a Vackar type v.f.o. tuned by VC1 and covering 1.8-2MHz. The voltage regulator VR provides 150V for V1 and the screen grid of the buffer V2. L2 is broadly resonant and V2 drives the power amplifier V3, the test point 'G' being provided to check grid current. The p.a. tank coil L3, with tuning and loading capacitors, allows V3 to be matched to most ordinary antennas.

Audio and modulator Section; The two section valve V4A/V4B is a high gain microphone amplifier giving full modulation from a crystal microphone. The valve V5 with the primary of transformer T1, provides anode and screen modulation of V3. When receiving V5 drives the loudspeaker.

The Receiver r.f. section; Here, V6 is a tuned r.f. amplifier, followed by the mixer V7. The valve V8 is the i.f. amplifier, a diode giving detection and a.g.c. bias for all stages. VR1 is the receiver r.f. gain and VR2 the audio gain control.

The power supply delivers approximately 120mA at 300V on 'transmit' and is reduced on receive. It's not absolutely necessary that the voltage is reduced when receiving, but I found this helpful in obtaining cooler running

over long periods as it avoided the heat of series dropping resistors.

Rotary Switching

The necessary change over for all the required circuits is achieved with a 8-pole 2-way rotary switch*(**see note below**). It's possible to change some circuits slightly so that fewer poles are needed, as described later. The functions of each pole are given below and this should be checked when wiring.

Switch Section 1; In the 'transmit' position T this applies h.t. to v.f.o. V1, and the buffer V2. In the 'receive' position R, h.t. is taken to r.f. mixer and i.f. stages, V6, V7 and V8.

Switch section 2 and 3; These contacts allow the same meter to be used to show p.a. anode current and to operate as a dip type tuning meter on reception. Section 2 supplies h.t. to either the p.a. anode or to the receiver. Section 3 takes the h.t. directly from the h.t. line, via S1, for reception, or from the modulator V5 for transmission. The main advantage of this method is that a 50mA meter can be used for both functions without any shunts having to be made up.

Switch Section 4; On transmit this switches the aerial to the p.a. tank circuit L3 and to the receiver aerial coil L4 on receive.

Switch Section 5; On transmit input to V5 is from the microphone amplifier V4B and from the receiver gain control VR2 on receive.

Switch Section 6; This connects the anode of V5 to the anode (via meter) and screen grid circuits of V3 to modulate the latter when transmitting.

Switch Section 7; This closes only on receive to bring in the speaker.

Switch Section 8; This opens during reception converting the power supply to choke input. This then reduces the h.t. voltage without resorting to dropping resistors.

Note: This switch is temporarily closed while receiving to put h.t. on the v.f.o. and buffer stages so that the v.f.o. can be 'netted' (tuned) to the operating frequency.

***Note**: It's quite convenient to use relay switching instead of rotary switches on this project. This is very convenient for c.w., one pole on the relay can provide a sidetone function and a 'delay' circuit for 'key up hang time' can be incorporated. **Editor**.*

● The prototype G3OGR 1.8/3.5MHz a.m. transmitter-receiver. This project is still viable says G3XFD and he suggests you'll find much of what you'll need in your junk box!

Alternative Arrangements

The switching, as shown in Fig. 1, was completely satisfactory. However, as the circuit lends itself to alternative arrangements you may choose to use items to hand, or to experiment. So, it's worth noting other ways in which change-over from transmit to receive can be arranged.

If a small matching transformer is used with the speaker, S7 is unnecessary since S6 can transfer to the matching transformer primary on receive. This dispenses with one switch pole.

The switch, S8, may be eliminated by using capacitor input in the usual way, a 4.7kΩ 5W resistor then being placed in series with the h.t. supply to V6, V7 and V8. By not switching the meter to indicate tuning on receive eliminates the need for S2 and S3. A 'tuning eye' operated from the a.g.c. line could be incorporated in the receive section. It is then possible to utilise a 4-pole switch only - S1, S4, S5 and S6 to perform all the necessary switching functions.

Chassis Details

Holes for the valve holders are readily made with a chassis punch, 5/8in dia. for the B7G holders and 3/4in for B9A holders.

Note: The original chassis illustration is provided in **Fig. 2**, for guidance purposes only. **Editor**.

The panel is bolted to the chassis flanges and also to side brackets bolted to the chassis. The two ball drives are fitted in holes aligned with the spindles of VC1 and VC6/7. The type of drive having a flange allows a Perspex cursor to be fitted with 8ba screws, or a stiff wire pointer can be soldered or screwed on. The scales***(see note)** are stout paper or thin card. After calibration a piece of Perspex 7.5 x 2.5in is bolted over the scale.

The variable capacitors VC6/VC7 tunes the mixer and oscillator circuits. The variable capacitor VC5 tunes the aerial circuit only, but space was left for a 3-gang capacitor to tune aerial, mixer and oscillator, with VC3 as an aerial trimmer, but eventually I found this was not necessary. The meter is immediately above VC1. Note: VC2 and VC3/VC4 were fixed to a flanged plate bolted to the chassis to avoid bolts in the panel. (If these capacitors have feet they can be fixed to the chassis instead).

The r.f. choke, C9 and C10 are supported on a tag strip, and a lead passes down through a hole close to pin 1 of V3. L3 is 65 turns of 22s.w.g. enamelled wire, layer wound on a 1in diameter Paxolin tube. The tube is bolted to a strip of Paxolin 1.75 x 0.5in fixed to the frame of VC2.

The loudspeaker can be bolted to a piece of 3-ply wood about 6 x 7in. This is spaced from the chassis side by a strip of wood. When the chassis is in its cabinet, the speaker locates behind rows of holes in the cabinet side.

***Note:** Small 180° clear plastic protractors - available from stationery suppliers - are ideal for use in this application.*

Editor.

Setting Up & Adjustment

Setting up and adjustments, starting with the v.f.o: The coil-can L1 in Fig. 2 also contains C1, C2, C3 and R1, forming a temperature compensated v.f.o. unit. This part of the circuit is completed by the leads to the numbered pins and VC1. For 1.8MHz use it is only necessary to adjust the core of L1 until VC1 gives 1.8-2MHz coverage, with a little to spare at the ends of the scale.

The regulator valve: This provides 150V for V1 and the screen grid of V2 with the power supply as given. If a 250V or similar supply is to be utilised and VR fails to strike when switching to transmit, the resistor R3 can be reduced to about 6.8kΩ or R5 to 2.2kΩ.

Buffer amplifier: The anode coil L2 of V2 is a medium wave type broadcast band coil, with primary removed. Due to the low parallel capacitance, this can be tuned to about 1.8MHz.

When first setting up the transmitter, you should connect a milliamp meter between test point G and chassis, with positive chassis. Set the v.f.o. to about 1.9MHz and adjust the core of L2 for maximum grid current. This should be about 3mA, falling off only slightly towards 1.8 and 2MHz. Note: R7 is included so that grid current can be measured without disconnecting R6.

The r.f. power amplifier: The supply is 300V so an anode current of 30mA on the panel meter represents an input of 9W. If the equipment is later used on

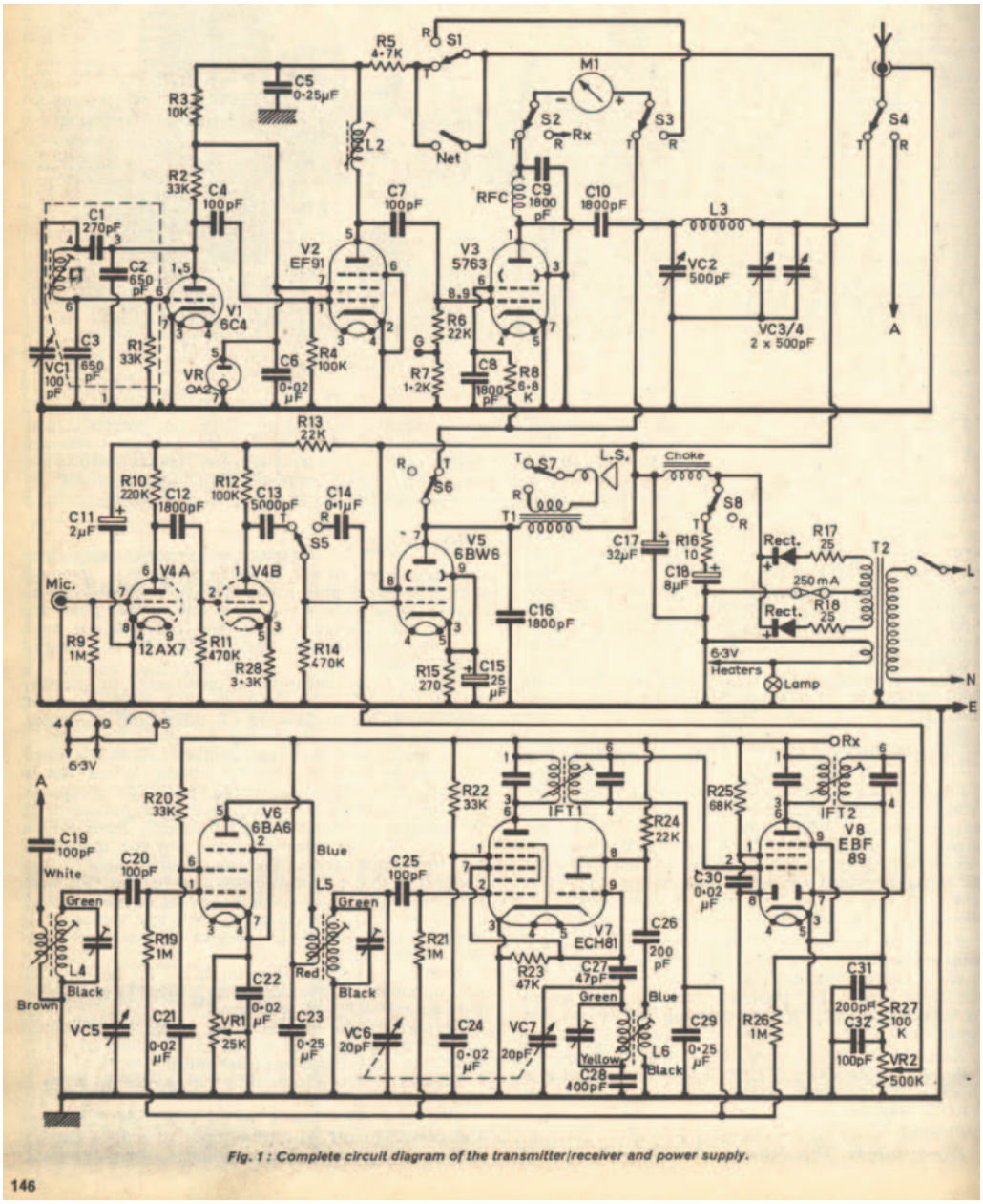

Fig. 1 : Complete circuit diagram of the transmitter/receiver and power supply.

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● Fig. 1 (above): Main circuit diagram of the G3OGR transmitter-receiver (see advice panel for further information including the provision of a low pass filter).

3.5MHz, the current can be 40mA or about 12W.

Connect a 15W household lamp to a coaxial plug and insert in the aerial socket or clip the lamp across VC3/4. To load the p.a. turn VC3/4 to maximum capacity, switch to transmit and tune VC2 until the meter shows a dip in anode current. Input will be low and is raised by decreasing VC3/4, meanwhile readjusting VC2 for minimum current. At 9-15W input (30-50mA the lamp should be quite bright.

Microphone amplifier: The external lead must be screened in the usual way and the connection from microphone socket to pin 7 of V4A runs against the chassis. Other leads should be clear of the heater connection X. Screened lead is used for connections to S5. Audio from the receiver was not taken to V4B because the extra stage of amplification was found unnecessary. The audio amplifier can be tested by temporarily shorting S5 and S7, the microphone and loudspeaker being well separated to avoid feedback.

Load up the transmitter into the lamp as described and tune in the signal with an independent receiver (r.f. gain of the latter should be at minimum and the aerial removed). Speech into the microphone should sound clean and clear in the receiver speaker.

The valve V5 operates at about maximum ratings on transmit, but screen grid and anode voltage fall to about 220V on receive, bias across R15 then dropping to about 10V.

The Receiver

Setting up the receiver; starting with the receiver r.f. stage. It is only necessary to adjust the core of L4 so that VC5 is about half closed when resonant at 1.9MHz. The variable resistor, VR1 is the r.f. gain control which is useful

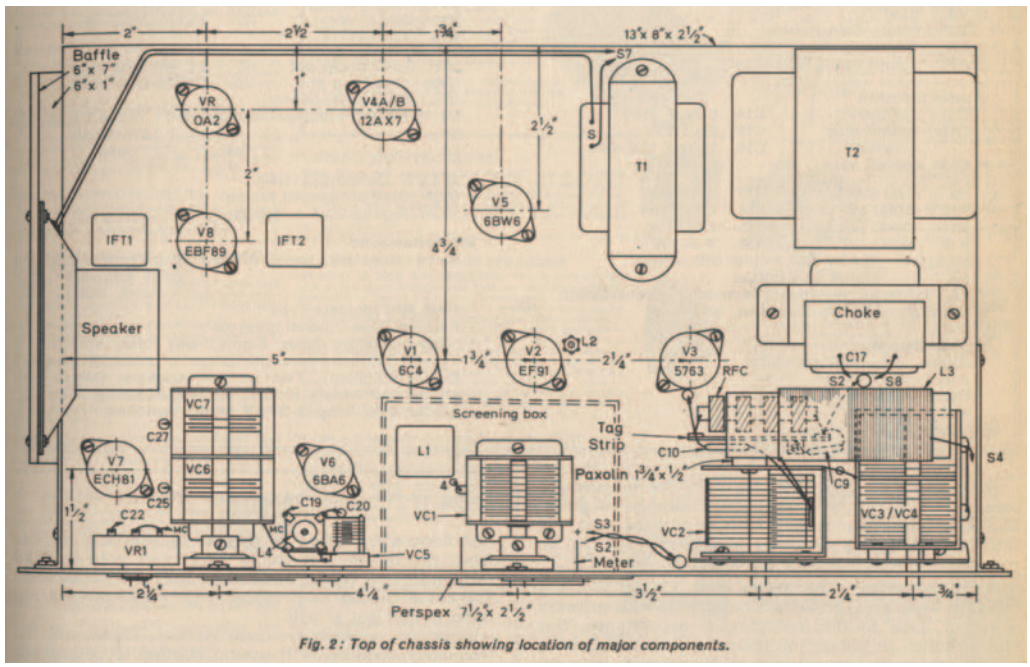


Fig. 2 : Top of chassis showing location of major components.

