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Britain's Best Selling Amateur Radio Magazine

I-Pro Traveller Antenna

Antenna Design by Carl Kidd G4GTW

CTCSS Project

Build a Practical CTCSS Tone Encoder

Win

A Tennamast Telescopic Mast Worth £460!

Part 1 of a 2 part competition

Practical Way

s.w.r. measurement with George Dobbs G3RJV

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ID-E880 NEW

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

£499.95 D

NEW IC-9100

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

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

NEW FIND IT CHEAPER? We'll Match it!

IC-T70E

Dual Band 2m/70cm Handy

£179.95 D

IC-E90

Triple band 6m, 2m, 70cms.

£234.95 D

NEW IC-E80D

- *2m/70cm Handheld*
- *D-Star +D-Star Repeat Mode*
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- *1000+ Memories*

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In Stock Now **£369.95 D**

IC-E92D

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

£369.95 D

IC-E2820

Great dualband mobile.

£424.95 D

Fitted with UT-123 D-Star module. **£579.95**

HF Transceivers

IC-7600 FREE USB keyboard!

This HF-6m transceiver is the successor to the IC-756 series. It takes features from the flagship IC-7800 and the more recent IC-7700, putting them into a package that brings the price within reach of many more hams. **£3379 D**

IC-7800	Deluxe HF / 50MHz All-Mode 200W Transceiver	£7999 D
IC-7700	1.8-54MHz 200W with built-in PSK-31 + keyboard	£5499 D
IC-7200	HF & 6m DSP 0.005-3335MHz wideband receive with USB port	£799 D
IC-7000	160m-70cm 100W (hf) Mobile, portable or base station	£1089 D
IC-718	160m-10m 100W transceiver that brings HF to those on a budget	£519 D

Other Radios

IC-910H	£1249 D	IC-R20	£389.95 C
IC-910HX	£1449 D	IC-R1500	£449.95 C
IC-2200H	£199 D	IC-R2500	£559.95 C
IC-R3	£385.95 C	IC-R8500	£1379.95 D
IC-R6	£172.95 C	IC-R9500	£9799.95 D

NEW The HF AlexLoop

Easy thumb tuning

- *7-Band Loop Antenna*
- *40/30/20/17/15/12/10m*
- *Manual tune in seconds*
- *1m diameter loop*
- *Packs in case 40x27cm*
- *20W QRP design*
- *Includes loop mast*
- *Easy handheld*

£279.95 D

RFSPACE SDR-IQ Receiver

NEW

The SDR-IQ is a high performance receiver covering 500Hz to 30MHz. It is powered directly from PC USB socket and work with Windows or Linux systems. A highly stable unit with dedicated software. **£469.95 D**

New **IF-2000** SDR IF feed for FT-2000 & FT-950. Feed your transceiver IF out into an SDR receiver at 10.5MHz **£219.95**

FlexRadio Systems

FLEX-1500 ARRIVES!

- *160m - 6m All Modes Transceiver*
- *5 Watts of clean RF-Power*
- *USB connection*
- *Selectivity to 25Hz!*
- *Use with laptop for easy portable*

£549.95 D

Gerald Youngblood (designer) presents Jeff Stanton with the first Flex-1500 during USA visit.

Arrives This Month
W&S Exclusive Distributor!

Flex-3000 100W 160m-6m

Includes auto ATU! Firewire connection.

£1399.95 D

Flex-5000 100W 160m-6m

The ultimate SDR radio with amazing front end, extra RX option and 2m & 70cm options.

£2495.95 D

YAESU

Choice of the World's top DX'ers

NEW VX-8DE

- *Triple Bander*
- *Upgraded APRS features*
- *Rugged and Submersible*
- *Powerful Li-Ion battery*
- *Beacon Function*
- *Built-in altimeter*
- *GPS option unit*
- *Increased Memory*
- *CW Trainer!*

£399.95 D

New Mobiles In Stock Now!

FT-1900E £129.95 D

55W 2m Mobile. 3 Watts of pristine audio, large LCD & 200 memories.

FT-2900E

75W 2m Mobile. No cooling fan needed! Large easy-to-read LCD.

£139.95 D

FT-7900E £249.95 D

50/45W 2m/70cm Mobile. 1000 Memories supplied with DTMF Mic.

HF Transceivers

FT-2000 £2079 D

FT-2000 classic HF & 6m 100W transceiver with PEP (performance upgrade) ready installed. Dual receive & fantastic filtering make this an impressive performer. We still have the largest, most up-to-date stock of Yaesu in the UK!

FT-2000D	200 Watt version of FT-2000 with built-in PSU.	£2649.95 D
FT-950	100W HF - 6m transceiver with DSP & Auto ATU	£1099.95 D
FT-450AT	100W HF - 6m with automatic ATU & latest updates	£679.95 D
FT-450	100W HF - 6m transceiver - great value.	£589.95 D
FT-DX9000contest	200W HF - 6m "formula one" contest machine	£3995 D
FT-DX9000D	Deluxe fully loaded base station	£7695 D
FT- DX9000MP	Amazing 400W "legal limit" radio	£7995 D
FT-857D	HF to 2m mobile. portable or base - up to 100W	£574.95 D
FT-817BHIDSP	Fitted with DSP module exclusive to W&S	£549.95 D

VHF Mobiles & Handhelds

FTM-10SE	50/40W 2m/70cms stereo FM	£269 D
FT-8800E	Dualband Mobile 50W / 30W	£289 D
FT-8900R	10/6/2m & 70cm Mobile	£334 D
VX-3E	2m / 70cm Handheld Wideband receive	£139 D
VX-7R	Waterproof dualband handy (silver / black)	£259 C
VX-6E	2m/70cms handy, 5W Wideband Receive	£199 C
FT-60E	2m/70cms, 5W handy Wideband Receive	£142 C

VX-3E

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

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Get that dream radio now!

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NEW AIRNAV RADARBOX-3D

RadarBox 3D - The world's ultimate virtual radar system with Google Earth as a map overlay & new 3D aircraft picture library.

Full Package **£489.95 C**

Current owners can upgrade to 3D with RadarBox-UG for just **£109.95 C**

RadarBox-Pro Basic Package - No 3D **£399.95 C**

YAESU
NEW HF RANGE

FT-DX5000 Series

W&S First! We were the first to receive official CE stock from Yaesu UK. No grey imports or non-Europe spec stock here! All our stock carries EU serial numbers that meets the full spec and performance. It matters because when you come to dispose of your radio in years to come, customers will want to check the serial number!

Exclusive Deals Only from W&S!

The new series comprises 3 options : FT-DX5000, FT-DX5000D & FT-DX5000MP. All offer 200W from 160m to 6m. Phone for latest deals & prices!

DUE JULY - ORDER NOW!

< FT-DX5000MP

WiNRADiO Excalibur Receiver NEW

- *9kHz - 49.999MHz*
- *Software Defined Radio*
- *USB Interface*
- *3 Parallel Demodulator Channels.*

The WR-G31DDC "Excalibur" receiver heralds a new standard of performance at a very affordable price. The robust front end handles today's busy bands with ease. You will love the live spectrum display (up to 50MHz wide) and absence of significant spurious signals.

Call for further details.

FAST SAME DAY DESPATCH SERVICE!
Orders must be received before 3pm.

KENWOOD
NEW TS-590E

W&S Exclusive! We are pleased to announce the new HF radio from Kenwood. Prices to be announced.

bhi DSPKR

NES10-2- mkII The original bhi DSP speaker for any receiver or transceiver **£99.95 C**

10 Watt integrated DSP speaker. **£154.95 C**

NEIM-1031 Mk II An in-line DSP module giving complete noise cancelling control **£139.95 C**

www.bhi-ltd.com

VIBROPLEX UK Distributors

V-CM A compact straight key with super movement. **£63.95 C**

V-CW High quality iambic key in the style of Vibroplex **£154.95 C**

Watson Cross Needle Meters

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

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

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

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

Watson Power Supplies

All Watson "NF" models use their exclusive *"Noise Offset Function"* which moves any noise spikes away from the band of operation.

You can depend on Watson

Power-Mite-NF

Compact Cont. 22 Amp Switch Mode PSU variable voltage & noise offset.

£69.95 C

Power-Max-25-NF

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

£89.95 C

Power-Max-45-NF

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

£119.95 C

Power-Max-65-NF

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

£209.95 D

W-3A 3A Analogue fixed 13.8V **£24.95 C**
W-5A 5A Analogue fixed 13.8V **£29.95 C**
W-10AM 10A Analogue variable **£59.95 D**
W-10SM 10A Switched fixed **£49.95 D**
W-25AM 25A Variable PSU **£89.95 C**

HF Transceivers

TS-2000E **£1489.95 D**

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

TS-2000X +23cm **£1749 D**

TS-480HX Ideal for mobile, portable or base station. Gives a massive 200W on HF and 100W on 6m. **£849 D**

TS-480SAT This model gives 100 Watts on all bands up to 6m, but adds a built-in automatic ATU. **£749 D**

Handhelds

TH-F7E	2m/70cm 5W (2-pin Kenwood) SMA **+FREE Clip Mic**	**£229.95 D**
TH-K2E	2m 5W 4-Key Keypad (2-pin Ken) SMA **+FREE Headset**	**£159.95 D**
TH-K2ET	2m 5W 16-Key Keypad (2-pin Ken) SMA **+FREE Headset**	**£165.95 D**
TH-K4E	70cm 5W (2-pin Kenwood) SMA **+FREE Headset**	**£159.95 D**

VHF Mobiles TM-V71E £289.95 D

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

TM-271E	2m FM 60W mobile. CTCSS, 200 Memories, DTMF Mic	**£165.95 D**
TM-D710E	2m/70cms 50/50W mobile. APRS +EchoLink, DTMF Mic	**£429.95 D**

Buttternut Vertical Antennas

These antennas are extremely efficient and use no traps. The large, air-spaced coils are the secret, and resonant adjtments can be made at ground level.

HF-2V 80, 40m DX vertical. 9.75m, Easy erect. **£289.95 D**
HF-6V 80,40,30,20,15,10m self support 7.9m **£389.95 D**
HF-9V As HF-6V but adds 17,12 & 6m. 7.9m **£449.95 D**

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

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Bencher
Morse Key Paddles

Morse Paddles Of Distinction
A range of high quality keys from the USA.

Hex-Paddle	Iambic paddle	£199.95 C
BY-1	Twin paddle, black base	£119.95 C
BY-2	Twin pad. chrome base	£139.95 C
BY-3	Twin paddle, gold base	£299.95 C
BY-4	Twin pad. gold parts	£189.95 C
ST-1	Single pad, black base	£119.95 C
ST-2B	Single pad, chrome b.	£144.95 C
RJ-1	Straight key, black base	£109.95 C
RJ-2	Strght key, chrome base	£129.95 C

Watson
Walk-About Antennas

Base loaded telescopic whips that plug into your FT-817 and give you total HF portability.

AT-10	10m single band whip	£19.95 A
AT-12	12m single band whip	£19.95 A
AT-15	15m single band whip	£19.95 A
AT-17	17m single band whip	£19.95 A
AT-20	20m single band whip	£19.95 A
AT-30	30m single band whip	£19.95 A
AT-40	40m single band whip	£21.95 A
AT-80	80m single band whip	£21.95 C

SGC
Auto ATU

SG-211
SG-211 "Stowaway" auto ATU. HF + 6m Up to60W. Powered by internal battery. Not weatherproofed.

Was ~~£249.95~~ **£199.95 C**

Heil Sound
Audio Equipment

Pro-set-4 & 5
Standard headset with a choice of NC-4 or 5 inserts. Requires AD-1 patch lead. **£114.95 C**

For Icom transceivers, choose the **Pro-Set-IC** with "Icom" Element £129.95 C

Pro-set-Plus
Pro-set Plus has the benefit of dual NC-4 / NC-5 mic capsules that can be selected. Requires AD-1 patch lead. **£189.95 C**

Pro-Set-PLUS-IC Icom Element £194.95 C

AD-1 Connector Leads One to suit any ham rig, tell us your radio. **£16.95 A**

GM-4 & 5

"Gold Line" mics contain the NC-4 or NC-5 capsule. Handheld or mounted on a stand. Requires CC-1 cable kit for rig. **£119.95 C**

CC-1 Cable Kits One to match every ham rig, tell us the radio you need it for. **£29.95 A**

Avair
X-Needle Meters

Cross Needle Models - Even Lower Prices!

