

Practical Wireless

PW

amateur radio & more!

win
tickets for
RIAT 2003

Licensed &
Ready To Go
part 3

Keen on Kits?
Try These!



June 2003 £2.85



It's 144MHz QRP Contest Time!

WATERS & STANTON

WEB ORDERING
www.wsplc.com

DON'T FORGET!
SUNDAY 25th MAY 2003



W&S HOCKLEY OPEN DAY
In our 30th Year of Trading!
Great Deals! Free raffle! Free Food!
Stands include - Manufacturers,
Repeater Groups & Clubs



NEW RIGblaster pro



New in the line up is the RIGblaster pro rig to sound card interface. Full status front panel LEDs, electret mic. input plus second mic. Now features dual headphone outputs 1/4" and 3.5mm. Built-in Yaesu CAT and Icom CI-V interface and Kenwood compatibility. Two independent keying outputs for CW and FSK. New CD-ROM program selections including sound card based DSP software. Large number of leads supplied for most hook-ups.

£299.95 B

BRAND NEW!!!

ICOM IC-703 • 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)

IN STOCK SOON PRICED £579 !!

YAESU FT-857

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.

IN STOCK NOW PRICED £799 !!



HEAD OFFICE • 22 MAIN RD, HOCKLEY • ESSEX • SS5 4QS
ENQUIRIES: 01702 206835/204965 FAX: 01702 205843
MIDLANDS STORE • W&S @ LOWE • BENTLEY BRIDGE
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• GLENROTHES • FIFE • KY7 5DF **ENQUIRIES: 01592 756962**
FAX: 01592 610451-CLOSED MONDAYS

ICOM IC-756 PRO II

£1999 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

£1449 C



COMES WITH FREE SP-21 & SM-20

HF/VHF 100W transceiver. Features large LCD with spectrum scope, auto ATU and same DSP system as IC-756PRO II. Supplied with free SP-21 speaker & SM20 desk mic.

ICOM IC-706 IIG DSP

£799 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-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

£1569 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

£2499 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

£1899 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

£989 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-847

£1148 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 separate antenna sockets.

YAESU FT-817

£569 C



All bands & All modes gives you a totally portable HF DX or VHF/UHF station. *Ours includes* battery and charger.

LINEAR AMP UK CHALLENGER III

£1795 C



HF linear amp 160-10m including WARC bands. Output 1500W CW or SSB, 400W RTTY. Soft start and timer protection at switch-on. Front panel adjustable ALC.

LINEAR AMP UK RANGER 811H

£895 C



HF linear amp 160-10m including WARC bands. Drive 10-100W, output 800W (max) CW. Soft start on switch-on. Compatible with all modern 100W HF rigs. Silent running Papst fan.

AMERITRON AL811 XCE

£799 C



Ideal 600W HF Linear more than enough for the full UK limit. 160-10m including WARC bands. Uses 3x 811A low-cost valves. Matches all modern 100W solid state HF rigs. Silent running cooling fan.

TOKYO HY-POWER HL-50B

£265.95 C



This model has been specifically designed for the FT-817. Enjoy up to 50 Watts output

FD-7021 POWER TANK

£24.95 B



12V DC 4Ah supply, ideal for FT-817 and the new IC-703. *2x 12V, 12A Cigar lighter sockets *+3/6/9V outputs *Computer controlled battery state *Built-in lantern *AC charger & cigar lighter power cord included *Shoulder strap *Compact size: 180 x 85 x 210mm *2.3kg

PHONE FOR EXPERT ADVICE ON ANY ITEM

08000 73 73 88

FREEPHONE ORDER LINE:

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



ICOM IC-2725E **NEW** £309 C



The Icom IC-2725 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-207H £279 C



Great budget price dual band FM 50W/35W transceiver. Simple band operation. Front panel detachable from main unit if required.

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-8900R **NEW** £369 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-7100 £329 C

Excellent dual band radio that has extended rx. Power is 50/35W. Features dual in-band reception and detachable display (requires YSK-7100).

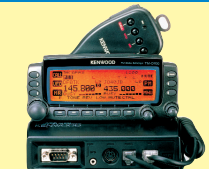


YAESU FT-1500M **Special Offer** £159 B

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



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!

YAESU VX-7R **NEW** £319 B



6m/2m/70cm

Available in Silver or Black



The VX-7R is the best outdoor handle ever. The case, keypad, speaker and connectors are all sealed against water damage. Wide frequency coverage from 500kHz to 900MHz the VX-7R is ideal for monitoring a variety of broadcasts. The display is a dazzling 132x64 dot matrix providing easy-to-read frequencies and information plus pictorial graphics.

YAESU VX-1R **GREAT PRICE** £119.95 B



2m/70cm

Ultra-wide frequency coverage which includes VHF and UHF TV audio, AM broadcast, FM broadcast and AM airband.

SAVE £100 WAS £219

YAESU VX-110 £99 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 **NEW** £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 £259 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-band 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.

MOBILE ANTENNAS

WATSON ANTENNAS (PL-259 base type)

NEW WGM-270. ON GLASS ANTENNA
Dual Bander 2m/70cm, 3.7m coax, Power 50W.
Supplied with matching box and mounting kit.

W-2LE	2m quarter wave 2.1dB 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/79cm 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 NEW	2m/70cm On glass 3.7m coax 50W	£29.95	B

MOBILE BASES

DIAMOND



K-600M.

Deluxe boot mount SO-239, c/w 5m RG-58 & PL-259

AML	Gutter mount fold over type	£15.95	A
K-11	Universal gutter mount	£24.95	A
K-33	Adjustable hatch mount	£23.95	A
K-400	Adjustable boot mount heavy duty	£26.95	A
K-600M	Deluxe boot mount + cable	£49.95	B
DPK-TR	Stainless Steel boot mount (ECH)	£18.95	A

WATSON



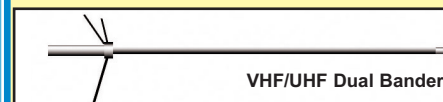
WM-14B.

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-200	2m/70cm colinear 6/8dB 2.5m	£79.95	C
X-300	2m/70cm colinear 6.5/9dB 3.1m	£99.95	C
V-2000	6m/2m/70cm 2.15/6.2/8.4dB 2.5m	£89.95	C

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 2.15/6.2/8.4dB 2.5m	£69.95	C

WATSON SAFE-2-WAY **NEW** £89.95 B

**AT LAST !!
A HANDS FREE
SYSTEM THAT
REALLY WORKS!**



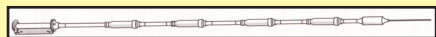
**Widely used commercially *Approved to Pan-European Standards *True Hands-Free *Noise Reducing *Acoustic Tailored Mic *Remote (3m) Latching PTT *Boom mic (3m) with Velcro *Adjustable gain *Adjustable Time-Out *Powered from rig mic socket *Ready made rig leads (£14.95 extra) *Also matches handhelds.*

The Safe-2-Way mobile Interface is made for Watson in the UK by the same company that equips UK Police and Emergency services with similar units. Purchase the ready-made lead to match your radio and tuck the unit out of sight. The plug-in PTT and boom mic both have 3m leads for dressing around vehicle. Don't risk your Licence or people's lives! Drive with **Safe-2-Way**.

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

VERTICAL ANTENNAS

HUSTLER BASE ANTENNAS



6-BTV. HF 6-band vertical

6-BTV NEW	80-40-30-20-15-10m 1kW PEP	£239.95	C
5-BTV	80-40-20-15-10m 7.64m 1kW	£209.95	C
4-BTV	40-20-15-10m 6.52m 1kW PEP	£169.95	C

CUSHCRAFT BASE ANTENNAS



MA5V HF 5-band compact vertical.

MA5V	20-17-14-12-10m 250W PEP	£229.95	C
R8	40-30-20-17-15-12-10-6m 1.5kW	£529.95	C
R6000	20-17-15-12-10-6m 1.5kW PEP	£349.95	C

HORIZONTAL BEAMS & DIPOLES

CUSHCRAFT



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	£349.95	D
A4-S	10-15 & 20m 4 el. Yagi 2kW	£599.95	D
A3-WS	12 & 17m 3 el. Yagi 2kW	£399.95	D
X-7	20/15/10m 7 el. Yagi 2kW	£699.95	D
TEN-3	10m 3 el. Yagi 2kW	£219.95	C

RADIO WORKS



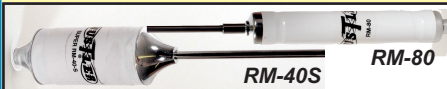
A choice of quality wire antennas available to fit almost any circumstances.

CW-160	160-10m 76.8m long	£139.95	C
CWS-160	160-10m 40.5m long	£134.95	C
CW-80	80-10m 40.5m long	£99.95	C
CWS-80	80-10m 20.1m long	£119.95	C
CW-40	40-10m 20.1m long	£94.95	C
CW-20	20-10m 10.36m long	£84.95	C
CW-620	20-6m 9.7m (32ft) long	£94.95	C
G5RV PLUS	80-10m with balun 31m (102ft) long	£64.95	B

MOBILE ANTENNAS

HUSTLER

Standard Resonator 400W (mast sections not included)



RM-10	10m 150-250kHz	£19.95	B
RM-11	11m 150-250kHz	£19.95	B
RM-12	12m 90-120kHz	£19.95	B
RM-15	15m 100-150kHz	£19.95	B
RM-17	17m 120-150kHz	£24.95	B
RM-20	20m 80-100kHz	£24.95	B
RM-30	30m 50-60kHz	£26.95	B
RM-40	40m 40-50kHz	£26.95	B
RM-80	80m 25-30kHz	£29.95	B
Super Resonator 1kW (mast sections not included)			
RM-10-S	10m 250-400kHz	£24.95	C
RM-15-S	15m 150-200kHz	£26.95	C
RM-20-S	20m 100-150kHz	£31.95	C
RM-40-S	40m 50-80kHz	£37.95	C
RM-80-S	80m 50-60kHz	£51.95	C

Lower Mast Sections

MO-1	54" (FOLD @ 22")	£33.95	C
MO-2	54" (FOLD @ 27")	£33.95	C
MO-3	54" (NON FOLD)	£26.95	C
MO-4	27" (NON FOLD)	£22.95	C

Mobile Mount Accessories

SSM-1	Ball mnt stainless steel spring&stud	£45.95	B
SSM-2	Ball mount	£28.95	A
SSM-3	Stainless steel spring & stud	£24.95	A
HOT	Trunk lip mount	£24.95	A
RSS-2	Stainless steel resonator impact spring	£10.95	A
QD-2	Quick disconnect adaptor	£19.95	A
VP-1	Multi-band adaptor	£7.95	A

LOWE SPS-8400 PSU

£99.95 C

SPECIAL OFFER



A general purpose variable 3-15V DC, 25A (30A peak) power supply. Modern design, dual analogue meters, front power terminals. More than enough for 100W transceivers.

MANSON EP-925 PSU

£99.95 C



A general purpose 3-15V DC, 25A (30A peak) power supply able to provide the needs of the modern 100W HF transceiver. *Dual analogue meters *Over current protection *Large power terminals for rigs *Quick snap connectors for ancillaries

LDG RT-11 Asm ATU

£239.95 B



*1.8-54MHz *5-150W *6-800 Ohm loads *Remote Autotuner *RF sensed *Dipoles, Verticals, Beams *Water resistant enclosure *built-in lcom and Alinco connectivity *Supply 11-15V DC *Size 216 x 140 x 76mm *Weight 1.14Kg

MFJ-969 ATU Deluxe Versa Tuner II

£199.95 C



*1.8-54MHz *300W PEP *T-match network *Internal 4:1 balun *Built-in dummy load *X-needle meter *3-way ant switch One of the most popular 300W models.

WATSON FC-130 Frequency Counter

£59.95 B



SPECIAL OFFER

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

SAVE £20 WAS £79.95

Offer Ends 30/6/03

AVAIR AV-20 VSWR/Power Meter

£39.95 B



Two cross-needle VSWR/PWR Meters ideal for any shack. *AV-20 3.5-150MHz *AV-40 144-470MHz *FWD/RFLD VSWR + PWR *150W *Sockets SO-239 *50 Ohms *Size 85x87x95mm *Weight 280g

AV-40

X-needle VSWR/PWR 140-525MHz £39.95 B

WATSON W-GMP Morse Key

£29.95 A



- Metal parts brass
- Hardwood base
- Miniature size
- Size 100 x 50 x 45mm
- Weight 150g

WATSON W-CRI Morse Key

£46.95 B



- Metal parts brass
- Hardwood base
- Size 145 x 80 x 50mm
- Weight 375g

MFJ-461 Morse Code Reader

£84.95 B



*Stand alone unit *Built-in mic *32char high contrast LCD *Automatic speed tracking *Serial port *Built-in speaker *9V PP3 (not included) Simple PC program available (user supplies disk)

WEST MOUNTAIN RIGBLASTERS

RIGblaster pro	Data interface 8-pin/mod. Cd & cables	£299.95	B
RIGblaster Plus	Data interface 8-pin/mod. Cd & cables	£139.95	B
RIGblaster M8	Data interface 8-pin, software & cables	£109.95	B
RIGblaster M4	Data interface 4-pin, software & cables	£109.95	B
Rigblaster RJ	Data interface RJ45, software & cables	£109.95	B
RIGblaster nomic8P	Data interface 8-pin, software & cables	£59.95	B
RIGblaster nomicRJ	Data interface RJ, software & cables	£59.95	B
FT100-CBL	Adapts all units to FT100 input	£12.95	A

AUDIO ACCESSORIES

HEIL



Desk Microphones

HCL-5/4 Classic retro-look HC-5/4 desk mic £259.95 B



Hand Microphones

GM-4/5 Goldline HC-4/HC-5 hand mic £129.95 B



Headsets & Boom microphones

HST-817 Traveler single side headset for FT-817 £89.95 B



HST-706 Traveler single side headset for IC-706 £89.95 B

Headphones & Boom Microphones

PRO-SET-PLUS Large H/phones with HC-4 & HC-5 £199.95 B

WATSON



Base Microphones

WM-308 Desk electret mic c/w ML-308 £59.95 B



Earpieces

WEP-300B Over the ear, 3.5mm mono jk-plug £2.95 A



Speaker Microphones

QS-112(Y,K,I,M) H/held spkr/mic (state which model) £16.95 A

bhi NES10-2 & NES-5 DSP Speakers



NES10-2

£99.95 B

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



NES-5

£79.95 B

bhi NEIM1031 NEW

£129.95 B



NOISE ELIMINATING IN-LINE MODULE
* Noise attn -20dB (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 in impedance 10K
* Line out impedance 100 Ohms * Line in sensitivity 300mV -2V RMS * Headphone socket 3.5mm mono jack * Power 12-24V DC 500mA

bhi 1042 SWITCH BOX NEW

£29.95 B

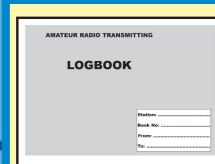


Connect more than one piece of equipment to your bhi noise eliminating speaker with the 1042 Switch Box.

Allows 6 pieces of equipment to be connected, 3 inputs loaded at 8 Ohms and 3 unloaded inputs (for low level signals). Two audio leads provided.

TRANSMITTING LOGBOOK NEW

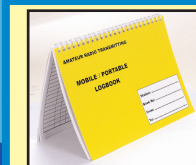
£4.99 A



Traditional Logbook for Radio Amateurs, A4 size, spiral bound for ease of use plus updated Prefix List and room for extra notes. A log is a legal requirement for any radio station. Order Code: LBVA-BK

MOBILE/PORTABLE LOGBOOK NEW

£4.99 A



The new Radio Amateurs Mobile/Portable Logbook. A5 size, spiral bound. Also contains relevant repeater information. Not a legal requirement for mobile, but great for recording QSO's. Order Code: LBMP-BK

THE **SGC** SPRING PROMOTION @ WATERS & STANTON

BUY NOW AND SAVE POUNDS!!!

SG2020

20W HF TRANSCEIVER



HF SSB CW & Data 160m - 10m plus gen coverage receive. VSWR meter, keyer and switched bandwidth filtering. Power variable down to 1 Watt. Includes mic and DC lead. Diecast case.

WAS: ~~£699~~ NOW: £549.95

SG2020 ADSP

20W HF TRANSCEIVER



HF SSB CW & Data 160m - 10m with DSP plus gen coverage receive. VSWR meter, keyer and switched bandwidth filtering. Power variable down to 1 Watt. Includes mic and DC lead. Die cast case.

WAS: ~~£899~~ NOW: £649.95

SG239 - MINI AUTO HF ATU

1.8-30MHz 200W PEP

Low cost.
Indoor
Use



For Long
Wires

Low cost with 170 tuner memory locations (not waterproof). Minimum input 1.5W.

WAS: ~~£299~~ NOW: £189.95

Next Day Hour Courier Delivery (Ex Sat & Sun) £10 Any Item. £12 For Two Or More

SG230 - HF AUTO ATU

1.6-30MHz 200W PEP

For Long
Wires



Fully waterproof. SO-239 input. Wire terminal output. Min input 3W. 406 x 305 x 76mm

WAS: ~~£399~~ NOW: £359.95

SG231

HF+6m 100W PEP AUTO ATU

For Long
Wires



Fully waterproof. SO-239 input. Wire terminal output. Min input 3W. 292 x 241 x 44mm.

WAS: ~~£439~~ NOW: £359.95

SG235 - 500W PEP

AUTO ATU 1.6-30MHz

For Long
Wires



Fully waterproof and 500W PEP. 170 tuner memory locations. Min input 3W. 406 x 305 x 76mm

WAS: ~~£1499~~ NOW: £799.95

AUTO ATUs require 12V at 500 mA max (SG-235 1.4A). Just connect between transceiver and random wire for all-band instant coverage. They can be positioned remotely in garage, attic or outside (ex SG-239)

SG237 - 1.8-60MHz 100W

For Long
Wires

Compact
Size



Fully waterproof. SO-239 input. Wire terminal output. Min input 3W. 178 x 229 x 38mm.

WAS: ~~£439~~ NOW: £299.95

SG237 PORTA 100W PEP AUTOMATIC PORTABLE COUPLER

For Whips



1.8 - 60MHz die cast boxed portable ATU for whip use. Min whip length 2.7m. 178 x 229 x 38mm.

WAS: ~~£649~~ NOW: £449.95

STEALTH ANTENNA KIT



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PW

JUNE 2003
(ON SALE MAY 8)
VOL. 79 NO 6 ISSUE 1155
NEXT ISSUE (JULY)
ON SALE JUNE 12

EDITORIAL OFFICES

Practical Wireless
 Arrowsmith Court, Station Approach
 Broadstone, Dorset BH18 8PW

☎ (01202) 659910
 (Out-of-hours service by answering machine)
 FAX: (01202) 659950

Editor

Rob Mannion G3XFD/EI5IW
 Technical Projects Sub-Editor
 NG ("Tex") Swann G1TEX/M3NGS
 News & Production Editor
 Donna Vincent G7TZB/M3TZB

ADVERTISEMENT DEPARTMENT

ADVERT SALES & PRODUCTION
 (General Enquiries to Broadstone Office)

Eileen Saunders M3TTO

Art & Layouts: Steve Hunt & Bob Kemp
 Typesetting/Production:
 Peter Eldrett

☎ (01202) 659920
 (9.30am - 5.30pm)
 FAX: (01202) 659950

ADVERTISING MANAGER

Roger Hall G4TNT
 PO Box 948, London SW6 2DS

☎ 020-7731 6222
 FAX: 020-7384 1031
 Mobile: (07885) 851385

ACCOUNTS

FINANCE/OFFICE MANAGER:

Alan Burgess
 Tel: (01202) 659940
 FAX: (01202) 659950

BOOKS & SUBSCRIPTIONS

CREDIT CARD ORDERS

☎ (01202) 659930
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SUBSCRIPTION ADMIN

Kathy Moore
 Tel: (01590) 641148
 E-Mail: subs@pwpublishing.ltd.uk

E-MAIL

PW's Internet address is:
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You can send mail to anyone at PW,
 just insert their name at the beginning of
 the address,
 e.g. rob@pwpublishing.ltd.uk



Cover Subject

Once again this issue is packed with radio delights for you to enjoy! The two kits from the Kit Radio Company shown on the cover provided our Editor with plenty of enjoyment as he put them to the test and in doing so discovered that they would, in his opinion, be ideal for all those who are keen to 'have a go' at kit building.

It's also time to prepare for the PW 144MHz QRP Contest and if you do take part remember to enjoy it. The contest is open to all.... no matter what your level of expertise. So, go on air and join in the fun!

Design: **Steve Hunt**

Photograph: **Tex Swann G1TEX/M3NGS**

June features

18 Tex's Tips & Topics

Sending in your helpful hint or topical tip for inclusion on **Tex Swann G1TEX/M3NGS'** page could win you a book voucher. Three PW readers have done that and share their ideas this month.

22 Radio Basics

Rob Mannion G3XFD describes the requirements for, and the building of the regenerative detector type tuneable i.f. stage of the Basic-4 receiver. He says "it's an interesting, practical and simple stage to build and set-up".

24 QRP Contest Rules

Dust off that rig, reel out your antenna, coaxial cable etc., and chase those contacts in this, PW's 20th 144MHz QRP Contest. **Neill Taylor G4HLX**, originator and adjudicator of the contest encourages you to join in and explains the rules to get you prepared.

28 Kit Radio Company Kit Reviews

Interested in kits?...Try these for size! Always on the look out for ideas to encourage the practical construction side of the radio hobby, **Rob G3XFD** reviews two simple but useful projects from the Kit Radio Company, which he thinks will prove attractive to all those who are keen to 'have a go' themselves.

30 Royal International Air Tattoo Competition

Enter our competition to be in with a chance of winning a pair of tickets to the ultimate Airshow Experience - RIAT 2003. Taking place over the weekend of 19 & 20th July the event will celebrate 100 years of flight and promises a weekend of thrills and magnificent displays.

36 Antenna Workshop

Peter Dodd G3LDO takes his turn in the 'workshop' and this time he takes a look at the computer modelling of antenna performance.

38 A Practical Wireless!

A simple but effective two band radio, ideal for shack or outdoor use is described by **Ian Liston-Smith G4JQT** in his article, aptly entitled the Practical Wireless. Why not consider having a go at building one yourself?

43 Licensed & Ready To Go!

Summer's approaching fast and so with that in mind in Part 3 of his series **Rob G3XFD** provides advice and information to help you achieve the best results from your low power h.f. portable station. You'll soon see why Rob enjoys working portable!

46 Practical Peter G3UCA Goes Portable and Mobile

Peter Sinclair G3UCA says it's easy to run a portable and mobile station - all it takes is a little organisation and planning. Read his article for a selection of good ideas to make your outdoor operating more efficient.

50 Carrying On The Practical Way

A utility receiver is the project under discussion with the **Rev. George Dobbs G3RJV** this month - all you have to do is find the board when you need it!

52 Radio Construction - A Lifetime Hobby

Roger Bebbington M0BWP has been described in PW as a 'Constructor Extraordinaire' and in this article he's been invited to describe the background to his beautifully engineered radio projects. And despite his relatively recent issued callsign...you'll soon realise Roger has been involved in the hobby for very many years.

54 Valve & Vintage

Phil Cadman G4JCP has lots to discuss this month, including EF50 valves and a novel t.r.f. receiver.

A vintage-style black portable radio with a large circular speaker grille. It features a tuning dial with numbers 1 through 16, a power switch with 'MW', 'OFF', and 'LW' settings, and a volume knob labeled 'VOL'. A yellow pencil is placed horizontally next to the radio for scale.

A close-up photograph of a mechanical assembly. A black, dome-shaped component is mounted on a white bracket. A green label with the text "10716" is visible on the bracket. The background is dark and out of focus.

author**info**

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

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

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

Data Surf:
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@firenet.uk.com

Tom Walters
PO Box 4440
Walton
Essex
CO14 8BX
E-mail: tom.walters@aib.org.uk

Graham Hankins G8EMX
17 Cottesbrook Road
Acocks Green
Birmingham
B27 6LE
E-mail: graham@ghank.demon.co.uk

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Published on the second Thursday of each month by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 9PW. Tel: (01202) 659910. Printed in England by Womers Midlands PLC, Lincolnshire. Distributed by Seymour, 68 Newman Street, London, W1P 3LD. Tel: 0207-396 8000, Fax: 0207-396 8002. Web: <http://www.seymour.co.uk>. Sole Agents for Australia and New Zealand - Gordon and Gots (Asia) Ltd., South Africa - Central News Agency. Subscriptions INLAND £31, EUROPE £39, REST OF WORLD £43 (Airsave), REST OF WORLD by airmail, payable to PW Publishing Ltd., WIRELESS, Subscription Department, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 9PW. Tel: (01202) 659903. PRACTICAL WIRELESS is sold subject to the following conditions, namely that it shall not, without written consent of the publishers first having been given, be lent, re-sold, hired out or otherwise disposed of by way of trade at more than the recommended selling price shown on the cover, and that it shall not be lent, re-sold, hired out or otherwise disposed of in any multiple edition or in any other form whatsoever by way of Trade, or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever. *Practical Wireless* is Published monthly for \$50 per year by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 9PW. Royal Mail International, c/o Yellowstone International, 87 Burfles Court, Hackensack, NJ 07601. UK Second Class Postage paid at South Hackensack. Send USA address changes to Royal Hackensack. Send UK address changes to Royal Hackensack. c/o Yellowstone International, 87 Burfles Court, Hackensack, NJ 07601. Send USA address changes to The USPS (United States Postal Service) number for the Practical Wireless is: 007070.

Rob G3XFD. This month Rob comments on recent club visits and has a suggestion to encourage newcomers to the hobby.

Amateur Radio Waves
You have your say! There's a varied selection of letters this month as the postbag keeps on filling as readers make 'waves' by writing in with their comments, ideas and opinions. Keep those letters coming!

Amateur Radio Rallies

A round-up of radio rallies taking place in the coming months.

Keep up-to-date with new products and who's doing what in the world of Amateur Radio with our News pages. Also, find out what your local club is doing in our club column.

This month **David Butler G4ASR** describes the difference between Ionospheric and Tropospheric conditions and how they effect DX contacts.

Carl Mason GWOVSW rounds-up the h.f. news with the help of your logs and reports, as well as reporting on a special event station for science week.

A good 'burst' of data is offered by **Roger Cooke G3LDI** this month as he looks at RTTY, offering some advice on getting started.

Graham Hankins G8EMX takes his bi-monthly look at the Amateur Television Scene and this month the topics under discussion are broadcast digital TV, the BATC rally and GB4FUN.

Tom Walters has all the latest broadcast band news and details of when and where to listen for your favourite programmes.

The bargains just keep on coming! Looking for a specific piece of kit? - Check out our readers' ads, you never know what you may find!

Check out our new look Book Store pages - we think you'll agree they look brighter and better than before. So, if you're looking for something to compliment your hobby check out the biggest and best selection of radio related books anywhere!

Subscribe to *PW* and/or our stable-mates in one easy step. All the details are here on our easy-to-use order form.

Recently there's been considerable media interest in historic radio transmitting and receiving sites, the *PW* team pick up the trail.



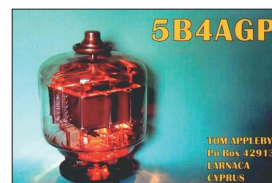
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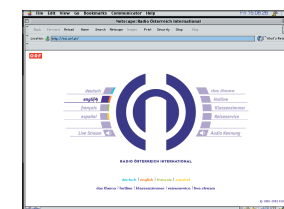
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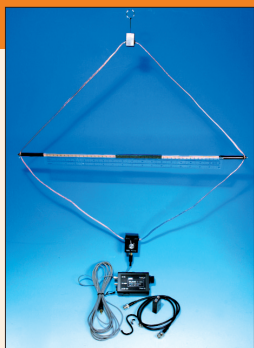
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GS35 model **£1595**



rob mannon's **keylines**

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

During the time I've been *PW* Editor I have been invited to many clubs. This has meant travelling to some wonderful locations and meeting delightful people when providing a talk about *PW* and the work which everyone here in Broadstone puts into the magazine.

In appreciation of my visit, some clubs offer me expenses for my travelling, etc., although I have to decline as I have a travel budget supplied by my publishers. However, instead of expenses when they were offered, I adopted a standard procedure, suggesting that the money be presented instead as a donation to the **Radio Amateurs Invalid & Blind Club (RAIBC)**.

The RAIBC does splendid things on behalf of house bound and severely physically disadvantaged radio enthusiasts and I have supported them for many years. Indeed, I was one of their travelling support members nearly 40 years ago (It's creaky me that needs the help now eh?).

I'm pleased to say the RAIBC still acknowledge the contributions from clubs which arrive following a *PW* talk in *Radial*, their magazine, and I appreciate this very much. However, I realised it was time for a change and I'm now asking clubs (when expenses are offered) to donate a *PW* subscription to a young, or keen new entrant to the hobby **who attends their own club**.

Out of courtesy I wrote to the RAIBC in early March to explain my reasons, and although at the time of writing (late April) I hadn't received a reply I feel sure they will respect my decision. Hopefully they'll also realise I still fully support their valuable work on behalf of disabled enthusiasts.

My decision to adopt the new suggestion is due to various factors. The first (and most significant) is that the RAIBC have recently been fortunate enough to receive some large legacies - which I have no doubt will be used to good effect on behalf of those who use their valuable services.

The second reason is that I'm very conscious indeed of the large number of people entering the hobby with no previous knowledge of radio whatsoever. And - with luck - those fortunate enough to be treated to a *PW* subscription by their own club will continue reading this magazine, and get their Licence.

Hopefully, the new reader will also join the **Radio Society of Great Britain** or the organisation which represents Amateur Radio in the country where they live. I say this because I see *PW* as **complimenting our hobby**. We don't compete with national societies, or try to emulate such bodies...instead our aim is to compliment the

efforts of everyone so we can all enjoy this wonderful pastime.

South Dorset First

The first club to take advantage of applying the new 'local support' initiative happens to be the **South Dorset Radio Society**, (SDRS) based in Weymouth. This active group was also the first club visit on my 2003 calendar - and everyone who attended on the absolutely chilling night in January will never forget the evening.

It was so cold on the way to Weymouth that my normally efficient car heater had a job to keep the windscreen clear of ice. We also considered 'running on the spot' in the hall used for the meeting...just to keep everyone warm during the talk as it was so cold!

I was delighted to hear from my good friend **John Rose M0BQO**, Treasurer of the SDRS, that they'd introduced my Presentation Subscription idea. The photograph John sent me, **Fig. 1**, shows



● Fig. 1: He's certainly no fool! Sebastian Green 2E1IHL receives his own subscription copy of *Practical Wireless* from South Dorset Radio Society Chairman Dr. Bill Young G4KUU at their AGM on 1 April 2003 (see text). Photo courtesy of SDRS.