● Fig. 2 (below): Diagram from the original 1970 issue of *PW* showing the chassis lay-out chosen by G3OGR. This is included for guidance purposes only.

Shopping List

RF Section
L1, C1, C2, C3, R1 incorporated in VFO2 coil - Electroniques (no longer available, see text)

C4	100pF mica		
C5	0.25µF 350V		
C6	0.02µF 500V disc ceramic		
C7	100pF mica		
C8	1800pF 1kV disc ceramic		
C9	1800pF 1kV disc ceramic		
C10	1800pF 1kV disc ceramic		
VC1	100pF air spaced variable		
VC2	500pF air space variable		
VC3/4	2 x 500pF or similar ganged capacitor		
R2	33kΩ 1W	R6	22kΩ 1W
R3	10kΩ 3W	R7	1.2kΩ 0.5W
R4	100kΩ 0.5W	R8	6.8kΩ 2W
R5	4.7kΩ 2W		
L2	Denco 'Blue' Range 2		
L3	65 turns 22s.w.g. enam. on 1in former		
V1§	6C4 B7G holder with shield		
V2	EF91 B7G holder with shield		
V3	5763 B9A holder		
VR	OA2 voltage regulator. B7G holder		
RFC	2.6mH 60mA r.f. choke		

Audio Section

C11	2µF 350V	C14	0.01µF 150V
C12	1800pF disc ceramic	C15	25µF 25V
		C16	1800pF 1kV disc
C13	5000pF mica		ceramic
R9	1MΩ 1/4W	R13	22kΩ 0.5W
R10	220kΩ 0.5W	R14	470kΩ 1/4W
R11	470kΩ 1/4W	R15	270Ω 1W
R12	100kΩ 0.5W	R28	3.3k 0.5W
V4A/V4B	12AX7 B9A holder with shield		
V5	6BW6 B9A holder		
T1	80-100mA type pentode matching transformer		
Speaker:	WB 2/3Ω 3.5in or similar		

Power Supply

Choke	Parmeko 120mA 5H
R16	10Ω 1W
R17	25Ω 1W
R18	25Ω 1W
C17	32µF 450V
C18	8µF 450V
Rectifiers	2 x SE-05
250mA	fuse and holder
T2	Parmeko P2931. 250/0/250V, 150mA, 6.3V 4A

Receiver Section

C19	100pF mica	C26	200pF mica
C20	100pF mica	C27	47pF mica
C21	0.02µF 500V disc ceramic	C28	400pF silver mica (padder)
C22	0.02µF disc ceramic	C29	0.25µF 150V
		C30	0.02µF 500V disc ceramic
C23	0.25µF 350V		
C24	0.02µF 500V disc ceramic	C31	200pF mica
		C32	100pF mica
C25	100pF mica		
R19	1MΩ 1/4W	R24	22kΩ 1W
R20	33kΩ 1W	R25	68kΩ 1W
R21	1MΩ 1/4W	R26	1MΩ 1/4W
R22	33kΩ 1W	R27	100kΩ 1/4W
R23	47kΩ 1/2W		
VR1	25kΩ linear pot	V7	ECH81 B9A holder
VR2	500kΩ log pot	V8	EBF89 B9A holder
V6	6BA6 B7G holder		
L4	1.8MHz bandspread aerial coil *		
L5	1.8MHz bandspread mixer coil*		
L6	1.8MHz bandspread oscillator coil*		

* Specified types 1.8/46 Electroniques - no longer available, please see text.

1FT1/2	Denco 1FT11/465
VC5	50pF air spaced tuning
VC6/7	2-gang 20pF or similar

Miscellaneous

Metal cabinet with panel 15 x 9 x 8in. 13 x 8 x 2.5in chassis type 1, pair 4in type C panel brackets, 50mA miniature meter: 8-pole 2-way rotary switch, two DL50A ball drives with flange for pointer. Two coaxial sockets (microphone and aerial), knobs, panel fitting lamp holder, 6.3V lamp and two SPST toggle switches.

with very strong signals and some kinds of noise.

Mixer and oscillator. L4, L5 and L6 have small trimmers incorporated during manufacture. VC6/VC7 can have a maximum capacitance of about 20pF each section. The core and trimmer of L6 are adjusted to give coverage of about 1.8-2MHz with a little to spare at the ends. The core of L5 is then adjusted near 1.8MHz and the trimmer near 2MHz for best reception.

With a given value for VC6/VC7, frequency coverage falls as L5/L6 trimmers are adjusted to lower inductance values, the cores being unscrewed to restore band coverage. On the other hand, frequency coverage increases as inductance is increased by adjusting the cores and the trimmers are reset to a lower capacitance. In this way, the receiver tuning can be closely matched to the v.f.o. tuning. It is also possible to use a 25 + 25pF or similar gang with extra 30pF trimmers for both sections, L5 and L6 cores being unscrewed to compensate.

The i.f. circuits; A connection should pass across the holder for V8, as in **Fig. 3**, earthing the central spigot or instability is likely. The four i.f.t. cores should be adjusted with a proper tool, either with a signal generator set to about 465kHz and fed to the input of V7 or with a stable signal. To avoid using shunts for a more sensitive meter the 50mA panel instrument reads the whole receiver current. This is about 30-35mA with no signal, falling to 25mA or so with average signals or 15mA or so with the v.f.o. on and tuned to the receiver frequency. The procedure is thus to tune for minimum meter current and to peak VC5 cores and trimmers for lowest minimum.

It would be feasible to use a 1mA meter with a shunt giving 0-50mA on transmit and any standard S-meter circuit on receive, but the metering as shown was found satisfactory.

Connections to VR2 were screened as shown in Fig. 3.

Power Circuit; With the transformer, rectifiers and choke listed, 300V was available at 100mA for transmission. With other transformers or chokes, it might be necessary to change R17 and R18. These may be increased if more than 300V is found at the anode of V3 or V5.

The VFO Calibration

The v.f.o. calibration is best achieved with the aid of a 100kHz crystal marker. This is carried out by tuning in the harmonics on 1.8, 1.9 and 2MHz on a separate calibrated receiver and setting the v.f.o. to zero beat and marking the frequency on the scale.

Intermediate markings can be estimated or found by using a receiver on the 3.6-4MHz range. The second harmonic of 1.85MHz will be heard on 3.7MHz and so on.

The capacitor, VC1, can be a double bearing metal frame type, with fixed plates well screened. A box 2 x 2.5in x 4in enclosed VC1 and L1. The flanges of the box can then be bolted to chassis and panel, and the top closed with a 4 x 2.5in plate fixed with self tapping screws.

Working On 3.5MHz

The transmitter-receiver circuit as shown in Fig. 1 has been found to give very good results on 3.5MHz, using V2 (EF91) as a buffer amplifier on 1.8MHz and as a doubler on 3.5MHz. So it's quite in order to use it for this band or for both 1.8 and 3.5MHz.

For single band working on 3.5MHz, a suitably wound coil for 3.5-3.8MHz v.f.o. coverage. However, L2 is broadly resonant at about 3.65MHz. The coil, L3 can be either a dedicated 3.5MHz tank coil or one half the 1.8MHz tank circuit described. For VC2, about 500pF may be retained, but 250pF is adequate.

PW

The Buddipole

A Portable Antenna Friend

● Kevin Romang G4SKN in action with the 'Buddipole' portable antenna system. Kevin enjoyed using the system and refers to it as the 'Friendly Antenna'.

Kevin Romang G4SKN has enjoyed using the Buddipole portable antenna - he describes it as a 'Friendly Antenna'. Kevin thinks the system will prove very popular with the 'stroke portable' brigade.

What comes in a smart black plastic tube 600mm long and 100mm in diameter? What can be rigged up on its own tripod, angled as desired and extended in length? No you're not reading an astronomy magazine, and the answer is not a refracting telescope!

Instead, I'm describing the Buddipole portable antenna system from **W3FF Antennas** in the USA. The original Buddipole has actually been around for a while as a home-brew project, but after some development is now available commercially. Designed as a 'go anywhere', easy-to-set-up loaded dipole system, this antenna might well be what h.f. portable operators have been searching for.

Up To Expectations?

Having been asked to review the antenna I was eager to see if it lived up to expectations. The system has already become a favourite 'across the pond' for those wishing to launch a signal from almost any location.

● Fig. 1: The antenna came neatly packed in a strong nylon hold-all within the plastic container (see text).

Of course Buddipole is a truly all American name, but as the designer W3FF is called **Budd** then I guess we can understand how the antenna came by its title! If we want to be patriotic let's translate it and call the unit a Friendly Antenna, which in my opinion is what it turned out to be!

The antenna came neatly packed in a strong nylon hold-all within the plastic container, **Fig. 1**. I was surprised at how light the whole kit was, weighing in at less than 1kg.

A small mast is available but I was supplied with a larger telescopic mast and tripod (heading photograph and **Fig. 2**). This proved to be reasonably strong and light in weight. The frequency coverage of the system is 7-54MHz (no breaks) and also from 144-148MHz.

The antenna comprises of two 0.558m long (22in) anodised aluminium elements, two well constructed loading coils, **Fig. 3**, and a pair of stainless steel telescopic whips. These, when used on their own permit operation on 50MHz and v.h.f.

The assembled legs attach to a 'T' piece, Fig. 3, with an adapter to fix to the mast. The system is provided with 3.65m (12ft) of coaxial cable with an encapsulated balun and flying leads at one end to connect to the 'T' piece.

At the other end of the feeder I found another adapter enabling BNC or PL259 connection. Last but not least, I found myself reading a small (but informative) manual, which includes a chart with suggested set-ups for the various bands. Maximum power rating for the whole system is claimed to be 250W.

As well as the tripod/mast, the review antenna came with the optional 'rotating arm kit'. This device enabled the shape of the dipole to be quickly changed, more on this facility later.

All the parts were checked after unpacking and I had a dry run assembling the kit. I was eager to set-up the system outside and see how the Buddipole stood up to the rigours of an unpredictable West Country winter!

Although it's always nice to play with antennas in the summer sun, I was looking forward to the challenge ahead and was determined to give the antenna a good Wiltshire winter airing. The wind was dropping, now if only that snow would melt…!

Easy Set-up

As luck would have it, the sun soon came out and I had plenty of time available to play radio. One advantage of being self-employed! The Buddipole was duly taken outside and the tripod/mast was erected on my uneven lawn. This extended to a maximum of about 3.04m (10ft). The antenna was very easy to set-up and as un-tapped coils were required for 7MHz, I thought I'd try that band first.

Note: Tuning the antenna for other h.f. bands is accomplished by connecting 'flying leads' to tapping points on the coils and by adjusting the length of the telescopic sections (six in all) on each leg of the dipole. The fully extended antenna including loading coils and centrepiece measures nearly 4.87m (16ft). The tuning chart lists the settings required.

I set the antenna up fairly close to the shack and by re-arranging some gear, I was able to connect my h.f. rig to the Buddipole. I also had the facility to switch between the review antenna and my 66-foot (20.1m) doublet.

On the first listening test I was concerned by a lack of received signal compared to my station antenna. It was obvious there was a mis-match. On lowering the

Accessories & Prices

W3-BPT Tripod £89.95
W3-BM Telescopic mast £49.95
W3-RAK Rotating arm kit £32.95
W3-DKB Carry bag £39.95

Note: Waters & Stanton have informed us that if readers quote '*PW* review' when ordering the Buddipole, free delivery will be offered.
Editor.

Buddipole I discovered that I hadn't extended one of the telescopic sections to the length indicated on the chart, whoops!

Correcting my mistake I returned to my radio to find a lively band with signals only 1-2 S-points down compared to the doublet. Finding a voltage standing wave ratio (v.s.w.r.) of no more than 1.5 to 1 over the whole band further encouraged me!

The 7MHz Band

The 7MHz band was quite active and running about 30W I broke in on an s.s.b. QSO to get some reports. **Dave M0TKO** in Brighton was 59+ with me on the Buddipole and he gave me the same report.

Switching in the doublet provided about a 10dB increase both ways indicated on our S-meters, but by ear the difference was marginal with me. Dave was conducting a net at the time and the other stations on frequency all gave me a report.

My thanks go to **Len M1DPE** in Grays (Dartford, Kent), **Peter EI2IU** in Castlerea (County Roscommon, Ireland) and to **Jed M0JED** in Kendal (Cumbria, Lake District) for their help. All the stations said I was a "good signal" using the 'Buddipole', with an average gain noted of about 10db (S-meter indication) when switching to the doublet antenna.