AV-20	200W 3.5 - 150MHz	£34.95 C
AV-40	150W 144-470MHz	£34.95 C

MFJ
Radio Accessories

MFJ-998 **W&S £649.95 C**

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

MFJ-925	Compact auto tuner	£169.95 D
MFJ-927	200W remote auto atu	£249.95 D
MFJ-928	Basic auto atu	£199.95 D
MFJ-931	Artificial ground	£112.95 C
MFJ-932	Mini loop tuner	£139.95 C
MFJ-934	Artificial ground + ATU	£199.95 C
MFJ-935B	Portable loop system	£199.95 C
MFJ-945E	Mobile atu 300W	£129.95 C

MFJ-929 **AUTO TUNER 1.8-30MHz 200W**

LCD readout, 20,000 memories, long wire & coax, radio interface. **W&S £209.95 C**

MFJ-991B	Auto atu 150W	£209.95 D
MFJ-994B	Auto atu 600W	£339.95 D
MFJ-962D	1.5kW ATU	£289.95 D
MFJ-969	160m - 6m 300W	£209.95 D
MFJ-971	Portable atu	£118.95 C
MFJ-974B	Balanced ATU 3.5-30MHz	£189.95 D
MFJ-986	3kW differential tuner	£349.95 D

MFJ-993B **Rugged 300W Auto ATU**

A true "Plug & Play" Auto ATU. Covers 160m to 10m. Capable of handling up to 300W - tunes almost any antenna, has X-needle meter & digital data display. **W&S £249.95 D**

MFJ-1260	Mic control 1 in/2 out	£99.95 C
MFJ-1263	Mic control 2in/2 out	£109.95 C
MFJ-1275	Sound card adaptor	£109.95C
MFJ-1625	Window Ant + Tuner	£199.95 D
MFJ-16B01	Dipole centre SO-239	£21.95 A
MFJ-16C06	6x dog-bone insulators	£4.95 A
MFJ-16E01	300Ω end fed SO-239	£10.95 D
MFJ-1796	40m-2m vertical	£239.95 D
MFJ-1798	80m-2m vertical	£299.95 D
MFJ-1908H	43ft fibre glass mast	£239.95 D
MFJ-1922	Digital screw driver control	£99.95 D
MFJ-1924	Prog. screw drvr control	£129.95 C
MFJ-1925	ATAS-100 controller	£72.95 C
MFJ-202B	Receiver noise bridge	£79.95 C
MFJ-250X	1kW dummy load (x-oil)	£55.95 C
MFJ-260C	300W dummy load	£44.95 C
MFJ-261	100W dummy load	£32.95 C
MFJ-265	2.5kW load fan cooled	£199.95 C
MFJ-403	Micro CW keyer	£66.95 C
MFJ-403P	Micro travel iambic	£79.95 C
MFJ-4103	PSU for FT-817	£52.95 C
MFJ-417	Pocket morse tutor	£76.95 C
MFJ-4403	Trcvr volt conditioner	£109.95 C
MFJ-442	Slim electronic keyer	£199.95 C
MFJ-461	Pocket morse reader	£99.95 C
MFJ-4714	4-way remote ant switch	£87.95 C
MFJ-4726	6-way remote ant switch	£159.95 C
MFJ-490	Memory keyer + paddle	£244.95 C
MFJ-495	Memory keyer	£189.95 C

MFJ-269 The Antenna Analyser has been refined over the years & the MFJ-993B tells you just about everything you need to know about your antenna system - resonance, impedance, reactance & can even measure coax losses & identify the position of open & short circuits. All in a compact unit that covers 160m to 70cms. Can you afford to be without one? **W&S £349.95 C**

• 1.8 -170 & 415-450MHz • Frequency Counter • LCD readout • SWR & impedance • N-socket (Ant), BNC (Counter) • AAx10 or ext. 12V DC • Size 103w x 173h x 60d mm • Weight 750g

Hustler
HF & Mobile Antennas

Verticals
Hustler verticals are known around the world for their performance and sturdy construction.

6-BTV	6 band inc 30m	£259.95 D
5-BTV	5 band 80-10m	£219.95 D
4-BTV	4 band 40 - 10m	£179.95 D

Mobiles

Base Whip Sections

MO-1	137cm Folds 1/3rd Up	£38.95 C
MO-2	137cm Folds Halfway Up	£38.95 C
MO-3	137cm Non Folding	£29.95 C
MO-4	67cm Non Folding	£26.95 C

Resonator Top Section

RM-10	10m	150-250kHz	£21.95 C
RM-11	11m	150-250kHz	£21.95 C
RM-12	12m	90-120kHz	£21.95 C
RM-15	15m	100-150kHz	£21.95 C
RM-17	17m	120-150kHz	£26.95 C
RM-20	20m	80-100kHz	£26.95 C
RM-30	30m	50-60kHz	£29.95 C
RM-35	40-30m	7-10MHz	£29.95 C
RM-40	40m	40-50kHz	£29.95 C
RM-50	60-40m	5-7MHz	£29.95 C
RM-60	60m	5MHz	£32.95 C
RM-80	80m	25-30kHz	£32.95 C

Diamond
HF Antenna

BB7V
The small space answer!
** HF 2 - 30MHz Vertical*
** No radials needed*
** 250W PEP 6.7m length*
** VSWR less than 2:1*
** Weight 2.3kg*
** 50 Ohms SO-239* **£325.95 C**

Butternut
Mini Beam

HF-5B ***Butterfly 5-Band Mini Beam***

Was ~~£449~~ **£399.95 D**

20m,17m, 15m, 12m & 10m. Just 12.5ft span - DX from a small garden!

** 5 Band Coverage 10 - 20m * 1.2kW PEP (500W CW) * Full coverage on 12m, 15m & 17m * 1.5MHz on 10m & 200kHz on 20m * 12.5ft span. 6.5ft turning radius * Forward gain up to 5dB * F/B ratio up to 20dB * Front to side ratio up to 30dB * Weight 10kg*

This antenna has NO traps. It uses linear loading and capacitive elements to achieve its small size. We have just a few at this special pre-antenna season price!

Watson
VHF/UHF Antennas

VHF-UHF Verticals

W-30	2m/70cms 3/6dB length 1.15m 150W SO-239	£49.95 C
W-50	2m/70cms 4.5/7.2dB length 1.8m 150W SO-239	£54.95 C
W-300	2m/70cms 6.5/9dB length 3/1m 150W SO-239	£74.95 D
W-2000	6m/2m/70cms 2.15/6.2/8.4dB length 2.5m 150W	£89.95 C

VHF-UHF Mobile Whips

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

AOR **AR-8600 £629.95 D**

Portable receiver ideal for desk top, mobile or carry round use. Wide band receiver 530kHz - 3GHz, all mode. Great for SSB HF, or FM VHF etc.

< AR-8200 £439.95 D
Hand-held wide band receiver 530kHz - 3GHz, all modes.

TGM
Compact HF Beams

MQ-24SR 4-Bands **£499.95 D**

This antenna covers 4-bands, 20-6m & up to 5.5dB gain.
** Element: 3.58m*
** Boom: 1.37m*

MQ-26SR as above + 17m & 12m **£599.95 D**

B-245 1kW 5-Bands **£899.95 D**

5-band compact beam antenna that will get you on 40m!
** Element: 21ft 6in*
** Boom Length: 10ft*

Watson
Coax Switches

Premium grade Watson RF coax switches.

4-Way Switches

CX-SW4N	DC - 1.5GHz 1.5kW 5x N-Type Connectors.	£59.95 C
CX-SW4PL	DC - 800MHz 1.5kW 5x SO-239 Connectors.	£56.95 C

3-Way Switches

CX-SW3N	DC - 1.5GHz 1.5kW 3x N-Type Connectors.	£49.95 C
CX-SW3PL	DC - 800MHz 1.5kW 3x SO-239 Connectors.	£41.95 C

2-Way Switches

CX-SW2N	DC - 3GHz 2kW 3x N-Type Connectors.	£32.95 C
CX-SW2PL	DC - 1GHz 2kW 3x SO-239 Connectors.	£26.95 C

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


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Rob Mannion's

keylines

The Editor pays tribute to a long serving author and welcomes his successor.

David Butler G4ASR has supported *Practical Wireless* for many years – 21 to be precise – and started writing on v.h.f. topics before I joined the magazine as Editor. David's column *VHF DXer* has developed into an extremely specialist monthly report covering the Amateur bands above 30MHz. Personally, as I've edited his work for many years I can say it's rare for me not to have learned something new each month as David's fascinating articles were prepared for publication.

Despite adversity in recent years – with major health problems causing great day-to-day difficulties and requiring hospital treatment, the *VHF DXer* column has always 'made it' into *PW* each month. Unfortunately however, the recent death of **Norman Fitch G3FPK** left a vacancy for a v.h.f. columnist in the **Radio Society of Great Britain** (RSGB) society's monthly journal *Radio Communications,* and as David is their VHF Manager, he's decided to concentrate on that monthly commitment.

So, it's with regret that **Tex Swann G1TEX** and I have to say 'cheerio and thank you' to our loyal, totally dedicated and enthusiastic colleague for his work as a monthly columnist for *PW* as he signs off from his column in this issue.

Fortunately however, David G4ASR is planning to continue his two articles each year in the *Antenna Workshop (AW)* series and – I'm hoping here! – we may even persuade him to consider three projects a year! But whatever happens in the future I'm sure that along with the goodwill that Tex and I have towards our friend and author, the other essential element of the *PW* 'team' – our readers – will also wish him well!

Thank you for your dedication David and I'm sure everyone associated with *PW* will look forward to your *AW* articles! Good luck Sir!

Introducing Tim Kirby G4VXE

Fortunately, David G4ASR was able to help us find a new author as his friend and fellow v.h.f. enthusiast **Tim Kirby G4VXE** was interested in taking on the year-round commitment. With David's help I was soon in contact with Tim – who lives near Oxford – and I was delighted to offer this young (compared to me anyway!), keen and dedicated Amateur Radio writer to take on the column.

Both Tex G1TEX and I were totally honest with Tim because writing a regular monthly column is a demanding commitment. There's no dodging deadlines in publishing! However, our new author – even though he's busy with a young family – already knows much about writing as he's an established author in his own right.

Now that Tim G4VXE is a full member of the *PW* Editorial team, we are planning the future of our v.h.f. column. Obviously, Tim will introduce himself fully when he starts in the August issue of the magazine but I can at this stage mention that we're planning to make the new look column much more 'inclusive'. By 'inclusive' I mean that the intention is that the new column will reflect all aspects of operation, whether it be DX chasing, propagation discussions, repeater operation and maintenance, QRP operations, frequency modulation (f.m.) work, single sideband (s.s.b.) microwave operating and anything else that we get up to above 30MHz! (ATV will still be covered by **Graham Hankins G8EMX**'s *In Focus*, of course).

Having discussed things at length with Tim, both Tex G1TEX and I are confident that our new team member has some excellent ideas that he wants to share with our important readers. However, we are – of course – anxious to hear what **you** would like to be featured in what is (let's face it!) your column! So, as Tim prepares to take over from David G4ASR, I issue an invitation to all our many readers who enjoy *PW* to write in to me so I can pass the suggestions, etc, onto Tim. And once he's under way we'll publish contact details so you can contact him directly.

In rounding off this edition of *Keylines* I'm must mention how proud I am that it seems everyone associated with *PW* (Editorial staff, authors and readers) have been part of the magazine for a long time. This is – in my opinion – because by working together we make a good team. Thank you everyone!

Rob Mannion G3XFD/EI5IW

Practical Wireless
PW Publishing Limited
Arrowsmith Court
Station Approach
BROADSTONE
Dorset BH18 8PW

Tel: 0845 803 1979
Fax: 01202 659950

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

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

Art Editor
Stephen Hunt
steve@pwpublishing.ltd.uk

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

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

Finance Manager
Alan Burgess
alan@pwpublishing.ltd.uk

Book Orders
bookstore@pwpublishing.ltd.uk

PW Publishing Website
www.pwpublishing.ltd.uk

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Directors: Stephen Hunt & Roger Hall

Subscription Administration
Webscribe
Practical Wireless Subscriptions
PO Box 464
Berkhamsted
Hertfordshire HP4 2UR, UK
pw@webscribe.co.uk
www.mysubcare.com
☎ 01442 879097
Fax: 01442 872279

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

readers' letters

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

A great deal of correspondence intended for 'letters' now arrives via E-mail, and although there's no problem in general, many correspondents are forgetting to provide their postal address. I have to remind readers that although we will not publish a full postal address (unless we are asked to do so), we require it if the letter is to be considered. So, please include your full postal address and callsign with your E-Mail. All letters intended for publication must be clearly marked 'For Publication'. **Editor**

The Magazine Joins The 7 Mile High Club!

Dear Rob,

I'm writing to advise you that *PW* has joined the 7 Mile High Club! (or not far off seven miles anyway!). Recently, I flew on an Airbus A320 to Auckland in the North Island of New Zealand, some 800 miles from Christchurch where I live. I'm not the most comfortable flyer, so I often take *PW* with me as a security blanket. I had just received the May 2010 issue.

About 150 miles into the flight I found Ralph Riddiough GM4SQO's letter seeking suggestions for receivers suitable for younger folk to build. Well there's a bargain on your doorstep Ralph!

We've ordered 50 of them for our next ZL3 Buildathon for a group of 10-13 year olds. It's a complete MK484 BC AM receiver kit for under £3 from UK **www.rapidonline.com** product code 70-0110. The really superb step by step building notes include one photo per component, and you can download them from the website now. With a bit of help you may even get one to tune up to 160 or 80m a.m., as published in *PW* a few years back. Best of luck Ralph! Suggested Editor's comment: where's the most interesting place you have read *PW* lately? Photos please!

David W Searle ZL3DWS
ZL3DWS@nzart.org.nz
Christchurch New Zealand

Ed: *Thanks David! Readers searching for simple MK484 kits can also buy them from our regular advertiser* ***Bowood Electronics*** *(see advert this issue).* ***Will Outram M6WIL*** *who runs Bowood, has had many repeat orders for his little kits and as David ZL3DWS remarks – the simple MK484 receivers are an excellent starter project.*

Mike Jones G3UED's Loft Antenna

Dear Rob,

When I spotted Mike Jones, G3UED's 14MHz band loft antenna, in *Antenna Workshop* in the May issue of *PW,* I couldn't resist putting one together, even though I already have a 20m dipole strung up in my loft-space – which in passing, works surprisingly well.

However, in my eagerness to get this new 20m r.f. radiator added to my loft-area antenna farm, I inadvertently confused Mike's balun wiring! That'll teach me not to hurry things along at breakneck speed. Anyway, once the necessary corrections were done, I hauled the antenna through the loft hatch and after trying to dodge and avoid all the empty cardboard boxes which once contained various transceivers etc (just why do we hoard all those empty cardboard boxes – sometimes, for literally decades) it was fixed to one of the last remaining highest points I could find.

Next, the feeder from the antenna via the balun, was attached to my rig. The switch on moment had arrived and 20m signals started to pour through the speaker – I was impressed. And it wasn't my imagination either, because the signals on Mike's antenna were actually a bit stronger than my usual 20m loft mounted antenna. After a little judicious pruning, the s.w.r. was tamed to an acceptable level using a very small squirt of r.f. Once that was done, I switched to higher power at 10W.