Sebastian is a 13 year-old pupil attending a local school in Weymouth and showed particular flair and interest in his Novice Course. Sebastian is particularly good at constructional work and John commented..."He told me that at school he's often asked to help with soldering advice during science lessons".

Well, after reading the news from John...I was very impressed indeed. Let's hope that Sebastian enjoys his *PW* as he strides his way on through the hobby. Perhaps he too might be teaching Science one day? Well done Sebastian - and thanks also to the SDRS for the presentation of the subscription. I hope Sebastian is the first of many newcomers to benefit from their club in this way.

Sebastian Green 2E1IHL receiving the first of his *PWs* by their Chairman, **Dr. Bill Young G4KUU** during their Annual General Meeting on 1 April.

practical wireless **services**

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

Subscriptions

Subscriptions are available at £31 per annum to UK addresses, £39 in Europe and £49 (Airmail) overseas. Subscription copies are despatched by accelerated Surface Post outside Europe. Airmail rates for overseas subscriptions can be quoted on request. Joint subscriptions to both *Practical Wireless* and *Short Wave Magazine* are available at £61 (UK) £74 (Europe) and £94 (airmail overseas).

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. Back issues for *PW* are £2.85 each and photocopies are £2.50 per article. Binders are also available (each binder takes one volume) for £6.50 plus £1.50 P&P for one binder, £2.75 P&P for two or more, UK or overseas. Prices include VAT where appropriate.

A complete review listing for *PW/SWM* is also available from the Editorial Offices for £2.50 inc P&P.

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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 (01202) 659930. 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 (01202) 659950.

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Technical Help

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

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



I'm writing to express my appreciation for all the help and encouragement I have had over the past few years in my quest to become a Radio Amateur. Being disabled made becoming an Amateur quite a challenge. However, a home correspondence course run by **Peter Pennington G4EQO**

I received help from all angles and when responding to an advert for a 144MHz base antenna, finding it was placed by **Dave G4QLT**. And although living a good two and half hours away, he drove to my QTH to deliver the antenna and then refused any payment!

My first disappointment was that it became obvious that 144MHz in my area was painfully quiet. However, I did make contact with **MWOWEE** and **MWORHD** and they kept my interest alive and through their efforts in getting me through the Morse test. My friend **GW3DRV** was also marvellous.

I was advised to contact the **Radio Amateurs Invalid and Blind Club** (RAIBC)...I did and the result was amazing! Once I had my new callsign I was given (on loan) a brand new Kenwood TS-570. To say I was over the moon would be an understatement...I'm having an incredible time working Amateurs all over the world. I've not dared to try a c.w. yet...but I will find the courage at some point I'm sure.

I considered it the greatest of privileges to enter the PW VHF QRP Contest last year. I achieved a rather lowly score **but I took part and have the certificate to prove it.**

As an after-thought, does anyone have any information on my grandfather during his Amateur Radio years? He was licensed before the Second World War. Does anyone have any QSL cards or entries in their logbooks? I would love to hear from them.

Editor's comment: Congratulations to everyone concerned. Such co-operation and success demonstrates the full spirit of Amateur Radio. Anyone with information on the original G3BV is asked to contact Quentin direct at the address shown.

There was much ado about toroids in the May issue of *PW*. For an excellent write-up, including clear illustrations, on the practicalities of using toroids I recommend that readers see the series of three articles by the late **Joe Carr** in *Short Wave Magazine* for August, October and November, 1998. (NB: **Not September**). The title of the series is Toroids, Binoculars, Rods and Beads...How to use ferrite and powdered iron cores.

Editor's comment: Thanks for the reminder Keith. Any reader interested in the - excellent - articles can obtain photocopies by contacting Clive Hardy G4SLU at Book Service on (01202) 659930.

The article Licensed & Ready To Go published in the April *PW* has a slight error reference the Trio TS-120V in that as far as I am aware the Trio company was not absorbed into Kenwood or at least not at that time. The reason was that in the UK, Thorn held the brand name Kenwood for the Kenwood Chef, etc., and the same could have been so other companies for some other markets. Consequently all Kenwood radios were marketed and branded Trio in the UK.

The change in the UK came as far as I can remember when Kenwood or Lowe Electronics

I have a TS-120V used as a transverter driver from 28 to 70MHz, and I found it admirable for portable use until a second-hand Icom IC-706 Mark II was purchased. A hidden advantage of the TS-120V was its extremely low current needs at about 2.5A on 10W transmit. The IC-706 draws that much on receive (almost!!). I got very close to having the car stranded on the shore at Point of Air on the Isle of Man after a prolonged portable session. Worse of all I did it again at a later date. Some people never learn from their mistakes!

Editor's comment: Bob is correct regarding the use of the Kenwood name. However, after discussion with Kenwood the style as published was adopted in the article as I didn't want to cause even more confusion. The deciding factor was the fact that both Kenwood and Trio names were used on the manuals/handbooks. There was only space for a small sample of each manufacturer's equipment - and as Bob suggests...the TS-130V does seem to be much less common than the TS-120V.

I ask that you publish this letter to shame whoever 'conned' me

● Finally Here!

New Icom QRP Portable

Radiocommunications Agency News

Leicester Man Convicted

Umesh Bharakhada, 37, living in Syston,

☐ Northampton News

90th Anniversary Celebrations!

The rally will feature all the major attractions, including Bring & Buy and Morse testing on demand with the intention of attracting a large number of visitors and a Talk-in station. The venue itself has 500 secure, off-road parking spaces, a large indoor rally hall (for the British summer!) and even a professionally-catered snack bar and licensed bar too. So why not go along? If you have any questions please call **Andy M3AMF** on **(07970) 187529**.



The Southport & District Amateur Radio Club is increasing its profile in an attempt to attract some of the new M3 operators who live in the Sefton & West Lancashire areas.

The first attempt by the Southport & District Amateur Radio Club (SADARC) to attract some new blood into the hobby was evident during their presence at the Norbreck Rally held in Blackpool in March. The stand was constantly manned by at least two club members and there was a computer showing a SADARC designed PowerPoint presentation on Amateur Radio and SADARC and a computer

running a live SSTV demonstration. For the SSTV demo a member of the club toured the exhibition with his Kenwood TH-D7E and VHC1 SSTV adaptor and beamed shots of the various stands and activities back to the receiving station on the stand.

During the rally several experienced Amateur Radio operators from the club's target area were met and the club looks forward to welcoming them to future meetings. The club's publicity material was handed out to organisers of local Foundation courses for the organisers to distribute among students from Southport club's area.

To find out more about



From left to right, members of SADARC spreading the Amateur Radio word at the Norbreck Rally, Don Atkins (Club Secretary) and Keith and Nigel.

activities of the Southport &
Dsitrict Amateur Radio Club
contact **Don Atkins M1BUL** at:
79 Roe Lane,
Southport PR9 7HR
Tel: (01704) 227726
E-mail:
donatkins@lineone.net
Website:
www.southportarc.org.uk

● It could be you!

Club Spotlight 2003

It's time to turn the Club Spotlight on again as we invite you to enter your club magazines into the Practical Wireless & Kenwood Club Spotlight Magazine Competition.

It's very simple to enter the Club Spotlight magazine competition and all you need to do is to send us the **three most recent paper copies (no E-mailed copies please)** of your magazine along with a covering letter. The covering letter should make it clear **which category of club you would like to enter your magazines into**. For example, the **Benelux QRP Club**, winner of the 2002 national award - can only enter in the National Club section, whereas the **Sutton & Cheam Radio Society** - last year's winners, have to specify that they are a Local Club.

Local clubs entering will be competing for the magnificent original trophy - kindly donated by Kenwood - and **National Clubs** will be competing for Bert's Bell, the award, which was instituted in 1997 in tribute to the late **Bert Newman G2FIX**.

National Or Local?

For either category (national or local) your covering letter should provide the following details: How many people there are on the Editorial team and the type of job they do/or did (if retired); how long the magazine has been established; how it's produced (on your computer or text supplied to 'outside' printer for professional printing, etc.) and whether

or not the publication is 'sponsored', the number of copies printed and membership size of your club. It would also help the judging panel if you could provide some historical details on your club.

The judging panel comprises of **Jim Bacon G3YLA, David Barlow G3PLE, David Wilkins G5HY and Rob Mannion G3XFD**. Entry to the competition is open now and all entries should be at the *PW* offices in Broadstone no later than **Friday 1 August 2003**. This is so the presentations can be made at the Leicester Show in September and members of the judging panel live in places as far apart as Cornwall, East Anglia and Greater London, so it will not be possible to consider late entries! So, make sure your club's entry reaches us in good time!

The Editor's decision (as head of the adjudication panel) is final and no correspondence will be entered into. **Good luck** and we look forward to reading **your** magazine!

**Donna Vincent G7TZB,
Club Spotlight Magazine Competition,
Arrowsmith Court,
Station Approach,
Broadstone,
Dorset
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Distance Record

Laser Comms

David Bowman G0MRF and Allan Wyatt G8LSD have achieved a laser communications record with a c.w. QSO over a distance of 49.3km.

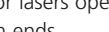
David Bowman G0MRF and Allan Wyatt G8LSD have been conducting tests over the last four months together with Derek Atter G3GRO and Lech Laszkiewicz G3KAU in a bid to develop laser communication distances.

The distances gradually developed from a few tens of metres to 20km, then 40km and then finally on Saturday 5 April 2003 to the record 49.3km. The path for the QSO was from Fairlight east of Hastings to Capel le Ferne east of Folkestone.

David, accompanied by his wife, arrived on site at 1830UTC and saw a good sunset but no view, as it was quite misty. The power station at Dungeness some 30km away disappeared completely by 1900UTC and by 2125UTC they had a sighting of the powerful white lights (used for aiming) as a dim yellow disc.

The laser was aimed at the disc and at 2130UTC the laser was switched on and Allan GOMRF received the signal immediately and within a few minutes both systems were aligned. Reports of 559 and 579 as well as both callsigns and additional characters were exchanged by 2145. The distance was verified by using the G4JNT software.

Semiconductor lasers operating at 670nm were used at both ends of the contact. Three mW to a beam expander at the G8LSD end, and 10mW barefoot at the GOMRF end.



Both receivers were designed independently and operated at audio baseband without a carrier. The 488Hz tones were generated in the transmitters for modulating the lasers by the dividing down of a crystal oscillator. Keying of the tone providing the c.w. and both receivers featured audio filters to reduce bandwidth.

Each station had separate receiving and transmitting equipment. David GOMRF used a purpose built telescope using a 100mm lens to gather light on receive, and Allan used a Russian 4.5in reflector telescope and swapped the eyepiece for the detector head. Both transmitters used tripod bases with vernier adjustments mounted above. Finally, the transmitter was mounted on the vernier mechanism.

The aiming of the laser was by rifle sight secured to the transmitter housing. Strong and very cold winds worked against long term holding of the beam position. But even when the laser dimmed from the brightest light in the sky to only just visible with binoculars, the signal remained audible.

The *PW* Editorial team congratulate David and Allan on their achievement!

They came, they saw.... they did it again! Wrexham Amateur Radio Society made a triumphant return to Wrexham Science Festival.

There was also a 144MHz Voice station, run by **Geoff GW6SBD** and **Rachel MW3SAI** (using an Icom IC-225) We also ran an ATV demo, in which **Ian GW1MVL** carried an ATV transmitter and camera around to provide 'live' pictures from the event! The Morse displays proved

All in all, despite a few small issues, the day was deemed a success we can now take a much deserved rest until Autumn, when we have to get planning for the 2004 event (however, some ideas are already hatching!!) - Hopefully we'll have more and more ideas, and displays next year!



- Mark demonstrates PSK to an interested group of youngsters.

*All pictures thanks to Mark MW1/MW3MDH
and John MW1/MW3VCD.*



- John's FT-847 running PSK31 on 14MHz in the Data Corner.

The event was supported by

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

Bishop Auckland RAC

Contact: M. Hill G0GFG/Tim Bevan M0ACV
Tel: (01388) 745353/(01388) 832948

The Bishop Auckland Radio Amateurs Club meet every Thursday at 2000hours in the Stanley Crook Village Hall, County Durham. The club is a centre for training for The Foundation, Intermediate, RAE and Morse courses as well as being the local Radio Amateurs Examination Centre for the area.

Bournemouth Radio Society

Contact: Chris Ellis M5AGG

Tel: (01202) 893126

Website: brswebsite.freemove.co.uk

The Bournemouth Radio Society meets on 1st & 3rd Fridays of every month at 1930hours for a 2000hours. Meetings are held at the Kinson Community Centre. Millhams Road, Kinson, Bournemouth. Why not go along to one of their forthcoming meetings?: **June 6:** National Coastwatch Institution by **David M10BC**; 20th: Test Cards & Icons by **Tony G3YWG**.

EAST SUSSEX
Brighton Radio Club

Tel: (01273) 887345

Website: brightonradioclub.co.uk

The Brighton Radio Club meet at Vallance Community Centre, Sackville Road, Hove on the 2nd & 4th Tuesday of each month from 1930-2130hrs. The club offers a varied programme of events and offers free refreshments at meetings as well as easy access for disabled visitors. The club is within easy reach of Hove Railway Station and bus stops.

**ESSEX**

Loughton & Epping Forest ARS

Contact: Marc Litchman

Tel: 020-8502 1645/07803-023501

E-mail: marc.litchman@dsl.pipex.com

Website: <http://www.lefars.org.uk>

Loughton & Epping Forest ARS meet every other Friday at All Saints House, Romford Road, Chigwell Row, Essex IG7 4QD. Forthcoming meetings are **May 2: HF Night On The Air**; **16th: Italian Rally Review** - A review of the 38th Pordenone Amateur Radio rally by **John Ray G8DZH** and **30th Club Visit - HMS Belfast** to operate GB2RN. Why not go along and join in the fun?



NORTHERN IRELAND

Bangor and District ARS

Contact: Mike GI4XSF

Tel: 0284-277 2383

E-mail: mike@qi4xsf.com

Website: <http://welcome.to/bdars>

The Bangor and District Amateur Radio Society meet on the first Wednesday of every month in 'The Stables', Groomsport, County Down at 2000hours. On **Wednesday 4 June**, they are holding their annual BBQ & QRP evening. The venue for this meeting is the Scout Camp in Crawfordsburn Country Park. This should be a great night with lots of QRP fun and good food. Visitors and new members are most welcome. Bangor and District ARS are holding their summer radio rally on **Sunday 22 June 2003**. A good selection of radio and computer traders will be in attendance. The always excellent bring and buy will be in operation. The rally will be located at the Crawfordsburn Country Club, which is near Bangor, County Down. Doors open at 12noon.

Keep those details coming in! ●

The Birmingham Online Repeater Group have put GB3DX on the air - read on to find out more....

Many Radio Amateurs in the Birmingham area had felt for some time that there was a need for a v.h.f. repeater to cover the whole of the area and so **Peter G4KQU, Amanda M0DZO & Steve M1KQU** got together to form the Birmingham Online Repeater Group (BORG). Between them and with the help of local Amateurs they then set about designing and building GB3DX.

The 'team' say that the thought of building a repeater was a bit daunting at first but that collecting the information wasn't too hard as a lot of good sources were found on the Internet. The hardest part was the building of the six cavity duplexers as they took over a month to build and it was a great relief when they tuned up perfectly. And finally on the 9 February GB3DX was sprang into life on **RV57 145.7125MHz**.

The GB3DX repeater is an Internet linked repeater (EchoLink Node No. 62872 & electronic QSO system). This means that Radio Amateurs from all over the world have access to the repeater via the Internet giving an opportunity for the users of GB3DX to work some DX stations.

The members of BORG would like to thank all those who helped with the building and funding of the repeater and also for the assistance of the RSGB RMC and Local Repeater Manager **Bill G3TQM** for all the good advice and help in getting the GB3DX project on air.

For further information on GB3DX visit the website at **www.gb3dx.co.uk**

☐ By Royal Appointment

Jim Hicks G4XRU has been awarded an MBE for services to Sussex business and the community.

Over the years Jim, an electronics engineer, has served voluntarily on a number of boards including Sussex Enterprise and Sussex Learning and Skills Council plus various committees for East Sussex CC, Brighton and Hove City Council plus both Sussex and Brighton Universities. He has also found time to start and run his own industrial electronics company Amplicon Liveline Ltd. (www.amplicon.co.uk) which has operated successfully in Brighton for 30 years. Jim, a member of Worthing Radio Club, is also one of a team who records *Radcom* each month for blind and partially sighted Amateurs.

Pictured here is Jim at Buckingham Palace receiving his award from Prince Charles and having a brief QSO. Jim said "It was a fantastic ceremonial experience which made me feel really proud to be British. I would have loved to have operated /P for Palace but of course, for security reasons, we had to leave all our communications equipment in the cloakroom"!



Practical Wireless, June 2003

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AMPRO 12 mt.....**£16.95**
 (Length 7' approx)
AMPRO 15 mt.....**£16.95**
 (Length 7' approx)
AMPRO 17 mt.....**£16.95**
 (Length 7' approx)
AMPRO 20 mt.....**£16.95**
 (Length 7' approx)
AMPRO 30 mt.....**£16.95**
 (Length 7' approx)
AMPRO 40 mt.....**£16.95**
 (Length 7' approx)
AMPRO 80 mt.....**£19.95**
 (Length 7' approx)
AMPRO 160 mt.....**£49.95**
 (Length 7' approx)
AMPRO MB5 Multi band 10/15/20/40/80 can use 4 Bands at one time (Length 100").....**£69.95**

VHF/UHF MOBILE ANTENNAS

MICRO MAG 2 Metre 70 cms Super Strong 1" Mag Mount (Length 22").....**£14.95**
MR700 2m/70cms, 1/4 wave & 5/8, Gain 2m 0dB/3.0dB 70cms Length 20" 3/8 Fitting.....**£7.95**
SO239 Fitting.....**£9.95**
MR 777 2 Metre 70 cms 2.8 & 4.8 dBd Gain (5/8 & 2x5/8 wave) (Length 60") (3/8 fitting).....**£16.95**
 (SO239 fitting).....**£18.95**
MRO525 2m/70cms, 1/4 wave & 5/8, Gain 2m 0.5dB/3.2dB 70cms Length 17".....**£19.95**
 SO239 fitting commercial quality.....**£19.95**
MRO500 2m/70cms, 1/2 wave & 2x5/8, Gain 2m 3.2dB/5.8dB 70cms Length 38" SO239 fitting commercial quality.....**£24.95**
MRQ750 2m/70cms, 6/8 wave & 3x5/8, Gain 2m 5.5dB/8.0dB 70cms Length 60" SO239 fitting commercial quality.....**£39.95**
MRQ800 6/2/70cms 1/4 6/8 & 3 x 5/8, Gain 6m3.0dB/2m 5.0dB/70 7.5dB Length 60" SO239 fitting commercial quality.....**£39.95**
GF151 Professional glass mount dual band antenna. Freq: 2/70 Gain: 2.9/4.3 Length: 31".....**£39.95**

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MR 214 2 Metre 1/4 wave (3/8 fitting).....**£3.95**
 (SO239 fitting).....**£5.00**
MR260S 2 Metre 1/2 wave 2.5 dBd gain Length 43" SO239 fitting.....**£24.95**
MR 258 2 Metre 5/8 wave 3.2 dBd Gain (3/8 fitting) (Length 58").....**£12.95**
MR 650 2 Metre 5/8 wave open coil (3.2 dBd Gain) (Length 52") (3/8 fitting).....**£9.95**
MR268S 2 Metre 5/8 wave 3.5dBd gain Length 51" SO239 fitting.....**£19.95**
MR280S 2 Metre 6/8 wave 5.8dBd gain Length 58" SO239 fitting.....**£29.95**
MR 614 6 Metre loaded 1/4 wave (Length 56") (3/8 fitting).....**£13.95**
MR 644 6 Metre loaded 1/4 wave (Length 40") (3/8 fitting).....**£12.95**
 (SO239 fitting).....**£15.95**

SINGLE BAND END FED BASE ANTENNAS

70 cms 1/2 wave, length 26", gain 3.5dB.....**£24.95**
2 metre 1/2 wave, length 52", gain 3.5dB.....**£24.95**
4 metre 1/2 wave, length 80", gain 3.5dB.....**£34.95**
6 metre 1/2 wave, length 120", gain 3.5dB.....**£44.95**
6 metre 3/4 wave, length 150", gain 5.5dB.....**£49.95**
 (All above end fed antennas are DC grounded, so are radial free!)

VHF/UHF VERTICAL CO-LINEAR FIBREGLASS BASE ANTENNA

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 (2 mts 3dBd) (70cms 6dBd) (Length 39")
BM200 Dual-Bander.....**£39.95**
 (2 mts 4.5dBd) (70cms 7.5dBd) (Length 62")
SOBM200 Dual-Bander.....**£49.95**
 (2 mts 4.5dBd) (70cms 7.5dBd) (Length 62")
SOBM500 Dual - Bander Super Gainer.....**£59.95**
 (2 mts 6.8dBd) (70cms 9.2dBd) (Length 100")
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BM45 70cm 3 X 5/8 wave Length 62" 8.5 dBd Gain.....**£49.95**
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BM60 2mtr5/8 Wave, Length 62", 5.5dBd Gain.....**£49.95**
BM65 2mtr 2 X 5/8 Wave, Length 100", 8.0 dBd Gain.....**£69.95**

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MRW-250 Telescopic TX 2 Metre & 70 cms RX 25-1800 Mhz Length 14-41cm BNC fitting.....**£16.95**
MRW-200 Flexi TX 2 Metre & 70cms RX 25-1800 Mhz Length 21cm SMA fitting.....**£19.95**
MRW-210 Flexi TX 2 Metre & 70cms Super Gainer RX 25-1800 Mhz Length 37cm SMA fitting.....**£22.95**

All of the above are suitable to any transceiver or scanner.
 Please add £2.00 p+p for hand-held antennas.

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All fittings Stainless Steel

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N TYPE for RG213	£2.50 each
SO239 to BNC	£1.50 each
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MB-6 6:1 Balun 400 watts power	£24.95
MB-1X 1:1 Balun 1000 watts power	£29.95
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AR26 Alignment Bearing for the AR300XL	£18.95
RC26 Alignment Bearing for RC5-1/3	£49.95

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Turbo mag mount 7" 4mtrs coax/PL259 3/8 or SO239	£14.95
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SO259 fitting	£12.95
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(Other lengths available, please phone for details)

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BAHF-4 FREQ:10-15-20-40 Mtrs LENGTH: 1.70m HEIGHT: 1.20m POWER: 300 Watts	£129.95
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MDX Lightning arrestor 1000 watts	£24.95
AKD TV1 filter	£9.95
Amalgamating tape (10mtrs)	£7.50
Desoldering pump	£2.95
Alignment 5pc kit	£1.95

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TMA2 2 1/4" to 1 1/4" heavy duty telescopic mast set, approx 40ft when erect, 9ft collapsed	£149.95
TMA1 2" to 1 1/4" heavy duty aluminium telescopic mast set, approx 20ft when erect, 6ft collapsed	£99.95
TMAF-1 2" to 1 1/4" heavy duty fibreglass telescopic mast set, approx 20ft when erect, 6ft collapsed	£99.95
TMAF-2 2 1/4" to 1 1/4" heavy duty telescopic fibreglass mast set, approx 40ft when erect, 9ft collapsed	£189.95

HF YAGI

HBV-2 2 BAND 2 ELEMENT TRAPPED BEAM FREQ:20-40 Mtrs GAIN:4dBd BOOM:5.00m LONGEST ELEMENT:13.00m POWER:1600 Watts	£329.95
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**ADEX-3300 3 BAND 3 ELEMENT TRAPPED BEAM**

FREQ:10-15-20 Mtrs GAIN:8 dBd	
BOOM:4.42m LONGEST ELE:8.46m	
POWER:2000 Watts	£269.95

**ADEX-6400 6 BAND 4 ELEMENT TRAPPED BEAM**

FREQ:10-12-15-17-20-30 Mtrs GAIN:7.5 dBd BOOM:4.27m LONGEST ELE:10.00m	
POWER:2000 Watts	£499.95
40 Mtr RADIAL KIT FOR ABOVE	£99.00

**HF VERTICALS****VR3000 3 BAND VERTICAL**

FREQ: 10-15-20 Mtrs	
GAIN: 3.8 dBd HEIGHT:3.80m POWER:2000 Watts (without radials)	
POWER:500 Watts (with optional radials)	£89.95
OPTIONAL 10-15-20mtr radial kit	£34.95

**VR5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs**

GAIN:3.5 dBd HEIGHT:4.00m RADIAL LENGTH:2.30m (included). POWER: 500 Watts	£169.95
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**EVX4000 4 BAND VERTICAL FREQ:10-15-20-40 Mtrs**

GAIN:3.5 dBd HEIGHT:6.50m	
POWER:2000 Watts (without radials) POWER:500 Watts (with optional radials)	£99.95
OPTIONAL 10-15-20mtr radial kit	£34.95
OPTIONAL 40mtr radial kit	£12.95

**EVX5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs**

GAIN:3.5 dBd HEIGHT:7.30m POWER:2000 Watts (without radials) POWER:500 Watts (with optional radials)	£139.95
OPTIONAL 10-15-20mtr radial kit	£34.95
OPTIONAL 40mtr radial kit	£12.95
OPTIONAL 80mtr radial kit	£14.95

**EVX6000 6 BAND VERTICAL FREQ:10-15-20-30-40-80 Mtrs**

HEIGHT:5.00m RADIAL LENGTH:1.70m (included) POWER:800 Watts	£249.95
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**EVX8000 8 BAND VERTICAL FREQ:10-12-15-17-20-30-40 Mtrs**

(80m optional) HEIGHT: 4.90m RADIAL LENGTH: 1.80m (included) POWER: 2000 Watts	£269.95
80 MTR RADIAL KIT FOR ABOVE	£79.00



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

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(Hi Grade Heavy Duty Commercial Antennas)

UTD160 FREQ:160 Mtrs LENGTH:28m POWER:1000 Watts	£44.95
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POWER:1000 Watts	£39.95
MTD-2 (2 BAND) FREQ:40-80 Mtrs LENGTH: 20Mtrs POWER:1000 Watts	£44.95
MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts	£89.95
MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts	£44.95
MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts	£79.95

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

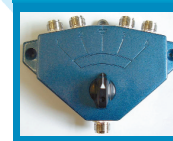
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10mtr RG58 Mil spec PL259 to PL259 lead	£10.95
30mtr RG58 Mil spec PL259 to PL259 lead	£24.95
1mtr RG213 Mil spec PL259 to PL259 lead	£4.95
10mtr RG213 Mil spec PL259 to PL259 lead	£14.95
30mtr RG213 Mil spec PL259 to PL259 lead	£29.95

(All other leads and lengths available, i.e. BNC to N-type, etc. Please phone for details)

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Tex's

Tips & Topics

Hello and welcome to the occasional column that, although it's called Tex's Tips and Topics, it's really about your ideas, tips and any 'tricks' you may use in the hobby. So, here's a few suggestions from readers seeking to win book vouchers for every tip published!

The first of the tips this time comes from **Mike Brett M3JTK**. He's suggesting a use for the short lengths of coaxial cable that you always seem to end up with when putting in feeder runs.

Mike's idea is that by removing the inner conductor and the surrounding insulation, then pulling out the screen from inside the remaining tube, it can be made into earth straps. Mind you, the cheaper RG58 (no, you wouldn't use that would you?), is rather poor for this purpose, as its screening braid is rather sparse, and made up of very thin copper wires.

After taking the screen out, solder one end to an earthing tag and twist and solder the other end to keep it tidy as shown in **Fig. 1**. The best coaxial cable is true Military grade coaxial cable with a good thick screening layer, these screens are often tinned as well. Although Mike doesn't mention the coaxial type, I'd suggest RG58/59 for thinner leads, and RG213 for heavier current versions.



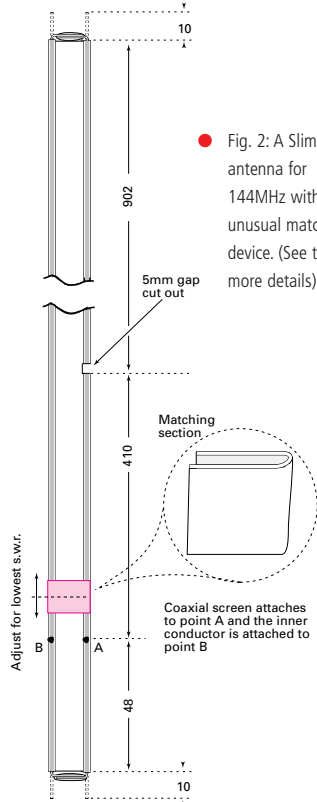
● Fig. 1: The ends of an earth-strap made from the otherwise discarded screen of coaxial cable.

Simple Slim-Jim

Now for a simple Slim-Jim style 144MHz antenna that may be fitted into a plastic tube for rigidity, or left just 'dangling' from a support point on the ceiling. Now you may say "well, we have seen this before quite often..", but bear with me as I explain a fascinating tuning/matching arrangement on the antenna made by **Peter G3ORE**.

Peter said in this letter "I made this one up for both **G6JXA** a white stick operator, and **Cyril G3JHG**, an ex-RAF veteran from the last World War. Cyril lives in an Anchor Trust Dwelling and is not allowed an antenna outside his room - shame on them!"

I agree Peter it's a shame, but let's have a look at the antenna itself as shown in **Fig. 2**. As you can see, apart from the tuning

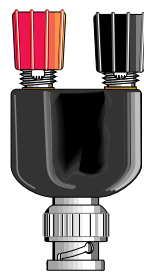


● Fig. 2: A Slim-Jim antenna for 144MHz with an unusual matching device. (See text for more details).

'plate' outlined in red, there's nothing dramatically unusual about the antenna. First you should take a 1.385m length of flat 300Ω ribbon feeder and trim back 10mm of the insulation at each end. Now with each end, twist the individual conductors together, to tidy them up, then fold the conductors over towards each other, before soldering them together.

If you follow the illustration of **Fig. 2** for the general layout, remembering to connect the screen of the coaxial feeder to the 'short' line of the flat twin as shown. Next take a small 10x20mm strip of thin, flat aluminium or copper plate (cut from a soft drinks can perhaps) and fold it over the feeder to grip it.

By adjusting the position of the flat metal strip along the length of the matching section, a suitably good match point should be found. When you have it, gently tape the adjusting strip in place. There you have it...a simple Slim-Jim!



● Fig. 3: A test equipment adapter makes an ideal coaxial to twin transition.

and cut into short lengths and with holes in each end, the feeder wires can be threaded through and held in place with a drop of glue or a plastic tie. Part of this antenna is the interesting device for coupling the coaxial feeder to the bottom of the twin feeder is shown in **Fig. 3**.

The adapter shown in **Fig. 3** was often found with oscilloscopes. Dieter says it's a great way of dividing a coaxial feeder into two wires, as in most cases, not only can wires be screwed directly onto the terminal posts, but they often accept 4mm banana plugs too.