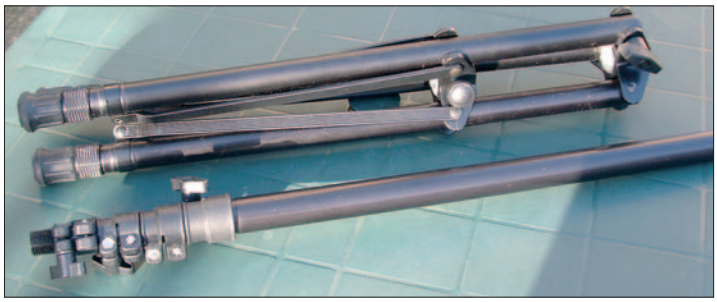
Ignoring the S-meter, (often a good idea!) as expected the doublet 10m above ground level was a better performer than the loaded dipole at 3m off the ground. Overall though, all stations were very impressed by the Buddipole's transmit capability on 7MHz. For portable work on the band I am sure there would be contacts a-plenty for any user!

Changing Bands

After the success on 7MHz I thought I would try changing bands, so the antenna was lowered again. This time the coils were tapped and the telescopic whips set for 14MHz. This time I got it right first time and again I had a very low v.s.w.r. over most of the band.

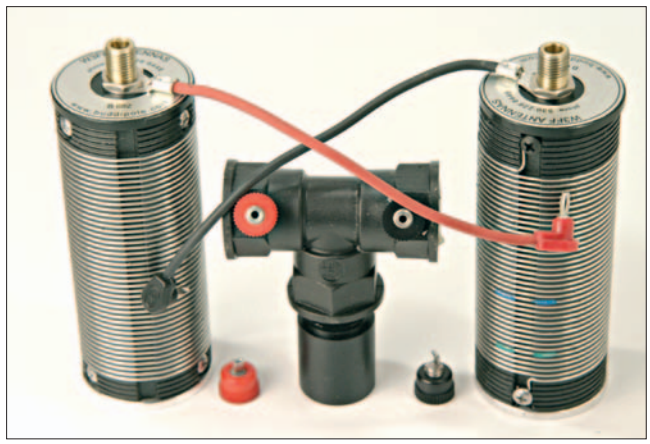
As before, the doublet was bringing in signals a little more strongly and I also noticed that on 14MHz the noise level was slightly up on the Buddipole. This time I loaded MixW (digital mode software) on my computer and selected BPSK31.

I called "CQ" on 14.070MHz running 10W and immediately **Wojtek SP1NQV** (Poland) replied. Wojtek gave me 599 and I responded with 589. Next, **Gerd DL1NGS** (Germany) was then worked. Similar reports



- Fig. 2: A smaller mast is available but G4SKN was supplied with a larger telescopic mast and tripod (see heading photograph also).

- Fig. 3: The antenna comprises of two 0.558m long (22in) anodised aluminium elements, two well constructed loading coils (shown here), and a pair of stainless steel telescopic whips. The assembled legs attach to the 'T' piece (centre).



exchanged, with Gerd's text being solid for the whole QSO.

A quick adjustment of the Buddipole landed me on 21MHz and I found a near perfect match on the lower end of the band. This time I thought I would try out a bit of c.w. I called **Gyula HA6KNX** (Hungary) on the key. I was running about 20W to the Buddipole and Gyula responded with a RST579. Switching over to my doublet, I asked for another report. Gyula came back with RST599 this time and I noticed that his signal was stronger than mine as well.

Best DX on 21MHz was a solid exchange with **Gene N5CE** (Oklahoma, USA). Not bad with a loaded antenna 2.74m (9ft) up on a fading 21MHz band!

Changing the Buddipole from 21 to 18MHz operation took seconds, as all that was required was to change the length of the whips. Again a satisfactory v.s.w.r. was easily obtained.

By now a pattern was emerging. It was quick and easy to tune the antenna on the h.f. bands and the Buddipole's performance was more than adequate considering its size, height and location. I had no problem obtaining low v.s.w.r. readings on the bands. Although of course, an antenna tuning unit (a.t.u.) could be used to iron out a slight mismatch that might occur under certain working conditions.

I had the chance to set-up the Buddipole on a few more occasions while the weather was fine and worked a good selection of stations when the bands were open. No problems were encountered, apart from one day when the wind got very gusty and the lightweight antenna nearly turned into a helicopter! **Note:** Make sure you guy that mast when the wind gets up!

Rotating Arms Kit

Also worthy of comment is the 'Rotating Arms Kit' available as an accessory for the standard antenna. This is described as a "kit for experimenters", for those who want to quickly change the configuration of the Buddipole.

The kit fits onto the central 'T' piece. Each arm of the dipole can be angled to produce a 'sloper,' a 'Vee', or any antenna shape you fancy.

Note: If you end up owning a Buddipole I suggest that you don't rely on the tuning charts when going down this road, as the resonance of the system will change significantly. I discovered this during my own experiments! In fact, this is the point where an antenna analyser will be handy, to check resonant frequency and bandwidth. Without one, the otherwise trial and error setting-up is likely to become very tedious!

A Lot Of Fun

In conclusion, the antenna certainly works well and provides a lot of fun, although loaded dipole systems are nothing new. My friend **Jon Wheeler G0IUE** has been experimenting with this configuration using mobile whips for a while now, with much success on h.f.

The 'Buddipole' will appeal because it is a portable multi-band system. Setting-up on different bands is quick and simple. Some will think that the outlay will not be worth it and will stick to home-brew antennas for their outdoor activities. Having tried and tested the antenna, I would find it difficult to decide which way to go if the 'portable' bug really bit me.

Rest assured though, if you owned this antenna you would have acquired a well-constructed portable antenna system, with good performance. I had a lot of fun with the Buddipole and declare in true British tradition that it's a Friendly Antenna!

PW

Product

The W3FF Antennas Buddipole

Company

Imported by Waters & Stanton PLC

Contact

General enquiries
Tel: (01702) 206835/204965

Pros and Cons

Pros: *Well made lightweight portable system, with adequate performance. No problems to tune on the h.f. bands. Easy to transport and keep safe in its robust container.*

Cons: *Might be a little delicate when the weather gets rough. A few people I have spoken to commented about the name of the antenna. No problem! call it 'Friendly Antenna' and be patriotic!*

Price

Retail price (inc. VAT) W3-BP Buddipole £199.95 **** (see note below)***

Summary

If you owned this antenna you would have acquired a well-constructed portable antenna system, with good performance. I had a lot of fun with the 'Buddipole' and declare in true British tradition that it's a 'Friendly Antenna'!

Supplier

My thanks go to ***Waters & Stanton PLC, 22 Main Road, Hockley, Essex SS5 4QS****, for the loan of the review system.* ***Tel: (01702) 206835/204965, FAX: (01702) 205843****.*

Antenna Workshop

John Heys G3BDQ takes another look at the G5RV Antenna and says it can work well almost anywhere, "when treated right"!

The G5RV Revisited

The late **Louis Varney G5RV** designed his, now very well known, multi-band antenna in 1946. This was the year I was first licensed, a time of valved transmitter and receiver 'separates' - when few operators used or had even heard of s.w.r. meters. His antenna was originally designed to be a DX radiator on the 14MHz band, showing the characteristics of a three half-wave end fed wire, but instead centre fed via an open wire matching section and 72/75Ω twin feeder or coaxial cable.

No antenna tuning unit (a.t.u) was needed, for at that time, most transmitters used π-section output circuits, which could be adjusted to match into a wide range of local impedances. Soon, it was realised that the G5RV antenna would also radiate on the 3.5, 7 and 28MHz bands, despite the standing waves (high s.w.r.s) along the feedline. In 1946, all the Amateur bands were harmonically related as we didn't have the 10, 18, 21 and 24MHz bands at that time.

Furthermore, by strapping the feeder wires together the system could be tuned, against 'earth' to work as an effective top loaded 'T' on 1.8MHz. With such versatility, it's not surprising that the G5RV soon became so popular.

The Basic G5RV

The illustration, **Fig. 1,** shows an 'ideal' G5RV antenna with just one modern addition, a ferrite choke just beneath the junction of the coaxial cable and the vertical open wire matching section. (This item will be discussed later in the text).

There are certain design considerations when contemplating using a G5RV antenna. The matching section (shown in Fig. 1 as open wire line) must, if possible, descend vertically for at least 6.1m (20ft). This demands an antenna height of at least the full length of the vertical matching section, i.e. 10.36m (34ft).

If the antenna can be erected higher than 10.36m, it will be more effective on all bands. One way to achieve this is by using a non-metallic centre support mast and sloping down the top wires to make an inverted 'V'.

Open wire lines are affected little by weather conditions and should not be heavy if made with 18s.w.g. enamelled wire and lightweight plastic spacers every half metre of so. The commercially made slotted 300Ω impedance ribbon feeder may be used, but its velocity factor must be considered and this will reduce the matching section to 9.3m (30.6ft).

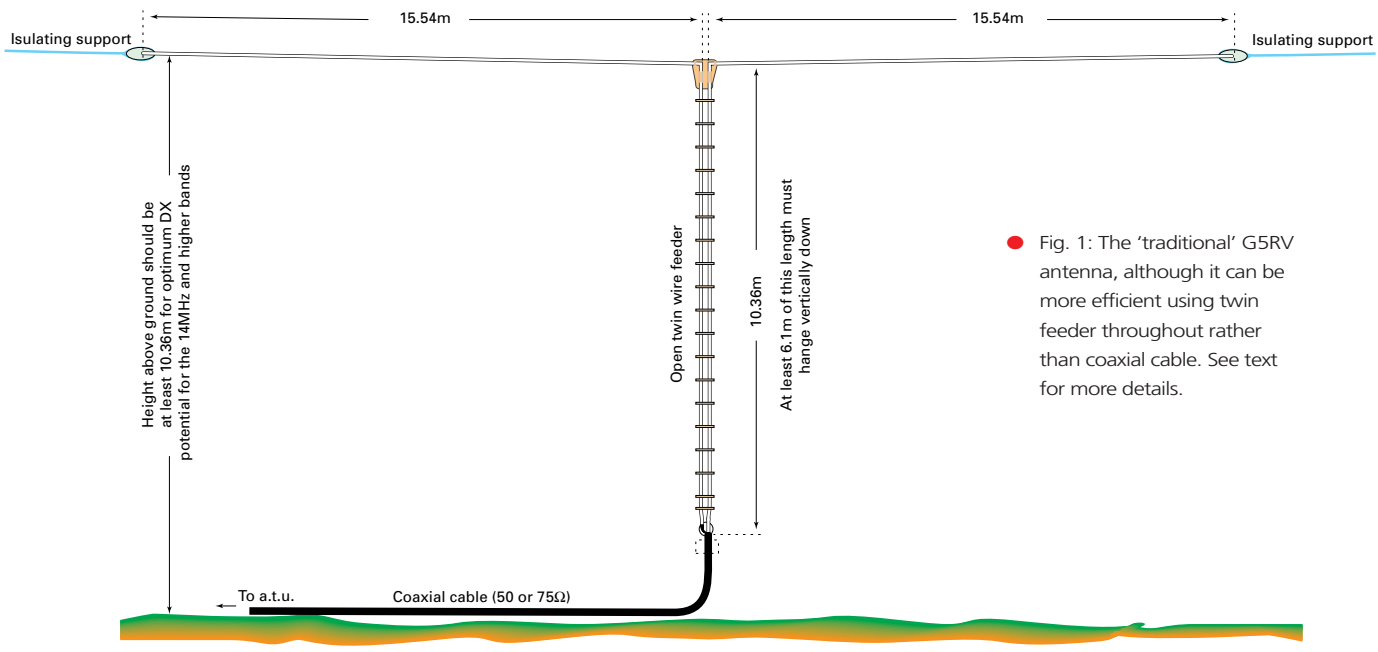


Fig. 1: The 'traditional' G5RV antenna, although it can be more efficient using twin feeder throughout rather than coaxial cable. See text for more details.

Band	Operating mode
28MHz	Two long wires each three half-waves in length and fed in phase. It becomes a multilobe wire radiating in many directions.
24MHz	A centre-fed long wire a little over five half-waves long.
21MHz	A centre-fed long wire five half-waves long.
18MHz	Two full-wave long antennas fed in phase.
14MHz	A centre-fed long wire of three half-waves fed out of phase.
10MHz	A collinear array with two half-wave elements in phase. However, the s.w.r. on the coaxial cable feeder may be as high as 40:1.
7MHz	A collinear array with two half-waves in phase.
3.5MHz	A half-wave dipole partially folded in the centre.
1.8MHz	May be used as a top loaded vertical. Some series inductance may be needed at the a.t.u. end of the feeder when the this is short.

Table 1: The G5RV exhibits differing operating modes on the different h.f. bands. See text for more details.

The connection of an unbalanced feeder (coaxial cable) to the balanced matching section will result in r.f. currents running back along the outer surface of the coaxial cable braid. These will produce standing waves along the coaxial cable, radiation and might give rise to unwanted TVI/BCI problems. Three or four 'clip on' ferrite filters will make up a coaxial choke and should be positioned on the coaxial cable just below its junction with the matching section and will prevent or minimise the standing wave problem.

The r.f. energy at v.h.f. and h.f. will run along the surface of a conductor and the suggested ferrite choke will be effective on 7MHz and the higher frequency bands and yet allow r.f. to be conducted normally on the inner side of the coaxial braiding. I have not heard of a source of large 'clip on' ferrites that will fit the heavier UR67 coaxial, so instead a coil choke can be made by winding the upper part of the feeder into a four turn 150mm (6in) diameter coil held together with tape.