I was ready to pounce on the first strongest signal I could hear. But on this particular day, there were plenty. I subsequently worked many European stations all with 5 by 6 to 5 by 8 reports, all using s.s.b. with one 5 by 9 report. No DX, yet.

Indoor antennas do work and this design courtesy of G3UED, substantiates that fact. Lastly, when the Summer arrives, I'll put it outside – if only to satisfy my rampant curiosity. 73.

Ray Howes G4OWY
Weymouth
Dorset

The Newark Hamfest 2010

Dear Rob,

As you weren't able to attend the first **Newark Hamfest** in October last year – I'm hoping that both you and **Tex Swann G1TEX** will both be present at the 2010 event? Last year Tex G1TEX and **Steve Hunt** told me that you weren't able to travel but were in contact with friends at the rally! Indeed, I actually watched Tex G1TEX put several – very fortunate – visitors through to you at home on the his mobile 'phone. That really does show dedicated service, with the Editor at home chatting to friends at the rally!

This 'telephoning the Editor' ceremony reminds me of one of your suggestions at the last Donington Leicester Show I attended. There, I had to join a queue of about 20 readers waiting to talk to you about *PW*. Unfortunately, the queue was moving so slowly – because everyone seemed to have so many questions, enquiries and ideas for you and Tex, that I gave up. Unfortunately, despite several other attempts I didn't get to chat to you but I did mange to write to to you a few days later. In fact, I've followed your suggestions – as you can see –

and I'm now on the Internet. One of the advantages is that I can E-mail you – as I've done today. Perhaps you might regret your suggestion later?

However, my main reason for E-mailing you Rob is to take up an idea you jokingly suggested – addressing everyone in the queue waiting to talk to you as Editor – and that was the idea of 'Tesco Delicatessen type 'queue tickets'. Although I'm certain you were joking (everyone enjoyed the suggestions!) I really think it would be a good idea.

If we were issued with a ticket it could at least – hopefully – stop the chap who always seems to appear, ignoring the queue and saying to you. "I'm only going to stop as few moments Rob", or whatever, and completely ignoring us poor prunes who've been waiting in line! After all Mr Editor Sir, it's probably the only time that we 'far north of England' types will get a chance to discuss things face-to-face with you in the year. So, what do you think of my (half serious) suggestion? Best wishes – I hope you can make it to the Newark show and we can both laugh together and make up for the chatting time we missed in 2009 – ticket or no ticket!

Bill Holding
Wooler
Northumberland

Ed: *It was frustrating for me too Bill, but I wasn't able to travel very far at all I'm afraid. However, I am absolutely determined to make it to the Newark Hamfest this year and I've even booked my accommodation! I'm also fully aware that this show has now become one of the few occasions in the year when readers from all over the UK and Ireland can get the chance of a face-to-face discussion with the Editorial staff. And although I am reluctant to give everyone the Tesco type tickets – I will do my very best to ensure your wait for our all-important discussion is as short as possible. I'll also try my best to encourage the individuals who (despite seeing a long queue) insist on 'queue jumping' to 'have a few words' – while I have then to witness the looks of dismay in the patient queue of waiting readers! But whatever you do – don't give up everyone. We need your feedback!*

Dartmoor Rally Attendance Appreciated – Just a few of the letters we received!

Dear Rob,
I'm writing to offer my thanks to you and the *PW* team for attending the Dartmoor Rally at Tavistock on May Day Bank Holiday. It's quite a trip for me from Penzance for the day – especially with the crippling price of petrol nowadays – but you've got a good 120 mile or so to drive. Rallies away from the main centres of population need the support such as you've demonstrated.

We appreciated your attendance at the rally last year and my friend **Tony Trevellan** and I were delighted that you attended again. I chatted with both you and **Steve Hunt** – and discovered that Steve is your Art Editor! I told him just how much we appreciate the excellent, smart and crisp look of *PW* nowadays.

We were also served by a very young man – who it turns out was **Freddie**, your Grandson. It was good to meet him. Perhaps another Editor one day? By the way – I was most impressed at how efficiently Freddie handled the change and helping visitors to your stand. Well done everyone – we're looking forward to seeing PW Publishing Ltd. at Tavistock again in 2011. Thanks for your support.

Chris Tregarron
Alverton
Penzance
Cornwall

Dear Rob,
I throughly enjoyed meeting you, **Steve** and your Grandson **Freddy** (who served me) at the Mayday Bank holiday rally in Tavistock. You'll probably remember me because I used to live in the village of London Apprentice, and we once met when you were visiting family in the area.

It was the first time that I had driven to this rally and my wife **Liz**' and I both wondered what the parking would be like. We're both disabled – Liz has arthritis and I am reaping the benefit of a mis-spent youth where I badly injured my legs in a motorbike crash in the 1960s. So, neither my wife or I can walk very far.

Driving into the rally we were immediately met by a very polite chap wearing the obligatory yellow jacket. He, very kindly, approached my car as he realised I am a disabled driver. He asked us both how far we could walk, offering to get us as close as possible. He was very kind and considerate and soon got us parked safely. In fact, we ended up parking almost next to your car Rob and we both throughly enjoyed the helpful staff, the rally itself and meeting your crew on the stand.

Both Liz and I have decided we'll attend the rally next year and we look forward to meeting you again. In the meantime, you can be sure that one family from St. Austell (us) throughly enjoyed the day out. I think the rally team deserve a round of applause.

Mike Dennis
Polgooth
St. Austell
Cornwall

Ed: *It was good to me you too Mike, after receiving E-mails from you it was nice to meet up personally. Freddy (11) thoroughly enjoyed himself – his only disappointment was that the Tea & Burger van ran out of food because they were so busy and he didn't get his promised burger! I too found that parking man very helpful. Please join me on the* Topical Talk *page for further comments.*

Dear Rob,
We might be a bit out of the way down here in Cornwall but judging by the staff on the *PW* stand at the Dartmoor Rally in Tavistock – we're certainly not forgotten. Thank you for supporting the rally on Bank Holiday Monday on May 3rd.

I didn't get to the rally last year but saw in *PW* that you were planning to attend again. It's quite a hike for us from St. Merryn – but not as far as your trip! You certainly are helping the hobby by supporting the far west rallies and meeting us. In fact, after chatting to you I'm encouraged and think I will have a go at my Foundation Course. My wife thinks I ought to have a go because I can then at least talk to other enthusiasts on the air. Listening in on 2m on my scanner I can often hear Irish Amateurs in County Cork and Dublin and, of course, the Welsh stations from across the Bristol Channel. I think that attending the Tavistock rally has given me a lot of encouragement to get on the air. Thanks again.

John Leeman
St. Merryn
Padstow
Cornwall

Ed: *Good luck with your Foundation Course John!*

Star Letter

Frank G8RY Is Enjoying PSK31 At 92!

Dear Rob
Just been reading your *Keylines* editorial about aged operators using PSK31. But get a load of this – I am 92 years old and have been operating on the mode since 2003 and enjoying it very much. I first started Amateur Radio way back in 1937 and I then went through the usual routine of home construction with a.m. gear. I then joined the RAF's Civilian Wireless Reserve (RAFCWR) and was called up in Sept 1939 and posted to the Wireless Telegraph fitting parties, I finished up as a flight lieutenant signals officer in a Group HQ in Naples and was always on the technical side as opposed to the operating the QRO transmitters using rhombic antenna farms

I was QRT from 1986 until 2003 for domestic and technical reasons, but with the passing of my wife in 2002 a void had to be filled. It was then that PSK came to the rescue and it saved my life. In fact, I'm known world wide – more so than in the village where I live!

Advancing years have brought about the usual losses, mainly hearing. So, I think that operating with PSK is the answer to all Amateurs who are hard of hearing and want to resume the hobby

I enjoyed getting your E-mailed reply – thank you Rob for your reply. However, I am only just getting used to this E-mail lark, so I put it off for some time because I did not want anything to upset my radio activity!

But printing out the ARRL news bulletins at 2300UTC on 7.095MHz I realised that a lot of information pertaining to Amateur Radio could be got, so I invested in the broadband for the Internet and don't regret it.

My previous E-mail was a bit cryptic as obviously there is lots more over 73 years but thought a few extra lines would interest you. Firstly, as I only have a small garden so the magnetic loop comes in very handy.

It is of Italian manufacture by Mazzoni (I3VHF) and only one metre in diameter mounted on a pole 12ft high just beneath the roof line – so it's not obvious. As it is slightly directional I use a rotator monitored by a CCTV camera and displayed by the side of the IC-7800 in the shack.

I know there have been a number of articles in *PW* about loops but believe me they are very good! Where else could you get a directional antenna covering seven bands – each one separately tuned to resonance with the s.w.r. displayed after keying in the QRG? All this is an aside to the original subject – but I thought you would like to have the full picture.

Prior to retirement I was into radio frequency (r.f.) heating as applied to the woodworking industry. These were used in 'setting off' synthetic adhesives used in the manufacture bent wood furniture, coffins and floors for the shipborne containers and drying out wool. They used up to 25kW of r.f., which was generated by self-oscillating triodes emitting lots of nasty harmonics causing TVI. The trouble I got into trying to stick two bits of wood together would make an interesting story! Could make it a separate article if you would like? Regards.

Frank Wyer G8RY
Burrough Green
Newmarket
Suffolk

Ed: *What a fascinating story Frank – I wish you more power to your stately elbow Sir! I think the using the CCTV camera to see the position of your loop antenna is very innovative and simple, especially as small cameras are so cheap nowadays. Readers will be interested to know – I'm sure – that an* Authors Guide *has been sent to Frank so that we may learn more about his experiences in r.f. heating. We should bear in mind that the use of this technology is even more widespread nowadays – often using up to four or more 813s valves to generate r.f. heating in many industrial process. It will make fascinating reading as it was a potent source of interference! Do any of our readers suffer QRM/QRN from r.f. heating? Let me know if you do please.*

Send your letters to:

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

Saving Analogue Radio

Dear Rob,
As a regular *PW* reader I was pleased to read about your Saving Analogue Radio campaign in the June issue. I also read all about it on the **Southgate Amateur Radio Society's** website and – of course – sent my vote in via the facility provided there.

Thank you for reply to me after you received my vote supporting the campaign to keep the analogue f.m. service on Band II. I get the firm impression from all the comments I have seen in newspapers and other sources discussing it that the general opinion seems to be – 'If it ain't broke – don't fix it'! I'm really beginning to think that the whole idea is to get us buying new receivers to give the high street a boost! Unfortunately though, buying new digital DAB radios won't help our economy much as they all seem to be made in the Far East nowadays!

Living on the north coast of Devon, I can get some very interesting reception problems on Band II v.h.f. As you know, the tidal rise and fall in the Bristol Channel is quite dramatic and both our u.h.f. TV service on the service and Band II f.m. radio were often spoilt by reflections from the sea.

I've tried a DAB radio (my son brought it down from London) here and it was very 'stuttery'. Even when our family's old (I bought it in the early 1970s) Grundig v.h.f. was working under poor reception on Band II, we always managed to listen to a programme. On the other hand my son's DAB – complete with a little Band III log periodic antenna he purchased in London, reception was very poor. Reception isn't much better in London either, so he tells me!

As a retired TV service engineer I think they've either got to instal much larger 'buffer' memories in digital receivers (enough for several minutes listening) and also instal many more small DAB relay stations. Regards.

Maurice Williams
Upper Torrs
Ilfracombe
North Devon

news & products

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

New Icom Deliveries!

Icom UK, based in Herne Bay Kent announced some interesting new rigs that should arrive soon!

In their latest press release the company proudly announced, "Icom radios are built tough, and the new IC-T70E v.h.f./u.h.f. dual-band and IC-V80E v.h.f. single band hand-held transceivers are no exception. These new additions to Icom's Amateur radio product range offer military rugged construction, water resistance and superior protection against the elements to MIL-STD-810 and IP54 standards. Both models feature great audio employing a BTL (bridge-tied load) amplifier that doubles the audio output. Together with a large speaker, this delivers 750mW of loud and intelligible audio making them ideal for operating in a noisy environment."

"Add a simple, straightforward design, long lasting battery life, built in VOX function and you have a choice of two models that are ideal for basic, on-the-go operations.

The IC-T70E is available now. The IC-V80E will be available from June 2010. Both models will be supplied with BP-264 1400mAh Ni-MH battery pack, charger, belt clip and antenna."

For more details visit the Icom UK website at: www.icomuk.co.uk
Further details from Icom UK
Icom UK Ltd.
Blacksole House
The Boulevard
Altira Park
Herne Bay
Kent CT6 6GZ
Tel: **(01227) 741741**
FAX: **(01227) 741742**
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Main Features of the IC-V80E

1: 144MHz single band hand-held transceiver.
2: 5.5W r.f. output power with the supplied battery pack.
3: 750mW (typical) of loud and intelligible audio with the BTL amplifier circuitry.
4: 13 hours* of operating time with the supplied 1400mAh Ni-MH battery pack. (*Approx for 5:5:90 duty cycle with power save on).
5: Dust protection and water resistant construction, equivalent to IP54.
6: Tested to MIL-STD-810-F.
7: VOX function built-in (Optional headset and adapter cable required).
8: 5-character alphanumeric display.
9: A total of 207 memory channels.
10: CTCSS and DTCS tone squelch.
11: DTMF memory channels.

Main Features of the IC-T70E

1: 144/430MHz dual-band hand-held.
2: 5W r.f. output power in v.h.f. and u.h.f.
3: 700mW of loud and intelligible audio with the BTL amplifier circuitry.
4: 10-11.5 hours* of operating time with the BP-264 1400mAh Ni-MH battery pack. *Approx for 5:5:90 duty cycle with power save on.
5: IP54 Dust protection and water resistance.
6: VOX function built-in (Optional headset and adapter cable required).
7: 6-character alphanumeric display.
8: A total of 302 memory channels.
9: CTCSS and DTCS tone squelch.

Jersey Repeater Installation Under Way!