Now to my last item, which is less of a trick and more of a tip...or better still a personal recommendation for a supplier of small parts.

Obviously a keen constructor, **James G3PCA** like many of us is finding it more difficult to find suppliers for some items.

James wrote in to recommend **Mode Components**, of **23-24 Warstone Lane, Hockley, Birmingham B18 6JQ. Tel:/FAX: 0121-233 3661**. On ordering some toroidal cores from Mode Components, James was told by **Chris G8CHW** that although he didn't stock the particular cores, he would try to find them and 'phone back.

Well true to his word, Chris did 'phone back, three weeks later, apologising for the delay! He'd found and ordered them directly from America and they were in the post to James. Great service Chris! And thank you James for letting us know of what seems to be another good outlet for components.

Well I've run out of space again. Many thanks for the tips that you've all sent in, they're all very useful. Book vouchers on the way for all published. **So, if you want a book voucher for an idea - you've got to write in first! - What are you waiting for?**

Tex

As an incentive, each published 'Tip' gets a £5 Book service voucher for the author. The best idea each month gets an additional £5 voucher as well. So, get writing! G1TEX

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4m	5ele (boom 128"/11.5dBd)	£69.95
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Practical Wireless, June 2003

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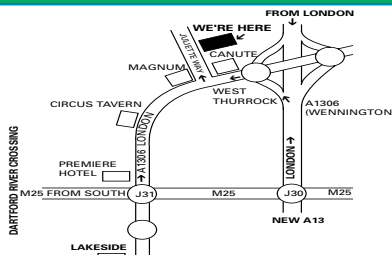
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Radio Basics

This month Rob Mannion G3XFD describes the heart of the Basics-4 receiver project. He explains how you can customise the tuneable intermediate frequency stage to suit your own needs, building and setting it up before starting the crystal-controlled front-end.

Many constructors have built regenerative detector receivers in their time. Indeed, when I first became interested in radio it was standard practice to build one-valved receivers.

By sheer coincidence, this month's letters pages carries a letter from **Martyn Lyndars** - the man behind the famous **Heard All Continents** (HAC) one valved receiver kits.

Simple receivers do work very well...although they have distinct and fundamental disadvantages to go with their simplicity and success.

Although we're not dealing with valved receivers at the moment, the equally simple

transistorised versions can also provide excellent results. The Radio Basics (RB) Basic-4 receiver is aimed at demonstrating how the problems involved with the regenerative detector (RD) can be solved. However, I can claim no originality...my only innovation is in the way the receiver is presented to you - by using it as a tuneable intermediate frequency.

As I've already explained to RB readers in previous projects - the simple regenerative detector is not an easy thing to adjust when used with a receiver coupled (more or less) directly to the antenna, and also covering a relatively wide range of frequencies. However, by choosing to make the RD form part of the tuneable intermediate frequency (i.f.) we can isolate it from the antenna removing one problem.

Isolating the RD from the antenna means that there's very little radiation from the oscillating detector stage. That's a good thing because you are then unlikely to be operating a low power transmitter on the frequency you're listening on (this was once a real problem in the days when everyone used such receivers!).

The Circuit

The circuit, **Fig. 1**, shows the basic type of receiver we're to use as the tuneable i.f. The self-oscillating detector is provided by Tr1, the MPF102. To save too much complication the regeneration (the name adopted where controlled feedback is used in a receiving circuit, providing extra gain and selectivity) and the amount of feedback is fixed.

So, instead of varying the amount of feedback using a variable capacitor, it's achieved here by varying the stage gain by making the power supply feed variable. With careful adjustment the circuit will oscillate, making it extremely sensitive and able to demodulate amplitude modulated (a.m.) c.w. and s.s.b. signals (more of this later in the

project).

Note: My advice is that the best quality carbon tracked component is used for R4. Please avoid using a wirewound component here as they can be very inductive, causing problems for the circuit.

Although the circuit in **Fig. 1** will work very well indeed, you can (if any r.f. instability occurs) connect a 0.1 μ F decoupling capacitor between the d.c. feed end of R4 and R3. The other end goes to the ground-plane (chassis).

If r.f. instability still occurs, a small value radio frequency choke (r.f.c.) can be inserted between R3 and the 9V power supply. Any small value r.f.c. will do the job, however, most of those available commercially from component suppliers seem to be around 10mH (millihenry). The r.f. input to the receiver is via the winding B on T1 which forms an r.f. transformer input using a toroid inductor.

Inductor Windings

The main inductor is formed by starting the windings at **A** (See **Fig. 1**). The tapping point leading to the Source (S) on the MPF102 is (as a **general rule**) best made at one third of the total winding (with **A** the starting point).

The variable capacitor, C1, tunes the main winding. It's marked with an asterisk on the circuit because there a several important factors to bear in mind for first-time success with this circuit (**more of this later**).

So, if winding **A** has 60 turns, the tapping point is made at 20 turns. The tapping point can be varied from what's suggested...but I suggest that until you've had some success that you adopt the one third of the total winding rule. We'll return to this aspect soon, after I've described the audio stage.

Audio Stage

The audio stage is provided by the extremely useful little LM386 integrated circuit (i.c.). This incredibly versatile audio amplifier will work on supply

voltages from as low as 3V and is ideal for battery powered projects.

However, please understand that although the LM386 is very forgiving with most components and working conditions...**it's absolutely essential that C7, the 0.1 μ F decoupling capacitor should be included.** It should also be mounted as close as possible to pin 3 on the i.c.

Both leads on C7 must be as short as possible, including the end connected to the groundplane (earth). This is essential because of the high gain amplification provided by the i.c., which will make the amplifier extremely unstable unless adequate de-coupling is provided.

The audio circuit in **Fig. 1** has appeared in RB projects on quite a few occasions, and hopefully you will have already have built one. If not...**I suggest you do so immediately.** Once ready for operation you can test it by briefly touching a plugged-in and working mains powered soldering iron to the lead-in which comes from the top end of the R5, the 10k Ω variable resistor.

If all is well you'll immediately hear the sounds of mains hum coming from the loudspeaker provided you've got the battery connected and the volume control set to maximum (experiment to check). I'm not dwelling on setting-up and testing this section too much. If you are a little unsure it's exactly the same amplifier as used in the Basi-Tracer and Resistance/Capacitance Bridge projects presented in the last year or so, making it easier for you to look in back issues.

Building The Receiver

Building and operating the Basic-4 tuneable i.f. section is simplicity itself...provided you take care with the tuning range itself and the effectiveness of the regeneration (feedback) settings/adjustment. So, let me now explain how we achieve these simple requirements.

Even though the Basic-4

receiver can cover literally any h.f. Amateur Radio band...I'll assume for the purposes of the explanation that we're all going to build a 7MHz receiver, using a 5MHz i.f. Because of this, the project will then require the tuneable i.f. receiver (the section we're working on now) to tune just over 100kHz of an i.f. in the region of 5MHz.

I say "In the region of" 5MHz because it's just as likely that you may have access to a crystal from your junk box (or bought at a rally) in the 12MHz range (to produce the 5MHz 'difference' frequency between 7 and 12MHz). Obviously, it's **not strictly necessary** to have the

below' requirement is to ensure the whole band is covered.

Obviously, it will be more convenient (especially when you're calibrating the tuning range to provide the most accurate dial readings possible) to use a 12MHz crystal to make band-edge marking easier. But knowing the 'make and mend' approach that's fundamental (forgive the pun!) to our hobby...I thought it would be best to remind the avid junk box collectors of the possibilities!

Again, it's obvious that the precise crystal frequencies aren't at all critical. It's even entirely possible to use a

detector' on its own frequency range (the i.f.) by the use of the down-converting front-end.

And we can then take full advantage of this by using the extremely sensitive - but otherwise difficult to control - regenerative receiver by making it cover only the a tiny fraction more than the required Amateur Band which conveniently at the moment is only 100kHz wide.

So, it's now time for you to actually build the tuneable i.f. receiver of your choice. Use a variable capacitor of around 100pF, and by referring to the information provided in the tables and diagrams in RB on

required...you can then fine tune the regeneration circuitry. This can be achieved by adjusting the position of the tapping point on the toroid. This can be done by carefully pushing/squeezing the winding - between A and the tapping point - with a fine pencil to obtain the smoothest control and 'depth' of regeneration (more on the later in the 'On the air' section when we've completed the project).

If you don't have a dip-meter or simple signal generator to provide a test signal to help you define the band edges don't despair. Instead you can test the receiver 'on air' by

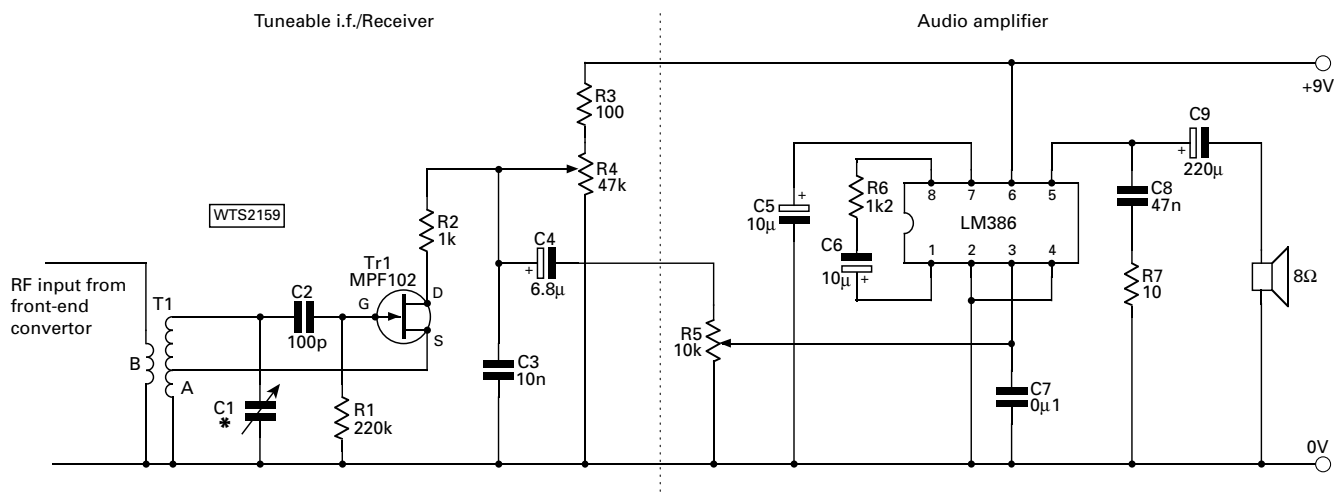


Fig. 1: Full circuit diagram of the simple regenerative detector intermediate frequency (i.f.) stage used in the Basic-4 receiver. In use the tuneable i.f. covers a very narrow tuning range (see text).

front-end crystal oscillator working **exactly on 12MHz**...although it does help for calibration purposes!

All you have to remember is that if your chosen oscillator crystal is **below 12MHz** (let's say it's marked as 11.800MHz) the resultant **high frequency end** tuning on your tuneable i.f. receiver will be at **4.8MHz**. Don't forget that, as previously explained in this series, as the local oscillator is above the 7MHz main band tuning, **the i.f. tuning is reversed**.

In other words, once we have set-up the crystal controlled front-end to produce the wanted 'difference' frequency to tune from 7 to 7.1MHz...the i.f. receiver will be required to tune from just above 4.8MHz to ensure complete coverage of the 40 metre band to a fraction below 4.7MHz. Again, the 'fraction

tuneable i.f. of anything up to 25MHz or so...provided you can get a fundamental frequency crystal to generate the necessary local oscillator frequency. However, I ask you to carefully avoid overtone type crystals or any crystals which are not operating on their fundamental frequencies. These can cause problems for the inexperienced constructor in this application.

Tuning Range

Now we come to the really important bit...setting the tuning range. It's important in this application because the narrower the tuning range we can achieve for the regenerative detector the easier it will be to control.

We already have the advantage of the wanted band (7MHz) being 'delivered to the

pages 24 and 25 of the March issue of PW - set your tuneable i.f. unit to cover the necessary range. The ideal tool for doing this is of course the Dip Meter...but you knew that already didn't you?

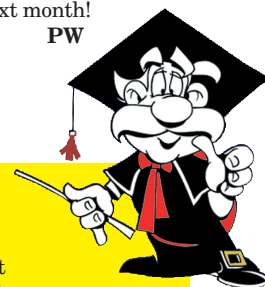
Fine Tuning

Once you've built and set-up your tuneable i.f. section to cover the correct range

connecting it to your antenna during darkness...when you'll be sure to receive some of the RTTY and other commercial transmissions. Then compare the signals heard on a receiver with known calibration.

Cheerio for now...it's front-end time next month!

PW



Good News!

Helpful readers have written in to tell me that they've found the following suppliers extremely accommodating when it comes to obtaining specialised components (especially toroid cores). **Mode Components (Chris Tredwell G8CHW)** of 23-24 Warstone Lane, Hockley, Birmingham B18 6JQ, is highly praised by a number of readers for his excellent service. Tel/FAX: 0121-233 3661 or E-mail ctredwell@webleicester.co.uk

Bowood Electronics. Readers have also reported how helpful this company is. (Please see display advert in this issue). You can E-mail them at sales@bowood-electronics.co.uk

The 20th Annual Practical Wireless 144MHz QRP Contest

0900-1600 GMT, 15th June 2003

Acknowledging 20 years of hard work on behalf of the 144MHz QRP

Contestants: I'm delighted to say - on behalf of everyone who enjoys the event - a hearty "Thank You Neill" for his efforts on our behalf. Readers may not realise it, but Neill G4HLX's work for the contest goes on literally throughout the year. Not the least job is 'chasing me' to make sure I've organised our end. Let's hope that the weather and propagation conditions help us celebrate this very special occasion this year. Good luck everybody - and again...thank you Neill G4HLX. **Rob Mannion G3XFD.**

Once again it's time for Dr. Neill Taylor G4HLX - the originator and the adjudicator - to announce the rules of the 20th PW 144MHz QRP Contest.

The time is fast approaching to take to the hills again for our annual day of low-power v.h.f. activity. Regular entrants to the 144MHz QRP Contest will need no reminding of the fun to be had, with the opportunity for plenty of contacts far and wide.

Newcomers will find the event an ideal way to get started in v.h.f. contesting. This is because the 3W transmitter output power limit gives everyone a chance to compete effectively.

Additionally, if you've not tried it before, you can expect to be surprised by what you can achieve using a simple station, when there are well-sited stations all around the UK. You can increase your chances of good DX by taking your equipment to a hilltop yourself, and maybe getting together with friends to operate as a group.

Sunday 15th June

Sunday 15th June is the day of the 2003 contest, and as usual there are trophies and prizes to be won by the most successful stations. The overall winners will receive the *PW* QRP Contest Winner's Cup.

The leading Scottish station will be awarded the **Tennamast Trophy in Memoriam to Frank Hall GM8BZX**, sponsored by **Tennamast Scotland Ltd.** The leading station in Eire or Northern Ireland will win the **PW EI/GI Trophy Clock**, sponsored by our Editor, **Rob Mannion G3XFD/EI5IW.**

And once again we are delighted to offer **every contest entrant a certificate**, no matter where you are placed in the results. Just send the corner-flash coupon from this page with your entry, to be sure of getting your certificate, which is again being sponsored by **Chris Rees G3TUX.** Leading stations in various categories (for example, in each locator square) will

receive specially-endorsed certificates and will be separately listed when the results are published.

As in previous years **Mike Devereux G3SED of Nevada** will be generously supporting the contest by offering a special prize for the winner of the main trophy. Additionally, the runner-up in the contest will receive a Solar Panel, kindly donated by **Bob Keyes GW4IED of Key Solar Products.**

New To Contests?

If you're new to v.h.f. contests, you may like to look at some of the introductory advice on the *PW* Contest website www.contest.org.uk. There you will also find an archive of results from previous QRP contests, log sheets to download, and other information.

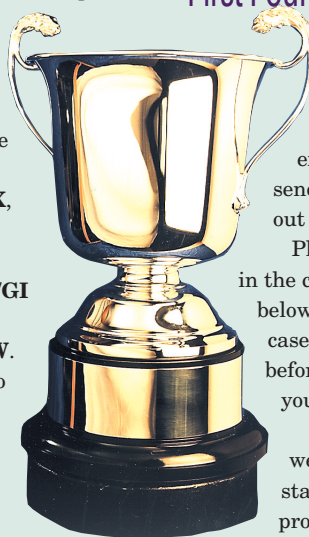
There's also advice to help you with sending your entry by E-mail. However, traditional entries on paper, sent by post, are also welcome.

First Four Hours

As usual, the first four hours of the contest coincides with the second session of the **RSGB 144MHz Backpackers' Contest**, and the QSO exchange is the same. So if you are sending an entry to both contests, sorting out your logs should be straightforward.

Please be sure that everyone taking part in the contest has studied the full rules, listed below, and this includes all operators in the case of group entry. Check the rules again before sending your log in, to be sure that you have included everything needed.

Let's hope that we enjoy some good weather, especially for the portable stations, and also some good v.h.f. propagation to really bring in the DX. Good luck to everyone!



Neill Taylor G4HLX

Contest Rules

1. General

The contest is open to all Licensed Radio Amateurs, fixed stations or portable, using s.s.b., c.w. or narrow band f.m. (n.b.f.m.) in the 144MHz (2 metre) band. Entries may be from individuals or from groups, clubs, etc. **The duration will be from 0900 to 1600UTC on 15th June 2003.**

All stations must operate within the terms of the Licence. Entrants must observe the Band Plan and must keep clear of normal calling frequencies (144.300 and 145.500MHz) even for CQ calls. Avoid frequencies used by GB2RS during the morning (144.250 and 145.525MHz) and any other frequency that's obviously in use for non-contest purposes. Contest stations must allow other users of the band to carry out their activities without hindrance.

The station must use the same callsign throughout the contest and may not change its location. Special event callsigns may not be used.

2. Contacts

Contacts will consist of the exchange of the following minimum information:

- callsigns of both stations
- signal report, standard RS(T) system
- serial number: a 3-digit number incremented by one for each contact, starting at 001 for the first
- locator (i.e. full 6-character IARU Universal Locator for the location of the station).

Information must be sent to, and received from, each station individually, and contact may not be established with more than one station at a time. Simultaneous operation on more than one frequency is not permitted.

If a non-competing station is worked and is unable to send his full universal locator, his location may be logged instead. However, for a square to count

as a multiplier (see Rule 4), a full 6-character IARU universal locator must have been received in at least one contact with a station in the square.

Contacts via repeaters or satellites are not permitted.

3. Power

The output power of the transmitter final stage shall not exceed 3W p.e.p. If the equipment in use is usually capable of a higher power, the power shall be reduced and measured by satisfactory means. The simplest way is often to apply a (variable) negative voltage to the transmitter a.l.c. line, reached via the accessory socket.

The output power can be accurately measured using the simple circuit of **Fig. 1**. Connect this to the 50Ω output of the transmitter and adjust the power so that the voltmeter does not exceed 16.7V on a good whistle into the microphone.

4. Scoring

Each contact will score one point. The total number of points gained in the seven-hour period will then be multiplied by the number of different locator squares in which contacts were made (a "square" here is the area defined by the first four characters of a universal locator).

Example: 52 stations worked in IO81, IO90, IO91, IO92 and JO01 squares; final score = 5 x 52 = 260.

Only one contact with a given station will count as a scoring contact, even if it

has changed its location, e.g. gone /M or /P. If a duplicate contact is inadvertently made, it must still be recorded in the log, and clearly marked as a duplicate.

5. Logging

Logs may be submitted by E-mail or by post. In either case the log must consist of columns showing:

- time GMT
- callsign of station worked
- report and serial number sent
- report and serial number received
- locator received (or location).

A log sent by post must be clearly written on one side only of A4 sized paper (210mm width x 297mm height), ruled into the columns listed above. Underline or highlight the first contact in each of the locator squares worked.

At the top of each sheet, write:

- callsign of your station
- your locator as sent
- sheet number and total number of sheets (e.g. "sheet no. 3 of 5").

The sample shown here illustrates how each sheet should be headed. Log sheets and covering-information sheets which may be used for paper-based entries are available for downloading

Fig. 1: A simple power measurement circuit (please see text).

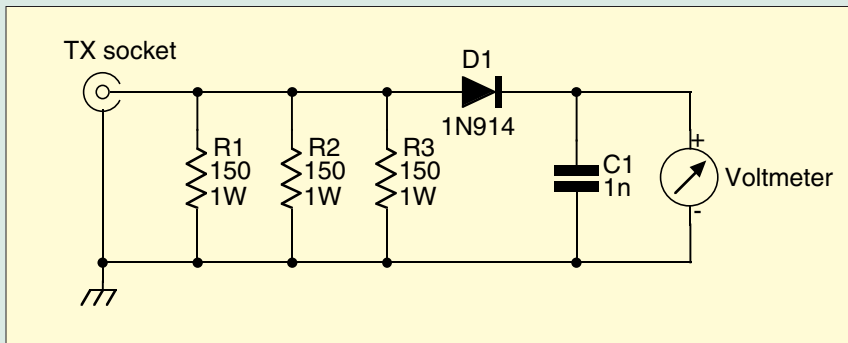


Fig. 2: Sample log sheet for PW 144MHz QRP Contest (see text).

Practical Wireless 144MHz QRP Contest 2003				
Date	Callsign	Locator		Sheet No Of
Time UTC	Callsign	Report & Serial No Sent	Received	Locator

Contest Rules continued

from the contest Web site
www.contest.org.uk

A log sent by E-mail, may be a file generated by logging software, provided it contains all the information listed above. It can also be a file in any other suitable format (plain text is fine) which, if printed, would be equivalent to a paper-based entry.

Preferably give the file a name including the station callsign (e.g. g4hlx.log), and send as a standard E-mail attachment - all common encodings can be accepted. If there is any problem with your entry you will be contacted by E-mail.

6. Entries

In addition to the log, the following information must accompany each entry:

- (a) name of entrant (or of club etc. in a group entry) as it is to appear in the results table and on the certificate
- (b) callsign used during contest (including any suffix)
- (c) name and address for correspondence
- (d) details of location of station during contest; for portable stations, a national grid reference is preferred
- (e) locator as sent
- (f) whether single- or multi-operator (a single-operator is an individual who received no assistance from any person in operating the station, which is either his/her permanent home station or a portable station established solely by him/her); if multi-operator, include a list of operators' names and callsigns
- (g) total number of contacts and locator squares worked
- (h) list of the locator squares worked
- (i) a full description of the equipment used including TX p.e.p. output power
- (j) if the transmitting equipment is capable of more than 3W p.e.p. output, a description of the methods used (i) to reduce and (ii) to measure the output power

- (k) antenna used and approximate station height a.s.l.

For an entry sent by post, this information must be written on a separate sheet of A4 sized paper. For an E-mail entry it should be written in the message sent with the log or, preferably, using the on-line form provided on the contest Web site - **www.contest.org.uk** - which also provides more information about sending entries by E-mail.

Failure to supply the required information may lead to loss of points or disqualification.

The following declaration must then be written and signed by the entrant (by one responsible person in the case of a group entry), or included in the e-mail text: *"I confirm that the station was operated within the rules and spirit of the event, and that the information provided is correct"*.

The entry should be sent, with the log sheets, by post to: **Practical Wireless Contest, c/o Dr. N. P. Taylor G4HLX, 46 Hunters Field, Stanford in the Vale, Faringdon, Oxon. SN7 8LX**, or by E-mail to **entry@contest.org.uk**

Entries must be postmarked or sent by E-mail **no later than 30th June 2003. Late entries will incur a heavy points penalty or may be disallowed.**

Comments Welcome

Any other general comments about the station, the contest and conditions during it are welcome, but should be written on a separate sheet of paper. Photographs of the station are also invited (but please note that these cannot be returned); if these are not available by the time the entry is submitted **they may be sent later, to arrive by 9th August 2003.**

A summary of the results will be published later this year in *Practical Wireless*. The full detailed results list will be available on the contest Web site soon after publication in *PW*; if you would like to receive this list by post, please enclose a s.a.e. when sending your entry.

A certificate will be sent to every entrant who encloses with the entry the corner-flash coupon on this page (**photocopies will not be accepted**). If you are sending your entry by E-mail, to claim your certificate you must post the coupon to the contest entry address with a note giving the callsign of your station

in the contest. **Please make sure that we have the address to which the certificate should be posted.**

7. Miscellaneous

Note that the conditions of the **Foundation and Intermediate Class Licences permit only the Licensee personally to operate the station.** Thus only single-operator entries are possible under Foundation or Intermediate callsigns. Of course, Foundation and Intermediate licence-holders may be operators of Full licence multi-operator stations (including club stations) when supervised by a Full licence holder.

When operating portable, obtain permission from the owner of the land before using a site. Always leave the site clean and tidy, removing all litter.

Observe the Country Code.

Take reasonable precautions to avoid choosing a site which another group is also planning to use. It is wise to have an alternative site available in case this problem does arise.

Make sure your transmitter is properly adjusted and is not radiating a broad or poor-quality signal, e.g. by over-driving or excessive speech compression. On the other hand, be aware that your receiver may experience problems due to the numerous very strong signals it will have to handle, and that this may lead you to believe that another station is radiating a poor signal. Before reaching this conclusion, try heavy attenuation at the receiver input.

The use of a high-gain r.f. pre-amplifier is likely to worsen strong-signal problems, so if you do use one, it is best to be able to switch it off when necessary.

8. Adjudication

Points will be deducted for errors in the information sent or received as shown by the logs. Unmarked duplicate contacts will carry a heavy points penalty. Failure to supply the complete information required by rule 6 may also lead to deduction of points.

A breach of these rules may lead to disqualification. In the case of any dispute, the decision of the adjudicator will be final.

PW

The 18th Annual PW 144MHz QRP Contest 0900-1600GMT, Sunday 15 June 2003

Entries by post should be sent, with the log sheets, to: **Practical Wireless Contest, c/o Dr. N.P. Taylor G4HLX, 46 Hunters Field, Stanford in the Vale, Faringdon, Oxfordshire SN7 8LX**, or by E-mail to: **g4hlx@breathemail.net**

Join in and have a great day!

RADIOWORLD

E&OE

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WEST MIDLANDS WS6 6BQ.**

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FT1000 MkV**
200W output comes
with external supply.

£Best UK price



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HF and 6m base station.
Built-in ATU, DSP, 100W
outputs, 2 antenna sockets,

large amber display. High-tech front end receiver
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The amplifier adored
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solid state transmit power
on HF-500W, 6m, LCD read-out. Price smash.

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usual quality excellent display.
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YAESU VX-1R

The world has never seen a dual-band
amateur hand-held transceiver which
provides such an incredible small size
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coverage until now. Weighs just over 4
ounces. 1W output. 10hrs of operation,
wide band receive.

£159.00



**YAESU
FT-1500M**

- 50W output power
- Four power levels
- Rugged construction
- Keyboard entry from
microphone • 175

memories • Built-in CTCSS • Smart search
• Wide/narrow deviation select • Packet ready

RWP £159.00



YAESU FT-817

The all new multi-band manpack,
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smaller than the FT-290, but can
replace the whole shack!

Radioworld price **£549.00**



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Real time band scope.
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matrix, LCD, CTCSS, optional barometric
pressure sensor.

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YAESU MB-200BX

YAESU'S all new desk top microphone
built for broadcast quality, large
diaphragm, a must for DSP transceivers,
it has the build quality and sound of Top
End studio mic's,

RWP £225.00

IN STOCK

Rob Mannion G3XFD is always on the look out for kits and ideas to encourage readers to 'have a go' themselves. It seems he's been enjoying using a simple receiver and an active r.f. pre-amplifier/antenna tuner, both built from kits.

The Kit Radio Company

KRC-2 Receiver & KRC-A-3 Kits

Regular readers will already know that for the last few months in Radio Basics I've been describing a simple project using a regenerative receiver as its central unit. However, although the project in question is in fact a simple form of superhet using the regenerative receiver as a tuneable intermediate frequency (i.f.) the self-build project from the Kent-based **Kit Radio Company**, is a 'stand alone' regenerative detector receiver.

Normally supplied as a kit for the individual purchaser to assemble themselves, the kits provided to me came ready to work. This perhaps might be considered to be a disadvantage (as I've not had the experience of building the kits) but in this case I'm sure that it won't be a problem...and I really don't see any difficulty at all in providing an opinion after trying both the KRC-2 receiver covering 1 to 30MHz, and the accompanying KRC-A-3 Active Pre-Amplifier Antenna Tuner unit.

Both units are battery powered and can be used together, or singly. I decided it would be best to report on the KRC-2 first, and then follow that with my opinion of the KRC-A-3.

The Receiver

Because of copyright reasons we're unable to publish the circuit of the design. However, the KRC-2 receiver, **Fig. 1**, is built around a two field effect transistors (f.e.t) receiver with a stage of regeneration feeding into a LM386 integrated circuit (i.c.) audio amplifier. The kit is fitted into one of the attractive standard ABS plastic boxes which are easily available (and very popular indeed) for housing kits. The box for this kit measures 190 x 110 x 55mm.

The simply styled black front panel of the finished kit is very attractive indeed...bearing in mind it only uses two main colours (black and white) together with red and yellow for the printed dial markings. The equally simple main tuning control and combined **On/Off** plus combined **Regeneration** control, **Fine Tuning** and three band wave-change control switches are neat and easy to use.



● The KRC-A2 to 30MHz regenerative receiver kit as built (above) with the KRC-A-3 Active antenna tuner unit (left). Rob G3XFD enjoyed trying them out!

On the rear of the box there are three miniature wing nuts (with a galvanised plated finished look to them) for

the main antenna input, ground connection and an auxiliary terminal, which I took to be for use with an external amplifier. The finished design is most pleasing. It's amazing what can be achieved with a simple box and careful choices of colours.

Approximately one half (left side looking into the rear) of the box is occupied by the working electronics, while the right-hand side is occupied by an 8Ω 300mW, 60mm diameter loudspeaker. The same side also houses the battery pack which itself holds six AA size dry cells for the 9V power supply. In the review model the battery pack was secured in place with the aid of a section of plastic foam – which also acted as an effective rear speaker baffle to reduce cabinet vibrations.

Interesting Techniques

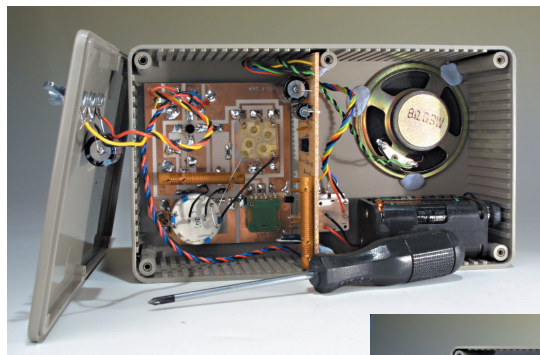
Unusually for a commercially produced kit the KRC-2 uses an interesting and unusual mixture of printed circuit board and Veroboard type layouts. The surface-mount style (literally the same techniques I use in the simple components-on-the-same-side-as-the-copper-track uses a good quality board, with the connection labelling points etched into the copper forming the printed circuit.