The addition of a choke or ferrite balun often makes the vertical feedline quite heavy and a small vertical support might be needed. If this is not done, the antenna centre will be pulled down and the antenna performance reduced. **Dave Ingram K4TWJ** does not use a choke balun, but instead suggests a long coaxial cable feed of at least 22m (70ft). This tactic will make the station a.t.u. tuning easier, but in my opinion will not prevent the standing waves and unwanted feeder radiation.

Radiated Energy

The full sized G5RV as illustrated in Fig. 1, has quite different radiated energy patterns on the various Amateur bands. The radiation characteristics of a typical G5RV on the various h.f. bands from 1.8 to 28MHz, giving the effective electrical lengths of the top are shown in **Table 1**.

A 10m (33ft) high G5RV is very close to the ground in terms of wavelength when it is used on the 3.5 and 7MHz bands so much of its radiation will be at high angles including the vertical. This will often enhance signals to and from stations located in the UK and over much of western Europe. It will however be a poor DX antenna on these bands.

On the higher Amateur bands, the G5RV's DX potential is good. Its quite low radiation angles together with its multi-lobed radiation patterns will allow world-wide communication when conditions are suitable.

Other Versions

The full sized G5RV may be rather big for many urban locations, but by putting bends in its 'top' sections it can often be fitted into small gardens. It's best if balance is maintained and that the bends are similar along each leg. Mention was made earlier of the use of a single but high centre support to make the antenna into an inverted 'V'. If this is done, it is suggested that the dipole ends come down to no lower than 4m (12-15ft). Another way to fit the antenna into a smaller property is to drop down each end vertically for no more than 3m (10ft).

Over 'the pond' **K4TWJ** has described a half sized G5RV operating on the bands 28 to 7MHz. He suggests the top should have two legs of 8.2m (27ft) and a matching section of slotted 300Ω line 5.2m (17ft) long. He also states that although the gain on 14MHz will be a little down on the full sized G5RV it will still be better than that of a conventional half-wave dipole.

Dave also describes an even smaller or 'micro' version of the G5RV which has its dimensions half as small again. This model will cover the bands from 28 to 14MHz and will need a total top length of 8.2m (27ft) and a matching section 2.6m (8.5ft) long. With these dimensions, the 'micro' version can be fitted into quite small areas.

Meeting G5RV

I was fortunate to meet the late Louis Varney G5RV about 20 years ago at an Amateur gathering in Bromley, Kent and he told me that a more efficient version of his antenna would have the same top dimensions but would use open wire transmission line all the way from its centre to the station a.t.u. This a.t.u. should be of a balanced design such as the 'Z-Match', the KW 'E-Zee Match' or a home-brew parallel tuned circuit with perhaps plug-in coils for each band. An a.t.u. of the unbalanced design as used in autotuning systems and many commercial products will not do and should never be used to tune balanced feeders via a 4:1 balun. In my experience, such baluns waste power and on some bands the lost power is dissipated as heat. The toroids of such baluns can become alarmingly hot. An antenna built on these lines should ideally have a feeder length of 26m (85ft) and will then work all bands and not give rise to matching problems at the a.t.u.

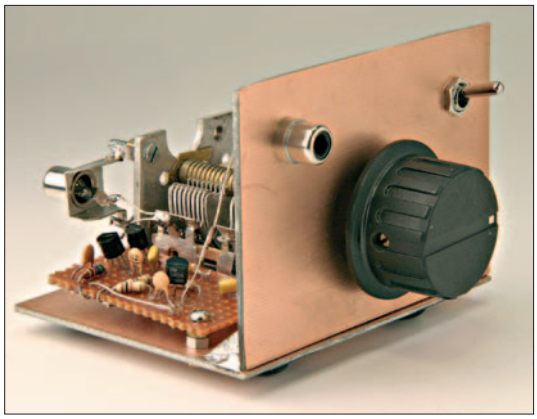
Some folk speak rather unkindly of the G5RV antenna design, but many Amateurs world-wide have found it to be very effective. I remember one 'W2' station on 'Top Band' who was coming through at a genuine S8 when using 100W to a G5RV in his small inner city New York lot. He said that the QSO really made his day!

Remember, some QRP stations employ G5RVs and still manage to work quite exotic DX!

PW

carrying on the practical way

"If you want to build a ship, don't drum up people to collect wood and don't assign them tasks and work, but rather teach them to long for the endless immensity of the sea". **Antoine de Saint-Exupery**



● This month's project - a wide ranging h.f. osciallator can be built using p.c.b. 'chassis' techniques.

This month the Rev. George Dobbs G3RJV is varying in frequency! Don't worry - he's actually got an interesting wide ranging oscillator for you to build - after you've read the appropriate quotation!

Following my choice of appropriate quotation this month, I hope you'll permit me to say something about my approach to this column; Amateur radio is a hobby. We do it because we love it; that's what the word amateur means! We're doing things we don't have to do and this is something rare....most of the time in most of our lives. Such is human nature that voluntary actions often require more motivation than compulsory actions.

So, a lot of this column is about inspiration; attempting to show readers interesting things that they can do in their own homes without a lot of expensive equipment and with the relative skill of the Amateur. So I "*don't assign them tasks and work*", I merely offer ideas which have amused and diverted me but I am often pleasantly surprised to find that readers build the projects I describe. As I said to a reader, some time ago, "I'm not a technical expert, just a Vicar* with a soldering iron".

***Comment:** Judging by the feedback we receive from our readers - all over the world - I should add "A much respected, keen Amateur Radio author, journalist and home-brew ideas man". Long may your soldering iron stay hot George! **Editor**.

Projects Described

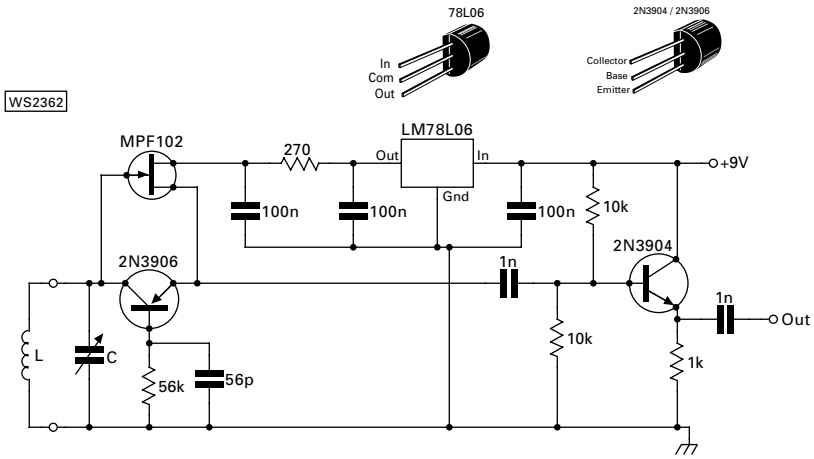
Whenever possible I try to describe projects that don't require a lot of test equipment to set-up, or to get them to perform their function. My assumption is that I'm writing for a complete Amateur who builds on the kitchen table and may only have the most basic of facilities and equipment.

Over the years I have gathered quite a useful array of workshop equipment, very often from second-hand or bargain sources. However, I recall, with fondness the days when I had very little specialist equipment.

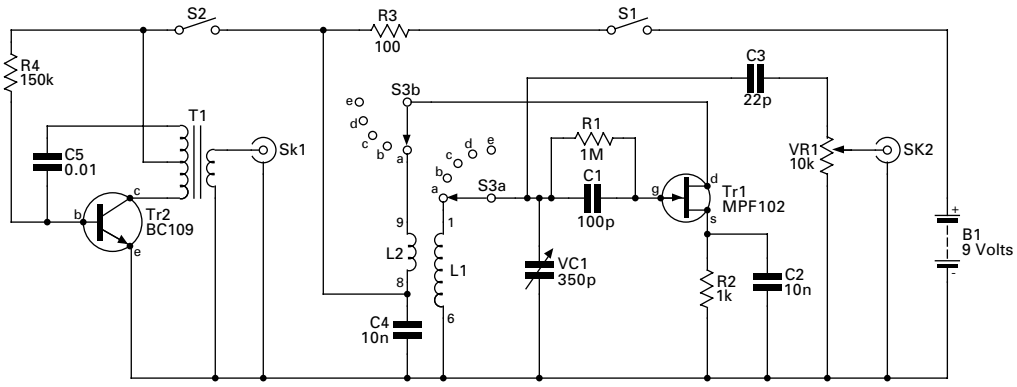
I remember too, many years ago, not having a signal generator to provide me with a calibrated test signal in the short wave spectrum. My solution in those days was to use what I had to hand.

My main receiver at the time was the grand old National HRO with its accurate dial and calibration charts. The tuning had been set up using a 100kHz

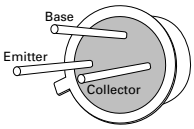
WS2362

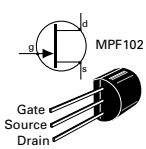


WS2361



● Fig. 2: The circuit of a simpler alternative approach to a wide range signal source for the h.f. bands. Attributed to Stefan Petrov LZ1OV, and first published in the GQRP Club's journal Sprat. First presented in a surface mount (SMD) format here it uses using conventional components and can work from 10kHz to 400MHz (see text).





● Fig. 1: The circuit of the 'Signal Generator for the HF bands' published in Short Wave Magazine during the 1980s. The circuit uses Denco coils (see text).

crystal standard. I found I was able to place a link coil close to the local oscillator and extract a variable frequency h.f. signal.

The down side of the technique was that I had to read the dial, refer to the chart for the oscillator frequency and then adjust that reading by subtracting the intermediate frequency. A lot of fuss but 'needs must'!

During the 1980s I described a 'Signal Generator for the HF bands' in the old style *Short Wave Magazine*. And with due acknowledgements to **Kevin Nice G7TZC**, the present day Editor of *SWM*, the circuit is shown in **Fig. 1**.

Readers might like to duplicate the circuit but I enclosed it for interest rather than replication. It used plug-in coils from the Denco valve short wave range. These are no longer available, although some readers may have a set of them or may even like to wind their own version.

It would not be difficult to wind a set of suitable coils to cover the h.f. range. The originals were 'Denco Miniature Dual Purpose Valve Type, Yellow – Ranges 1 to 5'.

The Circuit

The circuit uses an MPF102 field effect transistor (f.e.t.) in a Hartley type oscillator. It's a configuration well known in regenerative receivers, but in this application is arranged to enable it to oscillate over the whole tuneable range.

In use, L2 should be connected in the correct phase to give positive feedback and enable oscillation. (L1, the tuned circuit inductor, and L2 are switched according to band). The control VR1 is a linear potentiometer to adjust the amplitude of the output.

The circuit also includes an audio oscillator using a bipolar transistor with a typical transistor radio type audio output transformer to provide feedback. This provides some audio modulation for the radio frequency (r.f.) signal when providing a test signal for medium wave only receivers.

The common series 100Ω resistor (R3) allows the audio signal to modulate the r.f. signal. After 20 years this is still a useful circuit for those who want to build a variable signal source to cover the h.f. Amateur bands.

It shouldn't be difficult to build, although you'll require some ingenuity to obtain the suitable inductors. The MPF102 could be replaced by a 2N3819 and the BC109 could be replaced by almost any similar bipolar transistor.

Simpler Alternative

The circuit shown in **Fig. 2**, is a simpler alternative approach to a wide range signal source for the h.f. bands. I first saw this particular circuit when **Stefan Petrov LZ1OV**, offered it for publication in the **G QRP Club's** journal *Sprat*.

Stefan's version was offered in a surface mount (SMD) format. I was intrigued by the circuit and present it here using conventional components. The circuit is a cascode oscillator which LZ1OV has tested over the range 10kHz to 400MHz. The frequency depends on two components only – the tuned circuit L and C. It has a claimed frequency coverage (Fmax/Fmin) of more than two. In short, it appeared to be the ideal circuit for a little general purpose, wide range, h.f. oscillator.

The original circuit used an SMD bipolar pnp transistor, BFT92, and an SMD f.e.t., BFR30, and a BFR93 for the buffer amplifier. I bread-boarded the circuit using a 2N3906 and MPF102 in the oscillator and a 2N3904 for the buffer amplifier.

The MPF102 could be replaced by a 2N3819, 2N4416, etc. Almost any general purpose *pnp* and *npn* devices could replace the 2N3906 *(pnp)* and 2N3904 (*npn*).

The crude lashed-up circuit proved to be a success. My first version omitted the buffer amplifier and took the signal directly from the 1nF capacitor from the oscillator. I tried a range of tuned circuits for L and C from what I had around in my junk box. (The oscillator started up well with most of them).

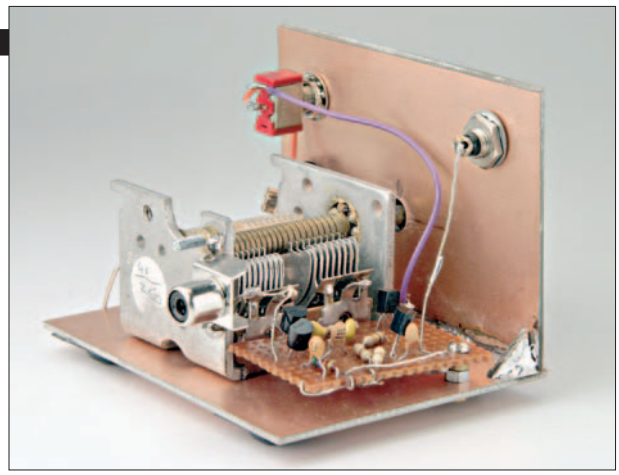


Fig. 3: The inherent stability encouraged G3RJV to build a better version using perf-board (see text).