As *PW* was going to press, *Newsdesk* received some exciting news from **Rob Luscombe MJ0RZD**: "Just to let you know the installation work is under way for the new repeater for the Channel Island of Jersey, please pass the information on and we hope to be on air early next month initially with testing and signal reporting, updates can be found on our website at **www.radioclubs.net/gb3gj/** which has just been updated with information the latest activities.

For members or potential members of the repeater group please note the AGM is proposed to take place on **Friday 11th 2010 at 8pm at La Moye**. Please note that only fully paid-up members of the repeater group are entitled to vote and subscriptions will be coming due. Should you have any items for the agenda, proposals or recommendations for committee members etc. please let us know as soon as possible. 73 Rob Luscombe MJ0RZD.
E-mail **mj0rzd@robluscombe.com**
website: **www.robluscombe.com**
Tel: **07797 923916**
The Jersey Amateur Radio Society at **www.radioclubs.net/gj3dvc/**
The Jersey Amateur Radio Repeater Group at **www.radioclubs.net/gb3gj/**

Stop Press News!

Flannan Islands IOTA Operation

Icom UK contacted *Newsdesk* to announce their support of an Islands On The Air (IOTA) operation.IOTA.

Ian Lockyer M3INL, Icom UK's Marketing Manager writes, **"Islands On The Air** is an Amateur Radio contest that encourages Amateurs from across the Globe to operate and make contacts from their Amateur stations to and from chosen islands. The **MS0INT** team are embarking on a DXpedition as part of this event to try to activate the remote North Atlantic island group of the Flannans, 20 miles northwest of the Outer Hebrides. Icom UK have loaned two IC-7000 h.f./50MHz/v.h.f./u.h.f.mobile transceivers to the team for use at the station."

Activated in 1989, 1995, 1999 and 2002, the mysterious Flannan Isles are a much needed and hard to reach IOTA. As one of the rarest prefixes in Europe (EU-118), MS0INT has only been 'claimed' by 31.9% of participants in IOTA so the team will have their work cut out!

The MS0INT DXpedition team, consisting of **Bjørn Mohr SM0MDG** (Sweden), **Christian Cabre EA3NT**(Spain), **George Moreno EA2TA**, **Oscar Luis Fernandez EA1DR**, **Vincent Colombo F4BKV** (France) and their leader **Col McGowan MM0NDX**.

The team are aiming will to be on the air from **Friday June 18th until Monday June 21st**. There will be two stations operating 24 hours continuously on all bands from 1.8 to 28MHz using c.w. and s.s.b. The stations will be situated on the highest point of the island Eilean Mòr, some 88 metres (290 ft) above sea level."

The team leader Col McGowan MM0NDX explains the journey that the team will have to take to reach the remote islands off Britain's north coast. "Firstly we'll fly from Edinburgh to Stornoway and then we'll cross the Isle of Lewis, in the Outer Hebrides by car. From the west coast of the Isle of Lewis we've got to jump in a fast sea RIB (Rigid Inflatable Boat) and head 20 miles out into the Atlantic to finally reach the Flannan Isles."

Col continued, "We are all very keen enthusiasts of the RSGB/Icom UK sponsored IOTA program, which promotes ham radio expeditions to any island. The Flannans are a group of islands which haven't been on-air for nearly 10 years and due to the lack of activity from there, the island group is now becoming one of the world's most needed islands to make contact with. We have high hopes of putting the Flannans on the air."

"Due to the fact that the Flannan Islands are very hard to land – and only while having excellent weather/sea conditions – the team has focused on having the lightest gear they could get whilst still securing the standards of quality in order to achieve the highest possible number of radio contacts around the world."

Col added, "We must emphasize we need near perfect weather conditions and good seas. This is why we chose the month of June – it's generally and historically calmer seas that time of year. If we fail to have good weather, the team may decide to go to another island, possibly even the St. Kilda Archipelago – although all actions will be undertaken following advice from our RIB skipper."

Island Name: Eilean Mor
Co-ordinates: 58° 17.0' N, 007° 35.0' W
GRID: IO68EH I
OTA: EU-118 I
OSA: OL-01
SCOTIA: DI-25
WAB: NA74
WLOTA: LH-0023
ARLHS: SCO-084

Follow the MS0INT team on Twitter: **http://twitter.com/ms0int**
Visit the MS0INT website: **http://www.ms0int.com**
Icom UK would like to wish the team the best of luck on their DXpedition!
Icom Marketing: **marketing@icomuk.co.uk**

Stop Press News!

Martin Lynch Introduces Wouxon Electronics

Martin Lynch G4HKS contacted *Newsdesk* with the latest up-date: "ML&S are very proud to have been appointed UK & Ireland Distributor for the Wouxun Electronics range of Communication Handhelds. They manufacture a complete range of high performance very low cost hand portables for both Amateur Radio and professional communications. Many features found on Wouxon hand-helds are unique. Unlike many other Chinese manufacturers, Wouxun have their own design and product engineering division with bang up-to-date manufacturing capability in Fujian, China. They don't 'Chinese copy' other brands and ML&S will stock the entire range of Wouxun products. A selection of 70, 144 and 430MHz equipment can be found at **www.wouxun.co.uk**

ML&S Martin Lynch & Sons Ltd.,
Outline House, 73 Guildford Street, Chertsey, Surrey KT16 9AS, United Kingdom
Tel: **(01392) 567333.**
E-mail: **Martin@MLandS.co.uk Web: www.MLandS.co.uk**

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Last Warning For Walford's QRP In The Country!

Newsdesk has received a final tip-off from **Tim Walford G3PCJ** that QRP in the Country event will be a **real radio field day**! It's to be held at Tim's farm at **Long Sutton**, **Langport**, **Somerset TA10 9NJ** on July 18th and all radio enthusiasts are welcome. Entry is free! Home-brew radio is the theme! The farm gate opens at 10am.

There will be many attractions including:

- Special event station **GX3CMH/P** operating c.w., a.m. and s.s.b.on 7MHz.
- A replica of the G3GC 3.5MHz 1935 crystal oscillator/p.a. 807 transmitter and associated receiver, v.f.o., modulator etc.
- Demonstration of Wireless Sets 19 (h.f.) and the (quite rare!) WS17 v.h.f. – operational on 50MHz (6m) using 'phone and c.w.
- Informal home-built competition (bring your entries please!).
- Construction and advice clinic displays of Walford Electronic kits
- Display of antique domestic radios.
- Award of **Bath Buildathon Competition** prize by **Rob Mannion G3XFD** *PW* Editor.
- Competitions, with Bring & Buy stalls.
- Several West Country Club stalls with *PW* and the RSGB in attendance.
- Farm tours (1 mile walk) led by Tim's wife **Janet**.
- Local food (barbeque) and beer for sale

In the event of poor weather, all will be under cover in the large farm buildings!

For further information please contact **Tim G3PCJ** at **walfor@globalnet.co.uk**
The Somerset Range of kits can be seen at **www.users.globalnet.co.uk /~walfor**
Tel: 01458 241224, FAX 01458 241186

Photo of some of gear that will be on display! (the Plank equipment).

Icom UK Engineer Dresses As Nurse (For Charity!)

Newsdesk heard a rumour – from the Amateur Radio grapevine – that some funny goings on had taken place at Icom UK in Herne Bay Kent. We sent our special reporter – our Kentish Korrespondent – to discover what was what!

Kentish Korrespondent reports: "*PW* heard that a senior engineer from Icom UK recently turned up to work in the most unusual work attire, much to the surprise and amusement of his work colleagues. I was sent to investigate! I soon found out that **Geoff Boakes**, who has worked for Icom for over 19 years turned up to his work bench dressed as a nurse complete with blue dress, ginger wig, stethoscope and fish-net tights.... not bad for a burly 6ft engineer. However, I soon discovered this brave stunt had a serious purpose as Geoff is raising funds for vital life saving treatment for his nephew – **Chris Boakes**. Nephew Chris is currently fighting a battle against Restrictive Cardiomyopathy, a condition which affects the lungs, liver and heart."

"It seems that the serious nature of Chris' condition that he requires a double transplant – heart and liver. This operation which has never been done in Britain before. In fact specialists in the UK are not prepared to attempt this operation which has left the family with the only option of raising £250,000 to travel to America to have the operation."

"Chris has a great deal of support from friends and family, with everyone pulling together to raise funds for this treatment. Friends and family have banded together on several fundraising events such as arranging quiz nights, sponsored walks/runs and jumping out of aircraft to name just a few. Geoff told me that he intends further fundraising activities including coming to work as a Punk Rocker. He enjoys strong support from his work colleagues including Marine Product Specialist **Virgil Parker** who is running the Orpington Marathon to raise funds for the charity."

To show your support and make a difference please go to either the **FightcardiomyopathyUK** group on Facebook or visit **www.thechrisboakesfund.com** and **www.myfriendneedshelp.org**
Further information also from Chris at Icom UK on **01227-741741**.

Centenary Celebrating WIA Receives Birthday Greetings

A number of IARU (International Amateur Radio Union) radio societies have written to the **Wireless Institute of Australia** extending their best wishes and congratulating it on its Centenary.

The congratulatory greetings are being received by the WIA President **Michael Owen VK3KI** and will be progressively posted on the WIA website.

Here are a few of them. The IARU Liaison Officer for the **Finnish Amateur Radio League** (SRAL), **Jukka Heikinheimo OH2BR** said "the WIA is one of the world's most respected national Amateur Radio associations. It has developed into a modern organisation representing the radio amateurs of Australia."

RSGB General Manager **Peter Kirby G0TWW** on behalf of the RSGB President, Board and Members said the Centenary is a wonderful achievement.

He commented that it would not have been reached without the outstanding commitment of many thousands of volunteers who have worked tirelessly for the WIA over the past 100 years.

Irish Radio Transmitters Society President, **Paul Martin EI2CA** extended best wishes to all on the occasion of the Centenary celebrations and acknowledged the work of the Wireless Institute of Australia. He added that the IRTS will be raising a glass to toast the WIA during its celebrations in Canberra.

Congratulations From *Practical Wireless*

Rob Mannion G3XFD writes: Everyone on *PW* sends their heartiest congratulations to the WIA on reaching their remarkable milestone. We have many readers in Australia and have much respect for our friends on the other side of the world – they've pioneered so much in radio communications. Here's to the next 100 years of Amateur Radio in Australia!

Successful Horndean Foundation Course

Left to right. Back row: Darren Parsons, Andrew Owen, James Richardson, Club Training Manager and Foundation Licence tutor Steve Turner M0RNA, Mark Shoyer M6WSX. Front row: Karen Hadfield M6KLH, Christine Cotton M6UBI and Jason Vann-Smith.

Left to right: Intermediate Licence tutor Gerry Turner G3COO, Graeme Lythgoe, Tom Lincoln, and Intermediate Licence senior tutor Mike Smith G4PRG.

Stuart Swain G0FYX, Hon. Secretary of the **Horndean & District Amateur Radio Society** (H&DARS) reports: "Horndean & District ARC, RSGB region 10 Hampshire, ran their fifth Foundation Licence class and exam, and their third Intermediate exam in April 2010. Training was supported with equipment bought with our Awards-for-All Lottery grant. All seven Foundation licence candidates passed, and both Intermediate licence candidates passed. We congratulate all the successful candidates, and thank the club tutors, **Steve Turner M0RNA** (our Training Manager) for the Foundation course, and **Mike Smith G4PRG** and **Gerry Turner G3COO** for the Intermediate course."

Further details about the Horndean & District ARC
From: **Stuart Swain G0FYX**
40 Parkside
Havant
Hampshire PO9 3PL
E-mail **g0fyx@msn.com**

Win A Tennamast Adaptamast Worth £460!

Practical Wireless and **Tennamast (Scotland) Ltd**. have teamed up to offer one lucky reader an opportunity to win a superbly engineered 10m (fully extended) Adaptamast worth £460! The lucky winner – if they live within the UK – will get their prize delivered right to their front door. (Delivery to addresses outside the UK at cost and by arrangement with Tennamast (Scotland) Ltd.).

How to enter? To enter the free contest (one entry only per postal address) all you have to do is collect the first corner flash from this competition page (photocopies of the competition page accepted) **but you must detach and include** the corner flashes (one from this page and that from the second competition page in the September issue of *PW)* with your entry. Then answer the three simple questions on the competition for that will be published in the September issue of *PW*. The questions will be set from information published on this page. Finally, just send your completed competition entry form together with your two corners flashes to the address shown on the entry form (the *PW* offices at Broadstone in Dorset). Multiple entries will be disqualified. The competition is open to all *PW* readers and our authors and by submitting your entry you will be considered to have accepted that the Editor's decision will be final. The first correct entry drawn from the Editor's 'outsize' hat after the closing date will win. No correspondence will be entered into. The competition will close for entries, which must arrive at the office on or by August 11th, with the draw taking place after that date. The winner will be announced in the October issue of *PW*.

Winner's choice: If the winner does not wish to have an Adaptamast, Tennamast (Scotland) Ltd. will be willing to credit the value of the prize towards any of their other products – see their website at **www.tennamast.com/**

Focus On Tennamast & Its Personalities

Tennamast (Scotland) Ltd, was orginally set up in 1986 and operated by Mechanical Engineer **Norrie GM4VHZ** and **Rose Brown GM0ONH**, who soon became very well known – not just in the world of Amateur Radio – because of their extremely high quality engineering products, ranging from boat trailers, boat cradles and Amateur Radio masts. Their now famous Adaptamast was introduced following close consultation with Radio Amateurs themselves, including the *PW* Editor who was the proud owner of one of the first models, especially designed to mount on the side of a house/ bungalow.