Incidentally, the layout seems to me, to be typical of

the type which I would use for v.h.f. However, the inductors seem to be wound on small wooden rods (perfectly acceptable for use on h.f.).

The Veroboard section, carrying the 2N3819 f.e.t. and the audio i.c., is mounted as a divider between the two halves of the box. And it's here that the designer's unusual approach comes to the fore in my opinion.

Some time ago I had long discussions with **Tony**



- The completed KRC-2 kit with the rear panel removed. The kit uses a mixture of conventional p.c.b. techniques and Veroboard (see text).

Westbrook of the KRC and I mentioned I wasn't that keen on Veroboard for projects...as we'd had so much trouble using the system at PW. (You can get cross-eyed trying to proof-read layout diagrams for mistakes!)

Despite my reservations, having seen the KRC printed layout overlay which is provided on the component side of the Veroboard (very clear, concise and easy-to follow) I've changed my mind. Provided that the designer doesn't make a mistake (and he hasn't because the unit works!) – no constructor should find building a kit using this method difficult. In fact it's surprisingly neat and effective for h.f. use.

On The Air

So, as I didn't have to build the kit...what was it like using it on the air? Well, I can say it worked first time! It also proved capable of receiving low level signals on a short wire antenna with a good earth.

Covering from 1 to 30MHz in three switched ranges the receiver proved a useful little project and I enjoyed using it. Surprisingly perhaps, for such a simple receiver, I was able to resolve both c.w. and s.s.b. with relative ease although tuning (without a slow motion drive) has to be carried out with care.

The use of the **Regeneration** control has to be approached with care also – and this is the hallmark of this type of detector - it takes skill to use them effectively. However, that skill comes with practice and there's a special thrill which comes to you when you do master this type of set!

Tuning is aided by the **Fine Tune** control – this helps to off-set the slight frequency 'pulling' which occurs as the regeneration control is used. The set is very selective... bearing in mind just how simple it is.

I think the kit will be an ideal starter receiver project for a keen constructor. Anyone building it will discover short wave listening in the same way as generations of others did before them.

Active Pre-Selector

The KRC-A-3 active preselector unit is also built into the same size and style of box, **Fig. 2**, as the receiver. They complement each other well, especially as the designer has used the same colour coding for the tuning ranges.

Very simple indeed to use, the KRC-A-3 two f.e.t., one i.c. unit is a clever little unit with a very helpful little 'extra' incorporated. In fact, I think it will prove fascinating and helpful to any constructor keen on using simpler receivers (also older types lacking sensitivity on the higher bands).

Built using the same circuit board techniques as the receiver, this unit uses a large inductor, wound on a section of pvc tubing. The switching unit uses a nicely laid out little p.c.b. design and a separate (Veroboard with printed overlay) holds the 'secret ingredient'.

The 'secret' is in fact a multivibrator type pulsing signal marker, generated from the i.c. circuitry on the Veroboard tucked on the far left-hand side of the completed kit.

Cleverly, the pulsing type signal from the 'Marker' unit allows you to tune up and match the antenna to your receiver for

the best results. All you do is to switch the Marker on and tune for maximum pulsing buzz. Once you've done that...you switch off the marker. It's very effective indeed.

I tried the active preselector with my Alinco DX-70 and my Roberts RC828 broadcast all band portable set - with excellent results. Using a short wire antenna in my shack/office cum study I found it was possible to tune-up easily on both receivers employing very short wire antennas.

When used with the KRC-2 it made the sensitive receiver even more sensitive. However, I found (as is common with this type of receiver) that strong signals from h.f. broadcast stations could overload the detector. The problem was quickly overcome however, by adjusting the sensitivity control on the active preselector.

Obviously, the most benefit will be found on simpler receivers. Despite this, I found that for general short wave listening on a compromise antenna (particularly a short wire) it

proved very effective indeed. In fact I've no doubt that it will prove a good investment for any keen listener who is forced to use less-than-ideal antennas at home.

I can imagine that the KRC-A-3 would also be a most useful travelling companion if a keen s.w.l. listener wanted to hear (for example) the BBC World Service when on holiday abroad and only had the choice of a very short antenna. I'm sure such keen types could find room in their suitcases for such a helpful companion!

Product

KRC-2 and KRC-A-3

Company

Kit Radio Company

Contact

Tony Westbrook on :
(01959) 563023

Pros & Cons

Pros: The completed kits are both easy to use and pleasantly (and simply) styled units. Once finished, the KRC-2 will provide many hours of listening pleasure and also valuable experience in 'driving' a basic receiver. Ideal training in my opinion. The completed KRC-A-3 Active Antenna Tuner unit is easy to use and effective. The pulsing multivibrator type 'marker' signal is particular helpful in tuning-up.

Cons: Due to the close spacing of the rear panel wing nuts (particularly on the KRC-A-3) the power lead should be attached before power is connected to avoid shorting the leads.

Price

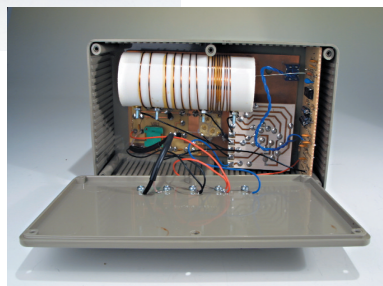
Either unit is available singly at £49.99 plus £4 P&P (UK and Ireland). However, both units are available together for a package price of £79.99 until August (plus P&P).

Summary

You'll have fun with these kits!

Thanks

My thanks go to **Tony Westbrook** of The Kit Radio Company, Unit 11, Marlborough Court, Westerham, Kent TN16 1EU, for the loan of the review units.



- Inside view of the completed KRC-A-3 Active antenna tuner unit. (see text).



- Rear panel view of the Active Antenna Tuning Unit. Power leads should be attached carefully before power is supplied, due to the close-spacing of the wing nut terminals, to avoid short circuits.

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The Royal International Air Tattoo

Prepare to be thrilled as the Royal International Air Tattoo 2003 sets the stage for a spectacular celebration of British triumphs in *100 Years of Flight*. Enter our competition



Over 30 nations will fly in for Europe's biggest airshow including the magnificent Red Arrows and an A-List of national aerobatic teams, and daring wing-walkers And there's even more family entertainment with hot air balloons, stalls, exhibits, road shows and exciting virtual reality rides! Read on to find out more delights of what RIAT has to offer visitors this year....

100 Years Of Flight

In December 1903 American bicycle-maker brothers Orville and Wilbur Wright pioneered a century of aviation with Orville achieving a 12 second, 120 feet flight, opening the door to long-haul air travel and the exploration of space. The RIAT 2003 salutes the British aircraft designers, engineers and test pilots spearheading giant leaps in aviation across the decades.

A Living History - the Best of British

- 10 themed decades - a living history of more than 150 of the world's most famous aircraft including replicas of the *Wright Flyer* and *Blériot XI*, *Sopwith Camel*, *de Havilland Gypsy Moth*, *Hawker Fury*, *Westland Lysander*, *Spitfire*, *Lancaster*, *Gloster Meteor* prototype, *Lightning*, *Harrier* and the faster-than-sound *Concorde* passenger liner.
- Super-sized screen coverage of the early pioneers, advances of the 1920s and 1930s, Battle of Britain and The Second World War - together with the dawning of the Jet Age and the evolution to today's aviation technology.

- Looking to the future - 21st century *Eurofighter Typhoon*, *Merlin HC3*, *Apache AH1*.

Ocean Watch 2003

Paying tribute to the gallant veterans of RAF Coastal Command on the 60th anniversary of the Battle of the Atlantic, international maritime and Search & Rescue units will fly into RAF Fairford for Ocean Watch 2003. This fascinating array of aircraft is normally seen on patrol from the Arctic Circle to the southern oceans.

Flying For Glory

The world's best pilots get airborne for a sensational eight-hour flying display - breathtaking solo jet and helicopter routines, legendary vintage aeroplanes, graceful gliders and a star appearance for the RAF's latest front line jet, *Eurofighter Typhoon*.

Musical Extravaganza

Tchaikovsky's famous 1812 overture, complete with Army cannons, is the highlight of a two-hour Musical Extravaganza performed by military bands at the close of flying. The big-sound concert also features 1940s swing,



Air Tattoo 2003

the 'smoke and thunder' of 21st century Top Guns in a competition for the ultimate aviation experience!



the classics and popular hits from the last 100 years, with even more entertainment as hot air balloons are released into the evening sky. Admission is free.

For all RIAT information or bookings (admission tickets, FRIAT, Aviation Club, Waitrose Jubilee Garden, Public Grandstand or Park & View) Tel: 0870 758 1918, or buy direct from www.airtattoo.com

Admission tickets **only** also available from branches of Waitrose and Stroud & Swindon Building Society, and from selected Tourist Information Centres.

Timetables & Ticket Info

Tattoo Timetable

The public gates to RAF Fairford (near Swindon on the Wiltshire/Gloucestershire border) open at 7.30am on Saturday and Sunday 19 and 20th July. Flying display from 10.00am to 6.00pm, followed by a free outdoor concert.

Airshow Traffic Improved

A professional traffic management consultant has been commissioned by RIAT to liaise with the County Police and Highways Agency. The new traffic plan is designed to speed vehicle flow, and improvements have been extended to car parking arrangements through investment in wider, resurfaced gateways. A Traffic Management company will oversee the car parks for both inbound and outbound flows. Plans are also underway for the introduction of a comprehensive Park & Ride scheme from Swindon. (Full traffic info on www.airtattoo.com)

Shuttle Bus

A frequent shuttle bus service will run from Swindon Bus Station to RIAT, taking around 40 minutes on the express route. First bus leaves Swindon at 7.30am, last bus returns from RAF Fairford at 8.00pm. Adults **£5.00 return**, children **£2.50**.

Tattoo Tickets

Adults in advance £27.95, on-the-day £33.00.

Children 15 and under go free if accompanied by an adult.

**WIN
TICKETS
WORTH
OVER
£600!**

Extra Options

Five Star Aviation Club

The Friends of the Royal International Air Tattoo enjoy a ring-side seat from the first aircraft arrival on Tuesday 15 July to the last departure on Monday 21 July. The seven-day package for aviation fans includes pre-show access to the airfield. **Adult subscription £125, children £62.50**

Aviation Club

Marquee with private grandstand and garden overlooking the runway. All inclusive price **£109.00 per guest** (RIAT admission, lunch, morning coffee & afternoon tea).

Waitrose Jubilee Garden

Traditional deck chair enclosure, offering a selection of summer refreshments. Advance tickets **£15 per person** (does not include RIAT admission or food and drink).

Public Grandstand

Reserved seating, great view of the flying display. Advance tickets **£15 per person** (does not include RIAT admission).

Park & View

Count them in as aircraft arrive for the Tattoo from Tuesday 15 July to Friday 18 July, and watch them take off for home on Monday 22 July. Two Park & View enclosures - advance tickets **£10.00 per adult** for Tuesday, Wednesday, Thursday and Monday and **£15 per adult** for Friday. Children 15 and under go free if accompanied by an adult.

Enter & Win!

To be in with a chance of winning one of the **10 pairs** of tickets on offer all you have to do is answer the questions below!

So what are you waiting for? Post your entry today!

Competition Questions

- 1 How many years of Flight will be celebrated at RIAT 2003?
- 2 The Royal International Air Tattoo is held in support of which charity?
- 3 In which year was the first International Air Show held?
- 4 Which aircraft is the star of the film *Memphis Belle*?
- 5 Who or what is a Fat Albert?
- 6 How many Red Arrows fly in the display?
- 7 Concorde's maiden Flight flew from RAF Filton, in April 1969. Where did it fly to?

Send your answers in on a postcard or sealed down envelope with the corner flash to **Practical Wireless, RIAT Competition, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW by 27 June 2003.**

Q u a l i t y • I n n o

ALINCO



ALINCO DX-70TH

Fully Featured Portable HF+6mtr Transceiver

The DX70 TH packs a hefty 100W punch on all Ham bands 1.8 - 50MHz. It is backed by a superb receiver with narrow filters fitted as standard. Make no mistake - this is a real DX operators transceiver ideal for use at home, or for that portable DXpedition.

- TX - all HF + 6mtr
- 100W output on HF & 6mtrs
- RX - general coverage 150kHz - 30-MHz, 50MHz - 54MHz
- SSB, CW, AM, FM and digital modes
- 100 memories
- Detachable faceplate and remote mounting kit available
- Speech processor standard
- Narrow filters fitted as standard

£699.00
SPECIAL
£599.00



ALINCO DX77E HF Transceiver 'GREAT VALUE'

The DX-77 is a design achievement that puts a HF desktop transceiver within your reach! And this is no 'bare bones' radio, nor is it a converted 'channelised' adaptation. The DX-77 was designed from the beginning to be a quality Amateur Radio, full of features to enhance its performance and your enjoyment.

- 100W HF transceiver
- General coverage RX 500kHz - 30MHz
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- 100 memory channels
- Built in speech compressor
- Front mounted speaker, loud clear audio
- Optional keyer

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SPECIAL
£499.00



EDX2 Auto Tuner

An automatic antenna tuner that matches a transceiver to a random wire antenna of over 3m in length (3.5MHz and above), or over 12m in length (1.6MHz and above). It comes installed with 5m of coaxial and control cables for instant operation with Alinco DX-70.

- Auto tuner
- 3.5MHz-30MHz (with over 3 metre element)
- 200W PEP power handling
- Power for tuning = 7-20W
- 13.8V DC $\pm 10\%$ operating voltage

£289.00

HFM-1

A stainless steel, heavy duty HF mobile antenna complete with spring base. Covers 3.5 to 30MHz when used with the Alinco EDX-2 Automatic Tuner. Alternatively it may be base matched with any type of tuner for mono band or multi band use. Power handling with the EDX-2 is 150W.

- Covers: 3.5 - 30MHz (when used with EDX-2 auto ATU)
- Length: 2.7 metres

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ALINCO DR-605E Dual Band Mobile

The DR-605E is a no-nonsense twin-band mobile transceiver that delivers power and performance with user-friendly features. The command keys are simply laid out to enable intuitive operation.

- Ready for 9600 bps packet
- Extended RX capability 136 - 174MHz, 420 - 470MHz
- 50W (2m) - 35W (70cms)
- 100 memory channels (+ CALL Channels)
- Cross band full duplex
- Tone search function
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- Channel indication mode
- CTCSS encoder fitted

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PMR 446 Licence Free Radio

Ideal for:
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Gives clear two way communications up to 2 miles range (dependant on terrain)

- 8 channels at 446 MHz
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Large selection of accessories available including:

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DJ-SR1

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EXPANDABLE TO RECEIVE
AM AIRBAND
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8.33KHZ CHANNELS



DR135E

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- Optional internal TNC operates 1200, 9600bps
- Front panel GPS input for APRS
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- Ignition key on/off feature
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- Super-wide 7 character display
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- Theft alarm feature
- AM airband receive
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- Size: 142 x 40 x 174mm

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- Wide RX possible (typical 135-173MHz)
- CTCSS + DCS enc/dec fitted
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- Alphanumeric display
- DCS, Tone burst and DTMF
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- THEFT ALARM!
- Emits a tone when disconnected from power
- S Meter with easy to read display
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- Comp. programmable 3rd party software
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- Large backlit display and keypad
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- Battery saver cct
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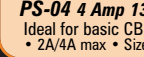
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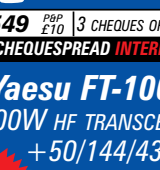
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Antenna Workshop

Peter Dodd G3LDO takes a look at computer modelling the performance of antennas using the PC program EZNEC3.

In the June 2002 edition of *PW I* described how a mobile h.f. antenna system can be modelled on a computer. As there was a lot of interest expressed in how it all works, this time I'm providing a description of the *EZNEC3* software I used to perform modelling.

However, in this article I can only give a brief description of *EZNEC* - the on-disk user manual that comes with this program is some 130 (electronic) pages! (But in spite of this complexity the program is easy to use).

Early antenna computer models were developed and used on large mainframe computers. The best known of these is the *NEC* series of programs. A simplified version called *MININEC* was developed for the the original IBM Personal Computer. These early computer models required considerable skill on the part of the operator to use them effectively, although as time has gone by, new versions have been developed to make them more 'user friendly'.

Additional Enhancements

There are now many modelling programs available, with each one introducing additional enhancements. Although rather than try to describe them all ... I have limited the discussion to *EZNEC 3.0 for Windows*.

The software calculates the radiation from the antenna from the r.f. current flowing in the antenna element(s). If the simplest of antennas, the centre-fed half-wave dipole is considered, the actual current distribution has a current maximum at the centre and is zero at the ends. The element is divided into segments of 'constant current' as shown in **Fig. 1**.

The current in each of the segments is calculated by assuming a known level of r.f. power to the antenna. It can be seen that the greater the number of segments, the more closely the model will represent the real current distribution.

Once the magnitude and phase of the current is known then the complex impedance for any part of the element can

be calculated. The total antenna electromagnetic field pattern can be built up from the magnitude and phases of the currents in the individual segments.

Antenna Modelled

The antenna is modelled as a set of straight conductors called **wires**, the ends of which are specified points in space using X, Y and Z co-ordinates. An example of a full-wave loop antenna is shown in **Fig. 2**. Wires are considered to be connected when their ends share the same XYZ co-ordinates.

For example, the loop of a cubical quad antenna is described by four separate wires whose end points lie at four points. This loop is thus modelled by four wires, even though a real loop antenna is made from a continuous wire. The antenna can also be rotated and viewed from any angle, and scaled in size.

The model is entered into the computer using a spread sheet sub-screen as in **Fig. 3**. The XYZ co-ordinates are entered into columns. Those on the right describe

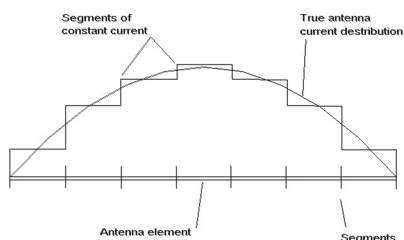


Fig. 1: Real and modelled current distribution over a half-wave dipole

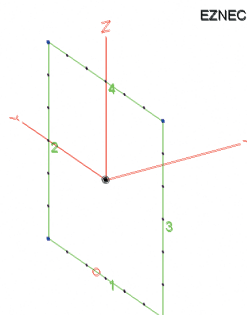


Fig. 2: The View Ant sub-screen of EZNEC, showing a three-dimensional view of a single element quad loop antenna against the XYZ axis. The dots along the wire are segments, described in Fig. 1. The wire numbers relate to the wires sub-screen shown in Fig. 3. The circle in the centre of wire 1 is the feed-point (source). The blue squares are wire connections.

Wires									
No.	End 1				End 2				Segs
	X (m)	Y (m)	Z (m)	Conn	X (m)	Y (m)	Z (m)	Conn	
1	0	-1.8541	-1.8541	W3E2	0	1.8541	-1.8541	W2E1	5
2	0	1.8541	-1.8541	W1E2	0	1.8541	1.8541	W4E1	5
3	0	-1.8541	1.8541	W4E2	0	-1.8541	-1.8541	W1E1	5
4	0	1.8541	1.8541	W2E2	0	-1.8541	1.8541	W3E1	5

Fig. 3: An example of the EZNEC Wires sub-screen of the full wavelength loop shown in Fig. 2. This is where you construct the antenna model. The data in the left XYZ columns and the right XYZ are co-ordinates of the ends of each wire respectively. In this case the co-ordinates are described in units of metres but can be changed to other units, such as wavelength or feet for example. Changes to the model can be seen if you have the View Ant sub-screen open.

Fig. 4: The home screen display of EZNEC3 where Open is used to access any existing file, which can then be modified and saved via Save As. Wires provides access to wires screen as shown in Fig. 3. Sources is the feed-point. Loads is a facility for connecting components such as a coil - used, for example, to create a loading coil on mobile antenna. FF Plot is the start button to run the program.

EZNEC v. 3.0	
File	Options
Outputs	Plot
Setup	View
Utilities	Help
Single quad loop for 21MHz	
File	quadloop.EZ
Frequency	21.1 MHz
Wavelength	14.2082 m
Wires	4 Wires, 24 segments
Sources	1 Source
Loads	0 Loads
Trans Lines	0 Lines
Ground Type	Free Space
Wire Loss	Copper
Units	Meters
Plot Type	Asimuth
Elevation Angle	0 Deg
Step Size	1 Deg
Ref Level	0 dBi
Alt SWR Z0	50 ohms

the point in space (co-ordinates) of **end 1** of the wire while those on the left describe the co-ordinates of **end 2**. Other data items that need to be entered are the conductor diameter and the number of segments (last two columns).

Generally, results become more accurate as the number of segments is increased, see Fig. 1. More segments increases the analysis time and the complex impedance matrix calculated by the program goes up as the square of the number of segments. Additionally the analysis takes longer although this is not a problem with modern high speed PCs.

Overlapping Wires

The program doesn't automatically connect overlapping wires. For example, four wires are required to model an X-shaped structure if the conductors are connected at the centre of the X. A Yagi element composed of tapered sections of telescoping tubing may be modelled by using several connected wires having different diameters.

For a complex antenna geometry, *EZNEC3.0* has a 'group edit' feature, which allows you to copy, move, add, or delete groups of wires, sources, loads, or media. Any block of data can be filled with a common value. Another feature permits changing the units of measure. This is particularly useful for switching between wavelengths and other units, or for converting a design from metric to Imperial units or vice-versa.

Access to the sub-screens so far described is obtained via a **home** screen shown in Fig. 4. When the antenna data has been entered the performance of the model can be calculated by selecting **FF Plot**.

The model can give the following information once the program has been run:

- r.f. currents in the antenna structure, which may be viewed after the impedance is calculated, as shown in Fig. 5.
- The far-field patterns, plotted directly on the screen in polar co-ordinates. These may be plotted as three dimensional, azimuth or elevation patterns. With either azimuth or elevation patterns the forward gain, front-to-back ratio, maximum sidelobe level, beam-width can be displayed as an overlay as shown in Fig. 6.

Specified Frequencies

With *EZNEC* the plots from data calculated at specified frequencies can be overlaid in colour on one display, giving a very good graphic comparison of the performance of an antenna over a given frequency range, see Fig. 7.

All modelling examples shown so far, are what is known as free space models that

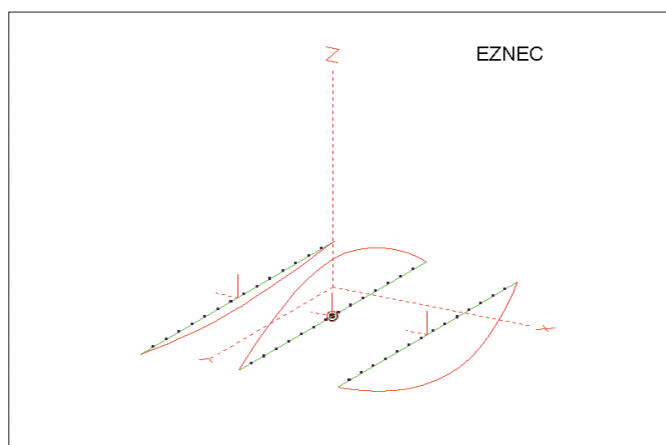
assume no ground reflection effect. A horizontal section at zero degrees relative to the X axis through the three-dimensional diagram describes characteristics of the antenna without the complication of taking ground into consideration and is the easiest way to model or compare antenna configurations in early stages of comparison or development.

In the real world, ground affects the far field patterns of antennas. *EZNEC* provides free space, ideal ground, or 'real' ground environments. If either a perfect or 'real' ground is specified, *EZNEC* assumes a perfect ground for impedance and current calculations. The 'real' ground description is used only for determining the shape and strength of the far field (pattern). *EZNEC* calculates the far field pattern that results from ground absorption or partial reflection due to finite ground conductivity and permittivity.

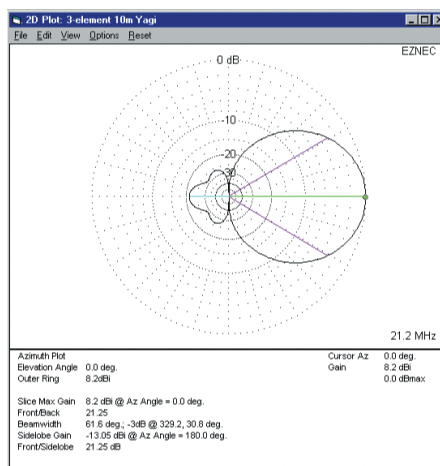
The program *EZNEC 3.0*, used in this article, can be obtained from **Roy Lewallen W7EL, PO Box 6658, Beaverton, Oregon 97007**. See <http://eznec.com>

While the cost for the full program is \$89 (download) or \$99+\$3 P&P, the demonstration version, *EZNEC 3.0 demo*, is the complete program, with on-line manual and all features. The only problem is that the program is limited in the antenna complexity that can actually be modelled. (This version is **FREE** and there is no time limit on the demo version.).

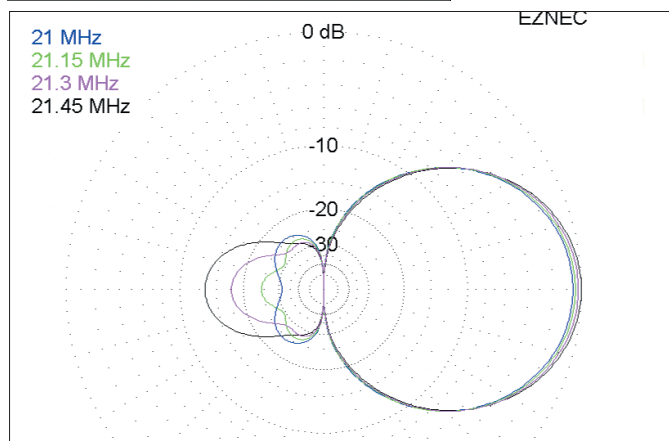
The manual on *EZNEC* provides a considerable amount of information on antenna modelling. But for additional



● Fig. 5: This shows a three-dimensional antenna geometry view of a 3-ele Yagi. The amplitude and phase of the r.f. currents on the driven element and the parasitic elements can be shown after the program has been run. Small markers, showing 0 and 90° are used as phase references. If the model is rotated and tilted so that it can be viewed down the Y axis the currents appear as phasors.



● Fig. 6: This shows free-space two-dimensional plot of the 3-ele Yagi shown in Fig. 5. The forward gain, front-to-back ratio, maximum sidelobe level, beam-width are displayed in the data box.



● Fig. 7: The frequency sweep of a 3-ele beam antenna giving a graphic comparison of the performance of an antenna over a given frequency range. The measurement frequencies are shown in the colour legend, at the top left-hand corner of the display.

information, go to **L Cebik W4RNL's** excellent antenna site at <http://www.cebik.com/> and check out Antenna Modeling Software Notes.

Another free MININEC antenna analyser program is *MMANA* by **Makoto Mori JE3HHT** and is available from <http://www.qsl.net/mmhamsoft/mmmana/>

pw

The Practical Wireless

Ian Liston-Smith
G4JQT
describes the
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Wireless', a
simple, but
effective two
band radio to
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shack or out
in the garden.

As many readers will know, the popular Ferranti ZN414 integrated circuit introduced in the early 1970s was replaced a few years ago, by the MK484, both devices give an introduction to basic radio circuits using various constructional techniques. And judging by the number of simple medium wave designs that have appeared, they seem to be very popular.

The design described here, employs two popular i.c.s, runs very efficiently from a PP3 type battery and covers both Long and Medium wave (l.w. and m.w.). Looking through my back issues of PW there have been recent designs using the MK484/LM386 combination, and the possible pitfalls. Yet a complete circuit covering both long and medium wave with both i.c.s on one board as an entire unit running off one battery hasn't been fully covered since the early 1980s.

In September 2001, PW published an article called Practical Circuit Board Construction, which described how to make circuit boards that look like p.c.b.s, without etching. So, it seemed to be a good idea to combine this construction method with a practical and complete MK484/LM386 a.m. radio design. So, for readers who would like all aspects of the MK484/LM386 circuits pulled together - read on...

The Circuit

Let me now turn to the circuit of the project, as shown in Fig. 1. After much experimentation, I found the best way to cover both l.w. and m.w. bands was to wind both coils on one ferrite rod, shorting out the l.w. coil to cover m.w. I'd tried switching between two separate coils, but the self capacity of the unused l.w. coil had undesirable effects.

You could try coils on separate rods for each band, as described in the February 2000 issue of PW*. But,



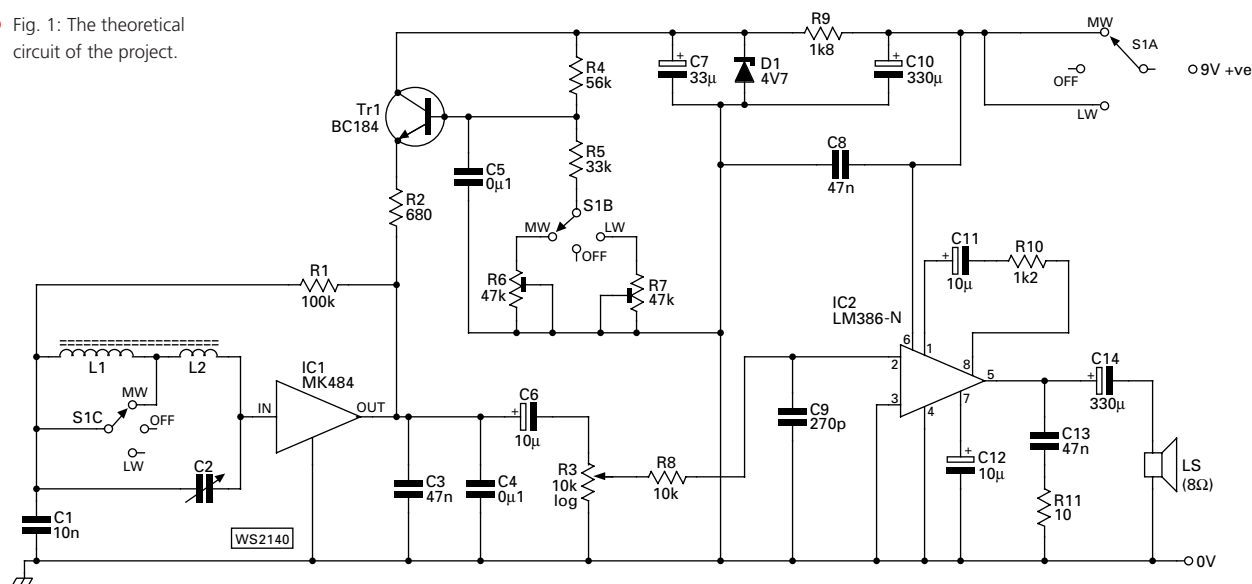
as a t.r.f. design is never going to be a high-performance DX receiver, there's no real advantage in doing this.