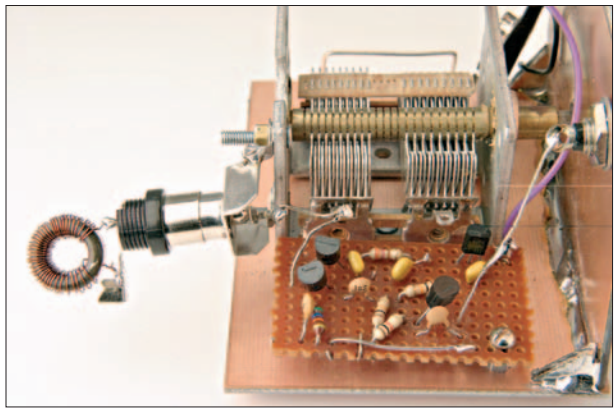


Fig. 4: The project was built onto base and front plates, made from scrap pieces of printed circuit board (p.c.b.) material. The photograph also shows the 'scrap box' variable capacitor and simple two connection toroidal inductor (see text).

Of course, h.f. oscillators really do require rigid construction techniques to remain stable. Most common oscillator circuits are capable of good stability, but that stability is almost always compromised by poor construction techniques.

Physical stability is always a pre-requisite to frequency stability. Despite this, I was surprised how stable the oscillator proved to be with various tuned circuits simply soldered into place on the board laying on the bench.

The inherent stability encouraged me to build a better version using perf-board, **Fig. 3**. I mounted this on a base plate and front plate, made from scrap pieces of printed circuit board (p.c.b.) material, **Fig. 4**.

Another pre-requisite of a stable high frequency oscillator tuned circuit is the use of a good quality variable capacitor. So, I rummaged around in my variable capacitor box and found a two gang capacitor of unknown origin but sturdy construction, Fig. 4. One of the gangs gave a capacitance range in the order of 30 – 240pF and this seemed ideal for a wide range oscillator.

Single Inductor

One of the advantages of this little circuit is that once a suitable variable capacitor has been found and installed, all that is required to change the tuning range is a single inductor (L in the circuit). This makes switching ranges very simple.

But why switch ranges? Keeping the leads short around the tuned circuit is a positive aid in frequency stability. The better option is probably to provide some means of plugging in the appropriate inductor, left in Fig. 4. This only requires two connections.

Personally, I'm very confident that astute *PW* readers could suggest a variety of suitable connectors to do the job. However, I just use what I have to hand; in this case phono plugs and sockets, mounted at the back of the variable capacitor.

My trial inductor was 42 turns wound on a T50-2 core, soldered across a phono plug. This tuned the useful range 3.5 to 10MHz.

Another inductor, 16 turns on a T50-6 core, tuned the range 9.5 to 25MHz but this was stretching the limits of oscillation at the high end of the range. But not to worry - a little experimentation will produce inductors suitable for individual applications.

The outcome was a worthwhile (and stable) oscillator unit that with an appropriate inductor can tune the whole of the h.f. spectrum. Assuming I can find the space, it will live on the shelf waiting for the time when I need a signal source for the short wave bands. The more fastidious constructor may like to calibrate the unit and prove a dial and scale - something I might get round to doing for my one signal generator one day!

PW

The Telescopic

● The completed unit folded down ready to pack.

Rob Hannan G4RQJ has come up with a simple antenna from a cheap source that's eminently suitable for holiday use.

Good things can be found in the most unlikely places and a recent trip around the local 'Poundstretcher' store produced the raw material for this little project. There, for the princely sum of just £2.99, was a wide-band indoor TV antenna. As I could guess the possibilities of the unit, one was quickly purchased.

As we live in a fringe area for TV, it was pretty obvious that the antenna was not going to do a lot for our TV picture however, as it consisted of two telescopic antennas on a base with suckers for attachment, the unit had obvious possibilities for v.h.f./u.h.f. portable activities.

Opening the base unit allowed me to see that the supplied coaxial cable connected to the telescopic elements via two small disc ceramic capacitors, **Fig. 1**. In-line capacitors, such as these have been fitted as a safety precaution in TV antenna feed-points for many years. They help to prevent any stray lethal voltages from reaching the exposed elements and thus to the user.

Hopefully, your 144MHz hand-held is totally isolated from the mains so, the small internal capacitors may be removed and the coaxial ends soldered directly to the solder tags at the base of each element. If you're intending using the original coaxial cable, then a suitable connector is added to the other end of and basically that's all there is to it.

Remember, that having removed the protection capacitors from the antenna, it shouldn't be used on a mains powered TV set. Although this type of capacitive protection should already be in place inside the set!

In use, you simply extend each telescopic antenna to 240mm for 145MHz operation, fine tuning can then be done for best v.s.w.r. if required. Or you could just keep the legs to the adjusted length (both equal) and swing the lower leg upwards, **Fig. 2**, to find the point of lowest v.s.w.r.

The usual figure for translating frequency to wavelength is normally to divide 2.90m by the frequency in MHz to give the overall full-wavelength (λ) in metres. Using 2.90m adjusts for the slight shortening of the wavelength due to the conducting elements themselves. Then divide the resulting figure by 4, for the length of each λ/4 elements.

However, with this antenna I've found that it's better to to use a figure of 2.81m divided by the frequency in MHz to arrive at the required length for each element. It seems to work better, probably due to the wire inside the centre-piece itself.

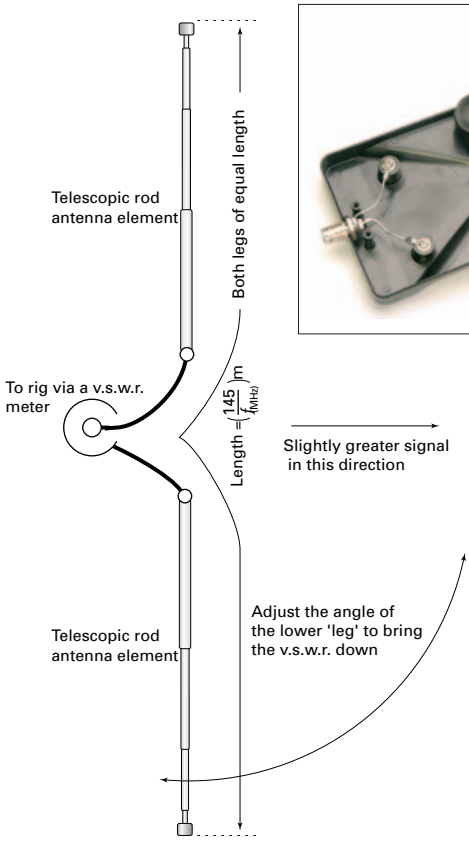
I decided to add a better quality of coaxial cable to the antenna that would also help provide a better choice of location of the system. So, an alternative method of fitting a suitable panel mounting BNC socket, **Fig. 3**, to the antenna unit was begun. All that I needed to do was to enlarge the hole that the coaxial cable presently passes through.

Unfortunately, the telescopic elements are a little too long for transmissions on the 430MHz band but operation on receive is reasonable. The base unit can be attached to most surfaces and can cater for either horizontal or vertical polarisation. As an example, if the window in **Fig. 4** is opened, weather permitting, the antenna will be well placed away from the building.

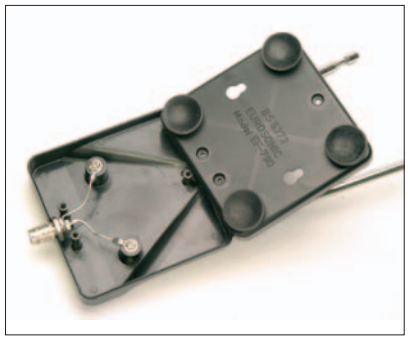
All in all, at £2.99 it's a good investment for the traveller or those in restricted locations, or places, where a 'real' antenna is not allowed.

PW

● Fig 1: Inside the original unit are the two series safety capacitors (blue) these are removed (see text).



● Fig 2: Illustrating the overall idea of the telescopic antenna and how to 'tune' it to the frequency of interest (see text).



● Fig. 3: After fitting the BNC socket and wiring the elements in. Note the four 'suckers' that provide a good grip on window glass.

● Fig. 4: Rob G4RQJ's prototype in operation on the kitchen window.

valve & vintage

Ben Nock G4BXD has a really interesting variation of the National HRO receiver on show this month. As usual the excellent photographs, featuring items from his own collection, are taken by the author himself.

Well here we are again, nearly into the summer already! Hopefully the rally season is well under way and I shall be seeing a few old friends at the various venues.

It's been a good start to the year and I've managed to find several interesting items to add to the collection here. Incidentally, while on that subject I'd like to point out that, unless very clearly stated otherwise, all the sets described are in my personal collection.

I mention the collection because a reader asked me over the air the other day where I found all the pictures of the sets I describe. He didn't realise they were photos of equipment I have here, although occasionally an item might get passed on after being played with for a while. So, with that explained, let's get on to today's outing into the world of 'valve and vintage'.

Not HRO Again?

Not another HRO debate? I hear you ask, especially all those who read *Radcom* as well as *PW*. My reply is "Yes"! - yet another HRO found its way home with me, although this time it's a very nice and somewhat unusual set.

The model in question is the National 1-10 v.h.f. receiver. Made by the same company as the HRO, the receiver employs the same plug-in coil method, although with this receiver the operator has to lift the lid and insert a set of two coils inside the set. The tuning range is 30 to 300MHz with a twin feeder aerial arrangement.

Apparently the 1-10 was initially designed for experimental work but worked so well it was adopted by Amateur and commercial services. The set uses four valves consisting of a tuned radio frequency (r.f.) amplifier (954 acorn type), a self-quenching superegenerative detector (955 acorn) transformer coupled to the first stage audio (6C5) which is then capacity coupled to the audio output stage (6F6).

The photograph, **Fig. 1**, shows my particular set which is the 1-10 model. **Note:** There was a 1-10A version which has a virtually reversed front panel with other minor changes.

Power for the set came from the National 5886 AB power unit, providing a 6V heater and 180V high tension (h.t.). I've tried my set on the air and even using just a short, one metre, length of wire, I was able to listen to Airband with ease. It was still working well after 60 years!

● Fig. 1: The HRO 1-10 v.h.f. receiver with power supply and speaker. The aerial connects through hole in lid of set (see text).

Monster Marconi

Another recent addition here in Kidderminster is the Marconi H2301, **Fig. 2**. This is really an Eddystone S.880/3 receiver and it's a monster of a set. It uses 23 valves and covers 500kHz to 30.5MHz in 30 switched ranges, each covering 1MHz.

The H2301 has all the features you would expect from a top-of-the-range receiver including an impressive low radiation output. In other words the signals from the various oscillators inside the set are so well screened that their detection outside the operating room was impossible.

The 880 range was specially developed for Government Agency use and had a very small production run. The quoted figure from the **Eddystone Users Group** (EUG), quick reference guide for the 880/3 is that 300 were produced between 1964 and 1967.

Due to the excess of screening inside the set and the generally solid construction it's a fairly weighty unit. The bandswitch selects the 30 individual bands and the tuning is arranged so that each band tunes from the half MHz point to half MHz, ie 3.5 to 4.5, 4.5 to 5.5, 5.5 to 6.5MHz, etc. with the integer MHz frequency being centre-place on the dial.

Russian Sets

There are many post Second World War Russian sets around. Since the "Fall of the wall" it seems to me that every Russian tank commander has sold off his vehicle's radio on eBay or such!

The modern trend has resulted in many nice examples appearing on the market. However, it seems somewhat strange to find an actual Second World War Russian set and it was with great interest that I acquired an example recently.

Designated the P-13, or in translation the R-13, the set, **Fig. 3**, is a similarly styled set (both in design and use) to the more widely known British WS18 or WS48. It's a self contained battery operated h.f. transmitter receiver with a case slightly larger than the WS18. Frequency coverage is around 3MHz, as you can imagine factual information is hard to come by. Even a search of the Internet isn't producing much joy.

The P-13 has six valves and appears to be a superhet design with several, if not all, of the valves having dual roles between receive and transmit. I've

begun a search for the circuit diagram and of course an effort to get the set going will be attempted.

Power for the P-13 was provided from 3V battery cells for the heaters and three 60V supplies wired in series to provide a 120 and 180V line. The headphones, microphone and Morse key are all connected into the front of the set via two pin plug sockets. A large tuning window not only provides a magnified view of the tuning scale, but also allows the user to see a neon tuning indicator bulb which served as a p.a. and aerial tuning indicator.

A Little Subterfuge!

A little bit of subterfuge now! It started at a recent rally when I picked up a little chassis that someone had obviously taken loving care to create, and into which they built a receiver and transmitter of sorts.

The chassis wiring was a little vague, crossing and running all over the place, so it was somewhat hard to follow. The builder had used real old components, many having seen the light of day in the 1920s. As I suffer from the chronic 'Collectivitis' bug that prevents me from throwing anything away, I was loathed to simply scrap the chassis after I had examined it. So, instead I, decided to revamp the set and circuit in the best way possible.

The result is shown in **Fig. 4**. It's now housed in a spare suitcase I had and comprises a receiver chassis, a transmitter chassis and (for now) a spare chassis with a meter fitted - I'll find a use for this later! The receiver is a two valve regenerative detector-amplifier set using a 1N5 as the detector and a DL92 as the audio stage. The high impedance headphone output is directly connected to the anode.

The transmitter uses a 3S4 as crystal oscillator and a 1G6GT as the power amplifier stage. The valves weren't my first choice, but as they were already on the chassis I decided to keep them.