Tennamast thrived, thanks to Norrie's engineering skill and the help of Rose and their dedicated staff. From their small factory in Beith, North Ayrshire in Scotland, their reputation soon grew with products delivered everywhere from Khazakstan to the North Sea oil rigs! However, Norrie and Rose wanted to retire to enjoy their motor-caravanning more, and so new Managing Director **Calum Mackie** took over in May 2009. Calum – an inspirational and experienced Engineer himself – plans many new products that will be made by their skilled staff and invites *PW* readers to visit their website. If you want it built – try Tennamast! But make sure you send your competition entry in too!

Moonraker Head Office & Mail Order
Cranfield Road
Woburn Sands
Bucks MK17 8UR
Tel: 01908 281705

Moonraker Satellite Shop @ M5 Communications
Moto Services Area
Junction 30 M5 South
Exeter EX2 7HF
Tel: 01392 427269

VHF/UHF Mobiles

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

Yagi Antennas

Diamond performance from the superb Diamond factory

A502HBR 6m 2 Elements, Power 400W, Gain 6.3dBi, Radial Length 3m **£89.95**
A144S10R 2m 10 Elements, Power 50W, Gain 11.6dBi, Boom Length 2.13m **£84.95**
A144S5RR 2m 5 Elements, Power 50W, Gain 9.1dBi, Boom Length 95cm **£45.95**
A430S15R 70cm 15 Elements, Power 50W, Gain 14.8dBi, Boom Length 224cm **£65.95**
A430S10R 70cm 10 Elements, Power 50W, Gain 13.1dBi, Boom length 119cm . **£49.95**

HF Mobiles

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

AMPRO-10	28MHz, Length 220cm, 38th fitting (slimline design)	£17.95
AMPRO-12	24MHz, Length 220cm, 38th fitting (slimline design)	£17.95
AMPRO-15	21MHz, Length 220cm, 38th fitting (slimline design)	£17.95
AMPRO-17	18MHz, Length 220cm, 38th fitting (slimline design)	£17.95
AMPRO-20	14MHz, Length 220cm, 38th fitting (slimline design)	£17.95
AMPRO-30	10MHz, Length 220cm, 38th fitting (slimline design)	£17.95
AMPRO-40	7.0MHz, Length 220cm, 38th fitting (slimline design)	£17.95
AMPRO-80	3.5MHz, Length 220cm, 38th fitting (slimline design)	£19.95
AMPRO-160	1.8MHz, Length 220cm, 38th fitting (heavy duty design)	£49.95
ATOM-20S	14MHz, Length 130cm, PL259 fitting (compact design)	£24.95
ATOM-40S	7.0MHz, Length 165cm, PL259 fitting (compact design)	£26.95
ATOM-80S	14MHz, Length 165cm, PL259 fitting (compact design)	£29.95

New Ground Plane Free Collinear Verticals

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

SQBM110P 2/70cm, Gain 3/6dBd, RX:25-2000MHz, Length 100cm, SO239 fitting **£54.95**
SQBM1010P 6/2/70cm, Gain 1.5/2.0/5.0dBd, RX25-2000MHz, Length 140cm, SO239 fitting **£79.95**
SQBM1010N 6/2/70cm, Gain 1.5/2.0/5.0dBd, RX25-2000MHz, Length 140cm, N-Type fitting **£84.95**
SQBM225P 2/70/23cm, Gain 2.5/5.0/8.5dBd, RX25-2000MHz, Length 130cm, SO239 fitting **£74.95**
SQBM225N 2/70/23cm, Gain 2.5/5.0/8.5dBd, RX25-2000MHz, Length 130cm, N-Type fitting **£79.95**

Tarheel Motorised Mobile

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

Little Tarheel II 3.5-54MHz 200W max length 48" **£349.95**

GP2500

All Band HF Vertical

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

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

All at an amazing £199.95!

NEW GP2500F fibreglass version now in stock **£249.95**

Dual and Triband Collinear Verticals

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

SQBM200P	2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, SO239	£54.95
SQBM200N	2/70cm, Gain 4.5/7.5dBd, RX 25-2000MHz, Length 155cm, N-Type	£59.95
SQBM500P	2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, SO239	£64.95
SQBM500N	2/70cm, Gain 6.8/9.2dBd, RX 25-2000MHz, Length 250cm, N-Type	£69.95
SQBM800N	2/70cm, Gain 8.5/12.5dBd, RX 25-2000MHz, Length 520cm, N-Type	£129.95
SQBM1000P	6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, SO239	£79.95
SQBM1000N	6/2/70cm, Gain 3.0/6.2/8.4dBd, RX 25-2000MHz, Length 250cm, N-Type	£84.95
SQBM223N	2/70/23cm, Gain 4.5/7.5/12.5dBd, RX 25-2000MHz, Length 155cm, N-Type	£69.95

Multiband Mobile

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

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

Yagi Antennas

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

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

ZL Special Yagi Antennas

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

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

HB9CV

Brilliant 2 element beams ... ideal for portable use

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

Halo Loops

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

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

G5RV Wire Antennas

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

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

Accessories

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

Trapped Wire Dipole Antennas

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

MDT-6 FREQ:40 & 160m LENGTH: 28m POWER: 1000 Watts **£79.95**
MTD-1 (3 BAND) FREQ:10-15-20 Mtrs LENGTH:7.40 Mtrs POWER:1000 Watts **£69.95**
MTD-2 (2 BAND) FREQ:40-80 Mtrs LENGTH: 20Mtrs POWER:1000 Watts **£79.95**
MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts **£129.95**
MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts **£69.95**
MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts **£119.95**

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





Manufacturers of radio communication antennas and associated products

The I-Pro Traveller Antenna

I was invited by the Editor to check out another antenna product from **Carl Kidd G4GTW** and was delighted when the details arrived describing the I-Pro Traveller antenna as a vertical dipole for home and portable use. The word 'Portable' always stimulates my interest as I'm a keen motor-caravanner and I eagerly awaited the product's arrival.

The well packaged item was delivered in good order and unpacked with care, noting just how it had been placed in its one metre long holdall. You'll all be aware of how many portable products don't seem to fit in their original cases once unpacked. No problem here, detailed instructions are included to ensure that everything fits in and, once properly packed, will suffer no damage in transit – a top priority for us Amateurs!

In The bag

In the bag I found that the system comprises an adjustable quad-legged base, a spirit level for setting up this base, lower adjustable capacity hat arms, the standard central matching section for 14MHz (20m), 18MHz (17m), 21MHz (15m), 24MHz 12m) and 28MHz (10m), the coaxial feeder link and jumper leads and the top capacity hat arms. (A small bag of essential spares is also included).

Fig. 1: The contents of the custom-made holdall for transporting the IPro Traveller antenna.

All ready for a day operating portable with the IPro Traveller Antenna.

Each item comes in its own strong plastic bag with an arrowed end marked to show the direction of stowage in the holdall. (It fits if you take heed of this).

A separate central matching unit is available for 7MHz (40m) if required. This was included for the this review but is an optional extra at additional charge.

The photograph, **Fig. 1**, shows the I-Pro Holdall and, left to right, heavy duty plastic bags, four foam protective packing pieces for the quad base, two end caps for the central matching unit, its red container and a pack of spares. Next, is a capacity arm, the support base together with its spirit level, the matching unit, another capacity arm, feeder support arm, jumper leads, instructions and laminated connections card.

System Description

The system's description is as follows: A multi-band vertical dipole with adjustable capacity hat arms:
Power handling capacity at resonance, 14MHz through to 28MHz : 1200W p.e.p.

- Power handling capacity at resonance with the 7MHz section : 1000W p.e.p.
- User manual selection with jumper leads on the multi band central matching unit.
- Dimension across capacity hat arms: 1700mm
- Erected height using either of the central matching units: 3m
- Total weight with standard matching unit only (excludes the 40m unit): 6.6kg

An assembly and maintenance document and a

Dave Mason G3ZPR tries out another antenna designed by Carl Kidd G4GTW and has a great time – working much DX!

laminated card illustrating band changing connections is also provided.

Construction & Design Features

The antenna is constructed in thick walled aluminium tubing, grade 6082T6; this grade has good mechanical strength and high corrosion resistance. Spring catches are fitted inside the upper and lower ends of the matching section to enable it to be secured to the upper and lower capacity arm sections.

Brackets are zinc plated and all fixings (nuts, bolts, washers and self tapping screws) are of stainless steel. The self tapping screws are only used when the antenna is to remain erected for long periods to ensure that good electrical conductivity is maintained.

Support base tube: This section of insulating material at the centre of the quad base is made of glass fibre tubing and is the same as the inductor former of the centre matching section. The material has excellent dielectric properties together with good structural strength and very low moisture absorption characteristics. So, whatever the weather, all year round use is possible.

Coaxial feeder 8 mm fibre glass support rod/arm: This cunning feature is simple in concept but is absolutely essential for supporting the feeder connection with its patch lead facility. RG58/CU (military specification) coaxial cable is used. Two jumper leads form part of this assembly to enable different tapping combinations for selected bands.

Matching section/inductor former: The windings are set on thick walled glass fibre tubing (as used in the support base) and by using eight bonding points, four on the top, four on the bottom, very low circulating current resistance is assured. The jumper sockets are gold plated and rated at 10A.

Fig. 2: Operating on a spit of land jutting out into Poole Harbour, gives 270° views over sea water.

The Assembly

When it comes to assembling the system – clear instructions are provided by the designer and are easy to follow, in practice I found the following routine suited me.

The routine: Set the quad base on the ground, the legs are adjustable so uneven ground poses no problem. Place the spirit level on the support base tube and adjust for level, lock the legs and remove the level. This is then stowed in one of the leg brackets to prevent loss.

The lower capacity arms are opened and located into the support base tube.(Leave unlocked, they will need to be adjusted later).

Select the desired central matching unit (14MHz through to 28MHz or optional 7MHz unit) and fit it into the upper capacity arm section, open and lock the upper arms.

Lift this complete assembly and lock into the lower arm section already mounted, make sure the spring locks are correctly located in the upper and lower tubes.

Place the feeder support rod/arm into the opening at the top of the central matching unit and fit its flexible ring at the back. Connect a coaxial feeder, minimum length 8m, to the SO239 socket and slide the weatherproof boot down over the joint.

Plug the jumper leads into the appropriate sockets, (referring to the laminated band changing card supplied), trail the feeder away from the antenna at 40-45° (not critical), connect to your transceiver and you are almost ready for 'the off'!

No antenna tuning unit (a.t.u.) or earth connections are needed with this antenna, direct connection to the transceiver reduces any losses. However, it is necessary to include an standing wave ratio (s.w.r.)/power meter to enable the correct adjustment of the lower capacity arms, although once set, it can be removed. In practice I found no detriment to performance by leaving it in circuit as it enabled quick band changes and adjustments.

Adjustments to the lower arms are arrived at empirically, key the transmitter and note the s.w.r. readings, using a measuring tape adjust the arms equally from the centre pole. Next, key the transmitter again to note the effect. You will soon find a dimension that gives you a 1.5 : 1 (or close) result. Carry out this routine for each band, noting your results, and you will be ready for operating with quick band changes when required.

Note: Your results will only apply to the type of location where they are made, with portable operation you will need to make minor adjustments to suit the terrain. (More on this later). And don't forget to lock the lower capacity arms.

Central Matching Unit

Connection of the feeder cable to the central matching unit is made by two jumper leads fitted with banana plugs and reference to the laminated card supplied. By the time I had completed this review I was familiar with the connections – but an advantage to having the s.w.r./Power meter in circuit is that you soon know if you've got it wrong ! Best stick to the card!

On The Air

Now for the crunch, does the I-Pro Vertical Dipole do what it is supposed to? I undertook a series of tests – carried out over an extended period – to check its performance, this was to include operation under different geographic and topographic conditions using propagation predictions and to give the maximum opportunity to stretch its ability. In other words – a thorough test!

Product: IPro Traveller antenna

Company: Pro Antennas

Contact: Tel: (01489) 789960

Pros: Very convenient contest system due to its ease of transport, assembly and adjustment....it's ideal for portable work!

Cons: Small problem with connections (problem now overcome by designer).

Price: £279.95 with quad-leg base. Optional 7MHz centre matching section £119.95. Optional custom-made holdall £19.95. The UK p&p cost £9.95. Buyers are asked to make contact prior to making payment to receive an accurate delivery date. (Please see website for further details).

Supplier: My thanks go to Carl Kidd G4GTW for the loan of the review antenna. He can be contacted at **Pro Antennas, 3 Forsythia Close, Hedge End, Southampton, Hampshire SO30 4TP.**
Tel: **(01489) 789960**
www.proantennas.co.uk

As the antenna uses no earth I considered it was important to test within urban surroundings, countryside, hilly, rocky and sea front conditions. As all of these conditions effect the performance of antennas.

After considering my own local geography, I decided to locate the station on the shore of Poole Harbour near Sandbanks. At this location there's a small sand spit jutting into the harbour, which gives a good 'take off' over the harbour and low lying Purbeck Hill areas to the open sea to the west and south west and over the harbour entrance and Sandbanks peninsula (a favourite place for Lottery millionaires to live!) to the south, south east and east. I thought this should give coverage for a good 270°. The photograph, **Fig. 2**, shows the antenna with its close proximity to the shore line.

The location proved to be a fantastic location for working /P and brought home the meaning of a good ground and a close sea take off! I was rewarded with a good range of countries from Norway, Sweden, Finland, Russia (Archangel down to the Ukraine), Romania and Turkey.

My second visit to this location continued with contacts to most of the Balkans, Italy Austria and Australia (Perth 599 both ways on c.w.).

On the third visit I reluctantly picked up the microphone (out of character for me) and proceeded to make effective contacts with stations from Kazakhstan, Australia (Tasmania 59 both ways), Nigeria, Morocco and Senegal, Madeira and Canary Islands and most of the eastern European countries.

While journeying from home (Poole) to Weymouth on a family visit I just happened to have the portable kit in the car so stopped briefly at Ringstead Bay, no sand here, just pebbles and rocks which made a good seat and operating desk. I responded to a "CQ" and had a super chat (fone) with Charlie in Victoria, the capital of Gozo Island, part of the Maltese group of Islands. Time, however, was not on my side so no further contacts were made.