***Note:** We all have our differing opinions! However, although I fully respect Ian and his experience, I can assure any reader who contemplates building the two ferrite rod receiver - in Radio Basics for February 2000 and refereed to by him - as being thoroughly worthwhile. By using the two ferrite rods, no compromise is made on performance and the suggested approach works exceptionally well. The only down side is that it's only really workable in a larger table-top sized radio. But whatever circuit you do make...you can be assured of thoroughly enjoying using the MK484! Editor.

The gain of the MK484 varies considerably with frequency, between its operational limits of about 150kHz and 3MHz (being highest around 1MHz). The MK484 data sheet explains how the overall gain can be adjusted, so as to enhance its performance on l.w.

Reduced gain in IC1, can be overcome by slightly

Fig. 1: The theoretical circuit of the project.



increasing the voltage to the i.c. on l.w. This adjustment setting is the function of the circuit around Tr1 and diode D1. Transistor Tr1, can be any general-purpose silicon *npn* transistor, but ensure the correct lead orientation for the circuit to work properly.

The pre-set controls R6 and R7 can set the supply to the MK484 in the range of 1-2V, the gain rises significantly as the voltage is increased. This adjustment has the advantage of enabling the r.f. gain to be set independently for each band, preventing the i.c. from overloading in areas of very strong signal.

The a.g.c. range of the MK484 is quite limited and overloading of the MK484 circuit has the effect of causing the strong signal to spread across the band and/or causing the signal to sound distorted. On the other hand, if you live in an area with no strong signals, the gain of the MK484 can be set a little higher, needing to be set only once.

High Gain

As with all high gain r.f. circuits, lack of attention to r.f. de-coupling and layout inevitably leads to unwanted oscillation and instability. Care has therefore been taken to eliminate these problems in this design.

The components C3 and C4 should be mounted close to the output pin of the MK484 i.c. Their combined capacity of around 150nF ensures that no r.f. gets to IC2, which would be one cause of instability. A single capacitor may be used here if you can find one of the correct value, but the nearest preferred higher value (180 or 220nF) gives slightly too much treble cut.

The more usual value of this combined C3/C4 capacitive component is 100nF, but the MK484 data sheet shows exactly how this capacitor's value may be calculated in conjunction with the a.g.c. resistor, R2. For a value of 680Ω, a capacitor with a value of 150nF gives satisfactory performance.

The LM386 is an ideal audio i.c. to use in a battery set as its quiescent current consumption is low and will work with a supply down to as low as 4V. The circuit used here is as suggested for an a.m. radio audio amplifier from the LM386 data sheet.

The purpose of R8 and C9 is also to eliminate any r.f. getting into IC2 and should be located fairly close to IC2's input pin. The network of R10/C11 gives some extra audio gain. Their values may be adjusted, but the data sheet suggests 10μF and 1.2kΩ which seem a good choice.

The two components R11 and C13 form a Zobel network, ensuring that the LM386 sees a resistive load at all frequencies and is commonly seen wired across audio amplifier outputs. Omitting these components will often be another cause of instability or poor audio quality.

The power/band switch, SW1, is a 4-pole 3-way type, with one quarter unused. When wiring up, ensure that you choose the correct contacts - if in doubt, check with an Ohmmeter. If you have a volume control, with switch, though they seem harder to find, then a simpler 2-pole 2-way switch may be used instead. The switched volume control is then used as the on-off control.

The Construction

Now to the construction. A p.c.b. may be made from the layout shown in **Fig. 2**, but one of the purposes of this article is to illustrate that this is not necessary if the construction method in the September 2001 article is followed.

Compare Fig. 2 with the photograph of **Fig. 3**, where in essence you have single-sided copper-clad

board, with the copper layer as the ground plane and drill and countersink holes for the component leads. These leads are connected underneath. A good idea, is to slip some insulating sleeving over leads that might come close to each other on the 'track' side.

The photograph of **Fig. 4**, shows how

the leads are connected up underneath, following the same pattern as the tracks. Earthed leads are soldered directly to the ground plane, these points being indicated by the square pads on track pattern of Fig. 2.

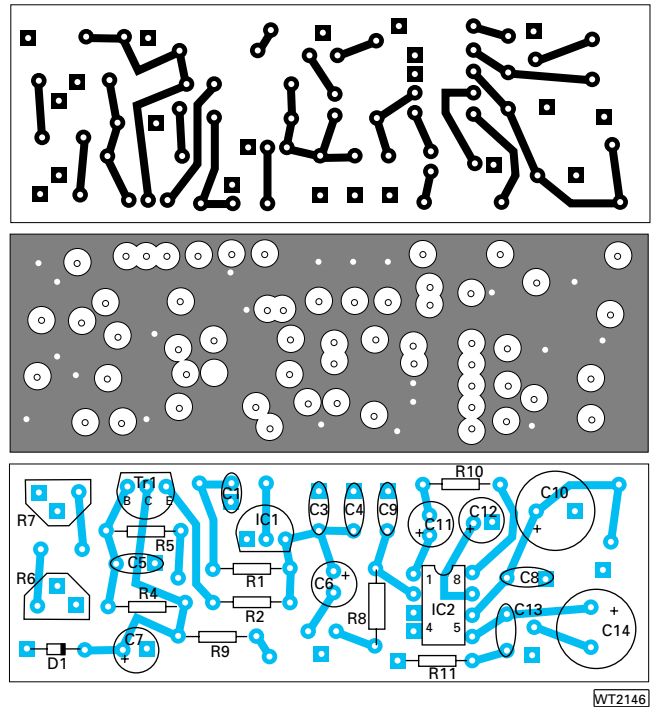
The advantages of this construction method are significant: It will accommodate all types of traditional components, including dual-in-line (d.i.l.) devices. The method needs no special tools and if a p.c.b. layout is given with a project, it can be followed exactly. This technique has no unwanted stray capacitance and so the technique is suitable up to v.h.f. And finally, the finished board looks very tidy!

Nevertheless, it's advisable to gather all the components together first, just as you would before making a real p.c.b. That way any variation in component types and lead spacing can be allowed for before drilling starts. Depending upon how you mount the board, you may like to leave a bit of extra width or length to allow for one or two fixing bolts.

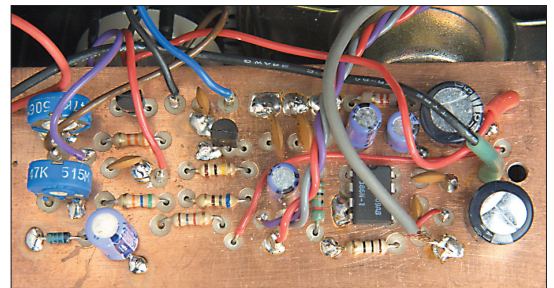
The m.w. coil consists of about 90 neat, close-wound turns of 0.28mm (32s.w.g.) enamelled wire on a paper former slipped over the ferrite rod. Don't wind it too tightly, as you will need to be able to slide it up and down the rod later. The l.w. coil is about 250 turns of the same wire neatly pile-wound on a paper former in the same winding rotation direction as the m.w. coil.

Wind Carefully

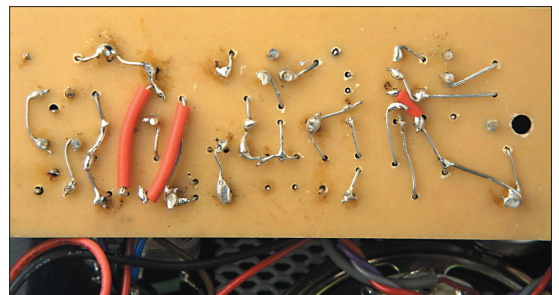
The best way to prevent the coil from unravelling, is to wind it carefully, but in rough layers, rather than start at one end and winding across in one go. The exact number of turns of both coils will depend on the



● Fig. 2: The 'track' pattern and overlay of the 'no-p.c.b.' p.c.b. The rounded areas around a smaller circle, indicate holes through the board, where the copper around the hole has been cleared away to prevent shorts.



● Fig. 3: Ian's prototype board, compare this to Fig. 2.



● Fig. 4: Underneath the board showing the interconnecting wires rather than copper tracks.



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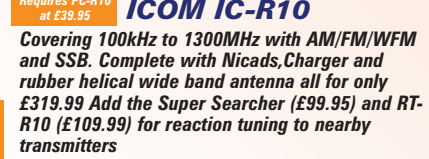
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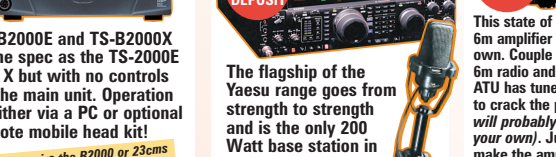
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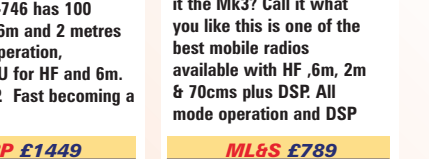
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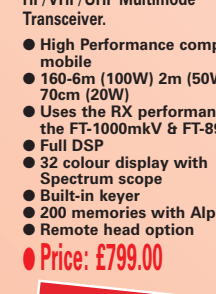
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The R.A.I.B.C. produces a Quarterly Journal called "RADIAL", which goes out to all of our members and supporters in either printed or cassette form. The photograph shows our Editor, Peter Hunter, GOGSZ in his shack chatting on the much loved FT-9900 which - of course - was supplied by Martin Lynch & Sons.

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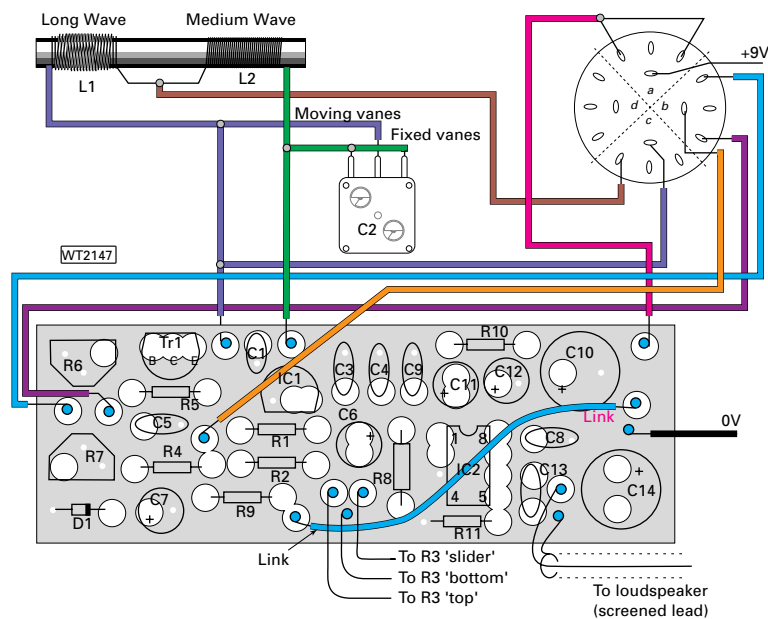


Fig. 5: Interconnecting the board with the other parts. The leads to R3, the volume control, should be twisted tightly together.

length and permeability of the rod and the exact value of the variable capacitor, so leave the leads long enough to add a few turns.

The MK484 requires the variable capacitor to be 'floating' with respect to the negative rail. This isn't a problem, but its significance is often overlooked. It

means that the moving vanes (which are usually directly connected to the spindle) must be connected to the C1/R1 side of the circuit and a plastic control knob should be used, otherwise hand capacity effects will affect the tuning.

A cheap variable type miniature capacitor works fine with this circuit, but take care when fitting it as the mounting screws will foul the vanes if over tightened. Both capacitor sections should be wired

together to get the maximum capacitance swing. Nevertheless, any variable capacitor with a maximum value of up to about 500pF can be used - with a corresponding reduction in the number of turns for L1 and L2 to achieve the correct frequency coverage.

The leads to the volume control and speaker ideally should be screened, with the screens soldered to the earth plane. This prevents any unwanted coupling in

the circuit so the position of these wires becomes much less critical. In practice however, I've found that when the volume control leads are twisted together, they don't need screening. But I would still recommend that the lead to the speaker is screened.

As is the general rule in all r.f. assembly, don't leave any wiring or component leads longer than necessary. Don't forget the insulated wire on the component side linking the two points (blue wire on the board marked 'link').

The suggested final assembly layout appears in Fig. 5, with the photograph of Fig. 6 showing the relative positions of the speaker, coils and board. The position of these main components can have a bearing on stability, especially if you live in a weak signal area and have the gain of the MK484 set relatively high. So, bear this in mind.

Setting Up

Setting up is easier before everything is mounted and wired into the box. Don't use a metal box as this will tend to screen the ferrite rod and prevent it picking up any signals! Connect the battery and put the l.w. coil, L1 at one end of the ferrite rod and the m.w. coil L2 at the other. Short out the l.w. coil and adjust R6, until about 1.5V appears at the junction of R1 and R2.

The lowest m.w. channel is 531kHz and the highest is 1602kHz so, the set should tune over this range. With C2 closed the aerial circuit should resonate at about 530kHz. If not, push L2 further onto the rod or add a few more turns. With C2 fully open the circuit should resonate at 1600 to 1620kHz.

Juggling the position of the coil and number of turns at the low frequency end of the band and adjusting the trimmers (if any) on C2 at the high frequency end will ensure that coverage of the whole of m.w. (and probably a bit extra) is achieved.

Remove the short from the l.w. coil, and adjust the other pre-set resistor, R7, to give about 1.7 volts at R1/R2. L1 should be in series with the m.w. coil and if both are wound in the same direction, their inductance will add and BBC Radio Four on 198kHz should be audible with C2 at about half capacitance.

To ensure full l.w. coverage (153 to 279kHz), add or subtract a few turns to L1 and/or move it slightly along the rod. When you have adjusted the final number of turns, the l.w. coil in particular will benefit from a coat of clear nail varnish to secure the windings.

I admit to being a bit of a perfectionist, and to be honest to get complete coverage of both bands using a miniature tuning capacitor took me some time as each adjustment slightly influences the others! They never tell you this in simple radio constructional articles. But if you are happy just to receive the main stations in your area then this precise fine-tuning is unnecessary.

The sensitivity must now be set. Switch to m.w. and adjust the appropriate pre-set resistor so that there is no whistling on any signals on the band and that any strong stations do not distort or spread excessively.

Next, you then repeat the procedure on longwave, this time adjusting R7 if necessary. Check, by tuning across the whole of both bands to verify the best adjustment of both pre-set resistors.

Although I've rather cheekily called this a 'Practical Wireless', it's unlikely to be quite as selective as even a cheap superhet receiver. However, once set up correctly, it's sensitive, completely stable and makes a fine little radio. As a complete radio project it is an ideal first introduction to home construction. Have fun building it!

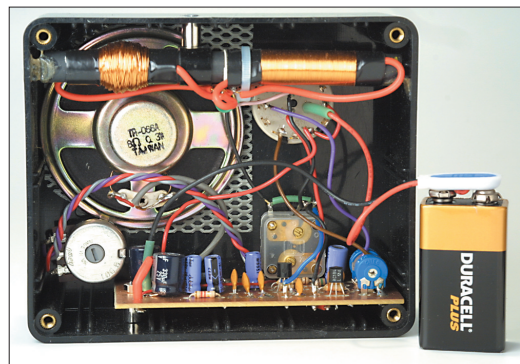


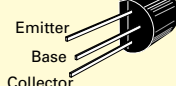
Fig. 6: The insides of the finished project, plenty of space for a PP3 battery to fit in.

Pin Configurations

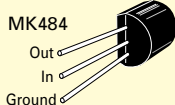
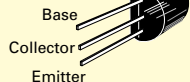
The regulator transistor Tr1 can have several pin configurations, depending on the type number. Take care to check that you arrange the correct orientation when fitting Tr1 on the board. Almost any general purpose npn transistor will work in this position if a BC184 type is not available.

BC184
BC184C
BC182KB

BC184B
BC182K
BC182KC



BC184L
BC184LC



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Antennas

Part 3

This month Rob Mannion G3XFD provides more helpful advice and encouragement. This time he's intent on getting you into the fresh air for some portable operations on the h.f. bands!

Welcome to Part 3 of this mini series....which was originally intended to be just one article! Despite my original plans though, it soon became obvious there was much to share with readers and like the famous 'Topsy' from *Uncle Tom's Cabin* (who just 'grew') - the article has also grown!

Although, I've not been at a loss for items of interest to include in the articles I've prepared so far...I must say that this particular section will be the most pleasurable to write because I'm dealing with portable working...an aspect of the hobby, which I thoroughly enjoy nowadays.

Obviously, my work as Editor of *PW* takes me to some interesting places and I have to spend much time driving. This is where taking a break can be made very enjoyable because within a minute or so of stopping...I can be on the air and chatting to friends.

Another advantage of working portable from the car is that I can take full advantage of our hobby, and the beautiful countryside. Additionally, whereas nowadays I'm strictly limited to the distance I can walk there's the chance to park up on a hillside with a good view, chat on the radio and 'Let the radio waves do the walking' so to speak!

So, if you're new to the Amateur Radio hobby and also disadvantaged when it comes to enjoying a walk in the same way as I and many others are...why not consider taking your hobby outdoors and into the countryside with you? There are very many advantages...and

you'll find that the power level limits applied to the M3 Licence don't work against you so much...especially if you can rig a good temporary antenna up for an expedition to visit our rural delights.

Easiest-To-Do

As before, I'll start off with the easiest-to-do methods of getting on the air when operating from a temporary site. I'll then go on to suggest more involved ideas and projects and hopefully you'll become as keen as I am on getting out and about.

And don't forget...many of my ideas will cost you next to nothing in money - the main expenditure will be in time and enthusiasm. Not a great expense when you realise later just how much fun you had working /P.

However, before I venture onwards to talk about the outdoor aspect of the hobby... I can't resist sharing the photograph, **Fig. 1** (on page 44), with you. I do so because I've been taken to task recently - somewhat light-heartedly - by readers who've said "I haven't got a car and can't drive...so how can I take part in the way you suggest Rob?"

Well, the chap in the photograph in Fig. 1, doesn't have a car but still joins in! Being a very keen motorcyclist he wasn't going to let one hobby interfere with the other. The 1kW h.f. mobile set-up brings him DX contacts from all over the USA and the World. I met him on several occasions at the Dayton HamVenture in the USA...and even though he's updated the motor bike and the h.f. rig, it was still basically the same set-up (including the



● Rob Mannion EI5IW/G3XFD pictured at Clew Bay, a favourite stopping off place in County Mayo. The beach where Rob is parked overlooks the sea in two directions and is ideal for h.f. operations even though the sacred Croagh Patrick and lesser mountains surround the site on three sides. The photograph (apologies for the appearance of the Editor!) is included to illustrate the use of a portable centre-supported trapped-dipole system (see text). Even at the low height (the pole supports the centre of the dipole in washing line fashion) shown in the photograph, world-wide DX is possible with low power.

(Photograph courtesy of Oliver Norris.)

corona discharge from the antenna when he transmitted so he told me!).

If the keen motorcyclist can work h.f. portable/mobile...you can too! I'm planning to operate /P using my battery buggy soon...so I'll be practising what I preach. So, why don't those of you without transport consider getting a bicycle and trailer? Even a small shopping trolley could carry enough equipment to get you on the air. The only limitation is your imagination...or perhaps the fear of being seen chatting into a microphone connected to a shopping trolley! Seriously though, anyone can join in operating portable...try it and see for yourself after you've read the article.

Portable & Convenient

As I mentioned last month, I find that one of the most convenient antenna systems available uses the American made SGC SG-230 automatic antenna tuner unit (a.a.t.u.). This system allows the use of a variety of relatively short wire antennas and tunes up for me as soon as it 'sniffs' the r.f. (See last month's article).

As already mentioned, I use my SG-230 at home for fixed operation but it's also extremely easy to release the security locking clamps* to take it away with me for the day. It's capable of being powered by a vehicle's 13.8V d.c. system, and (if you've got the extension cable kit offered by SGC) remotely operated and controlled.

continued on page 44

The reason why I'm mentioning the use of my SG-230 again is to stress **it's the lazy Mannion's way of getting on the air quickly and easily!** However, joking apart...it is extremely easy. I use the system in conjunction with a portable earth spike which is hammered into the ground.

Incidentally, the soil in the parts of Dorset I operate from is of the well known 'sandy heath' type. In other words...the ground is usually very dry and not very conductive. So, I take water with me to dampen the ground around the spike when it is dry. An odd, but very pleasing, side effect of this is that the sudden appearance of damp ground often attracts local wildlife!

The nature score so far as my favourite /P site at Holt Heath near Wimborne is several Slow Worms, numerous frogs, toads and the local Robin. The latter visitor, by the way, seems content to stay nearby...enjoying any water I have left over...completely unafraid of the large animal sat in his metal cage!

If I don't have time to erect my fibreglass fishing pole type vertical antenna - I just run out a long wire (about 20 metres or so of wire). **Ensuring it's above head height for the safety of anyone likely to approach.** I use three broomsticks (varnished and equipped with aluminium jointing sleeves) to support the antenna at the far end. However, this isn't always necessary as there's often a small tree into which I can throw my rubber ball (make sure no-one is likely to be in the way).

The rubber ball was a favourite toy belonging to my Labrador, Mandy. Nowadays I

have another use for it...as a throwing weight. It's not heavy enough to do (much) damage if it bounces back at me... but it carries enough weight to penetrate a tree in full leaf. A heavy duty string is threaded through a hole in the centre, enabling the antenna wire to be drawn up through any convenient tree.

If you try this method...please be careful of the rightful residents in the tree! Make sure you don't disturb any birds which may be nesting.

When it's time to leave for home, the end of the string attached to the wire antenna can be detached, and then be pulled through the branches and recovered. It's far easier to do it this way, and when erecting the antenna, the string can be arranged so that the tree provides the highest possible wire height. The string also keeps the end of the wire far enough away from the 'earthy' tree.

***Security Clamps:** These are available from caravan accessory shops, motorcycle and scooter centres, etc. They're designed to secure items mounted externally on various vehicles/ or outdoor locations. Those I use are of the braided steel cable type, fastened with two small padlock type snap locks.

The special security headed bolts are fastened onto my garage wall. I recommend that you take similar precautions.

Antenna Lead-In

Obviously, if you're using a wire antenna, you'll have to get the wire into the car with the minimum contact to the vehicles bodywork, etc. Nowadays, most of

us shy away from drilling holes in our precious metal boxes on wheels. And it's a long time since I last drilled holes and placed antenna mounts in the middle of a Morris Minor roof!

So, just how do you go about getting a wire antenna into a car? With the weather we experience in our group of Islands...you can never assume it will be dry for very long... so keeping windows open may not be a good idea and another method is called for.

The simplest technique I've found for antenna lead-ins, is to use one of the expanding plastic lattice-work grills sold by pet shops. These are intended to be placed on partially (or fully) open car windows to allow fresh air in for our doggy friends, whilst not allowing them to escape easily.

In practice, you can easily feed the wire through - and even secure it - to one of these grills. The next step is to weatherproof the system...and this is where some ingenuity is called for.

In my first version I decided to use thick, translucent polythene sheeting, folded round the edges of the grill, and kept in place by the grill/trellis assembly, car window, and the upper recess for the fully raised car window. The system works well enough, although you do tend to feel as if you're somewhat caged in...dry yes, but certainly caged in!

The preferred method is a really good one...but it does mean that you'll be spending money every time you replace your car. Despite that, it's my favourite.

First Step

The first step you have to take is to look in your local edition of *Yellow Pages* for the sections

dealing with suppliers of plastic materials, signs and displays, etc. One of these will be your source of a piece of good quality Perspex.

Once you've purchased the Perspex, the supplier may even be prepared to cut it to shape for you (mine did). In fact, I originally bought two sheets of Perspex, one for use in my car, and the other to replace the glass in the small opening top window in my study/shack. A double ended feed-through insulator was then attached, and the Perspex replaced the glass to provide a neat lead-in system. (Don't forget to replace the putty!).

The piece of Perspex (More modern forms of plastic or acrylic are available, but Perspex is still very suitable) for use in the car window will need different treatment. This is because a vehicle's windows are curved - meaning that the Perspex will have to curve in the same way.

Using a profile gauge (or paper template made by tracing the shape of the car window) you can cut and shape the Perspex to fit the upper recess of the car door. Make sure that the plastic will fit, but not too tightly into the grooves made for the glass window.

Next, you can then shape the lower part of the Perspex to sit on, or over the lowered section of car window glass. Here, fully aware of the danger of rainwater getting past the Perspex and into the car, I decided it was best to let the plastic sheeting overlap the window by about 50mm. This would ensure any water would run down the car window...and not inside.

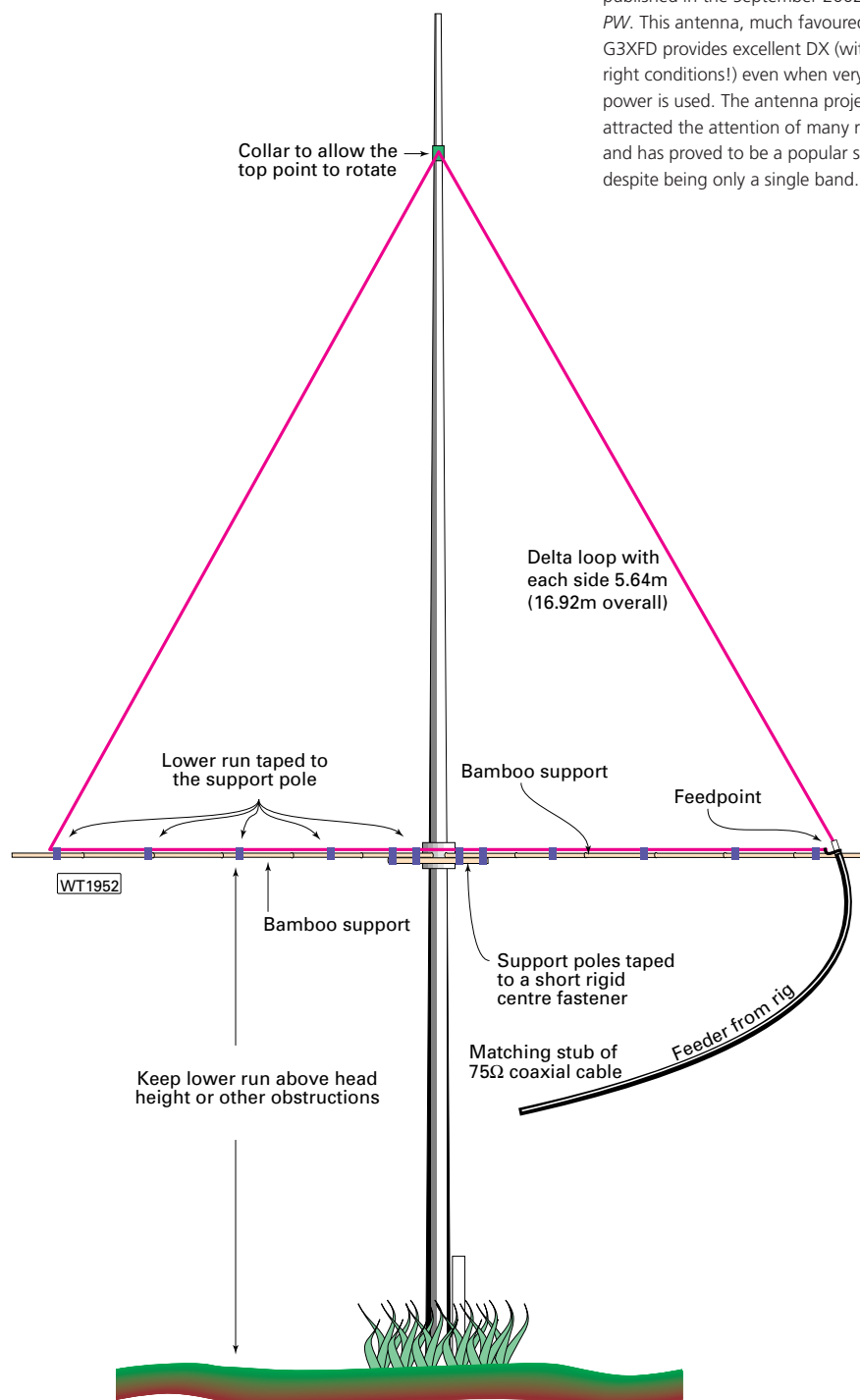
The final stage was to arrange a series of Perspex sections (stuck into place with any rapid curing, clear-setting adhesive) to follow the upper curve of the lowered car window. These sections allow the partially raised window to fit snugly underneath the plastic 'rests'. The antenna lead-in hole can be drilled anywhere where the incoming wire will be convenient for the operator.

There's no real need to use a formal lead-in type of insulator. A bolt with lock nuts either side will do just as well. However, a nice looking lead-in insulator will look better. When finished, the system is easy to install and remove...it's also workable with hand-operated and electrically powered windows.



● Fig.1: Something to counter the complaints "I haven't got a car" directed at G3XFD when he suggests getting "out and about" to enjoy Amateur Radio. This gentleman is a regular visitor to the Dayton HamVention in the USA which G3XFD also attended. The keen 'biker' thoroughly enjoys his hobby and operates a 1kW mobile station from his motor bike and trailer combination! Power for the station is provided by a petrol-powered 2.5kW generator set housed within the trailer.

● Fig.2: The portable Delta Loop system as published in the September 2002 issue of *PW*. This antenna, much favoured by G3XFD provides excellent DX (with the right conditions!) even when very low power is used. The antenna project attracted the attention of many readers and has proved to be a popular system, despite being only a single band. (see text).



Single-Band Antennas

Finally, this time, I must mention the use of single-band antennas, with the accent on using them for portable operating. This type of antenna includes the American made Pro-AM whips which I've favoured for a number of years. These long h.f. loaded whip antennas are (in my opinion) rather too long for true **Mobile** operation mounted on a car...but they really come

into their own for portable work and I carry a set (for 7, 14, 18 and 21MHz) in the car ready for use any time.

In practice I tend to use mine in conjunction with the MFJ-945E mobile tuner. Designed specifically for mobile working this little a.t.u. enables the Pro-AM antennas to be used effectively over a large frequency range...**without the need for the operator to get in and out of the car. Very useful indeed!**

For an in-depth look at the idea please see pages 16 and 17 of the *Antennas To Go* magazine presented free with last month's *PW*. The article - Out & About Having Mobile & Portable Fun provides full details.

The next single-band antenna just has to be the Delta Loop Portable system, **Fig. 2**, which originally featured in the 70th anniversary issue of *PW* in September 2002. Using a simple length of wire, together with

garden centre bamboo canes you can make this folding antenna very easily indeed.