As it turned out, with 1.4V for the heaters and around 100V for the h.t. both the receiver and transmitter work very well. The chassis had the 5-pin plug-in coils fitted and without any real modification the set now operates on 7MHz quite nicely, achieving a transmit output of around 300-400mW.

I have added a few decals and labels to the front panel. Later experimentation will involve trying other valves and circuits.

It's really nice to be able to play with such gear. The lack of interest in home construction these days and the move towards plug-in-and-play operating in my opinion, does nothing for the hobby as a whole.

● Fig. 2: The Marconi H2301 receiver, showing its superb clean lines and well laid out controls (see text).

Thanks & Finally

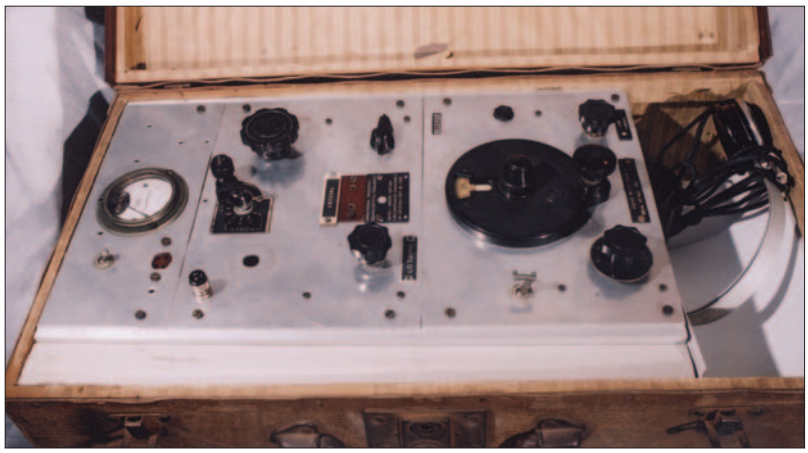
A very big 'thank you' goes to **John Eastbrook** of Kent and **Neil Clyne G8LIU** of Middlesex who both sent me information on the RBJ mentioned last time around. A full copy of the manual for the set, received from Neil, will enable me to check it over and back to first class operation.

A couple of requests from readers now: **Freddie Wagstaff** from Northumberland is looking for information, circuit, etc., for the GEC Marconi receiver R410 or R411. **Simon Saunders** is after any documentation that connects Air Ministry component numbers (the 10H/1234, etc.) to actual component values. Details to me please and I'll pass them on.

Well that's all for now. I'm looking forward to meeting one or two of you at the various rallies. As always, you can write to me at; **62 Cobden Street, Kidderminster, Worcestershire DY11 6RP**, or via E-mail at **G4BXD@qsl.net**

You can also have a look at the new 'Russian web page' at **www.qsl.net/g4bxd** Cheerio for now. **PW**

● Fig. 3 (left): The Russian P-13 Second World War back-pack after restoration. The batteries are housed in the lower compartment below the set (see text).



● Fig. 4: The re-vamped home made chassis now fitted into a suitcase, ready for a little field trip by a Kidderminster-based Special Agent (see text).

VHF DXER

DAVID BUTLER G4ASR
YEW TREE COTTAGE
LOWER MAESCOED
HEREFORDSHIRE
HR2 0HP
TEL: (01873) 860679
E-MAIL: g4asr@btinternet.com

REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

THIS MONTH DAVID BUTLER G4ASR TAKES A LOOK AT METEOR SCATTER OPERATING PROCEDURES.

Meteor scatter (MS) is unlike most other propagation modes, in that neither station can hear the other until an ionised meteor trail exists to scatter or reflect the signals. As the reflections are often of very short duration, the normal QSO procedure is not readily applicable and specialised operating techniques must be taken to ensure that a maximum of correct and unmistakable information is received.

The two stations have to take turns to transmit and receive information in a defined format, following the procedures as detailed below. Some meteor showers are strong enough to make some of these measures unnecessary but there is no reason why the suggested procedures should not always be used. As with any operating procedure, the virtues of the MS operating procedures are mainly that they are standard and are widely understood throughout IARU Region 1.

TWO TYPES OF MS CONTACT

There are two types of meteor scatter contact; a scheduled contact and an unscheduled contact. A scheduled contact is where two interested stations arrange in advance the callsigns to be used, frequency, timing and duration of the test, as well as the transmission mode such as c.w., s.s.b. or FSK441. (FSK441 is a relatively new machine generated mode written by **Joe Taylor K1JT**).

Scheduling is normally carried out by exchange of letters or E-mail, by radio via the European VHF Net on 14.345MHz, by Internet chatrooms or packet-radio. A non-scheduled contact, often called a 'random' contact, is where a station calls CQ or responds to a CQ call. Random contacts are far more difficult and because you're starting entirely from scratch, it's particularly important for both stations to follow the standard meteor scatter QSO procedures.

Accurate timing of transmit and receive periods is important for two reasons; to maximise the chances of hearing the other station and to avoid interference between local stations. The recommended time period for random contacts is 2.5 minute periods for c.w., one minute periods for s.s.b. and 30 seconds for FSK441. This practice gives quite satisfactory results. However, growing technical standards make it possible to use much shorter periods and operators may wish to arrange one minute schedules for c.w. and shorter periods for s.s.b. especially during major showers. (The timing of FSK441 can't be changed as it is fixed by the program).

If non-standard time periods are used the first priority is to avoid causing interference to local stations that are using the standard periods. Quick-break procedures within s.s.b. contacts can be very effective and is often used by DX stations. It involves taking a break every 15 seconds in case the QSO can be completed within one long burst. Prior to any MS activity it's absolutely vital that clocks are set to better than two seconds of standard time. This can be done by using a clock that receives standard frequency transmissions, the telephone 'speaking-clock' or GPS time signals. Any clock inaccuracy will result in wasted time and will cause unnecessary interference to other MS stations.

All meteor scatter operators living in the same area should, as far as possible, agree to transmit simultaneously in order to avoid mutual interference. If possible, northbound and westbound transmissions should be made in periods 1, 3, 5, etc. counting from the full hour. Southbound and eastbound transmissions should be made in periods 2, 4, 6, etc. The location of the UK means that we can work towards the north-east and the south-west, so the IARU rule is overridden in the UK by local agreement to transmit in the **second** period. So, for example if you have arranged an FSK441 schedule from 1100-1130UTC you would transmit at 1101-1102, 1103-1104, etc.

Every uninterrupted scheduled period must be considered as a separate trial. This means that it's not permissible to break off and then continue the contact at a later time. Scheduled contacts using c.w. or s.s.b. are usually in the range 1-2 hours although during shower periods this can be significantly reduced. Operators using the more efficient FSK441 transmission mode often use 30 minutes or less.

SCHEDULED CONTACTS

Scheduled contacts can be arranged on any frequency, taking into consideration the mode and band plan. They should of course avoid using known popular frequencies and the random meteor scatter frequencies. The frequency used for CQ calls for non-scheduled random contacts should be 144.100MHz for c.w., between 144.195 to 144.205MHz for s.s.b. and 144.370MHz (or 50.270MHz) for FSK441. There are no individual frequencies on the 50 and 70MHz bands for c.w. and s.s.b. usage. Instead the frequencies 50.200 and 70.150MHz may be used for both random c.w. and s.s.b. calling.

To avoid continent-wide interference, which results from a large number of stations attempting to complete contacts on the various MS calling frequencies, a QSY method is recommended. A letter system is used for c.w. calling, whereas a number system is used for FSK441. There is no such system for s.s.b. it's every man for himself!

The procedure for moving a c.w. QSO off the calling frequency without losing contact is as follows: During the CQ the caller indicates on which frequency he/she will listen for a reply and carry out any subsequent QSO. The QSY frequencies should take place in the segment 144.101 to 144.126MHz as shown in **Table 1**.

Select the frequency to be used for a QSO by checking whether it is clear of other stations and interference. In the call, immediately following the letters 'CQ', a letter is inserted to indicate the frequency that will be used for reception when the CQ call finishes. This letter indicates the frequency offset from the actual calling frequency used.

For example CQE would indicate that the operator will listen 5kHz up from the frequency the CQ is being made on. At the end of the transmitting period the receiver should be tuned to the frequency indicated by the letter used in the CQ call. If a signal is heard on this frequency it may well be a reply from a station who has heard the CQ call and replies on the frequency calculated from the letter used during this call. When the caller receives a signal on the frequency indicated during the call and identifies the reply as an answer on his CQ, the transmitter is moved to the same frequency and the whole QSO procedure takes place there.

A similar QSY procedure is used by operators using FSK441 transmissions. However, instead of using a letter system, operators should use a number system. Indication of what frequency they intend to carry out the QSO is made by adding the three digits of the nominated frequency. For example CQ383 indicates that the station will listen on 144.383MHz for a subsequent contact. The sub-bands for FSK441 usage are 50.260 - 50.280MHz and 144.360 - 144.399MHz.

An MS contact starts with one station calling the other, e.g. 'OH5LK G4ASR OH5LK G4ASR'. In c.w. and FSK441 the letters 'de' (or in s.s.b. the word 'from') are not used. The report consists of two numbers as shown in **Table 2**.

The lowest possible report is 26 and the highest is 59. The report is only sent when the operator has positive evidence of having received the correspondent's or his own callsign or parts of them. The report is given in the format 'OH5LK G4ASR 37 37 OH5LK G4ASR 37 37'. The report should be sent between each set of callsigns, three times for c.w., twice for s.s.b. and twice for FSK441. The report must not be changed during a contact even though signal strength or duration might well justify it.

As soon as either operator copies both callsigns and a report he may start sending a confirmation. This means that all letters and figures have been correctly received.

You are allowed to piece the message together from fragments received over a period of bursts and pings, but it's up to the operator to ensure that it's done correctly and unambiguously. Confirmation is given by inserting an 'R' before the report such as 'OH5LK G4ASR R37 R37'. A station with an R at the end of the callsign should actually send 'OH5LK G4ASR RR26 RR26' so that the other station is sure that two 'R's together must be a confirmation report and not just the trailing R in my callsign.

When either operator receives a confirmation message, such as 'R27', and all required information is complete he must confirm with a string of R's, inserting his own callsign after each eighth R such as 'RRRRRRRR G4ASR RRRR ....'. When the other operator has received R's the contact is complete and he may respond in the same manner, usually for three periods. Contacts using s.s.b. are conducted in the same way as c.w. or FSK441.

When attempting random contacts, speak the letters clearly, using phonetics where appropriate. It may not be necessary to use phonetics during a scheduled s.s.b. contact, but you should still speak clearly.

A complete QSO is established when both operators have copied both callsigns, the report and a confirmation that the other operator has done the same. This confirmation can either be an 'R' preceding the report or a string of 'RRRRs'.

If a confirmation report (R**) is received it means that the other operator has copied both callsigns and the report, but you may still need something from that station. At that stage, you can try to ask for the information needed by sending a missing information code string as shown in the **Table 3**. These strings are only used when operating in c.w. or FSK441. When received the other operator shall respond by sending only the required information. This approach must be used with great caution to prevent confusion.

As I've just mentioned a valid contact is one where both operators have copied both callsigns, the report and an unambiguous confirmation. However, no recourse should be made during the contact to obtain the required information via other methods such as the DX Cluster, talk-back on another band, etc. Regrettably a number of stations are often seen using the Cluster to obtain such information. Secondary methods such as these invalidate the meteor scatter contact.

DEADLINES

That's it for another month. Please send your reports to the address given at the top of the column to arrive with me by the last weekend of the month. Good luck with your meteor scatter experiments and see you again next month. *73 David G4ASR*

A	1kHz	(CQA)
B	2kHz	(CQB)
C	3kHz	(CQC)
D	4kHz	(CQD)
E	5kHz	(CQE)
F	6kHz	(CQF)
G	7kHz	(CQG)
H	8kHz	(CQH)
I	9kHz	(CQI)
J	10kHz	(CQJ)
K	11kHz	(CQK)
L	12kHz	(CQL)
M	13kHz	(CQM)
N	14kHz	(CQN)
O	15kHz	(CQO)
P	16kHz	(CQP)
Q	17kHz	(CQQ)
R	18kHz	(CQR)
S	19kHz	(CQS)
T	20kHz	(CQT)
U	21kHz	(CQU)
V	22kHz	(CQV)
W	23kHz	(CQW)
X	24kHz	(CQX)
Y	25kHz	(CQY)
Z	26kHz	(CQZ)

Table 1: Letter System for c.w.

First Number (Burst Duration)	Second Number (Signal Strength)
2: up to 5 seconds	6: up to S3
3: 5 - 20 seconds	7: S4 to S5
4: 20 - 120 seconds	8: S6 to S7
5: longer than 120 seconds	9: S8 and stronger

Table 2: MS Reporting System

BBB	Both callsigns missing
MMM	My callsign missing
YYY	Your callsign missing
SSS	Duration and signal strength missing
OOO	All information incomplete
UUU	Faulty keying or unreadable

Table 3: Missing Information

HF HIGHLIGHTS

CARL MASON GW0VSW
12 LLWYN-Y-BRYN
CRYMLYN PARC
SKEWEN
WEST GLAMORGAN
SA10 6DZ
Tel: (01792) 817321
E-MAIL: carl@gw0vsw.freeserve.co.uk

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

You may remember in my March 2004 column I mentioned the Italian QRP Club and included a picture of the cover of their bulletin. Well, I did wonder just what the woman was telling the operator in the cartoon so was pleased when **Godfrey Manning G4GLM** in Edgware, Middlesex wrote in to say "I am not very knowledgeable where Italian is concerned, but I think the punch-line to the cartoon on the cover of the magazine reads - All right then, you may buy a new microphone. I'm sure that I have heard that said a few times! Another interesting quote, also on the front cover, applies equally to QRPers and higher power operators alike and reads - Don't EVER give up!".