High Places

Two visits were then made to Steeple Hill near Creech in the Purbeck Hills, **Fig. 3,** this, with the adjacent Whiteways Hill is a favourite for Radio Amateurs (particularly the **Poole Radio Society**!) and model aircraft enthusiasts. The chalk heights slope away towards Poole, Swanage, Kimmeridge and the Island of Portland (still referred to as an Island although you can drive there!) and provide a good take off for h.f. and v.h.f. alike.

On the first visit the good breeze blowing when I left home, turned out to be a Force 8 gale on the hill, so there was no way the antenna was going to stay upright in those conditions! Indeed, the designer recommended some form of guying in rough weather – but I don't think anything would have kept it standing on this day. The test was abandoned .

On the second visit to this location a more clement weather condition prevailed and we were off again. Contacts were made across the United States and Canada in abundance with Africa, Turkey, Israel, Greece, Russia and the Balkans providing a wide geographical span.

Fig. 3: Operating 'up in the hills' above Creech in the Purbeck Hills.

The Urban scene

The City of Bristol in the English West Country served as my urban location where I located the station at night time in the grounds of a block of flats on the northern edge of the City. While this location lacked the space afforded by 'The Downs' (gentle rolling grassed hills) it's part way down a northern facing slope towards Stoke Bishop.

The location was quite the opposite aspect to one I would normally select – but the results came in during the brief period of operation. The path was open from Lithuania on the Baltic Sea coast, The Netherlands, Bulgaria, Italy and the United States. Operation was only for a brief period and so the results weren't conclusive but, as my wife **Viv** and I were only there to babysit the grandchildren, extended operation was not an option. Once again **I just happened** to have the kit in the boot of the car!

The urban environment can also be accommodated provided there is minimal obstruction to the low angle of radiation at close quarters. This applies to both matching units.

With our fickle and inclement weather I feel the designers recommendation to guy the antenna is a wise comment and the suggested point of guying is 10mm above the feeder support rod. Attachment at any other point is discouraged. I also found it beneficial to keep the matching units ends clean by spraying with a WD40 type of easing oil and wiping off to remove surface film to ensure continued ease of fitting together in its respective tubes.

The G3ZPR Home QTH

My new shack at my home QTH is well placed for radio work involving portable antenna testing, as I can set them up just outside with easy access for band changing and adjustments. The garden faces north unfortunately and the houses are on the south which make for a fairly good block to low angles of r.f. radiation.

Fig. 4: In the more urban environment of the back garden.

My main station antenna is a Comet CHA 250 BX, properly mounted at 35 ft above ground (and not far short of sea) level. Although this antenna has also low radiation characteristics, it is high enough to clear the house and be a very effective system.

The I-Pro must, however, be at ground level so I wasn't expecting too good results. Despite this, experimenting with moving the antenna across the garden while checking signal strengths from incoming stations resulted in a clear improvement, **Fig. 4**. This process was something akin to setting up a satellite dish through a gap in the adjacent buildings but, it worked!

I'll resist boring readers with a list of countries, be it sufficient to say that, over an extended period, I worked, Europe, Asia, Middle East, Africa, South Africa, Caribbean Islands (Turk and Caicos Islands), Australia (Geelong RST559 on c.w.), much of Europe, the USA, Canary Islands and Canada. But I won't go on!

Avoiding Comparisons

I don't like comparing specialist antennas with other market contenders when I don't have access to the other antennas. Neither do I have a dipole, which might be considered an acceptable standard.

So, under the circumstances I can only compare the I-Pro with my Comet CHA 250 BX vertical antenna at my main station. Both have low angle radiation properties but there the similarities end – bearing in mind my earlier comments on height above ground. I decided to do a 'Beacon Hunt' with both systems running simultaneously on receive.

This turned out to be more difficult than I expected, the hunt was more about Noise-to-Signal than Signal-to-Noise Ratios! I've provided **Table 1** to indicate the results of the tests and although signals were scant at the time, there was no clear winner. However, I'm confident that the I-Pro equals the performance of the Comet on all bands tested – despite their difference in elevation above ground.

The Test Rig

For the tests I used my Alinco DX 70TH portable operating rig on the high power setting at 100W. This is the transceiver I use when I'm touring in Europe and the UK with Viv in our motor-caravan – and it has proved itself as a reliable transceiver for portable use.

For portable work my 24Ah 12V battery can sustain operation for a two to three hour period depending mainly on transmission periods. Contesting would clearly discharge the battery quicker as transmission-to-receive ratio would be close to 1:1.

My test operation involves a much greater listening period so the ratio would be closer to 1:4. All of the equipment fits on to a small trolley, which can get me to places where the car cannot go. This is real freedom!

Overall Result

The I-pro vertical dipole is a pleasure to use and matches its claimed performance. It took me a while to get the hang of setting it up and adjusting for the different bands but I spent time at the home QTH to become familiar with it prior to going portable.

I had watched the online video produced by the antenna designer **Carl Kidd G4GTW**, which gave a good picture of performance at the sea shore and I was determined to put that to the test and to see how performance was affected by other types of location.

The table of results, **Table 2**, shows 93 contacts made to 59 countries(CW+FONE), the sea shore environment although numerically less (time and tide) to the home environment 36/38) was, however, the clear winner in terms of DX countries worked, **Fig. 5**, with 14MHz being the most active band. This also reflects the propagation table prediction.

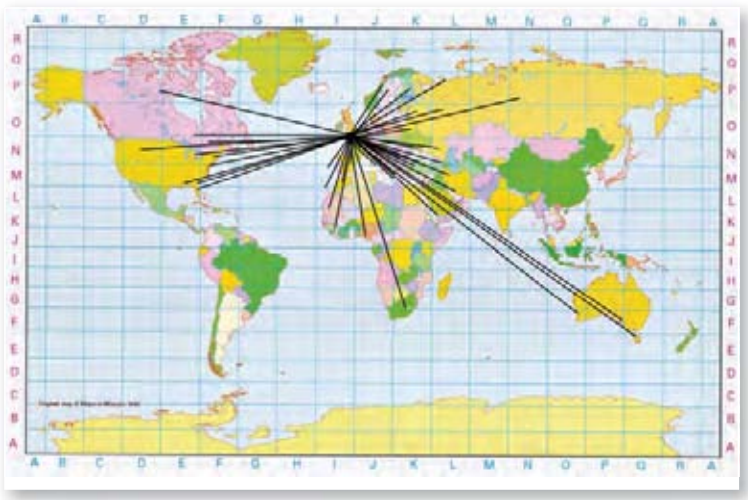

Fig. 5: During the review period, David worked stations in many countries.

The 18MHz (17m) proved an interesting band and 21MHz came next. 24 and 28MHz were disappointing – mainly due to propagation conditions as I confirmed

Table 1

LOCATION	CALL	14100	18110	21150	24930	28200
NEW YORK	4U1UN	0000			NIL	NIL
N. CANADA	VE8AT	0010			NIL	NIL
SIBERIA	RR90		0120		NIL	NIL
ISRAEL	4X6TU	0200	0210	0220	NIL	NIL
FINLAND	OH2B	0210			NIL	NIL
MADEIRA	CS3B	0220			NIL	NIL
VENEZUELA	YV5B		0000		NIL	NIL

Table 2:

BAND	*COUNTRIES*	*CW*	*FONE*	*SEA*	*HILL*	*URBAN*	*HOME*	*TOTALS*
10 M	0	0	0	0	0	0	0	***0***
11 M	0	0	0	0	0	0	0	***0***
12 M	1	0	1	0	0	0	1	***1***
15 M	8	8	3	1	3	0	7	***11***
17 M	14	13	6	6	2	0	11	***19***
20 M	28	23	28	30	3	5	13	***51***
40 M	8	6	5	0	0	5	6	***11***
TOTALS	***59***	***50***	***43***	***37***	***8***	***10***	***38***	***93***

with my main station, with the Comet antenna being used for comparison. Constant checking of Propagation Predictions and Real Time tables nothing was heard and no responses made. Discussion with fellow Amateurs revealed that only two local Amateurs had heard any activity at all.

Throughout the test period I found only one item relating to it's design which I would like to see improved. The photograph, **Fig. 6**, shows the banana plugs on the feeder lead at the angle **they naturally assume.** The vertical line represents the socketed side of the matching unit where the plugs would be plugged in. It can be clearly seen that, with the red upper plug in situ, there is a tendency for the the lower black plug to be pulled out by it's lead. This is simply remedied by making the black lead longer by the distance of the plugs contact point. Whilst this is not a big issue I found it annoying to have to keep checking the lower black plug to make sure it was still making contact even if not fully home.

Fig. 6: A small modification to the leads was needed to reduce the tendency for the 'earthy' side plug to pull out.

As a final comment, I would love to have the opportunity to take this antenna on my European tour later in the year for its compact design and overall performance make it a really attractive option.

Note: The 7MHz centre unit was only tested in the urban and home environments and found to exhibit first class performance remedied by making the black lead longer by the distance of the plugs contact point. Whilst this is not a big issue I found it annoying to have to keep checking the lower black plug to make sure it was still making contact even if not fully home.

The system is available online from **Pro Antennas**, **www.proantennas.co.uk** note also that the system comes complete with only the 14MHz through to 28MHz central matching unit. The 7MHz unit is an extra. Video clips demonstrating the antennas capability are well worth viewing.

I can visualise this antenna being used as a very convenient contest system due to its ease of transport, assembly and adjustment. However, for my operations as G3ZPR/P, it's a purely portable antenna that's particularly suited to sea shore locations but performs very well on hillside and open field locations as well. In other words – it's ideal for portable work!

My thanks for the loan of the review system go to Carl Kidd G4GTW.

●

Carl Kidd G4GTW Comments on the G3ZPR Review

I am delighted with this excellent review; it leaves no doubt that the I-Pro Traveller has met the difficult challenges presented by the many and varied portable operational requirements.

The one and only small criticism regarding the connections has since been addressed. A simple adjustment is now explained in the instructions.

I can honestly say, I have never before read an antenna review that has put an aerial system through such a variety of test locations. Ultimately, this gives the reader a real practical feel for the I-Pro Traveller's true capabilities. The review is extremely detailed and doesn't leave any stone unturned, all in all an excellent job!

Carl Kidd G4GTW, Pro Antennas

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

rallies

Radio rallies are held throughout the UK. They're hard work to organise so visit one soon and support your clubs and organisations. PW Publishing Ltd. is attending at rallies marked *.

Send all your rally info to

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

June

June 13th

The Ipswich Rally

The Ipswich Radio Rally (The East Suffolk Wireless Revival) will be held at the Orwell Crossing Lorry Park, A14 Eastbound, Nacton, Ipswich IP10 0DD. The doors will open at 9.30am and admission will be £1.00. There will be car parking, talk-in on S22, trade stands, a Bring & Buy, a car boot sale, special interest groups, catering and the GB4SWR HF station will be operating.

John G3XDY
Tel: 07710 044858
Steve M1ACB
Tel: 07711 329624
www.eswr.org.uk

June 13th

The Junction 28 QRP Rally

The South Normanton Alfreton and District Amateur Radio Club in association with the G-QRP Club will be holding the 9th Junction 28 QRP Rally at the Alfreton Leisure Centre, Church Street, Alfreton, Derbyshire DE55 7AH (this is just 10 minutes from Junction 28 on the M1). The doors will open at 10.00am and there will be a Bring & Buy, special interest groups, catering with a licensed bar and facilities for the disabled.

Russell Bradley G0OKD
Tel: 01773 783658
E-mail:
russell.bradleyG0OKD@ntlworld.com
www.snadarc.com

June 20th

The Newbury Radio Rally

The Newbury Radio Rally and Boot Sale will take place at the Newbury Showground, which is next to J13 on the M4. The doors will open at 9.00am (sellers will have access from 8.00am), admission will be £2.00 and there will be talk-in on S22 and V44, free car parking, trade stands, a display area of amateur radio stations, special interest groups, a flea market, catering and facilities for the disabled.

E-mail: rally@nadars.org.uk
www.nadars.org.uk

June 25-27th

The Ham Radio Show

Europe's largest radio event, the HAMtronic Ham Radio Show, will take place at Messe Friedrichshafen, the new exhibition centre on the edge of Friedrichshafen airport in Germany. The show will be open on Friday and Saturday from 9.00am to 6.00pm and on Sunday from 9.00am to 3.00pm. Tickets will cost €8 per day or €15 for three-days (children up to 12 free). Hall A1 will house the trade stands and clubs from around the world and there will be an enormous flea market in halls B1, B2 and B3. There will also be car paring, lectures, catering with a licensed bar, special interest groups, a camp site and facilities for the disabled.

www.hamradio-friedrichshafen.de/ham-en

June 27th

The West of England Radio Rally*

The West of England Radio Rally will take place in the Cheese & Grain, Bridge Street, Frome, Somerset BA11 1BE. There will be trade stands, an RSGB bookstall, catering, car parking and facilities for the disabled.

Shaun G8VPG
Tel: 01225 873 098
E-mail: rallymanager@westrally.org.uk
www.westrally.org.uk

July

July 3rd

The Bangor Rally

The Bangor and District Amateur Radio Society Rally will take place in the Donaghadee Community Centre, County Down BT21 0HB. The doors will open at noon and there will be trade stands, a Bring & Buy and special interest groups.

Bill GI4AAM
Tel: 028 9181 6707
E-mail: bill.langtry@btinternet.com
www.bdars.com

July 3rd

The Stockport Rally

The first Stockport Rally will be held at Walthew House, Shaw Heath, Stockport SK2 6QS. The doors will open at 10.00am, admission will be £1.00 and there will be car parking, trade stands, catering and facilities for the disabled.