Back issues of the September 2002 *PW* are available if you require the full article. However, you can make one very easily from the illustration in Fig. 2. Dimensions for the loop on 18MHz are 16.92m (55ft 6in) **total length** for resonance on 18.100MHz. The wire required is 0.7mm stranded wire (as used in mains 'flex').

The 20m version requires 21.654 metres total length for the loop (7.2m per side). The required matching stub is 3.49 metres of 75Ω impedance coaxial (TV) cable. The system will then tune-up from a standard a.t.u. **with superb results using low power.** Try one and see for yourself!

Next month I'll be chatting about possible TV and radio interference problems, etc. In the meantime...enjoy your hobby.

PW

● Although this article is primarily aimed at encouraging more h.f. portable operation Rob G3XFD mentions that he always takes his v.h.f. equipment with him. This photograph, taken during the 2002 *PW* 144MHz QRP Competition on a foggy June day, shows the v.h.f. antenna mounted on an 8m high mast, using a portable Tenna-Tourer mast base. The same system is used to support a trapped dipole for the h.f. bands (see heading photograph).



Practical Peter G3UCA Goes P

Using his simple and practical approach, Peter Sinclair G3UCA enjoys working both mobile and portable. In this article, he shares good ideas on how you can make your own outdoor Amateur Radio operating more efficient.

Having decided he wanted to enjoy portable and mobile operating Peter Sinclair G3UCA decided to organise himself, and the necessary equipment to obtain the best results. He aims to encourage you to do the same!

When I decided to do some mobile/portable operation, the first thing I had to do was to provide a suitable mount onto which I could fit either mobile whips or a short mast to hold up dipole antennas. I was fortunate in obtaining a suitable mount and after some modification this became the basis of the antenna system which I'm describing here.

The decision to fit the home brewed bracket, see illustrative drawing **Fig. 1**, using the bolts - which hold the tow ball to the tow bracket, **Fig. 2 and 3**, - was taken as this would provide a very good earth to the car body. Firstly, I removed the original bolts and fitted some longer types.

The tow ball was then re-fitted permanently. When I wish to use the bracket, it just slots over the protruding bolts, being retained with two star washers and two additional nuts. (see photos and drawing in Fig. 1).

My mobile whips are mounted onto the left hand side of the bracket using a 'gum boil' style mount, inset **Fig. 4**. This provides a very stable mount and also a very good earth which is necessary for efficient mobile operation.

I use Pro-Am whips for mobile working in motion, and home brewed versions (centre loaded) for portable operation. These are approximately 2.74 metres (9ft) long and are usually one to two S-points up on the Pro-Ams on 3.5 and 7MHz.

Incidentally, I've made a full set covering the bands from 1.8 to 28MHz. The articles are based on an article by G3TSO which appeared in *Radio Communications* and also the now defunct *Ham Radio Today*.

Antenna Analyser

My preferred method to tune the whips is by means of an MFJ antenna analyser model MFJ-259B. But you could use a Grid Dip Oscillator (whoops showing my age there!) or an f.e.t. (gate dip) oscillator.

The analyser is connected to the base of the 'gum boil' mount using the same coaxial cable which will eventually go to the rig. The resonant frequency and feed point impedance is then read off the analyser's display.

In practice the whip top section is adjusted to bring the resonant frequency into the portion of the band on which you wish to operate. By tuning the frequency of the analyser a graph can be plotted showing the 2:1 points, i.e. the usable portion of the band before re-tuning of the whip top is required. (As an example on 7MHz the lowest s.w.r. I could obtain was 1.5:1, with a feed point impedance of 20 Ω).

Now comes the all important step! I fit a toroidal matching transformer directly onto the base of the gum boil mount using a back-to-back male PL259 connector, **Fig. 5**. Next, I re-connect the coaxial cable to the other side of the transformer.

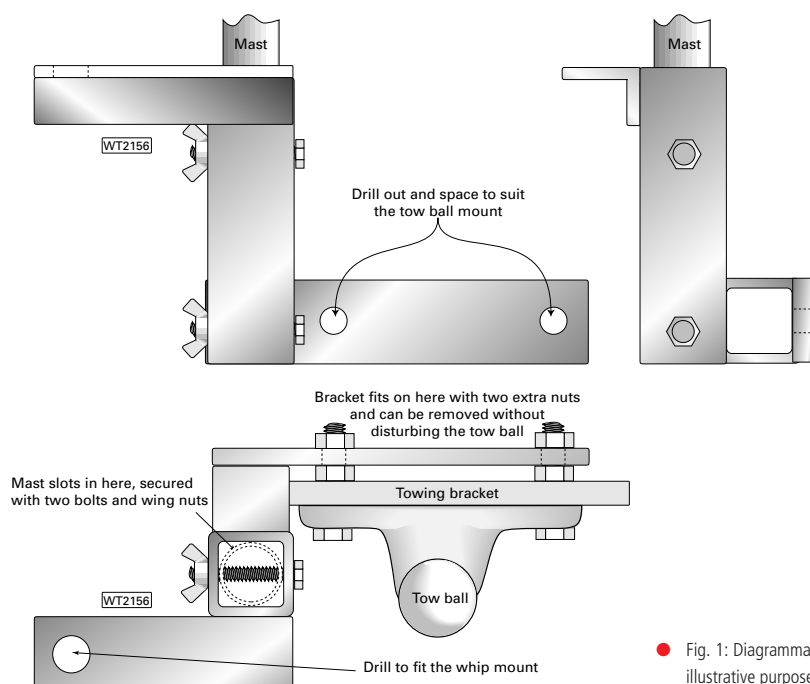
Then, by switching the transformer to 20 Ω (other tapings would have to be tried if you did not know the feed point impedance) I now get a perfect match into the 50 Ω coaxial cable and into the rig. The s.w.r. then read 1:1 and the rig produced full power. Unfortunately however, the toroidal transformer I use is no longer available. It was made by LAR, but similar ones can be home made (see diagram) and other makes are available.

Second Mount

We now come to the second mount on the bracket which is a welded square section, shown in both photos, **Fig. 4**, which will allow a 25mm (1 inch) square aluminium section mast to slot inside. I also have three 1.525m lengths with a round section riveted into one end. These all slot together making a 4.575m free standing mast, **Fig. 6 and 7**.

Each section is secured together with a bolt and wing nut, (see **Fig. 6**). The base section has two bolts and wing nuts. Next, 228mm down from the top section I drilled a hole and again fitted a bolt and wing nut. This allows me to slot in a 1.22m length of broom handle which holds the centre of the dipole. It's free to rotate in any direction allowing the dipole to be positioned in any direction relative to the position of the car.

The total height of the system above ground level (a.g.l.) is as follows: Mount above



● Fig. 1: Diagrammatic drawing of the home-brewed mast mounting bracket. Shown for illustrative purposes only, actual sizes will depend on vehicle, material to hand and individual requirements (see text).

Portable and Mobile!

The article he provides some

ground 305mm + three sections of mast at 1.525m = 4.9m and the broom handle (less part inside mast) = 1.07m, totalling 5.95m. This is very close to the recommended height for Near Vertical Incidence Skywave* (NVIS) propagation on 7MHz.

*I won't go into NVIS propagation in this article as it has already been well documented in the Amateur Radio press.

Dipole Centre

The method of fitting the dipole centre, **Fig. 8**, to the broom handle is to first cut a flat onto it, and then drill two holes and again secure with bolts and wing nuts. I fit bullet connectors onto the ends of the 7MHz dipole which enables me to extend it to 3.5MHz if required.

I have used the 7MHz dipole at this height on many occasions and can consistently put a 5&9 plus signal from my portable station located near Preston in Lancashire to all parts of the UK.

When the dipole is removed I can fit a light weight rotator (made for TV antennas on a caravan) to turn a small 144 or 430MHz beam antenna. The whole system works extremely well in practice.

Matching Transformer

The toroidal matching transformer has appeared in the internationally appreciated Technical Topics, compiled by **Pat Hawker G3VA** in *RadComm* on at least two occasions and also in articles in the (as mentioned) now defunct *Ham Radio Today*. The original is attributed to **9M2CP** in an article in *RadCom* in July 1972.

So, there you have it...now that the weather is getting better, perhaps I've persuaded you to build your own version, get out and do some portable operation? If you do...you'll be surprised how quiet the background noise is once you get away from the computers, TV and vacuum cleaners, etc.

It's a whole new (much quieter) radio world out there. Try it for yourself...you won't regret it!

PW



Fig. 3: The tow ball was then re-fitted permanently. When G3UCA wishes to use the bracket, it slots over the protruding bolts, and is retained with two star washers and two additional nuts (see text). The G3UCA mobile whips are mounted onto the left hand side of the bracket using a 'gum boil' style mount (top left). It provides a very stable mount and also a very good earth which is necessary for efficient mobile operation (see text).



Fig. 2: The decision to fit the bracket using the bolts - which hold the tow ball to the tow bracket - was taken by G3UCA as this would provide a very good earth to the car body (see text).

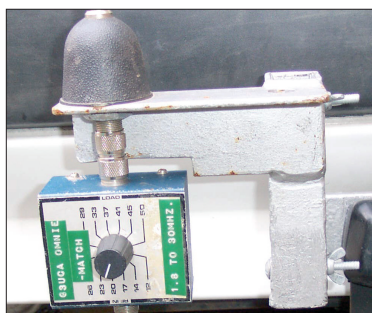


Fig. 5: Peter G3UCA fitted a toroidal matching transformer directly onto the base of the 'gum boil' mount, using a back-to-back male PL259 connector (see text).

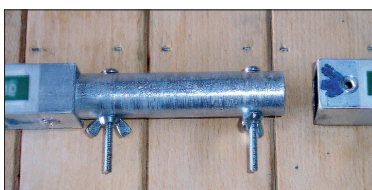


Fig. 6: Three 1.52m lengths with a round section riveted into one end. These all slot together making a 4.6m free standing mast (see text).



Fig. 4: The second mount on the bracket which is a welded square section, allowing a 25mm square aluminium section mast to slot inside (see text).

Fig. 7: The home-brewed antenna system and coiled up dipole. Also seen are the slot-in-tube sections. (See text for suggestions on the assembly).

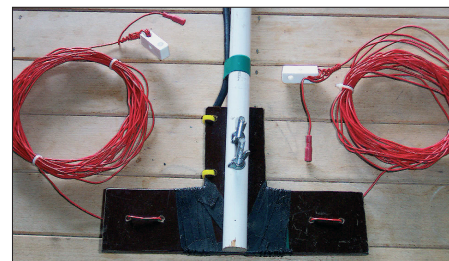
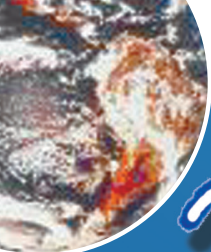


Fig. 8: Close-up photograph of the dipole centre assembly (see text).



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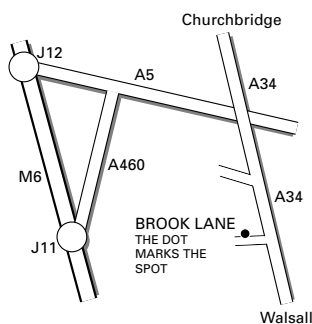
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Kenwood	YK-88SN-1	1.8KHz SSB Narrow Filter 8.83MHz.....	£40.00	Kenwood	YO-901	Scope.....	£250.00
Kenwood	PS-430	Power Supply.....	£100.00	Kenwood	Yupiteru	Multiband Handheld Scanner.....	£199.00
Kenwood	YG-455CN-1	270Hz CW Crystal Filter.....	£100.00	Kenwood	MVF-9000	Base / Mobile Scanner.....	£199.00
Kenwood	TM-241E	2M Mobile Transceiver.....	£120.00				
Kenwood	TH-215E	2m Handheld Transceiver.....	£99.00				
Kenwood	TH-235	2m Handheld Transceiver.....	£95.00				
Kenwood	TS-520	HF Base Transceiver.....	£99.00				
Kenwood	TR-2400	2m Handheld Transceiver.....	£50.00				
Kenwood	TM-251E	Mobile Transceiver.....	£140.00				
Kenwood	TH-F7E	Dual Band Handheld.....	£199.00				
Kenwood	TR-751E	2m Multimode Transceiver.....	£250.00				
Kenwood	TM-255E	Power Supply.....	£145.00				
Kenwood	TM-255E	Low Drive Linear Amplifier 100W HF.....	£150.00				
Kenwood	TM-455E	Dual band Handheld Transceiver.....	£170.00				
Kenwood	TM-431E	Receiver.....	£175.00				
Kenwood	R-5000	2m / 70cms Handheld Transceiver.....	£175.00				
Kenwood	TM-D700E	Receiver.....	£225.00				
Kenwood	TS-80S	2m Multimode Transceiver (Fair Condition).....	£295.00				
Kenwood	TS-50S	2m Multimode Transceiver (MINT).....	£395.00				
		70cms Multimode Mobile Transceiver.....	£450.00				
		70cms Mobile Transceiver.....	£110.00				
		Receiver.....	£499.00				
		Dual Band Built In TNC.....	£299.00				
		HF Mobile / Base Variable Power.....	£425.00				

Please note, the equipment listed may have been sold or updated, please ring 01922-414796 to check availability



Please note, the equipment listed may have been sold or updated, please ring
01922-414796
to check availability



Carrying On The Practical Way

This month the
Rev. George
Dobbs G3RJV

discusses a
helpful
project...a
utility receiver
board. "A
Simple Little
Thing" he
says...if it can be
found when
required!

"Small to greater matters must give way"

William Shakespeare

"Anthony and Cleopatra", Act 2 scene 2

There are a few little circuit boards in my workshop which can only be described as 'utility' items...things which can be used quickly to serve a variety of applications. I've got quite a few such boards and they share two common characteristics – they're very useful but I can never locate them when needed!

So, this month's project came from my inability to find my utility receiver board! That is, it would be **if I could I find it, or wasn't if I didn't find it!** However, in essence the project is a convenient circuit board that could be quickly adapted to be an impromptu receiver at almost any frequency.

From time-to-time, the need arises for a simple receiver on a specific frequency to act as a piece of test equipment, or even to listen to signals. For many purposes, the simplest of direct conversion receivers is enough to do the job...and that's what I'm about to describe.

Block Diagram

To provide you with the basic idea, **Fig. 1** shows the block diagram of a simple direct conversion receiver. The input tuning selects the desired signals from the antenna.

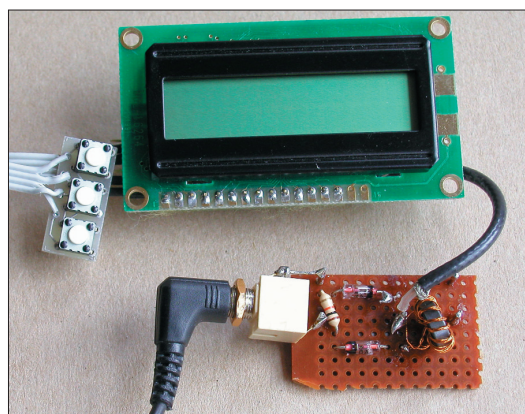
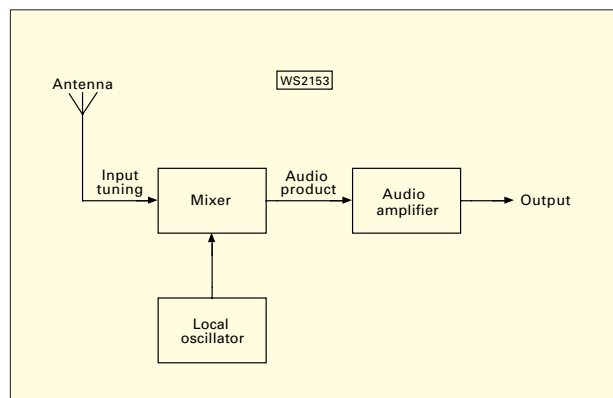
Next, the selected radio signals are mixed with a local oscillator signal, which is also operating at the desired frequency. The mixer products will include audio signals either side of the desired frequency and the upper and lower sideband signals. These audio products are then amplified in order to be heard.

A quick glance at what's required, in **Fig. 1**, shows that some of the functions could be performed by existing items in the workshop. And, quoting the situation here as an example,

my workshop has several audio amplifiers including a test amplifier, an amplifier for my CD player and at least two sets of amplified speakers working with a computer.

I also have two signal generators

● Fig. 1: Block diagram of the G3RJV 'Utility' direct conversion project. It's useful...when George can find it in his busy workshop! (See text).



● This month's project - a utility mixer board in use, and being fed by a DDS-1 oscillator (see text).

which cover a wide range of frequencies. So, as you'll realise...I already have the local oscillator and audio amplifier ready for use. To have a simple receiver, I can get away with just the mixer. The best choice would be a passive mixer, because in this way the system won't require a power supply.

The G3RJV Circuit

The diagram, **Fig. 2**, shows the little circuit I used. It's a passive mixer based on a trifilar wound transformer and uses only four parts. (I first saw it used by **Bill Currie VK3AWC** in a little receiver circuit).

The input from the antenna, usually through some form of input tuning, goes to L1 of the transformer. The local oscillator is fed to the centre of L2 and L3 to provide a balanced output to a pair of diodes, D1 and D2. The average level of products from D1 and D2 appear at the top of the resistor and this is the output which drives the audio amplifier.

Ideally the diodes should be germanium types, like the 1N34A or OA81 or Schottky barrier diodes, such as the BAT82 or BAT83. Don't forget that the two diodes are handling radio frequencies and a low forward voltage drop is helpful. (**Don't worry though...**if none of the types I've mentioned is available in your junk/stores box, one of the common silicon diodes will do the job).

Toroids Again!

Probably the most difficult part of the circuit is winding the transformer....and yes, it's those dreaded toroids again! But, as the Editor has encouraged readers to 'have a go' in Radio Basics recently...I'm also asking you to try. Please be assured...they're not so difficult in practice.

The transformer is 12 turns of trifilar wound wire on a ferrite toroid core. The core I used was an FT37-43 but the larger FT50-43 would also serve and would be easier to wind.

In practice, almost any ferrite core pulled out of the junk box would be suitable. The winding space demands a small gauge of wire, and I

found that 0.27mm (32s.w.g.) enamelled copper wire worked well.

Having encouraged you to try winding toroids yourself, we now proceed on to another problem area...trifilar windings ...which again are not so difficult when you actually try it for yourself. As regular readers will know...I'm always a little nervous of describing circuits using bifilar or trifilar windings as they are easy to get wrong. So, perhaps a brief description is not out of place to help those of a slightly nervous disposition.

So let's first take a look at L1, L2 and L3 closely. They are formed from three lengths of wire, twisted lightly together **and wound on the core as one wire**.

To start...take the three lengths of wire (100mm would be plenty long enough). My method is to hold them side-by-side and tie a knot in one end then secure the joined ends in a small vice or 'third-hand' soldering tool.

The wires are stretched side by side and a knot is made to join them at the free end. Experience has taught me that twisting the wires by hand is the easiest method.

I usually slide a pencil through the inside of the free end of the three wires and 'twirl' it. As the twists are formed, using my fingers I stroke them along the wires, as this helps to keep the twists evenly spread over the whole length. (Three or four twists per centimetre is plenty).

Treated As One

The twisted wires are treated as one wire as the turns are added to the core. **Remember that in toroidal core winding, each time the wires passes through the hole counts as one turn.**

Essentially, the idea is to space the winding evenly over about three-quarters of the available core space. Once the winding is completed the wires at each end are separated and tinned with solder. Now the difficult bit – sorting out which wire goes where!

The vital thing is to get the phasing right, the correct ends of the windings going to the right places. This can be done by continuity testing, using the resistance range on a multi-meter to identify the ends of each wire.

On the diagram, a dot identifies the same end of each winding. For simplicity, and to follow the diagram, I will call the dotted end the 'top end'. The input winding is simple – the dot end goes to the input and the other end goes to ground.

However, L2 and L3 are a little more tricky. The top end of L3 is connected to the

bottom end of L2, which goes to the oscillator input. The **top end** of L2 goes to D1 and the **bottom end** of L3 goes to D2. (Read that again **carefully** - before winding your own toroid).

In practice it's easier to mount the other parts **before** the trifilar transformer is added. This means as soon as the correct end of a winding has been identified it can be soldered in place. (The heading photograph shows the prototype that I built on a small piece of Perfboard).

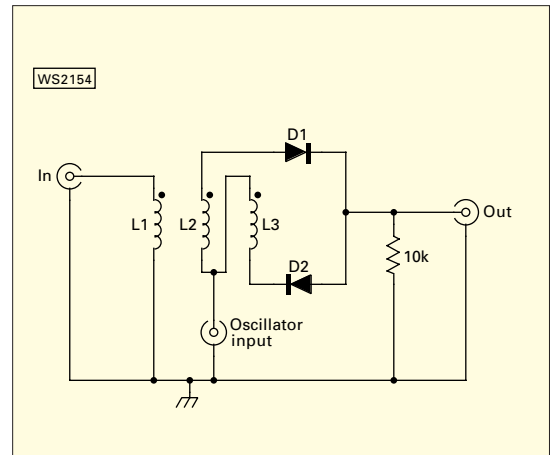
Bench Amplifier

I tried out my board by connecting it to my bench amplifier and using a miniature DDS oscillator as the local oscillator. This is the DDS-1, a digitally synthesised oscillator which outputs up to 15MHz and made by RMT Engineering in the USA.

The DDS-1 provided plenty of signal to drive the mixer and I tried the 7MHz Amateur band to see how the circuit worked without any input tuning. Surprisingly, it produced quite a reasonable receiver for 40 metres. So my little board lies on the bench, **until it gets lost**, as my easy way to fabricate a receiver when needed.

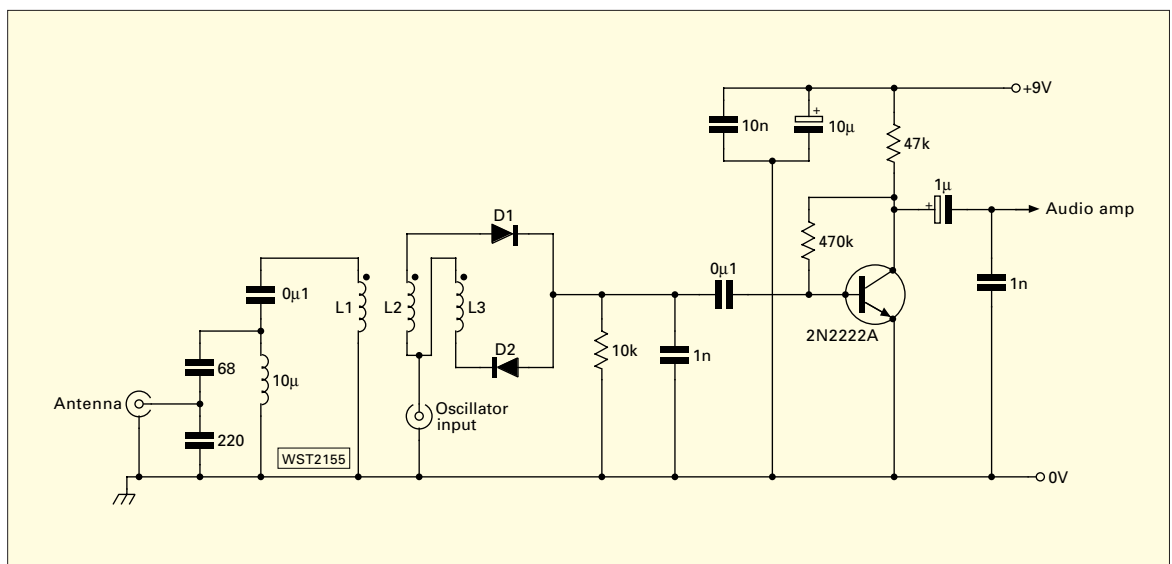
Although not really designed as a specific receiver, I did a little more work to see how it might perform on 7MHz. The original set-up lacked any input tuning and the amplification was a little too low. The diagram, **Fig. 3**, shows how I added a simple input tuned circuit, with an axial choke as the inductor, and a little more audio amplification. This arrangement produced a lot of useful signals on the band.

● Fig. 2: The circuit of the basic passive mixer unit. The dots on the drawing are markers to assist in preparing, winding and identifying the inductors (see text).



PNW

● Fig. 3: The circuit of the simple receiver board discussed in this month's article by G3RJV (see text).



Radio Construction... A Lifetime Hobby

Roger
Bebbington
MOBWP and
his superbly
built projects
featured in *PW*
a year ago in
Topical Talk.
He was then
awarded the
honorary title
'Constructor
Extraordinaire',
Roger now
describes his
lifetime's
experience in
the radio
hobby.

My first real interest in short wave radio began as a schoolboy, when I obtained an R1155 via a friend of the family. He'd just acquired an Eddystone slide-rule dial receiver and passed on the 1155, which cost me the princely sum of £5 at 10 shillings (50p) a week for it.

The R1155 also came with a few *Practical Wireless* magazines - the first time I had ever seen the magazine - detailing various modifications you could do to the receiver. An uncle who was a former Second World War radio man - whose home always had some neighbour's radio set opened up for repair also helped as an early source of radio knowledge and old radios to play with.

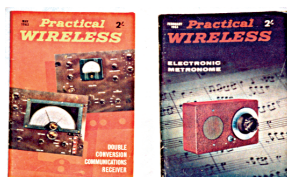
I recently purchased an old BC 348 ex B17 Flying Fortress Command Receiver. This then reminded me of visits I paid as a school boy to a local scrap yard. It was full of high quality American aircraft radio equipment of all sorts from the nearby RAF Burtonwood base. It certainly provided a plentiful supply of radio bits and valves for a keen schoolboy and I still have a liking for surplus equipment of the wartime era.

On leaving school I was to gain an Apprenticeship at Pilkington Brothers glass works in the town of St. Helen's. This glass-making town was, and still is, internationally famous for its glass products and I became a fully indentured apprentice fitter and turner.

Home-Brewed Projects

I had already tried my hand at a few home-brew projects. And when a constructional project entitled A Double Conversion Communications Receiver by P. R. Lewis appeared in the 1963 May, June, and July editions of *Practical Wireless*, **Fig. 1.**, I was really keen to have a go.

In the articles P. R. Lewis stated his main source of reference was "an excellent series of articles in



● Fig. 1: Roger's copies of *PW* from 1963...both of which started him off on building his own versions. Both featured projects still work.



The circuit description was of a 13 valve double conversion design, **Fig. 2** shows my version, using all Denco Miniature Dual purpose coils. I think the selling point for me of this receiver at the time was **the use of plug in coil sets (Fig. 3).**

● Roger Bebbington MOBWP...a man who takes his hobby seriously...but also really enjoys "doing a job properly". He's pictured in his shack posed in front of some of his prized projects...before sharing the story behind them.

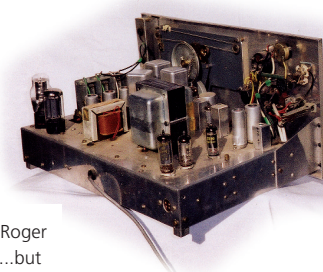
Wise Decision!

I think my choice of plug-in coils was a wise decision! The mechanical work involved in constructing the plug-in coil sets was well worth the extra effort, as it avoided complicated switching.



The receiver's coil section actually consists of three six-way miniature Jones sockets mounted in a row under the receiver. The plug-in coil sets were fitted with three six pin Jones plugs with the Denco coils soldered onto them, one set for each wave range.

I remember



the miniature Jones plugs and sockets were difficult to obtain. But, at a recent rally at Blackpool I spotted new 'old ones' for sale still in the original Ministry of Defence waxed paper wrapping. Of course, I couldn't resist buying some!

● Fig. 2: Three views 1963 *PW* double-conversion superhet as built by Roger MOBWP. He was fortunate enough to have a suitable Eddystone dial...but as he says in the article...some modifications were needed (see text).

the *PW*, October 1954 to March 1955". Recently, I was lucky enough to obtain the entire volume of the 1963 *PW* at a local rally recently for £2. They've provided a good memory-jogger to help describe the radio which I built.

Front Panel

The original *PW* design used a half moon dial mounted at the far right hand side of the front panel. However, I had spotted an Eddystone dial in an Amateur Radio shop in Manchester (long gone now I suppose).

The front panel had to be mounted away from the main chassis by about two inches to take the Eddystone unit. Also, an extra pulley wheel had to be fitted to connect the dial drive shaft to the main tuning gang, and as a result the dial finished up being mounted off-centre.

The front panel was originally sprayed grey but it now has a yellowish tinge. This is due to the lacquer (used to secure the lettering) discolouring with age.

Incidentally, trying to get a professional finish to the front panels of any project made in that era was always a problem. This project was no different **and it was in fact my second attempt** at creating a decent front panel, as I'd stripped my first effort off and started again.

Recently, I've been given the address of a useful website www.thedecalpaperstore.com who supply sheets of Decal paper in A4 and A3. These are made especially to run through a PC printer. Using a graphics or photo manipulation package I hope to be able to put this to good use recreating a dial scale and decals for the front of any new projects.

Chassis & Valves

The chassis layout I adopted is more or less as described in the *PW* articles. The specified valves were pretty standard for the time and the line-up consisted of two **EF95**, one **6BE6**, two **EF93**, one **ECH81**, two **EB91**, one **12AT7**, one **EF86**, one **EL84**, one **GZ34**, and a **VR150** stabiliser valve.

The first intermediate frequency is 1.6MHz and the second is 465kHz. These of course being the standard i.f.s produced by Denco coil sets of the time.

Wiring Layout

The wiring layout was very much left to the constructor's own arrangements and choice. In fact, the wiring colour coding is a bit different and very much my own idea!

I set out the required parts to wire the stages one at a time and used a common colour for each section. I also wired each stage in one go. This was done for a reason...as perhaps two or three weeks might go by before I started again, and it enabled me to pick up the wiring quite easily using another colour.

My wiring system was, I suppose, a form of error-checking. I've also realised that it makes the circuit very easy to trace after all these years. **I spent about five years on and off building the radio**, but it was worth it in the end and using it on the air has given me a great deal of enjoyment!

Electronic Metronome

The only other piece of equipment I constructed (that has survived intact) from the 1960s is an Electronic Metronome. The project was by **K. Berry** and it appeared in another 1963 edition of *PW* and it was an ideal project for my first venture into solid state circuitry.

The circuit is very simple and used two Mullard OC41 transistors in a multivibrator circuit producing a metronome beat note variable between 45 to 200 beats

per minute.

The original *PW* version of the metronome used a die-cast metal box. However, in my version I used a

small wooden box covered with Rexene with speaker cloth on the front, hard to come by at the time).

The construction of a metronome may give everyone an inkling as to my other passion in the 1960s! And you may have guessed already...it was for electric guitars, amplifiers and the like. The *PW* of the 1960s catered for just about every aspect of electronic music and was full of circuits and projects dealing with the subject.



● Fig. 3: The Denco coil units for the 1963 receiver were mounted as plug-in units (see text).