DX NEWS

On to some DX news now and three operators **Filippo IK0AIH**, **Fabrizio I0HJC** and **Michele IK7JGQ** who work at the Italian Antarctic station *Baia Terra Nova* and are now active with the new callsign **IR0PS**. They can usually be found around 1730-1815UTC on 14185kHz and also plan to be QRV on the long path between 0730 and 0830UTC. Michele IK7JGQ has stated that he hopes to be onboard and operate /MM from the polar ship *Italica* so keep an ear open for that one!

Francois Bergez F8DVD is active from Svalbard (EU-026) until the 10 April and will operate from a town called Longyearbyen using the callsign **JW/F8DVD**. Activity will be on all bands from 3.5-28MHz and you can QSL via the French Bureau or direct to Francois at **6, Rue de la Liberte, F-71000 MACON, France**.

In Bosnia-Herzegovina **Jose Matos CT1FKN** (4W6FK) will use the call **T98FKN** until 6 August and plans to operate on all h.f. bands during his free time. Jose is currently in Bosnia-Herzegovina working from the city of Doboj as a member of SFOR. QSL via CT1FKN or direct to **Rua D Afonso Henriques 83 B 3-E, P-2330 Entroncamento, Portugal**.

In the Maldives this month **Pierre Pasteur HB9QQ** will again operate as **8Q7QQ** from Velighoo, North Atoll (AS013) between 13 and 27th April. Activity is expected to take place on the 10/18 and 24MHz bands using full size loop antennas. Please QSL via Pierre's home callsign or direct to **Sunnhaldenstrasse 28-A, CH-8600 Duebendorf, Switzerland**.

AWARD NEWS

This year **IOTA** celebrates its **40th Anniversary** and to start the year off the Radio Society of Great Britain (RSGB) has agreed to let the IOTA island group listings including full titles, geographical coordinates and qualifying islands to be available on the Internet on the RSGB IOTA website. By posting this on the Internet it brings key programme information to a much wider audience. It also has the added advantage of enabling the listings to be kept right up-to-date as new group reference numbers and qualifying Islands are added.

The RSGB maintains the copyright to this data and has stated that no part of it may be reproduced unless it is for personal non-commercial home use without prior written permission. Following this policy change the IOTA Committee has amended the requirement in the rules that applicants must have first purchased their own copy of the paper *IOTA Directory* in order to enter the award programme.

There are currently 18 separate certificates available for Island chasers and these are graded in difficulty as well as two prestigious awards for high achievement. They can be claimed by producing evidence of having made two-way communication, since 15 November 1945, with the required number of Amateur Radio stations located in the IOTA groups listed for the award.

Many of the islands and IOTA groups are DXCC countries in their own right though others may not be. However, by meeting particular eligibility criteria they can also count for credit. The basic award is made for working stations located in **100 IOTA groups**. That should not be too difficult to achieve, even for those who run modest stations or operate with low power.

The current island group listings are now available on-line or alternatively can be found in any *IOTA Directory* published after 2000. The listing will still continue to be published and copies of the latest 11th Edition of the *IOTA Directory* can be obtained from the *PW* Book Store.

The **DX-TA-SEA DX Club** (WW8DX) issues two awards which are available to either licensed amateurs or short wave listeners for working or hearing stations in Ecuador. The **HC8/HD8 DX Diploma** is issued for contacts made with a minimum of three different HC8 or HD8 stations in the Galapagos Islands. The **Equatorial Line Diploma** is for contacts made with different Ecuadorean HC & HD prefix areas. If you would like further information on both these awards visit **www.octavia.com/QSL/awards.htm**

One award that is available closer to home is **The Mediterranean Islands Award** (MIA) which is sponsored by the Mediterranean DX Club and is available to either licensed Amateur Radio operators and s.w.l.s for working stations from islands located in the Mediterranean Sea. For full information please visit **www.mdxc.org/mia**

LOTS OF DX & AWARD NEWS THIS MONTH FROM CARL GW0VSW

This year IOTA celebrates its 40th Anniversary.

QSL INFORMATION

Just enough space now for some QSL information and I'll begin with **Carl McDaniel W3HC**. Carl asks that anyone who sent a QSL card to him for contacts made with **BI3H** in 2000 and had it returned unverified to resubmit it, as he has finally got the 2000 logs in order. It is also worth mentioning that Carl is the QSL Manager for the following DX stations, XQ3WTR, CE3WTR, PY2OMS and PT5T. QSL direct to **2116 Reed St, Williamsport, PA 17701, USA**.

US Amateur **Koos Berrevoets K3S** is still receiving QSL cards for **V51E**, **V26DX** and **TU2XZ**. However, he is not the QSL Manager for these stations and has said the correct routes are V51E direct **Kosie du Buisson, PO Box 350, Outjo, Namibia**. V26DX to KU9C via the bureau or direct to **Steven Wheatley, PO Box 31, Morristown, NJ 07963, USA** and TU2XZ via W3HC direct only.

Finally to Bulgaria and **Vladimir Radev LZ1OT** who is now the QSL Manager for **4L1GW**. New QSL cards printed and these can

be obtained via the bureau or direct from **PO Box 18, 1504 Sofia, Republic of Bulgaria**.

YOUR REPORTS

Onto your reports now and the first of these comes from all c.w. man **Ted Trowell G2HKU** on the Isle of Sheppy in Kent who is recovering from a serious fall in his local church which knocked him out! Despite multiple bruising across his chest Ted is now recovering at home and was able to use an electronic key as the up and down movement of a straight key is not possible at this time!

Several island contacts were made on the 1.8MHz band and these included OH0NL (Aland Island) EU-002, 9H1KT (Malta) EU-023, EA8BH (Canary Islands) AF-004 and 5B4AGC (Cyprus) AS-004 between 2000 and 2100UTC using a Ten-Tec Omni 5 and vertical antenna.

THE 7 & 10MHz BANDS

On 7MHz **Martyn Medcalf M3VAM** in Chelmsford, Essex worked s.s.b. stations T77EB (San Marino) 1936, EA5DFV (Spain) 2304 and RL3A (European Russia) at 2319UTC using an Icom IC-746 with a SGC237 tuner and 8.2m of wire.

A warm welcome now to new reporter **Ian Hulse M3VIH** in Stoke-on-Trent who was pleased to work his first stateside station **Tim Duffy K3LR** in West Middlesex, Pennsylvania at 1040UTC using a Lake Electronics transceiver and 5W c.w. to a 7MHz Hamantenna erected in an inverted dog leg 'V'. Ian says "To be fair the band was very quiet this morning and I was the first person to call Tim and even luckier that he heard me"!

Meanwhile Ted G2HKU operated on 10MHz with a G5RV and worked T77C (San Marino), CT3FT (Madeira Island) AF-014 and OY1CT (Faroe Islands) EU-018 around 1700UTC.

THE 14 & 18MHz BANDS

Our second new reporter is **Mike Palmer MM1MDP** in Kirkintilloch, Glasgow, who has made some interesting contacts using a Yaesu FT-817 running 5W QRP to an ATX style Walkabout antenna. Mike says "As I live in a flat, the antenna is mounted on a bracket outside the 3rd floor living room window when I operate and brought in when I close down"! Contacts made using BPSK31 include OM100TS (Slovak Republic) 1204 a special event station marking the 100th anniversary of the two-tone c.w. transmission system, DB4RU (Germany) 1218, HG3IPA (Hungary) 1231, a special call for the International Police Association and best DX WA2VOS (USA) in New York City at 1302UTC.

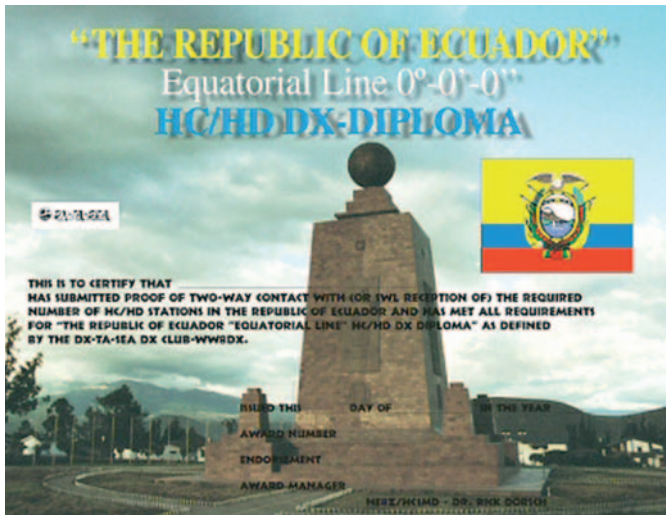
THE 21 & 24MHz BANDS

On to 21MHz now and **Owen Williams G0PHY** in Biggleswade, Bedfordshire, who made two contacts using an Yaesu FT-747 and 100W s.s.b. to a dipole antenna. The first of these was with 3B9FR (Rodriguez Island) AF-017 at 1500UTC followed slightly later by a contact with well known amateur **Marti Laine OH2BH** who was operating as EA8BH (Canary Islands) AF-004 at 1655UTC. Owen says "I could have listened all afternoon to Marti's working his pile-up and it was great to have worked this Ham Radio institution"!

In Liverpool **Billy Clayton 2E1WHC** used his Kenwood TS-570D and Cushcraft MA5V antenna to work OH6HQI (Finland), T95N (Bosnia-Herzegovina) IZ6EIY (Italy) and RV3NA (European Russia) between 1300 and 1500UTC. His daughter **Jessica** is newly licensed with the call **M3FGX** and she was very pleased to make contact with **John Naberezny WE2F** (USA) in New York so much so she talked with him for over half an hour.

The 24MHz band had just one QRP contact for Ted G2HKU who fought high static levels to work VA3DX (Canada) in St. Catharine, Ontario at 1501UTC using his Icom IC-721S transceiver.

Also spending some time on this band was **Rob Hastings M3AHH** in Chelmsford, Essex who found conditions 'reasonable' working PY2VA (Brazil) 1252, CT2IUA/P (Portugal) 1312, YO4PX (Bulgaria), CT3MD (Madeira Island) AF-014 at 1546UTC using a Kenwood TS-50S, MFJ-945E tuner and 10W s.s.b. into an inverted Carolina Windom 80 Special.



The Equatorial Line Diploma is for contacts made with different Ecuadorean HC & HD prefix areas.

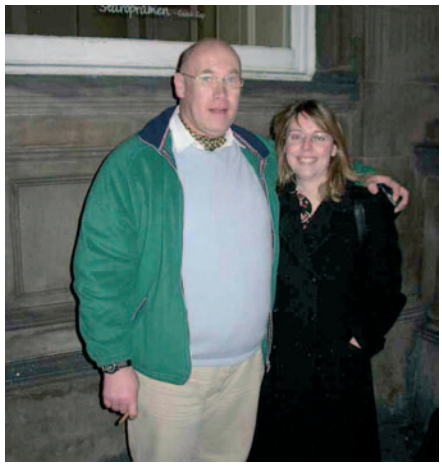
The HC8/HD8 DX Diploma is issued for contacts made with a minimum of three different HC8 or HD8 stations in the Galapagos Islands.

THE 28MHz BAND

Onto 28MHz now and the 100W mobile signal of **Mark Hampton M5MDH** who lives in Eastleigh, Hampshire, which reached RW4FE (European Russia) 1144, UU7J (Ukraine) 1208, WP2Z (Virgin Islands) NA-106 1219, FY5KE (French Guiana) 1228 and A61AJ (United Arab Emirates) at 1236UTC. Since this report Mark's car has been put off the road after he hit a fox which cracked the radiator. The fox came off worse, though his equipment, a Yaesu FT-857 survived the crash. The antenna used was a Watson monoband whip.

SIGNING OFF

That's about all there is space for this month though I must mention a flying visit I had to Edinburgh a few weeks ago where I managed to meet up with a friend of mine, fellow RNARS member **Colin Topping GM6HGW/ZD9HGW** and his wife **Gail GM7GKE/ZD9GKE**. They have been kept very busy after they recently moved house so their Amateur Radio activities have had to take a back seat for a while. As both are members of the Magic Circle their various card tricks and illusions kept me suitably entertained during our evening meal.



Colin Topping GM6HGW/ZD9HGW and his wife Gail GM7GKE/ZD9GKE.

As usual my thanks go to all our reporters and 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

TEX SWANN G1TEX/M3NGS
C/O PRACTICAL WIRELESS
TEL: 0870 224 7810
E-MAIL: tex@pwpublishing.ltd.uk

TEX SWANN G1TEX/M3NGS TALKS ABOUT REFILLING COLOUR INK-JET CARTRIDGES AND USING DIGITAL CAMERAS

Time seems to fly by faster and faster, it hardly seems like it's my turn to write the column again. I wondered what I should tackle this time, then a series of queries were thrown my way, which prompted me to have a closer look at colour in the hobby.

The colour that I'm referring to is actually the various items that we rely on to make the hobby the fulfilling experience that it can be. Take printing for instance, most of us now have colour printers attached to a computer, and we use them to print out all sorts of things - from family photographs to our own QSL cards. I suppose that I'm like many others and I'll often sit down to do some printing on a Sunday evening - then find that my printer has run out of ink. Or at least it claims it has!

I've been using Epson printers for a very long time, since way back in the mid-1980s, when I had a very noisy 24-pin dot matrix wide column printer that was replaced by an Epson laser printer. That laser printer earned its keep, and could be refilled quite easily with toner powder. Mind you, it took weeks to remove the film of waxy powder from wherever it had landed in the event of a spill!