Bernard G3SHF
Tel: 01625 850088 (daytime)
Nigel G0RXA
Tel: 0161 428 8413 (evenings)
E-mail: info@reddishrally.co.uk
www.reddishrally.co.uk

July 4th

The Barford Norfolk Radio Rally

The Norfolk Amateur Radio Club will be holding their Barford Radio Rally – Barford is 9 miles SW of Norwich, close to the A11 and the A47. The doors will open at 9.00am (8.00am for traders) and admission will cost just £1. There will be talk-in, car parking, trade stands, a Bring & Buy and catering.

David G7URP
Tel: 01953 457322
E-mail: radio@dcpmicro.com
www.norfolkamateurradio.org

July 11th

The Cornish Mobile Rally

The Cornish Radio Amateur Club 47th Mobile Rally will be held in Penair School, Truro, Cornwall TR1 1TN. The doors will open at 10.30, admission will be £2.00 and there will be talk-in, car parking, trade stands, a Bring & Buy and catering.

Ken G0FIC
Tel: 01209 821073,
E-mail:
ken@jtarry.freeserve.co.uk
www.cornishamateurradioclub.org.uk

July 18th

The Macmillan (Northampton) Rally

The Macmillan (Northampton) Rally will be held in Roade Village, Northants. This is one mile West of J15 on the M1. There is no entry fee for visitors or traders but all donations offered will go to Macmillan Cancer Support, as will all refreshment monies.

Gary G6NYH
Tel: 01604 243333
www.tetra2000.com

July 18th

The McMichael Rally

The McMichael Rally & Boot Sale will be held in Reading Rugby Club, which is just off the A4 east of Reading. The doors will open at 9.30am an admission will be £2.00. There will be talk-in, car parking, trade stands, special interest groups, a car boot sale, a raffle and catering with a licensed bar.

Pete G8FRC
Tel: 01189 695697
E-mail: g8frc@radarc.org
www.McMichaelRally.org.uk

July 25th

The Colchester Rally

The Colchester Radio Amateurs Annual Rally will be held at St Helena School, Sheepen Road, Colchester CO3 3LE. The doors will open at 10.00am and there will be talk-in, car parking, trade stands, special interest groups, a Bring and Buy, flea market and car boot sale.

Brian
Tel: 01206 822547
E-mail: brianfitz@aspects.net

July 25th

The Horncastle Rally

The Horncastle Summer Rally will be held in the Horncastle Youth Centre, Willow Road, Horncastle, Lincolnshire LN9 6DZ. Admission will be £1.50 and there will be catering and facilities for the disabled.

Tony G3ZPU
Tel: 01507 527835

July 31st/August 1st

The AMSAT-UK Colloquium

The AMSAT-UK International Space Colloquium will be held at the Holiday Inn Hotel, Egerton Road, Guildford, GU2 7XZ. You can meet Amateur Radio satellite builders; there will be presentations on Amateur space communications and GB4FUN will be in attendance.

www.uk.amsat.org/content/view/704/283/

August

August 1st

The King's Lynn Rally

The King's Lynn Amateur Radio Club Rally & Car Boot Sale will be held at The Gaywood Community Centre, off Gayton Road, King's Lynn PE30 4EE. The doors will open at 10.00am and admission will be £1.50. There will be talk-in, free car parking, trade stands, catering and a camp site by prior arrangement.

Ray G3RSV
Tel: 01553 671307 or 849700
E-mail: ray-g3rsv@supanet.com
www.klarc.org.uk

August 1st

The Lorn Rally

The Lorn Radio Amateur Rally will be held in the Crianlarich Village Hall, Crianlarich, near Oban FK208QN. The doors will open at 10.30am and there will be trade stands, catering and a raffle.

GM0ERV,
E-mail: gm0erv@sky.com
MM1AVR
E-mail: stewart.mciver@btinternet.com

August 8th

The Flight Refuelling Hamfest*

The Flight Refuelling Amateur Radio Society Hamfest will be held in the Cobham Sports and Social Club Ground, Merley, Nr. Wimborne, Dorset BH21 3AA.

Mike M0MJS
Tel: 01202 883479
E-mail: Hamfest@frars.org.uk
www.frars.org.uk

August 15th

The Friskney & East Lincolnshire Rally

The Friskney & East Lincolnshire Communications Club Rally will be held in the Friskney Village Hall, Church Road, Friskney, Lincolnshire. This is 6.5 miles south of Skegness. The doors will be open from 10.00am to 2.30pm and admission will be £1.50. There will be talk-in on S22, catering, car parking and facilities for the disabled.

Bren 2E0BDS
Tel: 01754 820204
E-mail: felcc@btinternet.com
www.felcc.webs.com

August 22nd

The Rugby Rally

The Rugby Amateur Transmitting Society rally will be held in Princethorpe College, Princethorpe, Rugby CV23 9PX (NGR SP395710). This is a new location for this rally and it's 7 miles south-west of Rugby, not far from the A45. Doors will be open between 10.00am and 4.00pm and admission will be £2.00.

Tony
Tel: 07759 684411
www.rugbyats.co.uk

Plan your rally visits in the year ahead with our comprehensive list of forthcoming radio events. PW Publishing will be at shows marked* – go along to our stand for great deals on subscriptions to *RadioUser* & *Practical Wireless*. Club Secretaries and Event Organisers: Please send us all your details if you would like your event to be mentioned here.

KITS & MODULES

NEW TRIBAND ACTIVE RECEIVE PRESELECTOR for 80,40, & 20m. Tuneable on 80m, fixed tuned on 40 and 20m. Can be configured for maximum gains of 16dB on 80m, 23dB on 40 and 20m, or 11dB on 80m 17dB on 40, and 18dB on 20m. Complete kit comprises amplifier and switch PCB's and components, 2 pole 3 way switch, polyvaricon, and 10K log gain pot. **£20.50 inc P&P**.

SPECTRUM 10mm COILS, pin compatible with TOKO types. Coil values 1.2, 2.6, 5.3, 11, 23, 45, and 90uH. Some types have the primary tapped at ¼ turns and a low impedance secondary winding. Others have centre tapped primary and relatively high impedance secondary winding. Full details of turns ratios, etc. can be found on the components page of the website. **1-9 qty 75p each plus £1 P&P**.

SPEECH PROCESSOR increases the average sideband power of SSB transmitters without driving the PA into clipping. Includes filtering to enhance the higher voice tones to increase intelligibility, and it sounds nice too. Panel control for clip and output level. Supplied with plugs & sockets to suit most popular rigs. Type **SP1000, PCB & Hardware kit £42.50, Ready built £60.00**.

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

TRANSVERTERS for ICOM rigs, supplied with cables. Automatic with no cable switching. IC756Pro & II & III, 775, 781, 7600, 7700, & 7800 use type **TRC4-10L/IC1.** IC735, 761, & 765 use type **TRC4-10L/IC3. Built to order £280.00.**

STATION PREAMPS for 2 or 4 or 6metres. RF & DC switched. Adjustable 0-20dB gain. 100W power handling. **RP2S, RP4S, RP6S, PCB & Hardware kit £35.00, Ready Built £57.00**.

MASTHEAD PREAMPS, for 2 or 4 or 6meters. 20dB gain 1dB NF. 100W through handling. RF switched & DC fed via the coax. Heavy duty waterproof masthead box, and a DC to RF station box with SO239 connectors. **RP2SM, RP4SM, RP6SM, PCB & hardware kit £41.00, Ready Built £65.00**. **Masthead fitting kit £6.00**.

MASTHEAD PREAMPS 400W rated, for 2 or 4 or 6metres. RF switched. DC fed via a separate wire. 20dB gain 1dB NF. Heavy duty waterproof masthead box with SO239 connector. **RP2SH, RP4SH, RP6SH. PCB & hardware kit £42.50, Ready Built £65.00**. **Masthead fitting kit £6.00**.

PSK31 INTERFACE KIT. Module as described in PW Feb 2009. Suitable for a variety of digital modes. PCB and components **£21.00**. Box kit complete with cables but excluding microphone plug **£35.50**.

POUNDBURY 20/80m SSB RECEIVER

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

3N201 MOSFET equiv. 40673 £2.25 each, P&P £1.00 any quantity.

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

OFF-AIR FREQUENCY STANDARD, crystal calibrator unit phase locked to Radio 4 using a two-loop system. Includes a monitor receiver to ensure Radio 4 is being heard loud and clear. Fixed outputs 10MHz at 2V p-p, and 1KHz at 1V p-p as oscilloscope CAL signal. Switched outputs 1MHz, 100KHz, 10KHz, and 1KHz at 6V p-p, into 500 Ohms. Single board design as featured in July & Sept 2008 PW. Background heterodyne whistle at 2KHz confirms lock condition. 12/13.5V DC operation at 65mA. **PCB kit with ferrite rod £50.00, PCB kit + drilled box and hardware complete £86.00. Ready built £131.50.**

TWO TONE OSCILLATOR as featured in *PW* March 2005. A vital piece of test equipment used together with an oscilloscope for setting up AM, DSB, & SSB transmitters. **PCB & hardware kit £28.00. Ready Built £52.50**.

SPECTRUM COMMUNICATIONS

12 WEATHERBURY WAY, DORCHESTER, DORSET, DT1 2EF. Tel & Fax 01305 262250.

E-mail: tony@spectrumcomms.co.uk

Web site www.spectrumcomms.co.uk

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IF DSP/HF marvel

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FT-2000 + SP-2000 SPEAKER
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FT-950
HF + 6m IF DSP

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OR GO LARGE
FT-950 + NISSEI PS-300
£1189.99

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HF + 6m/IF DSP

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FT-450 + MS-1228 ..... £619.99
FT-450AT £639.99
FT-450AT + MS-1228 ... £689.99

FT-897D
Includes DSP

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Our best selling transportable
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IF/DSP marvel (200W)

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OR GO LARGE
FT-2000D + SP-2000 SPEAKER
£2649.99

IC-7000
HF + 6m + 2m + 70cm. Superb F DSP. Colour display.

STILL ONLY
£1025.00
or IC-7000 + MS-1228 1069.99

TS-2000E
HF + 6m + 2m + 70cm. Not only is this Kenwood's top machine with IF DSP, it also uses cutting-edge technology in a streamlined package. Not for the faint hearted!
Free MS-1228 28-amp power supply

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TS-480SAT £735.99

SP-2000
External speaker + audio filters. features a large 4.7"/120mm speaker along with a 3-selection hi-cut and 2 section low cut. Dual switched input + headphone socket.

£134.99

MD-200
Broadcast quality dynamic mic. It sounds & looks superb. Fits 8-pin round & 8-pin modular radios. (Optional 6-pin modular adapter £19.99)

OUR PRICE
£199.99

YAESU ACCESSORIES

MD-100A8X	£139.99
FC-30	£225.00
FC-40	£309.99
DMU 2000	£829.99
Quadra	£3675.00
MH-59A8J	£71.95
YF-122S	£124.99
YF-122CN	£119.99
YF-122C	£114.99
CD-24	£124.00
FNB-78	£110.00
PA-26	£74.99

PSUs

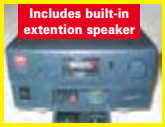
NISSEI PS-300

Features: ★ Over voltage protection ★ Short circuit current limited ★ Twin illuminated meters ★ Variable voltage (3-15V) latches 13.8V ★ Additional "push clip" DC power sockets at rear. Dim'ns: 256(W) x 135(H) x 280(D)mm. A truly professionally made unit built to outlast most PSUs.

30 AMP/12 VOLT PSU
TRUE 'LINEAR' PSU

OUR PRICE £149.99

DIAMOND GZV-4000
Includes built-in extention speaker



Diamond quality power supplies/ switch mode. 40 amp version.
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GZV-2500 25 amp version of GZV-4000 ..... sale price £119.99

DIAMOND GSV-3000

"Linear power supply". 30 amp @ 13.8V. 1-15V variable.
Diamond quality PSU £189.99

NISSEI MS-1228

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'Smallest version to date' now with cigar socket.
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ANTENNAS

DIAMOND CP-6

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SEND SAE FOR DATA SHEET
SALE PRICE £299.99

ATAS-120
Military spec mobile antenna – superbly made. Covers HF + 6m + 2m + 70cm. *Fully automatic. (*certain Yaesu radios).

OUR PRICE
£249.99

INTRUDER II
11 band (80-10 6/2/70cm). PL-259 fitting. Colapses to 95cm (~ 3 ft).

£37.99
(2 for £70.00)

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13 band (80-10/6/2). PL-259 fitting. Includes WARC bands. 13 band version of Intruder II.

£54.99
(2 for £99.00)

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HF-6V (80/40/30/20/15/10m) £375.00
HF-9V (as HF-6V + 17/12 & 6m) £425.00

VHF/UHF TX

YAESU VX-8E
6m/2m/70cm. "APRS" with Rx:- 0.5-1GHz.
SPECIAL PACKAGE OFFER VX-8E + extra battery.....£329.99

£299.99

YAESU VX-7R
6m/2m70cm + wide RX. An amazing 6W water proof hand-held. Case £19.99/spk mic £32.99. Cigar lead £24.99/ BNC adapter £6.

£239.99

NEW YAESU FT-270 R/E
2m FM handie (keypad). Incl's batt/charger. £99.99

YAESU FT-2900 R/E
Latest 2m FM (70W) mobile. Built like a tank. Incl's DTMF mic £135.00

YAESU FT-8900 R
10m + 6m + 2m + 70cm. (up to 50W).
+ FREE 6m/2m/70cm mobile antenna
Includes DTMF mic + wideband receive £325.00

YAESU FT-7800E
2m/70cm + wide Rx. (50W/35W) includes DT, MF, mic £189.99
In-car kit £30.00. Extra DC lead £15.00

YAESU FT-7900 R/E
Latest commercial built 2m/70cm mobile + wide Rx. (Incl's DTMF mic) £235.00

ACCS

MFJ-993B INTELLITUNER
Fully automatic (1.8-30MHz). 300W SSB.