Guitar Pre-amplifier

Little evidence remains of anything I constructed in the 1960s for either radio or music amplification. Despite this, I discovered an old and now rather dog-eared *PW* circuit diagram for a guitar pre-amplifier.

I remember constructing the pre-amplifier and found it didn't work very well. I was only able to stabilise it when I added 8µF decoupling capacitors and 47kΩ resistors.

The guitar pre-amp also included the then popular vibrato effect. I remember that the oscillator 'thump' proved very hard to remove! But with a little persistence it became very useful...and I eventually built two for use in separate power amplifiers.

The last power amplifier I built used a pair of EL34 output valves based around the *Strand* hi-fi Amplifier which appeared in the October 1962 edition of *PW*. I've also still got the blueprint and remember using a h.t. of 450V (higher than specified) to help boost the power output!

It must have worked because I repeatedly returned the 'Fane' speakers which were still under warranty back to the company - much to their annoyance - for rewinds. (Fane were a regular advertiser of loudspeakers in *PW* in that era).



● Fig. 4: Not many constructors would attempt rebuilding an Eddystone 730/1A in this fashion! The fully restored receiver can be seen on Roger's left in the heading photograph.

Much Changed

Almost 20 years went by from the end of the 1960s before I developed a serious interest in short wave radio again...and how it had all changed!

With a short wave receiver and a long wire antenna it soon became apparent that a suitable antenna tuning unit (a.t.u.) was required to help tune out some of the noise and QRM especially on the lower frequency bands.

What better than to construct an a.t.u. myself! The one I chose was from an old *Short Wave Magazine* I still had in my possession dated July 1977.

The circuit largely consisted of two variable capacitors, and a large multi-tapped coil that could be switched to either being parallel tuned, series tuned, Pi-tank, and an L-network. All the necessary parts were pretty easy to obtain, and a bit of coil winding practice did not go amiss. The unit worked well even though I constructed it some 15 years later!

Will I ever start a major constructional project again? The answer is yes... if I ever find enough spare time. I'd love to construct a real vintage project, and it will perhaps be from one of the Second World War bound editions of *PW* I've recently acquired. There's a challenge for me and perhaps you'll read about it in *PW* eventually!

PW

Value & Vintage

The brown dustcoat, and the box of EF50 valves on the counter clearly indicates that the Manager on duty in the PW vintage 'wireless shop' is none other than Phil Cadman G4JCP. He's been rather busy!

Hello, and welcome to the June Value and Vintage column. With the nice weather it's almost too nice to be stuck here inside the Value & Vintage 'shop'! As promised, this time I'm featuring a novel t.r.f. receiver which uses two EF50 valves. The set was first mentioned by **Fred Herod G4DZV** when he wrote to me last year. At the time, neither of us could locate where the design had been published, but as ever, readers of the V&V column soon provided the answer!

The set Fred remembers is undoubtedly the one attributed to **R. Berry** and published in the August 1955 issue of *Practical Wireless*. However, several correspondents also mentioned similar EF50-based receivers which were featured in *Wireless World* around the same time. One in particular - by **H.E. Styles**, published in May 1953 - was very similar indeed to the Berry design.

May I thank everyone who wrote to me on this subject, particularly **Jim Grant, Dennis Lisney G3MNO, Rodney Dewes, David King GM1FPD** and **Alan Emerson** who all very kindly sent me copies of EF50-based receiver circuits. **Phil Judkins G3OMJ** also (very kindly) looked through his collection of *Wireless World* magazines and came up with 12 related articles covering simple t.r.f. and superhet receivers.

The first article was a conventional two-valved EF50 design by **S.W. Amos** from March 1949. This was the receiver which **H.E. Styles** later improved. The unofficial 'series' closed with a car radio design, again by S.W. Amos, in December 1956.

The 1955 Design

The circuit, **Fig. 1**, is the R. Berry design of 1955 with some unusual features. Firstly, reaction is controlled by

Wally Bell's attractive EF50 receiver (see text).

a variable resistor rather than by a variable capacitor.

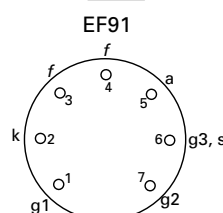
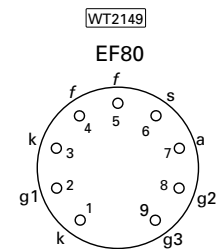
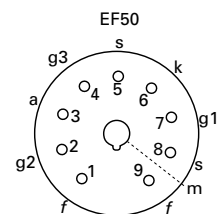
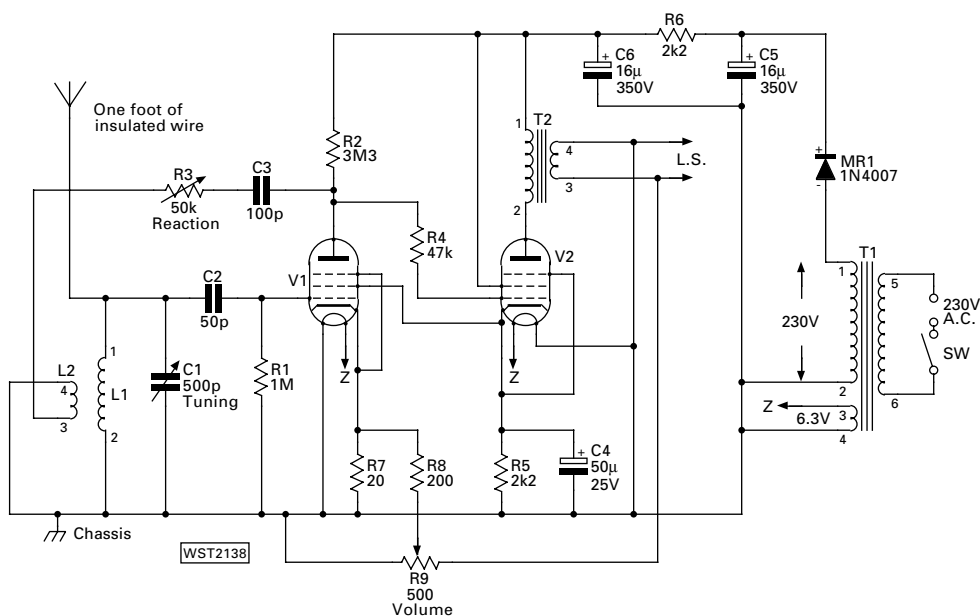
Secondly, the volume control adjusts the audio level by varying the amount of negative feedback. Hence, at low volume, audio quality is improved. But most unusual of all is the coupling between V1, the detector, and V2, the audio output valve.

The grid of V2 is connected to the anode of V1 without the usual d.c. blocking capacitor and the screen of V1 is connected to the cathode of V2. You'll also notice that V1 has a very high value anode load resistor. Consequently, the valve operates under starvation conditions and gives very high gain. This is the same technique which is used in the Mullard 3-3 audio amplifier.

Building it today shouldn't be difficult, although finding a Wearite PHF2 coil - L1 and L2 - might be! No EF50 valves and B9G sockets? Don't worry...you can use modern miniature valves instead.

Back in the 1950s, Dennis Lisney and a colleague both built versions using B7G-based EF91s and found they worked very well. I'd guess the B9A-based EF80 (similar characteristics but slightly lower h.t.), might also prove satisfactory. The EF50 has a remote cut-off characteristic, so it occurs to me that the EF92 and EF85 might also be worth a try.

Fig. 1: The circuit the design published by R. Berry in 1955 with some unusual features including reaction is controlled by a variable resistor rather than by a variable capacitor. Recommended valve pin-outs shown, together with alternatives with their pin-outs (see text).



Some Suggestions

Whichever valves you choose for building your version of the 'EF50' design...I've some suggestions which may help. Firstly, a 1A fuse on the primary side of T1 would be a welcome safety feature.

Secondly, note that if a 1N4007 silicon diode is used instead of a metal rectifier, the h.t. winding need only be rated at 200V (at 20mA r.m.s.). The voltage drop across a silicon diode is negligible compared to the voltage lost across the type of metal rectifier originally specified. On the l.t. side, the 6.3V winding only has to supply 600mA.

An alternative to T1 would be a mains to 6V, 6VA transformer for the heaters, together with a mains to 24-0-24V (or 0-48V), 6VA transformer wired in a voltage quadrupler circuit for the h.t. supply. (Aim to get around 250V across C6).

The output transformer T2 isn't critical. The original used a 100:1 ratio for a 3Ω loudspeaker. This equates to a 60:1 ratio if an 8Ω loudspeaker is used, although I'd imagine any ratio between 40:1 and 60:1 should work equally well. In fact, 40:1 suits both the EF91 and EF80 very nicely indeed. Even a 240V to 6V mains transformer will work adequately well if you can't get the real thing.

Although R5, V2's cathode resistor, is shown as 2k2Ω, it must be chosen under working conditions such that V2 passes approximately 10mA. To do this, using your test meter temporarily monitor (in series) with the primary winding of T2 (or, if you know the resistance of T2's primary, measure the voltage drop and do the maths) and substitute a 10kΩ wirewound variable resistor for R5.

As the valves warm up, adjust the variable resistor to give 10mA anode current. Once you're happy, switch off and measure the resistance. Then select the nearest preferred value for R5. Use 0.5W resistors throughout.

Commercial Coil

You can try any commercial coil intended for a regenerative detector for L1 and L2 (leave any antenna winding open circuit). The diagram, **Fig. 2**, shows the coil arrangement used in H.E. Styles' *Wireless World* design. I've included it because it shows a variable capacitor controlling reaction - should you prefer that - and because the winding inductances are given for Medium Wave coverage.

Those same inductances ought to work with the coil arrangement in Fig. 1. However, in any event, if you wind your own coil, you'll have to experiment with the spacing between the windings. If you can't make the detector oscillate, try swapping the connections to one of the windings. Finally...**R3 has to have a carbon track as a wirewound variable resistor will not work!**

There isn't really an ideal candidate to use as the rectifier. An EB91 with both diodes in parallel would supply enough current, but it can't handle the voltage. You could possibly try an EY91, or simply opt for the popular 6X4. Both provide far more current than is needed, but there's little other choice. **Don't forget to allow for the increase in heater current if you do go thermionic.**

Someone who has recently tried the *PW* design is **Mike Beith**. Mike used CV4014 valves - equivalent to the EF91 - and found they gave lots of gain but reaction was very difficult to control. (That may have been due to too much coupling between the antenna and reaction windings. Very careful adjustment of these two windings is often necessary when high gain valves are used.)

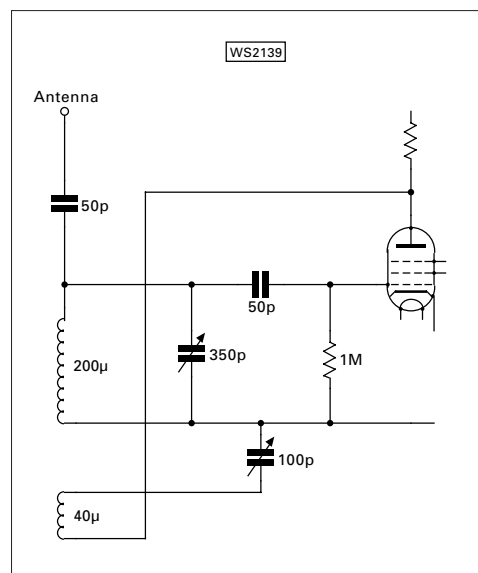
Attractive Sets

To give you some idea just how attractive little sets like those under discussion can be, the heading photograph, and **Fig. 3**, shows a three-valve EF50 design built by my E-mail 'keyboard-pal' **Wally Bell**. The set is really quite small and very attractive. Inside,

it's very reminiscent of an American midget receiver.

While on the subject of straight receivers, the difficulty of knowing exactly what frequency a t.r.f. set is tuned to recently came up in conversation. On m.w. and l.w., there are enough well-known stations to allow a reasonably accurate dial scale to be quickly drawn. But on the higher frequencies, although calibration is possible, it's more time consuming and can seldom be done to high accuracy.

Single-chip digital frequency meters with 1kHz resolution are inexpensive, **but of course there's no local oscillator they can measure**. So, does anyone know of a way to accurately measure the frequency a t.r.f. receiver is tuned to?



● Fig. 2: The diagram shows the coil arrangement used in H.E. Styles' design (see text).

Inverters & Batteries

A query about using rechargeable batteries with the KRC-A-2 inverter kit I reviewed last time has been raised. As it stands, the kit will not work satisfactorily with NiCad or NiMh cells in place of the specified alkaline cells. **The terminal voltage of the rechargeable cells is too low.**

Of course, an external power source can use rechargeable cells. Both NiCad and NiMh batteries are eminently suitable providing enough cells are used to give at least 9V (eight NiCad or NiMh cells would give 9.6V). Don't be tempted to try a 12V lead-acid battery without regulating the voltage to 9V first.

Letter From Charles

The Editor has passed me a letter written by fellow Valve and Vintage author **Charles Miller**. Charles refers to my 'Power That Valved Portable' article in the December 2002 issue of *PW*...saying that he is "totally bemused as to why anyone would go to all that trouble to power a valved portable set. Why not use a 'D' cell and a stack of PP3-type batteries?", he asks.

Well, in replying, for occasional use, I'm in full agreement with Charles. However, if a receiver is used regularly, then rechargeable batteries have got to be better long-term value, not to mention more 'environmentally friendly'. But such arguments miss the point.

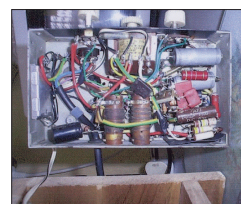
Home electronics constructors don't always choose the simplest, most efficient - or even particularly sensible - way of doing things. People construct circuits for fun; to learn; to gain experience; or maybe just to try something new.

When the Editor originally suggested an article about powering battery-valved portable sets, I was acutely aware that such an article would have limited direct appeal. So, instead of a simple, take-it-or-leave-it design, I decided to construct the power supply out of a collection of independent p.s.u. modules, **each module having other potential uses.**

The low drop-out regulator, the switched-mode regulators, and the h.t. inverter were all meant to stimulate ideas for other power supply projects. After all, what knowledge would anyone gain, and where would be the fun, in simply wiring a few batteries together?

Ah, Sunset. And time to put up the shutters up on the Valve and Vintage 'shop'. **Remember, please send your comments and letters to me either via the *PW* offices, via E-mail to phil@valveandvintage.co.uk or direct to: 21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX.**

PW



● Fig. 3a, b, c: Different views of three-valve EF50 design built by G4JCP's e-mail 'keyboard-pal' Wally Bell. The set is really quite small and very attractive. Inside, it's very reminiscent of an American midget receiver.

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.

Last month I described how enhancements in tropospheric conditions may cause 'lifts' that enable v.h.f., u.h.f. and microwave operators to contact DX stations much further away than normal. It's important to recognise however, that there are certain non-tropospheric conditions which can also provide considerable enhancement to v.h.f. transmissions. These occur in the ionosphere and now I'll describe them in a little more detail.

IONOSPHERIC PROPAGATION

As you are probably aware the ionosphere plays an integral part in the propagation of signals all the way from low frequency right through to 30MHz at the upper end of the high frequency (h.f.) spectrum. But the effects don't just stop there. These ionospheric influences gradually diminish with rising frequency so that at 300MHz (u.h.f.) it has no known effect on propagation. But just how far up into the v.h.f. spectrum does the ionosphere have any effect that can be used by v.h.f. DX operators?

The ionosphere is sub-divided into areas termed the D, E, F1 and F2 layers and under certain conditions the E and F2 layers can act like a mirror to v.h.f. signals particularly in the range 30-70MHz and reflect them back to earth well beyond the normal radio horizon. For this to happen either layer has to become heavily ionised.

The intensity of ionisation in the E-layer is seasonal, highest in June or July. When ionisation becomes abnormally intense v.h.f. signals as high as 250MHz can be reflected back to earth up to a distance of around 2400km. This is called Sporadic-E propagation.

Other propagation modes that rely on ionisation in the E-layer include auroral-E, auroral back-scatter, ionosscatter and meteor scatter. Higher up in the F2-layer the intensity of ionisation depends not only on the season but also on sunspot activity which reaches a maximum every 11 years or so. Signals as high as 70MHz have been known to reflect from the F2-layer and the range covered can be extremely great. F2 propagation is the mode that enables world-wide contacts to be made on the 50MHz band in the years around sun spot maximum.

During October 2001 - March 2002 there were regular F2 openings on the 50MHz band to all four corners of the World. Many operators were hoping for a repeat performance during the recent winter period but there was not even a glimmer of long-

distance F2-layer propagation. Therefore it must be concluded that we are now on the slippery slope to solar minimum and that it will be a 10-year wait before the sounds of Australian, Japanese and other Far Eastern stations return to the 50MHz band. However, all is not lost.

Ionospheric modes such as Sporadic-E, Aurora and Trans-Equatorial propagation continue to provide numerous opportunities for making long-distance contacts on 50MHz.

THIS MONTH DAVID BUTLER G4ASR DESCRIBES THE DIFFERENCE BETWEEN IONOSPHERIC AND TROPOSPHERIC CONDITIONS

Indeed, within a few weeks of reading this the summer Sp-E season will have started. During these openings you'll be able to make many contacts with stations throughout Europe and sometimes much further away. These events are often very intense and as a consequence you won't need very much power or a large antenna to make contact with v.h.f. DX stations.

Despite no 50MHz F2-layer propagation being noted during March, readers did report trans-equatorial openings on six days during the period and auroral back-scatter openings on 18 days during the month. The only snag was that you really needed to be located in southern England and Wales to make the most of the t.e.p. events and similarly be situated in northern England and Scotland to enjoy the auroral openings. Anywhere else and it was a bit of a washout!

The trans-equatorial openings to Africa were quite brief and all were reported by southern stations as occurring between 1500-1800UTC. The highlights included V51E (Namibia), 5N6NDP/9 (Nigeria) and 9L1BTB (Sierra Leone) on March 1, 5U7JB (Niger) on March 8, J5UDX (Guinea-Bissau) and 5U7JB on March 9, J5UCK on March 16, ZS6NK (South Africa) on March 20 and 9J2KC (Zambia) on March 28. Also on March 28 between 1915-1955UTC there was an excellent t.e.p. opening to South America with the stations of PY1RO and PY2VA (Brazil) being worked with 59+ signals.

Auroral openings were much more numerous although you did need to be located

in a favourable northern location to make anything of them. As is often the case very little traffic was reported on the 50MHz band. It's on the 144MHz band where most activity can be found, especially at the c.w. end of the band. This mode is very effective and it's a pity that many newcomers to v.h.f. operating cannot use Morse. Amongst the DX reported by Scottish operators were the c.w. stations of LA0FX, LA1T, LA2AB, LA5EKA (Norway), OH2NY, OH5LK (Finland), OZ2PBS

(Denmark), SM2CEW, SM5CUI (Sweden) and YL3AG (Latvia).

Brian Carter G8ADD takes me to task after reading my recent explanation of coronal holes. He suggests that it was a pity that I didn't make it clear that these ominous dark shapes are in no way visible at wavelengths accessible to the human eye. He fears that someone may take a look for them with binoculars, which could be disastrous!

Brian recalls that back in the sixties he knew an amateur astronomer who made a spectrohelioscope, a very intricate instrument which made it possible to see solar flares, prominences and filaments but even this would not show the corona. Most days the visibility was so bad that all that could be seen was a deep red blur (he worked in H-alpha light). So to reiterate - **never view the Sun with the naked eye or with any unfiltered optical device, such as binoculars or a telescope!**

TROPOSPHERIC PROPAGATION

There were many days during March when tropospheric propagation was enhanced on most of the v.h.f., u.h.f. and microwave bands. When I say 'most' I really mean from 144MHz and up. Generally speaking far less tropo enhancements occur at the low end of the v.h.f. range which includes 50 and 70MHz. Actually it's a little bit more complicated than this because when I say 'tropo enhancement' I should really specify whether I mean refraction, ducting or forward troposcatter.

Tropo refraction and forward troposcatter do occur on the 50 and 70MHz bands but the

effects are much less than those encountered at higher frequencies. Tropo ducting is extremely rare (if not unheard of) at 50MHz and although this mode of propagation may exist in principle at 70MHz any contacts are either rare and/or very difficult.

A tropo duct may be compared to a microwave waveguide, in that a duct will not propagate signals whose wavelength is too long in relation to its vertical depth. The minimum duct size required at 50MHz (6m wavelength) is approximately 400m. At 70MHz (4m wavelength) the minimum duct size is reduced to around 300m.

Although ducts approaching 400m deep are occasionally formed over warm seas, ducts over land in temperate climates are generally much shallower. This is borne out by the observation that while tropo ducting may occur many times a year on the 144MHz band, there are very few records of tropo ducting at 70MHz or lower frequencies in the UK. It also explains why strong ducted signals can be found on the 430MHz band or microwave bands at times when ducting on 144MHz is much weaker or even absent. Indeed this situation is often encountered by microwave operators who discover that whilst 10GHz signals can be very strong those on the 144MHz band talk-back liaison frequencies are virtually non-existent!

To help you keep track of likely openings there are several weather-related websites and one of the best I've found is run by **William Hepburn**. His excellent website www.iprimus.ca/~hepburnw/tropo_nwe.html provides a 5-day forecast of possible tropospheric ducting. The site displays areas in north-west Europe (other locations may be selected) which exhibit the necessary atmospheric conditions to produce tropospheric bending of v.h.f. and u.h.f. radio waves. Another general weather site worth looking at is run by **Bob G4UJS** and can be found at www.qsl.net/g4ujs/weather.htm

Robert Broadbridge M1DYS reports that on March 17 he contacted the station of 2E1SIM in Norfolk from his QTH in Bournemouth. The unusual aspect was that he



● Working v.h.f. DX stations such as these is not as difficult as you may imagine. By following G4ASR's regular advice...you can learn how to evaluate propagation conditions effectively and work the DX.

was working him through the Caen f.m. repeater in France!

Robert mentions that maybe this sort of contact is commonplace but it was certainly a new experience for him. Well Robert I can certainly confirm that type of contact is indeed commonplace but congratulations in making the contact anyway.

Stations operating with f.m. equipment will often notice when band conditions are up but to make best use of tropospheric (or ionospheric) enhancements you should use c.w. or s.s.b. techniques. When you operate with these modes you'll discover that enhancements occur all the time via different forms of propagation. The equipment need not be terribly sophisticated. **Brian Carter G8ADD** running a Yaesu FT-817 transceiver and a small 5-element Yagi reported contacting stations in six countries during the 144MHz contest on March 1-2.

CONTESTS

Victor Swanwick G7TMU reports that he has recently started v.h.f. operation again following a break of over 3 years of inactivity. He mentions that he always worked some good DX during contests and wonders whether I know of any websites that list all v.h.f. contest dates.

In my opinion the first port of call for contest information must be the site run by the

Radio Society of Great Britain (RSGB) v.h.f. contests committee. You can find it at www.blacksheep.org/vhfcc It contains a contest calendar (see Fig. 1) listing all RSGB v.h.f., u.h.f. and microwave contests for the year, contest rules and details of how to enter a contest.

It also contains downloadable contest stationery, recent results and claimed scores. I

found the links section very useful as it contains free logging software and directs you to even more contesting information.

Two other sites, one for v.h.f. and the other for microwaves, are also worth investigating. If you want details of all European 144MHz contests take a look at www.144mhz.co.uk This site is run by **Derek G0NFA** and in addition to an in-depth contest calendar it also provides details of DXpeditions and other station activity.

If your interests lie in microwave operation you really must take a look at www.qsl.net/g3pho This superb site entitled The World Above 1000MHz is run by **Peter Day G3PHO** and provides copious details both for newcomers and experienced operators.

Specialist groups such as the AMSAT (Satellite), BARTG (Data), BATC (Television), DUBUS (Moonbounce), UKSMG (50MHz) and WAB (Worked All Britain) also run contests and although intended for their own membership there is nothing to stop you participating. Indeed non-members are often encouraged to join in to create more band activity.

David Toombs G8FXM/M3FXM Secretary of the UK Six Metre Group has provided details of the UKSMG Sporadic-E contest. The date for this year's event has been changed due to previous conflicts with the CQ WW contest held on the last weekend of May and to changes to the IARU Region 1 contest dates. The contest will run for 24 hours over the weekend June 7-8 commencing at 1200UTC on the Saturday. It is open to both members of the UKSMG and non-members alike. Further details may be found at the UKSMG website

www.uksmg.org/sporadic.htm or by E-mail to the contest manager PA7FM, contest@uksmg.org

You may think that contests are only held at the weekend but you're mistaken. Two groups, the **Nordic Radio Amateur Union** (NRAU) and the RSGB run activity contests on a Tuesday evening. The table, Fig. 2, gives details of the UK activity contests (UKAC) which cover all bands from 50MHz to 24GHz.

The four contests per month are timed to coincide with the popular Nordic activity contests (NAC) and similar events in other European countries but running later than the other contests because of the time difference and to promote intra-UK working. The NAC events are very similar with the exception that the third Tuesday of the month is devoted entirely to 1.3GHz activity and the fourth Tuesday is for activity on the 2.3GHz band and above. The fourth Tuesday is also allocated for 50MHz activity. Further details may be found at www.edr.dk or at www.qsl.net/la1kka

DEADLINES

That's it again for another month. Forward any news, views, comments or photographs to the address and by the date given at the top of the column.

Thanks for your letters and good luck with the DX. See you again next month.

73, David G4ASR

● Fig. 1

RSGB VHF CONTESTS

May 11	0900-1200	70MHz c.w.
May 17-18	0400-1400	144MHz
May 18	1100-1500	144MHz Backpackers
May 25	0900-2100	5.7GHz /10GHz Cumulative
June 15	0900-1300	144MHz Backpackers
June 22	0900-2100	5.7GHz /10GHz Cumulative

● Fig. 2

UK ACTIVITY CONTESTS (UKAC)

2000-2230 hours

1st Tuesday	144MHz
2nd Tuesday	430MHz
3rd Tuesday	1.3GHz to 24GHz
4th Tuesday	50MHz

HF HIGHLIGHTS

CARL MASON GW0VSW

12 LLWYN-Y-BRYN

CRYMLYN PARC

SKEWEN

WEST GLAMORGAN

SA10 6DZ

TEL: (01792) 817321

E-MAIL: carl@gw0vsw.freemove.co.uk

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

This year's Science Week has generated a good deal of activity judging by the amount of activity heard on the h.f. bands. **Dennis Egan GW4XKE** and friends operated from **Murch Junior School**, Dinas Powis in the Vale of Glamorgan between Monday 10 and Friday 14th March using the call signs **GB2003SET** (Science Engineering and Technology) and **GB4AOS** (Advancement Of Science). Logistical support was received from the Head Master Charles Davies and all his staff.

Throughout the week Science teacher **Ian Williams** arranged that all the children, in groups of 10, had time to visit the school 'shack' to see Amateur Radio in action. During the week **Sid Richards GW0PPG** gave a talk on 'Science Engineering Technology' using a v.h.f. demonstration station from one of the classrooms using a mobile whip on a magnetic mount.

It was a busy week and all the operators had their hands full getting as many children as possible to speak to other schools around the UK and Europe on the 7MHz band. **Glyn Jones GW0ANA** stepped in at very short notice to help **Carlos Eavis G0AKI** operate GB4FUN. This is the Radio Society of Great Britain's fully equipped mobile radio shack, which had arrived on Friday morning, just in time for Red Nose Day.

Local Councillor for the **Vale of Glamorgan and Sully Council**, **Tony Ernest GW3LQE**, also spent the day at the school supporting the team's efforts and even went 'on air' for a short period of time. The station finally closed down later in the day at 1600UTC with a total of 248 contacts in the logbook. The special QSL cards have now arrived and will be sent out in due course.

DX NEWS

Johnny Melvin G3LIV, a *PW* reader, will be operating from Malaysia using the 'key' and possibly PSK31. His call sign will be 9M2/G3LIV and locations will be Kuantan, mainland Malaysia from 6-16th May, Penang Island AS-015 May 16-30th and Langkawi Island AS-058 Malaysia 30th May-June 9th.

Keep an ear open for **Leonid Kharchenko UT1WL** who is currently working in Conakry in the Republic of Guinea. He has obtained a licence from the local authorities and is operating as **3XY1L** and is expected to be active throughout the year. This is not a

DXpedition, and he will be active only during his spare time on weekdays after 1800hours and probably in the daytime during weekends. Most of his activity will be on 14 and 21MHz with the possibility of 7MHz a little later on.

Leonid's equipment includes a TS-50S transceiver which is run on batteries due to the difficult situation with local electricity supplies. During his stay there, Leo will try to activate some local islands which may include some new IOTAs. All QSL cards should go via the bureau or direct to **George Chlijanc UY5XE, PO Box 19, 79000, Lviv, Ukraine**.

QSL INFORMATION

On to this month's QSL information now, which includes DP1ANF via RK1PWA, FW8FP via VK4FW, HK3AXY via the bureau or direct only to **Mike Benjamin W2GR, 1064 99th Street, Niagara Falls, NY 14304, USA. OX2K**

76726 Germersheim, Germany. The following stations EM3W, FK5DX, FK8GM, J39BW, ST2/G4OJW, ST0K, UZ3AYR and WB2RAJ/VP9 are all managed by **Dick Kashdin WB2RAJ, 4591 West Overlook Drive, Williamsville, NY 14221, USA**.

YOUR REPORTS

Time for your reports now and an extract from the large 7MHz log of **Roy Walker G0TAK** in Kendal, Cumbria shows that there was plenty of activity on the band this month. Contacts 'on the key' include PA3ALX/QRP (Netherlands) 1023, LA9LE (Norway) 1135, GM3CSO (Scotland) 1323, ON5BW (Belgium) 1339, DK7GI (Germany) 1355, OZ4OC (Denmark), EI6AN (Ireland) 1455 and a little later YO2ARV/P (Romania) at 2042UTC using a TS-570DG and 3.5MHz long wire loop.

CARL MASON GW0VSW HAS REPORTS ON A SPECIAL EVENT STATION FOR SCIENCE WEEK AS WELL AS ROUNDING UP YOUR LOGS

via OZ1ACB, ST2CF via Claudio Fabbro IV3OWC, Via Casale Coloset 3, I-33030 Moruzzo, Italy. TA1ZK/O via HB9DUR, V25WX via W4WX, VI5WCP via VK3ZZ, and UN1F, UN2E, UN6T and UN9FD via Alexander Schwindt DF6PB, Josef-Kunz Str.3,

THE 14MHz BAND

On 14MHz now and welcome to new reporter **Rick Leach MM3RAL** in Dunbeath, Caithness, who is doing very well with his h.f. station. Rick says "I am a QRP station due to restrictions at my home and this means I



- 5B4AGP (also G3RZ) QSL received by Steve M3SWB for a PSK31 contact on 24MHz.

cannot erect an outdoor antenna. I never run more than 5W output from an FT-817, which is normally connected to an indoor random wire. However, I am due to move shortly and this has now been removed in favour of a 'Miracle Whip' which has given me very good results so far".