Then I started using ink-jet printers of which the early Epson versions again were quite easy to refill when the ink ran out. The printers at the time, had little 'intelligence' as to how much ink was left in the tank, they would blithely keep churning out blank paper, long after the final drop of ink had been squeezed through the print-head. At the time many refill kits were available with bottles of coloured ink and a large filler with an equally large, but unsharpened needle. That's everything that was needed to keep a busy ink jet printer printing.

Fig 1: Reading the on-cartridge chip convinced the computer how much ink is left for use.

RUNNING TOTAL

Then manufacturers started placing a 'chip' in the printer cartridge, this had a 'running' total of all the drops of ink that had been used in both the printing and head-cleaning cycles. In the printer driver, there was an ink-level utility that would read the contents of the chip and display a suitably appropriate level on screen as seen in **Fig. 1**. The best 'guess' of the utility is that there may be around 43 pages (similar to the last one printed) left in the two cartridges. Although it's still easy to replace the ink, the system refuses to print as it considers the tank to be 'empty'.

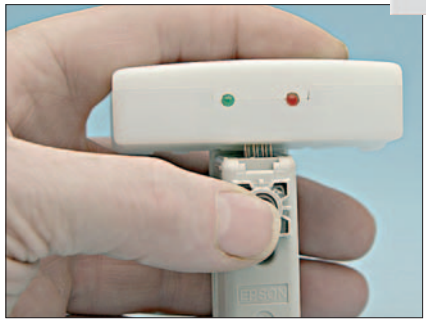
Like many other users, I was reduced to having at least two of each of the Epson cartridges (both black and colour) in hand for when I ran out. These four 'spare' cartridges had a value of around £70, not an inconsiderable value by any means. I had tried several non-Epson cartridges in the past, but had been less than happy with the colours that were produced.

While 'pattern' ink cartridges for many other printers seemed to be more than adequate, Epson always seemed to defeat the refillers. Since then I've discovered that there is an ink that is suitable for refilling 'photographic' printers such as Epson. But a solution for the chip still defeated me. However, I've now found a small unit that will reset the counter to zero - at last!

The unit, shown in **Fig. 2,** is a small self-contained with two l.e.d.s and a matrix of pins, suitable to fit the on-board chip on Epson printer cartridges. In use the cartridge is carefully aligned with the matrix of pins and will only fit properly one way round, **Fig. 3**. On pressing the cartridge onto the pins, both the red and green l.e.d.s light then go out. The cartridge may be refilled and replaced in the printer, where the printer utility will show the new 'full' status as in **Fig. 4**.

Fig. 2: This unit allows you to reset the ink counter back to zero.

Fig. 3: In use the device is pressed against the pins of the chip. See text for more details.



RECENT TALK

Recently I gave a talk to my radio club, Poole Radio Society, on digital cameras and image techniques. As it seems to be becoming 'all the rage' to have and use digital cameras, I thought I'd give you a little background to help in the decision making. Although, I'm not going to recommend any one make or model, as that's beyond the scope of this article. Instead, I'd like to put the various specification into some kind of significance.

In general terms, digital cameras are more expensive than the equivalent 35mm unit. The simple 'once-only' throw-away 35mm camera may be capable of recording more detail than a cheap

Fig. 4: Now look at all that ink. But now it no longer reflects reality.

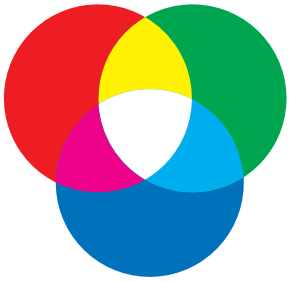


Fig. 5: Varying amounts of the three primary colours (red green and blue) allow all colours to be created.

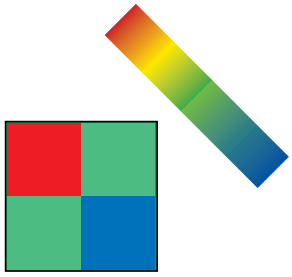


Fig. 6: Using two green sensitive cells as well as a red and a blue ones, a pel (single pixel) makes a closer representation of how the human eye 'sees' colour. See text for more details.

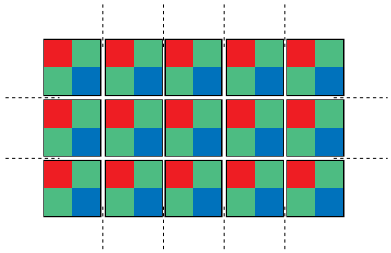


Fig. 7: A regular matrix, often of many millions of pixels, is formed into a camera's sensor array.

digital camera, but the digital camera has many other advantages. So, let me assume that you're looking to make your first purchase.

Digital cameras use a matrix of light sensitive cells to record the amount and colour of the light falling on each cell called a 'Pixel' (or occasionally just 'Pel'). Each pixel responds to an element of red, green and blue light falling on the element as represented in **Fig. 5**. As you can see a combination of these will represent other colours, from white, where they are all present - to black, where none of them are present.

As the use of round cells isn't a very efficient use of an area, in most cameras a square arrangement of cells is used in the sensor. In **Fig. 6** the square pattern represents a common arrangement. Note: There are two green cells, which helps to balance the light to the way that the human eye does. Shown to the upper right is a swathe of colours that may be represented by this arrangement. And of course lightness, or darkness, would be the overall level of light falling on all of the cells. The individual pixels, many millions of which may be used in a camera, are also arranged in a matrix as shown in **Fig. 7**.

Cameras are usually quoted in the number of 'megapixels', the number, in millions, of pixels, or picture elements that go to make up a complete image. The higher this megapixel number is the better the ultimate quality of the image. The more pixels - the finer the 'grain'. There are however, several methods of quoting these figures. The figure to ask about is the number of effective or 'real' pixels on the sensor that the camera uses to 'see' an image with.

EXTRA INFORMATION

You may see 'Output' pixels being quoted, often twice as many as the effective - but most of them are 'guesses'. But extra information is bought at the expense of extra storage space. As a rule of thumb, a three megapixel (Mp) picture will need around a megabyte of space on a storage card (for very good reproduction). A picture of six megapixels will need around twice as much space. So, the 256MB card shown in **Fig. 8**, will hold no more than about 200-220 pictures.

The Canon A70 digital camera shown in Fig. 8 has a 3Mp sensor and was bought as a present for my XYL. It runs from four AA cells, may be used at eye level or with an in-built 'live' screen (which 'eats' batteries by the way), has a variety of operating modes and uses relatively cheap Compact Flash memory cards. Memory cards can be an expensive addition to any camera, though in larger sizes the Compact Flash type offers good space per pound value. They are also available up to 1GB with 4GB versions around the corner.

A card-reader is one of the simplest ways of getting the pictures from the camera's card into the computer. It's possible to buy a simple 'one-type' reader, but I prefer the six-type as shown in the photograph of **Fig. 9**. This accepts six different types of storage card in the four interfaces, and couples to the computer via a single universal serial bus (USB) lead.

When you start with digital photography it's a good idea to add a CD-ROM writer to your present machine if it hasn't got one already. 'Burning' your own CD-ROM to store images on them is cheaper than paying for it to be done commercially and will 'pay for itself' over quite a short period.

To get an idea of the many cameras that are around, I suggest that you have a look at **www.dpreview.com** which is a great site for setting up comparisons between various cameras. You'll also find some test images on the site (for many of the 'better' cameras) which are well worth looking at before making a decision .

Well that's all the space I have this time so, I'll say bye for now, see you next time. Space is rather tight here, but if you have a query about a parameter for digital cameras drop me an E-mail and I'll do my best to explain it for you.

73 Tex G1TEX / M3NGS

Fig. 8: A Canon A70 digital camera with a 256MB compact flash memory card. The smaller blue card is an Secure Data (SD) type from another camera. As with other cameras, using the rear-mounted screen, drains battery power quite quickly.

Fig. 9: A multi-format digital memory card reader. Shown with two of the types that it can read, this six-way type couples to a computer via a USB lead. See text for more details.

For inks and the ZAP-IT device contact: **Accutre, 21a Furzey Road, Upton, Poole, Dorset BH16 5RW, UK** or have a look at their website **www.accutre.co.uk**

For information about many digital cameras and a side-by-side comparison, look at: **www.dpreview.com**

Trader's Table

The equipment for sale on this page is secondhand or ex-demonstration

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Kenwood TS-520SE, £150. Icom IC-210, £80. Trio 9R59DS, needs service, £40. Icom 701 with p.s.u., £150. Plus other SK items, inspect and collect. Tel: Kent (01303) 813213.

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Large p.s.u., 475V, 500mA, 250V, 500mA, various low voltage outputs, £70 - buyer must collect. Oscilloscope single trace large unit, £70. Oscilloscope dual trace, £50. Signal generator, 150kHz to 300MHz, £30. Tel: (01450) 375872 after 1800 for details.

Magazines for sale, *PW*, *Wireless World*, *SWM*, *RadCom*, *Television* and *Elektor*, approx 400 magazines, between 1959 and 1985 - offers. Tel: (01248) 811197.

Optibeam 5 bands OP9, new, in box, never assembled, £680 o.n.o. John M0CJW, QTHR. Tel: (01522) 789959 or (07973) 462268.

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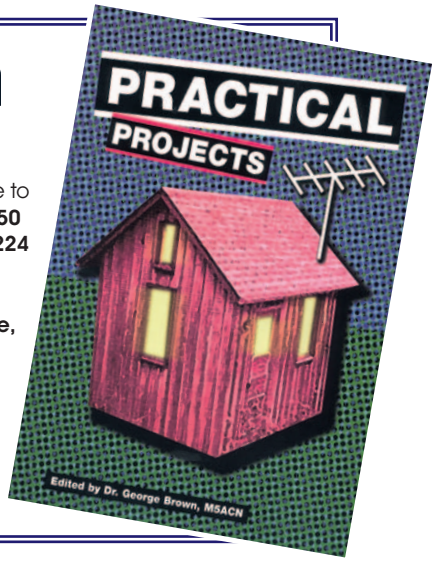

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topical talk

The Amazingly Versatile EF50

This month a letter from a *PW* reader sets Rob G3XFD's memories rolling as he takes a look at the amazingly versatile EF50. It seems as though there's a real treat coming along for those who enjoy using this truly pioneering and historic valve!

The thought provoking letter (see letters this month) from **Ian Wilkes GW3FSW** on the topic of EF50 valves makes interesting reading. Ian's letter also got me thinking more on my plans for an 'EF50' special feature, which I've been planning for later in 2004. It seems very appropriate that the article will appear under the special series title 'It's A Classic - The EF50'.

However, I should begin Topical Talk this month by answering the question posed by Ian. And I'm pleased to say that if readers can provide us with the title, date of publication and what the particular article covers - there's usually no problem whatsoever in locating historical projects from either *PW* or *Short Wave Magazine* archives. Our problems start when we get vague requests asking for 'an article from several years ago' with little other information, which then turns out to have been published 30 to 40 years ago!

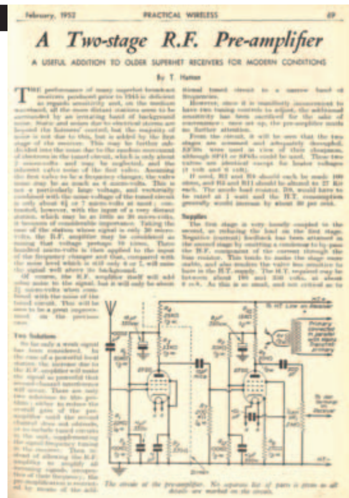
Readers requiring help to obtain photocopies of articles are asked to contact **Clive Hardy G4SLU** in the Book Store Department. Clive will then dive into the archives, working closely with us (to help locate what you require) before sending off the completed photocopies. Paying for the service isn't too painful and 'plastic' (credit cards) 'Will do nicely' as they say! To help, Clive will estimate how much photocopying will be, and what's involved (basically, photocopies are the only option for any project from *PW* or *SWM* older than four/five years).

The EF50 Feature

The special EF50 feature I'm planning will reproduce as many applications, circuits and projects for the valve that I can find on your behalf. Obviously the G5UM receiver project, which Ian GW3FSW mentioned will be included, along with the useful untuned r.f. circuit in **Fig. 1**.

Incidentally, the small advert, **Fig. 2**, features a war surplus r.f. pre-amplifier using an EF50. These units were still in use in the Royal Navy during my service days!

● Fig. 2: The EF50 often appeared in War Surplus equipment - such as this pre-amplifier advertised in the September 1951 *PW*. Ideal for use in Band I v.h.f. television reception it cost 75p plus 5p P&P.


A Two-stage R.F. Pre-amplifier
A USEFUL ADDITION TO OLDER SUPERHET RECEIVERS FOR MODERN CONDITIONS

● Fig. 1: This two-stage untuned r.f. pre-amplifier (*PW* February 1952) by T. Hatton, demonstrates just how versatile the EF50 was - and still is - to the radio enthusiast.

Obviously, I'll be busy in the archives finding all the EF50 projects, circuits and ideas I can on your behalf. And of course, you can help by writing in (or E-mailing) to suggest your own EF50 favourites, although most I know of appear in *PW* from around 1945 up to the mid-1950s. I look forward to hearing from you with you 'EF50 requests', and although I can't promise to reply personally to everyone, each contribution will be appreciated! **PW**

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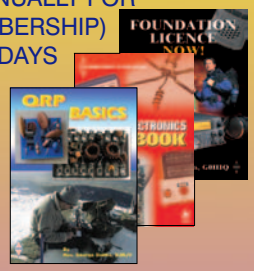

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