Rick has certainly worked some excellent DX using this set-up including IO4C (Italy) 0819, KC1XX (U.S.A.) in Mason, New Hampshire at 1115. This was over a distance of 3171 miles and is Rick's best mile-per-watt so far at 634.2. He then worked SM7CQH (Sweden) at 1339UTC before calling it a day!

In Liverpool **Steve Bainbridge M3SWB** used an IC-706 MkIIIG with a home-made vertical antenna and PSK31 to work VK3FML (Australia) in Yarrambat, Victoria 1540, SV1EFM (Greece) 2117 and WA2EW (USA) in Kingston, New York at 2118UTC.

All c.w. man **Ted Trowell G2HKU** on the Isle of Sheppy in Kent, found band conditions to be "Very good despite a noticeable decrease in activity!". Amongst the DX worked during late afternoon and early evening were VK6VZ (Australia) in Glenn Forest, WA at 1500, 9V1YC (Singapore) 1710, 9J2BO (Zambia) 1725, YB0ECT (Indonesia) 1750, CX3AL (Uruguay) 2105, FG5FR (Guadeloupe) 2127, and DK8TU/T18 (Costa Rica) at 2135UTC using a Tec Omni V with 70W and G5RV antenna. Ted has now been licensed for 64 years and has just celebrated his 80th Birthday!

Martyn Medcalf M3VAM in Chelmsford, Essex uses an IC-746 connected to an SGC-237 tuner and 8.2m of wire as the antenna. This all works well together and the long list of contacts on 14MHz includes F6KEH (France) 1002, EI/DH5ST/P (Ireland) 1101, VE3AT (Canada) 1157, EO410CYD (Ukraine) 1532, IZ0BVU (Italy) 1720, EA3BFX (Spain) 1724 and N2BA (USA) in Glenn Ridge, New Jersey at 2225UTC.

THE 18 & 21MHz BANDS

Now for some h.f. portable contacts from **Peter Lowrie M15JYK** in Newtonabbey, Northern Ireland, who has been out testing a new LDG Z-11 auto-tuner with his Yaesu FT-817. The antenna was a monoband home-brew quarter-wave vertical based on *PW's* Twenty to 2 article from a few years ago. The small Z11 tuner matched on every band from 14MHz up and performance on 18MHz was quiet surprising! Stations worked with 5W here using s.s.b. included SP3CSD (Poland) 1305, F5REQ (France) 1404 (5/7), YO3GNO (Romania) 1420 (5/5), N5YA (U.S.A.) in Texas 1445 (5/7), VO1TA (Canada) 1452 (5/9), SM6TMR (Sweden) at 1505 (5/9+) and LA5KJA (Norway) 1525 who was also low power from a QRP Plus at his QTH in Kjell at 1525UTC (5/6).



● ZL7C QSL for a 28MHz contact made with the Chatham Island DXpedition in October 2002 by Paul M0CCQ.

Gary Macleod MM3SCO in Tongue, Sutherland has worked 93 countries so far using a TS-50, MFJ-948 tuner and converted CB antenna. His 21MHz contacts this month using s.s.b. include CX9BAE 1005 (Uruguay), EA6XD (Balearic Islands) 1031, JW/SM0BSO (Svalbard) 1055, EY7AV (Tajikistan) 1126, J3/DJ7RJ (Grenada) 1301, EK3SA (Armenia) 1434, and UN7PBY (Kazakhstan) at 1457UTC.

In Bishopston, near Swansea, **Robin Trebilcock GW3ZCF** found band conditions "Disappointing compared to this time last year" but still managed to find PSK stations PY2PZW (Brazil) 0905, JA5TX (Japan) 0937, ZP6VT 1053, ZS6AEU 1423, K16GV (U.S.A.) 1715 and VE7AJJ 1720UTC using an IC-756 Pro and 7MHz horizontal loop antenna.



● GB2003SET QSL for the Science Week special event run by Dennis GW4XKE.

The s.s.b. of **Clint Oliver M3GMM** who lives on the Isle of Wight worked PT7VB (Brazil) 1700, AA8RV (US) in Lima, Ohio at 1710 and CO2HR (Cuba) at 1932UTC using an IC-756 PRO with 10W to a Carolina Windom 80.

The indoor station of **Alex Shillito G2FRY** in Nottingham continues to put out a good c.w. signal. Among the stations worked were CO2MA (Cuba), 7X4AN (Algeria), JY9NX (Jordan), 8P9NX (Barbados), JW0HU (Svalbard), ZF2NT (Cayman Islands), J88DR (St. Vincent), VP9/W6PH (Bermuda) and A61AJ (United Arab Emirates) using an FT-101E and

8ft rod mounted to the side of a wardrobe.

THE 24MHz BAND

The 24MHz band provided a mixed bag for **Mike Baker G3SUK** in Stowmarket, whose s.s.b. log includes YO2BMI (Romania) 0917, 9K2HN (Kuwait) 1015, 4Z5LA (Israel) 1538

and EA8/W4GKR (Canary Islands) 1608UTC using an IC-746 and 80W to a Carolina Windom antenna.

Also operating here was another new reporter **Bill Kitchen G4GHB** in Ashton-Under-Lyne, Lancashire. Bill also favours a simple station and is producing good results using a home-brew c.w./s.s.b. 4W transceiver powered with 12V from two solar panels! The antenna is a 6m long vertical tuned with a roller coaster a.t.u. Voice contacts this month include 7X2DG (Algeria) 0945 and SV2CXI (Greece) at 1050UTC.

Using slightly more power was Steve M3SWB who used 10W and PSK31 to work 5B4AGP (Cyprus) at 1450 followed by K3KYT (U.S.A) in Everett, Pennsylvania at 1600UTC.

THE 28MHz BAND

On to **Paul Burgess M0CCQ** in Ellesmere, Cheshire was pleased to receive his ZL7C QSL this month confirming another new country. His 28MHz log this month includes ST2NH (Sudan), 3G5Q (Chile), OA4DLZ (Peru), VK8DP (Australia) in Ringwood, Victoria. VP6DIA (Pitcairn Island), 6W7/F5AHC (Senegal) and V51/DL2SL (Namibia) using an FT-920 with 300W to a 5-element Yagi

Continuing his mobile s.s.b. activities was **Mark Taylor G0LGJ** in Dereham who is changing his car but still found the time to work 5X1DC (Uganda) 1257, NP2BT (U.S. Virgin Islands) 1333, TR8LE (Gabon) 1337 and VP5/KN4UG (Turks & Caicos) at 1345UTC using his FT-100 and 100 watts to a Pro-Am whip antenna.

SIGNING OFF

That's it for another month and there certainly seems to have been a good deal of activity judging by everyone's logs. I hope I have managed to squeeze you all in? All bands have been open for most of the day with generally good propagation and the higher one's have even had a few nice surprises for some of our reporters.

It's good to see the number of reporters growing and long may that continue. Thanks to **Tedd Mirgliotta KB8NW** editor of the *OPDX Bulletin* for the DX information and to everyone for their E-mails, letters and 'phone calls. They are all appreciated. Have a good DX filled month.

73, Carl GW0VSW

DATA BURST

ROGER COOKE G3LDI

THE OLD NURSERY,
THE DRIFT,
SWARDESTON,
NORWICH,
NORFOLK NR14 8LQ
TEL: (01508) 570278

E-MAIL: rcooke@g3ldi.freemove.co.uk PACKET: G3LDI @ GB7LDI

There is something about the sound of RTTY that, to me, has been very seductive over the decades I've been using it. I must admit to being too much involved with Packet over the last 15 years to take an active role in the mode, but there is little that is new happening in packet now to keep me bogged down. So, with the changes in this column, and my newly delegated speciality subjects of RTTY, Packet and Pactor, I thought I would rejuvenate my interest, learn of the latest developments and become more pro-active once again!

You only have to listen on the RTTY segments during a major contest to ascertain the amount of Amateurs that use RTTY. The sound of the 'jingle-bells' still holds an attraction for me – I suppose it must be my musical ear! However, 170Hz shift is just as endearing as the old 850Hz shift we used about 50 years ago. Enough of the nostalgia!

The main route to a very efficient and versatile RTTY station is the computer/sound card and software method. Modern RTTY is not the noisy mode it once was, and like other digital modes, the ubiquitous sound card is the saviour of most of the digital modes these days. There are several software programs for the user to select and it mostly boils down to a personal choice. However, some do perform better than others and probably the best of the bunch at the moment is MMTTY.

The latest version of MMTTY is 1.64 and is readily available from the Internet on a number of sites. The one I would recommend is a favourite for RTTY information in general and is run by **Don Hill AA5AU**. Take a look at <http://www.aa5au.com> (Fig. 1).

On Don's site you will find a link to MMTTY and all the information you need in order to download the program. Written by **Makoto Mori JE3HHT**, it is the program favoured by most contesters, and for general RTTY operations. It is simple to use and has many features. It will run on all operating platforms after and including WIN95 and of course you will need a soundcard.

The MMTTY program is free for Amateur use and the MMTTY engine has also been used in other programs. For everyday use, there are a number of macros that can be set up to reel off the usual information or as we used to call them, 'brag tapes' from the days of punched paper tapes! It is so easy now to use RTTY, it is little wonder that more and more Amateurs are enjoying the mode.

There is one main request with regards to using any version of MMTTY and that is that **all** comments, bug reports, requests for help etc., **must** be handled through the MMTTY

eGroup. Members of the beta/help team as well as Mako JE3HHT, the author are all reading the messages on the list server. Please **do not** send E-mail directly to JE3HHT, the Webmaster of the MMTTY Website or members of the beta/help group.

Check on the website and MMTTY group for the latest information. Take a look at the MMTTY English Website at <http://www.qsl.net/mmhamsoft/> (Fig. 2) or MMTTY Users Group at <http://www.groups.yahoo.com/group/mmtty>

45.45 bauds, but occasionally you will find that some Amateurs use other speeds. In fact there is one contest that is specifically for 75 Bauds only.

The Murray code, similar to the Baudot code, was used in the UK, and in the early teleprinter days, it was necessary to physically change the governor on the motor in order to change speeds, quite a tiresome procedure, as they usually then had to be set up once again using a tuning fork strobe.

Five bit codes can only directly encode 32

ROGER COOKE G3LDI TAKES HIS TURN IN BRINGING YOU HIS DATA BURST

GETTING STARTED

Like all digital modes, it helps if you can type. However, hunt and peck works too, although somewhat slower. This is where the clever use of macros, or buffers, can help. Most programs have a feature called 'type-ahead'. This enables the slow typist to type ahead of what is actually being sent, thus creating an impression of machine-speed sending. HF

RTTY is only 45.45 bauds anyway, so it is not particularly fast, and lots of people are used to a keyboard these days.

Having downloaded the program, follow the install instructions and play with the program off-air. Read the user information. There have been some improvements on the English version so this should now help a lot. It may also help to print some sections so that you have instant access to the manual! Looking at the AA5AU site, you will find some excellent tutorials aimed at the beginner, so if in doubt, either look there or ask another RTTY operator.

The RTTY system uses the Baudot code. This is a five-bit code, which means that every character has five bits, either mark or space. As I have already said, the normal speed on h.f. is

different symbols, which obviously is not enough to cover all 26 letters, numbers and punctuation. This problem has been solved by using one or more of the codes to select from multiple code translation tables. ITA2 uses a LTRS code to select a table of upper-case letters and a FIGS code to select a table of numbers and punctuation.

The standard shift used now is 170Hz. This



Fig. 1.

gives mark and space tones as 2125 and 2295Hz respectively. Some TNCs use 200Hz shift, such as my PK232. This will work, but it is better to use the correct shift. Straddle tuning has to be employed on any other shift, and if you are using tight filtering, this can detract from received copy.

Another good site to look at is **www.rttyinfo.net** (Fig. 3). This has a very useful tutorial that you will find interesting.

Do a lot of listening on the air and get a feel of how RTTY is being used. Take a look on some of the commercial frequencies too. It's quite interesting what you can find, but be prepared to juggle your speed around and also your frequency shift, as the commercial stations use all sorts of variations.

INTERFACING THE TRANSCEIVER

Once you feel comfortable with the mode and want to dangle your feet into the water, decide on which method you will use to key the transmitter. You can either use AFSK or FSK.



Fig. 3.

In my early days on the mode, only one method was used and that was FSK. We had to put a variable capacitor across the v.f.o. and adjust it for 850Hz shift. Again, being musical helped a lot, and I could get my shift to the nearest cycle. However, it did not stay there! I had to check it every month or so. Using FSK, the signal is very clean and crisp.

If you are using AFSK, you have to take great care in setting up the audio levels. Audio distortion, carrier and unwanted side-bands can create a signal that is the bane of the RTTY world! Most modern AFSK generators are of the continuous phase (CPFSK) type, so should be fairly good. However, be very careful in setting up the audio levels.

It is just as easy to FSK using the COM port of the PC into the FSK connection on the transceiver, so I would recommend that method. By using this method, you can then utilise all the filters in the transceiver for receiving, a fact that will be mandatory if you are considering entering RTTY contests.

If you are keen on contesting, then using MMTTY with a suitable contesting/logging program is the ideal combination. The best complimentary program to use is Writelog. This combination is the most popular of the bunch. Writelog is not free, it costs about \$35 but is well worth the investment. You can also use it on c.w. and s.s.b. and I hope to write some more about this in my next column.

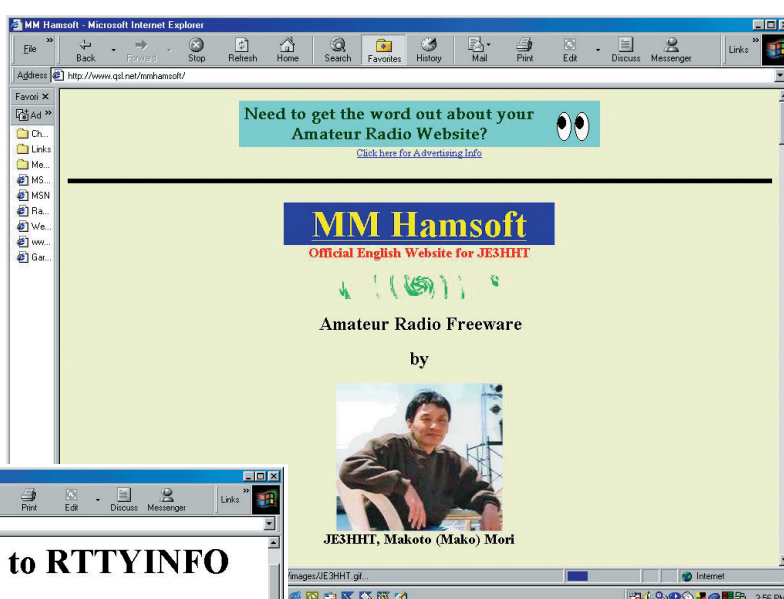


Fig. 2.

things for you to do, if you have not done so already.

Join the British Amateur Radio Teledata Group (BARTG). All the information you will need is on the website at: **www.bartg.demon.co.uk** If you are wondering what the next RTTY contest will be, just take a look at the RTTY contest calendar

PACKET MATTERS

The RSGB DCC are pleased to announce that following the very successful event last year in Coventry, RSGB DCC will be sponsoring a similar two day event on the weekend of Saturday 13 September and Sunday 14 September again in Coventry.

The content of the two days has not as yet been finalised, but provisional thoughts are to split the event to cover the following topics: Packet/Data Discussions and Presentations, Packet/Data Workshops & Voice Internet Gateways Discussions and Presentations. How the topics will be split in to the two days will very much depend on people coming forward with ideas and offers to give presentations. The topics above are far from being 'cast in stone' so if you have any suggestions or ideas as to how these topics can be expanded then please let Steve Morton know and he will do his best to incorporate them in to the final programme.

The two days will be open to all, not just NoV holders, but everyone with an interest in the topics for discussion or the presentations. Any questions, or suggestions to G8SFR via E-mail to **g8sfr@rsgb.org.uk**

Finally, for this month, if you are interested in the 802.11 high-speed technology, and this is the way forward for packet radio, then please join the RF_LAN group. To subscribe to this group, send an E-mail to: **RF_LAN-subscribe@yahoogroups.com**

That's all for this time so until my next column in the August issue keep your letters and suggestions coming to me, cheerio for now.

Roger G3LDI

RTTY NEWS

Don AA5AU now has the domain **rttycontesting.com** and has totally revamped the old AA5AU WriteLog Website. It's still the same site which a much needed facelift. It's still dedicated to RTTY contesting using WriteLog for Windows but now there are no longer any advertisements, no pop-ups, etc.

You can still get to the site via **http://www.geocities.com/writelog** However, the new permanent address is: **http://www.rttycontesting.com** (Fig. 5) or just **http://rttycontesting.com**

Don says: "I'm more committed than ever to helping others get the most out of WriteLog for RTTY contesting and to assist anyone in getting started on RTTY. My personal RTTY page at **http://www.aa5au.com/rtty.html** is unaffected by this new domain and has not changed. It's a totally different site".

Don hopes to include more tutorials and information pages in the near future on **rttycontesting.com**. He would appreciate your time in browsing the new formatted site and would like some feedback, negative or positive, on the changes.

Your comments are appreciated, but please send them direct to him and not to the reflectors unless your comments will benefit the group. Don's E-mail address is: **Aa5au@bellsouth.net** There are a couple of

Trader's Table

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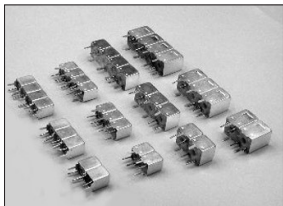
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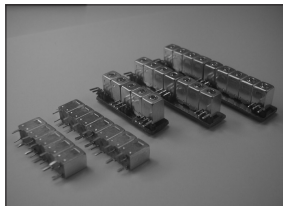
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IN VISION

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With broadcast digital television (DTV) gradually increasing its availability in the UK, via satellite and terrestrial transmitters, the British Amateur Television Club (BATC) committee has decided to purchase some Digital Amateur Television Transmission Encoders from Germany, to evaluate their potential for digital Amateur television (DATV). The BATC is anxious that ATV should not be 'left behind' technically, and if these encoders prove to be successful, it may be possible to

Previous venues are no longer available; the Sports Connexion near Coventry was very popular for several years – located in the Midlands, close to motorways, with a pub and camping close by for those who volunteered to set up on the Saturday night! But it cost in excess of £1000 to hire, which would be difficult to recuperate today. So, the club moved to the Cryptography Museum at Bletchley Park; this only opened to the public every other weekend, so the BATC arranged its rally date on an otherwise closed Sunday. But when Bletchley and enigma machines entered

Communications Agency ex-mobile laboratory, GB4FUN is entirely self-contained.

The roof of GB4FUN supports masts and various antennae for h.f. and v.h.f. transceivers and a computer controlled transceiver tracks and displays the paths and coverage footprints for satellites in low earth orbit, together with operating data – times of coverage, Acquisition of Signal (AOS) and Loss of Signal (LOS). The RSGB Repeater Management Committee chairman **Carlos Eavis G0AKI** looks after the development and deployment of the travelling exhibition and is keen to add Amateur television to the range of modes that can be experienced. So, on behalf of the BATC, I have agreed to help him to do that.

As part of National Science week, GB4FUN was in position at a family outdoor forestry centre in Derbyshire. As this was quite close to Birmingham I went along to meet Carlos and discuss the ATV possibilities. Even before a forthcoming refit, there is adequate space for a basic ATV station; transmitter, receiver, monitor, a couple of cameras and maybe simple vision mixing.

The initial thoughts are to provide ATV transmitted from the van to a local receiving point, with 144MHz talkback. Therefore, I have volunteered to construct a transmitter and receiver, from kits, to be part of the GB4FUN setup.

The van must also be able to receive ATV of course, but the tricky bit will be to find or provide a signal to be sent back to GB4FUN. Even if the demonstration station were within the coverage of an ATV repeater, activity would probably be unpredictable and infrequent unless specific arrangements were made. At the moment, arrangements for sending ATV into GB4FUN are therefore still under consideration.

Meanwhile, if you happen to hear GB4FUN on air and decide to 'work' it, a vital point should be emphasised, whether the contact is voice or ATV, there could be schoolchildren within the van listening, eventually watching, even eventually becoming Radio Amateurs themselves. Keep your 'overs' short, but **clear** and **try** to make them interesting, this 'audience' is not interested in listening for an hour of your 'life history' for example. When ATV does arrive, avoid too much of the 'mug shot' – maybe show some of the kit – even take a lid off perhaps!

Space has caught up with me again so until next time, keep 'In Vision'. That's all for now, 73 and P5.

Graham Hankins G8EMX

GRAHAM HANKINS G8EMX LOOKS AT BROADCAST DIGITAL TV, HAS NEWS OF THE BATC RALLY AND GB4FUN

confidently use the 430MHz band again and introduce digital ATV repeaters on the other bands.

More than 50 years ago Amateur television technology was easily able to follow that of professional television at the time. The electronic and radio world was analogue, amplitude modulation was commonplace on the broadcast and Amateur bands and 430MHz transmitters could easily be built or modified to accept a video waveform. Receiving ATV was simply a matter of upconverting to the 600MHz u.h.f. television band. Some very keen Amateurs built colour cameras ahead of professional TV.

Achieving digital amateur transmissions will be a much greater challenge because DTV has not been easy even for the broadcasters, who had to develop a system with an encoding and compression process able to deliver a reliable service to the viewer. So, even when the BATC has taken delivery of the German encoders, there is much to be determined to evaluate their suitability for Amateur television use.

The units have standardised input/output interfaces and are programmable to various digital modulation systems and data rates. On delivery they are pre programmed for 2Mbit/second and 5Mbit/s with an output frequency of 434MHz, so with an 430 to 1270MHz up-converter it may be possible to transmit DATV on 1270MHz, receivable with a digital satellite set-top box.

Regular readers of In Vision may have been expecting me to announce details of the BATC's annual rally this month. But as a rally needs a venue, date and organiser, and none of these have been settled yet, the ATV rally might be later than usual.



● The 24 and 13cm antennas (one of them rotatable) adorn the roof rack of Kent Television Group's mobile ATV coverage vehicle.

popular folklore, the Park began to open every weekend so goodbye BATC.

A couple of new locations for a BATC rally have been suggested. One is a holiday park in west Wales, the other possibility is in the area of Ross-on-Wye. Clearly neither is ideal from a transport viewpoint. The latest suggestion is to return to Bletchley to a sports hall even closer to the railway station. More details may be available next time, or keep an eye on the BATC website <http://www.batc.org.uk>

EDUCATIONAL FUN

The RSGB mobile station, **GB4FUN**, is an educational vehicle used to demonstrate the hobby, technology and capabilities of Amateur Radio to schools, colleges and other venues where potential and particularly young potential Radio Amateurs may be found. Presently housed in a modified Radio

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There's a fair amount of good news this time, but also some bad as well, so let's deal with that first. At time of writing (early April) things were looking black for **Radio Austria International**. The following rather sad announcement was posted on ROI's website: <http://roi.orf.at>

Effective 1 July, 2003, ROI, the international service of the ORF, the Austrian Broadcasting Corporation, will have a new structure. In future, the ORF's domestic radio station 'Österreich 1' - the most successful cultural broadcaster in Europe - will be broadcast on short-wave. The programme mixture, consisting of information, cultural features, music, literature, education, science and religion, has found wide acceptance among Austrian listeners and will thus be available to Austrian expatriates and a global listening audience interested in Austria. In addition, there are plans to offer programming in English, beyond the extent currently offered by Österreich 1 programme. Programming in French and German will be discontinued from July 1. Nevertheless, we are convinced that, through this re-structuring programme, the ORF will continue to offer interesting programmes on short-wave.

So, they're making the best of a bad job – but unless you speak German, Österreich 1 will not be of any use to you. French is being axed, and there may be some English, or there may not. There will be no government help with finance, and there may not be enough will from the central ORF broadcaster to provide a dedicated foreign service. As ROI's editor-in-chief **Michael Kerbler** wrote sadly to me "It is a pity". **It is indeed, were my thoughts!**

For a last listen the current English schedule is at: 0000-0200 on 9.870; 0400-2230 on 6.155; 0400-2230 on 6.155; 0400-1800 on 13.730; 0500-0600 on 17.870; 1500-1600 on 15.515; 1500-2230 on 5.945 and at 2300-0000 on 9.870, 13.730MHz. And take a look at the website for all the good things that we shall be losing (failing a last-minute rethink).

ANOTHER DOOR OPENS

As one door closes, some others open (just a crack). **Radio Slovakia International (RSI)**, which has just celebrated its 10th anniversary, has added broadcasts in Spanish to its schedule from 30 March 2003. The station says that it hopes to acquire listeners in both Spain and Latin America. RSI currently broadcasts in English, French, German and

Russian as well as Slovak. The A03 schedule is: Spanish at: 0230-0300 on 6.190, 9.440, 11.990; 1430-1500 on 6.855, 7.345, 11.600; 2000-2030 on 6.855, 7.345, 11.650MHz and English at: 0100-0130 on 5.930, 6.190, 9.440; 0700-0730 on 9.440, 17.550, 15.460; 1630-1700 on 5.920, 6.055, 7.345 and at 1730-1900 on 5.920, 6.055, 7.345MHz. Website: www.slovaRadio.sk/index.html

TOM HAS A MIX OF GOOD & BAD NEWS THIS MONTH, READ ON FOR THE LOW-DOWN.....

Radio Slovakia International are as liberal with their frequencies as they are with their languages – looking forward and investing rather than holding up their hands and saying 'Can't afford it'. It seems disgraceful to me to give the chop to Radio Austria International at a time when ROI has just received a prestigious prize for press freedom.

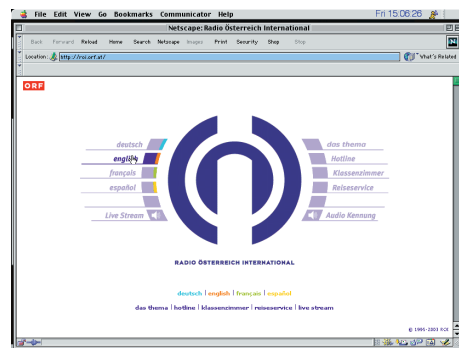
The Journalists' Union said: "Radio Austria International makes an essential contribution through quality journalism to an image of Austria as a tolerant country open to the world". No more, by the looks of it.

The staff of **Radio Free Europe/Radio Liberty (RFE/RL)** can breathe slightly more easily. For months past, there have been warnings that RFE/RL was under threat of physical attack, perhaps from a bomb. There was talk that for its own safety the station would have to be moved lock stock and barrel out of central Prague.

So, who was doing the threatening? – we didn't know, but now five Iraqi diplomats have been expelled from the Czech Republic, and apparently the threat has now gone away also. Who said that Saddam Hussein's network of nastiness didn't extend to other countries?

VOICE OF TURKEY

Not altogether removed from the Iraq war is that delightful European holiday destination Turkey. Their international station the **Voice of Turkey** is certainly not giving up any ground. They have 26 languages on the go, including the main European ones, plus many of the former Soviet Union's republics, Central Asia and as far as China. This is an effort that not surprisingly employs more than 50 short wave frequencies, and operations on six satellites.



The Voice of Turkey's English shortwave schedule can be heard at: 0400-0500 on 6.020 (Europe, N America), 7.240 (Africa); 1330-1430 on 17.690 (Asia), 17.815 (Europe); 1930-2030 on 9.890 (Europe); 2130-2230 on 9.525 (Asia) and at 2300-0000 on 6.020 (Europe) and 9.655MHz (Europe).

If you want to get into the Voice of Turkey's good books, you can go online, and

fill in a listener questionnaire at http://www.trt.net.tr/anket_ingilizce.html Personally, I've never got any further than this, as this website seems particularly impenetrable for English speakers. Has anyone got the answer to this?

PROBLEM SOLVED?

Someone who has got an answer to a website problem is **Dominic Cleal M3CMH (Dominic@computerkb.co.uk)**. I was complaining in my April column that **DRM** were not publishing on their website how to get in on their Software Project.

But Dominic came across the information in an extraordinarily roundabout way. He was on work experience with his school at the Rampisham transmitting station (ex BBC, now owned by VT Merlin Communications), and found himself working alongside some of the people behind **DRM**.

Now the secret is out - the web address for the Project is www.drmx.org it's so close to the basic website address www.drm.org but so unlikely

that anyone would ever guess it. You have to pay 60 euros to become part of the Project and assist DRM in their development. But Dominic even supplies the (very complex) web address where maybe you can get the software for free (quality not guaranteed). Take a look at: <http://www.tu-darmstadt.de/fb/et/uet/fquet/mitarbeiter/vf/DRM/DRM.html>

That's all for this month, so until next time keep tuning that dial and don't forget to let me know of any interesting finds.

Bye for now, Tom

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Practical Wireless **bo**

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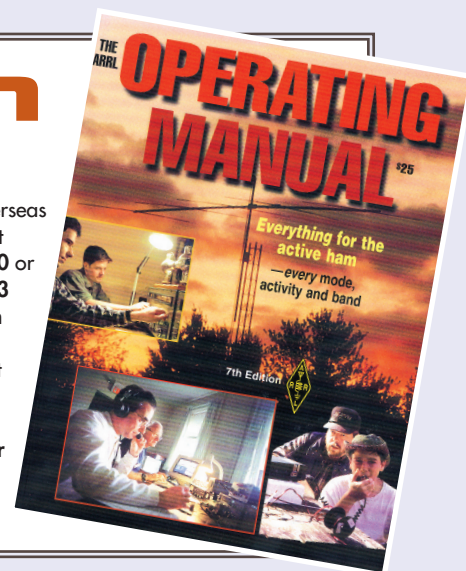
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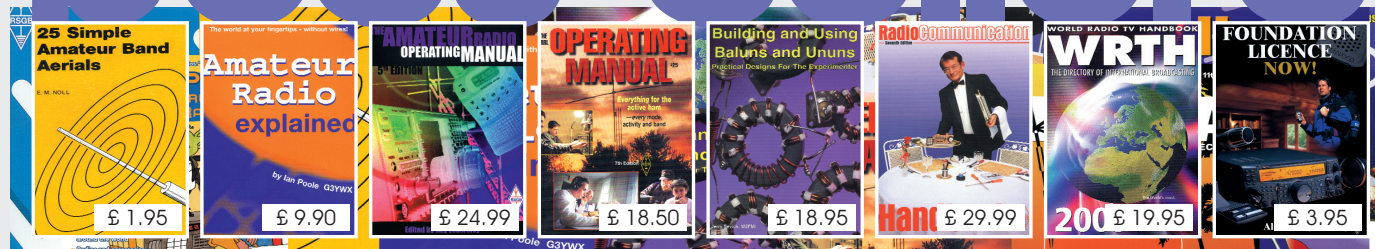
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