Easy to use ATU. SALE PRICE £245.99

MFJ-949E

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

MFJ-259B ANALYSER
1.8-170MHz £254.99

MFJ-269B ANALYSER
1.8-170MHz + 70cm £329.99

Case £29.99 ..... Dip Coils £29.99 (fit 259/269) ..... Case £29.99
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MFJ-260C 300W dummy load £49.99
MFJ-264 1.5kW dummy load £79.99
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SGC MAC-200 New auto tuner 1.8-54MHz (200W) wire, vertical, dipole. You name it. (5 selectable outputs). £289.99

SGC-239 Mini tower ATU (1.8-30MHz) £199.99
SGC-237 HF+6m Tuner £309.99
SGC-230 (HF-200W) ATU £449.99
SGC-Smart lock (specify model) £69.99

GIZMOS

NISSEI PWR/SWR METERS

RS-502 1.8-525MHz (200W) ..... £79.95 P&P £6.50
RS-102 1.8-150MHz (200W) ..... £49.95 P&P £6.50
RS-402 125-525MHz (200W) ..... £49.95 P&P £6.50
RS-3000 1.8-60MHz (3kW) Incls mod meter £59.95 P&P £6.50
RS-40 144/430MHz Pocket PWR/SWR ..... £34.99 P&P £5
DL-30 diamond dummy load (100W max) ..... £29.99 P&P £5

D-308B DELUXE DESK MIC

(with up/down). Many amateurs (over 4000) have been pleased with it's performance. Includes 8-pin round Yaesu mic lead. Icom/Kenwood & other leads available. Phone (£19.99 each).
Replacement foam windshield £3.00 + P&P.
Truly remarkable audio on both SSB & FM/AM
SALE PRICE £79.99

NEW NOISE FILTER!

A superb TDK 'snap fix' ferrite clamp for use in Radio/TV/ Mains/PC/Phone etc. *Simply close shut over cables and notice the difference!* Will fit cables up to 13mm diameter. Ideal on power supply leads/mic leads/audio leads/phone leads.
2 for £12.99 or 6 for £30.00 (P&P £4.00)

LIMITED STOCK

10m PNEUMATIC MAST

We have a small quantity of "military spec" pump-up masts (part of a Government order). All brand new in a crate and supplied with cover (close HT ≈ 6 foot). Anodised green finish.

40m guy kit pack £49.99
Ground fixing spikes (3-off) £35.00
2 foot all ground fixing kit..... £99.99
(Can be hand operated or by compressor/foot pump)

SALE PRICE **£999.99** Del £40.00.

CAROLINA WINDOM

CW-160S	(160-10m) 40m long.....	£149.95 P&P £10.00
CW-160	(160-10m) 80m long.....	£159.95 P&P £10.00
CW-80	(80-10m) 40m long.....	£129.99 P&P £10.00
CW-80S	(80-10m) 20m long.....	£149.99 P&P £10.00
CW-40	(40-10m) 20m long.....	£119.99 P&P £10.00
G5-RV	(80-10m) + balum	£74.99

NEW DIAMOND WD-330

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

Japanees quality made product

WOW **£199.99**

CUSHCRAFT BARGAINS *Delivery £15.00*

MA5B	Mini beam 10, 12, 15, 17, 20m.....	WOW £449.99
A4S	4 ele beam (10 - 20m).....	£649.99
A3S	3 ele beam (10-20m).....	WOW £539.99
R-8E	Vertical (40 - 6m) "special".....	SPECIAL £499.99

Q-TEK PENETRATOR

"We've sold 100s all over Europe"

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

SEND SAE FOR LEAFLET **£199.99**

NEW Wire Penetrator 50ft long (1.8-70MHz).....£179.99

W-8010 DIAMOND SHORTENED DIPOLE

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

£159.99

Standard & Deluxe G5RV P&P on either full/half size £7.50

Half size 51ft (now includes heavy duty 300Ω ribbon).....£24.95
Full size - 102ft (now includes heavy duty 300Ω ribbon) ...£28.95
Half size (Deluxe) - 51ft (40-10m) £36.95
Full size (Deluxe)- 102ft (80-10m) £42.95
In-line choke balun £39.99

Q-TEK INDUCTORS

80mtr inductors + wire to convert ½ size G5RV into full size. (Adds 8ft either end).....£34.99 P&P £4.00 (a pair)

TRAPS BACK IN STOCK

BALUNS & TRAPS (1kW)

Baluns 1:1 or 4:1 or 6:1 .....£34.99 each P&P £4
Traps 80m or 40m or 20m or 15m.....£39.99 pair P&P £5

DOUBLE THICK FERRITE RINGS

A superb quaility ferrite ring with incredible properties. Ideal for "R.F.I". Width 12mm/ OD35mm. 6 for £12.00 P&P £4.00
12 for £20.00 P&P £5.00
30 for £40.00 P&P £10.00

COAX SWITCHES (P&P £6.00)

2 way CX-201 (0-1GHz) SO239.....£19.95
2 way CX-201 'N' (0-1GHz) 'N' £24.95
4 way CX-401 (0-500MHz) SO239.....£79.95
4 way CX-401 'N' (0-500MHz) 'N' £89.95

REPLACEMENT POWER LEADS

DC-1 Standard 6-pin/20A fits most HF .....£22.00 P&P £3
DC-2 Standard 2-pin/15A fits most VHF/UHF .... £10.00 P&P £3
DC-3 Fits Yaesu FT-7800/8800/8900, etc ..... £17.50 P&P £3

YAESU REPLACEMENT MICS

MH-IC8 8 pin Yaesu mic (8-pin round) .....£39.99 P&P £5
MH-4 4 pin fits older HF, etc. (4-pin round) .....£34.99 P&P £5
MH-31A8J 8 pin modular .....£34.99 P&P £5

COAX BARGAINS

True military spec real UK coax

RG-58 Military spec x 100m.

£49.99 or 2 for £90.00

Coax stripping tool (for RG-58).....£4.99

RG-213 Military spec x 100m (10mm dia).

£129.99/100m or 2 for £229.99

Q-TEK TRI-MAGMOUNT

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

KENWOOD TH-F7E

2m/70cm Tx. Rx: 0.1-1000MHz (AM/WFM/FM/SSB). Incl's battery pack (Lion) + charger.

Includes free remote mic

£229.99

ALINCO DJ-596E

2m + 70cm Handie. Includes nickle metal N.M.H.I and charger.

Includes free remote mic

£179.99

W-8681 PROFESSIONAL WEATHER STATION

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

Professional version OUR PRICE **£79.99**

HEAVY DUTY SWAGED MAST SET

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

£74.99 each. TWO FOR £135.99 DEL £15.00

NEW SWAGED MAST SETS

20 foot mast. 1½" – 4 x 5 foot sections. (Swaged) **£46.99**

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

H/DUTY CAR BOOT MAST SET

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

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

NEW CAR BOOT MAST SET

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

2 for £74.99 del £13.00

HANGING PULLY

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

£24.99

MAST HEAD PULLEY

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

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

30m pack (4.4mm) nylon guy rope £15.00
132m roll 4.4m nylon guy (480Kg b/f) ..... £45.00 Del £7.50

NEW EASY FIT WALL PULLEY

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

£12.99 + P&P £4.50

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

30m pack (4.4mm) nylon guy (480kg).....£15.00
132m (4.4mm) nylon guy (480Kg) £45.00

BARGAIN WINCH

500kg brake winch. BARGAIN PRICE

£79.99 Del £10.00

(Now includes cable grip)

Winch wall bracket.....£22.99

LOW LOSS PATCH LEADS £4.50 P&P

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

EP-300

Over the ear earpiece.

£9.95

P&P £4.00

DB-770H (BNC)

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

£54.99

P&P £5.00

MT-3302

Heavy duty universal mount.

Includes 5m cable **£29.99**

MT-6601

Adjustable roof rack/window bar mount

£19.99

YAESU G-450C

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

WOW **£309.99**

G-650C extra heavy duty rotator + 25m cable..... £349.99
G-1000DXC extra heavy duty rotator + 25m cable £419.99
G-2800DXC The goliath of rotators..... £749.99
GS-065 thrust bearing..... £54.99
GC-038 lower mast clamps £32.99

AR788

Quality rotator for VHF/UHF. Superb for most VHF-UHF yagis, 3 core cable required. 3 core cable £1 per mtr.

OUR PRICE **£79.99**

AE-201 thrust bearing.....£24.99

DIAMOND YAGIS No tuning required

2m/10 element No tuning required SO-239 feed..... £74.99
70cms/10 element No tuning required SO-239 feed..... £48.99

Q-TEK COLINEARS (VHF/UHF) Del £12.50

X-30 GF 144/70, 3/6dB (1.1m)..... £44.99
X-50 GF 144/70, 4.5/7.2dB (1.7m)..... £59.99
X-300 GF 144/70,6.5/9dB (3m)..... £79.99
X-510H GF 144/70, 8.5/11dB (5.4m) £139.99
X-627 GF 50/144/70, 2.15/6.2/8.4dBi (2.4m)....£89.99

DUPLEXERS & TRIPLEXERS

MX-2000 50/144/430MHz Triplexer £59.99
TSA-6011 144/430/1200MHz Triplexer.....£59.99
MX-72 144/430MHz.....£34.99
MX-72 "N" 144/430.....£35.99

MOBILE ANTENNAS Del £10.00

DB-7900 2m/70cm (5.5/7.2dB) 1.6m (PL-259).....£39.99
DB-770M 2m/70cm (3.5/5.5dB) 1m (PL-259).....£24.99
Diamond HV-7CX 7/14/21/28/50/144/430.....£129.99
Diamond CR-8900 10/6/2m/70cm (1.26m) £99.99
Diamond AZ-506 2m/70cm – only 0.67m long.....£39.99
PL-62M 6m/2m (1.4m) PL-259 .....£23.99
PL-627 6m/2m/70cm (1.7m) PL-259.....£44.99

LIGHTNING ARRESTER

SP-350V Replacement fuses £5.00

DC-1000MHz (400W through power). SO-239 fitting. **£24.95** P&P £3.00

Station log books:- 3 for £10

ALLUMINIUM POLES

20 foot (collection only) 2".....£49.99
10 foot (collection only) 2".....£29.99
2.4m (2") Ally pole.....£29.99
SPECIAL OFFER 2.4m x 2" poles (5 off).....£100.00
5 foot x 2" pole.....£14.99

COPPER ANTENNA WIRE ETC

Hard drawn (50m roll).....£40.00 P&P £7.50
New: 50m roll, stranded antenna wire.....£19.99 P&P £7.50
Flexweave (H/duty 50 mtrs).....£44.99 P&P £7.50
Flexweave H/duty (18 mtrs).....£21.99 P&P £7.50
Flexweave (PVC coated 18 mtrs).....£24.99 P&P £7.50
Flexweave (PVC coated 50 mtrs).....£59.99 P&P £7.50
Special 200mtr roll PVC coated flexweave .....£180.00 P&P £10.00
Copper plated earth rod (4ft).....£14.99 P&P £8.00
Copper plated earth rod (4ft) + earth wire.....£24.99 P&P £8.00
New RF grounding wire (10m pack) PVC coated .....£14.99 P&P £5

METALWORK & BITS (Del Phone)

2" mast-floor base plate.....£14.99
6" stand off brackets (no U-bolts)..... £8.99
9" stand off brackets (no U-bolts)..... £10.99
12" T & K brackets (pair) £18.99
18" T & K brackets (pair) £22.99
24" T & K brackets (pair) £26.99

All bracket measurements are from wall to end of bracket

U-bolts (1.5" or 2") each £1.50
8mm screw bolt wall fixings £1.70
8-nut universal clamp (2" to 2") £7.99
2" extra long U-bolt/clamp £6.99
2" crossover plate with U-bolts £14.99
15" long (2") sleeve joiner (1.5" also available) £18.99
3-way guy ring £5.99
4-way guy ring £6.99
Heavy duty guy kit (wire clamp, etc.) £49.99
Set of 3 heavy duty fixing spikes (~0.7m long)..... £29.99
30m pack (4.4m) 480kg B/F nylon guy..... £12.50
Roll of self-amalgamating tape 25mm x 10mtr..... £8.99
Special offer:- Self-amalgamating 3 rolls..... £20.00

MFJ-1117

DC High current distribution unit £59.99

MFJ-1118 metered

High current distribution unit £99.99

RH-9000 BNC

40cm flexible whip for the ultimate in gain. **£29.99** P&P £5.00

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

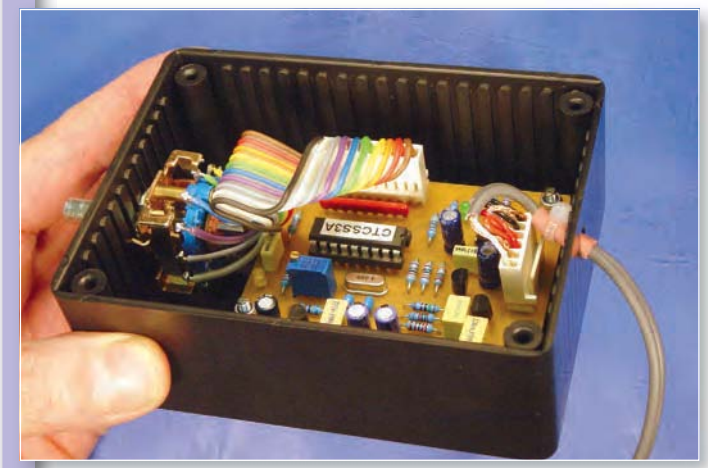
RH-9090 SMA

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

Rx:- 25MHz-2.9GHz **£34.99** P&P £5.00

Constructional Project

A Practical CTCSS Tone Encoder



The multi-selectable CTCSS unit, mounted into an external case for use on any radio. The main p.c.b. is small enough to fit inside many ex-p.m.r. rigs.

Like many Radio Amateurs I spent a number of years away from the hobby. However, coming back to my old hobby with an old kit-built Wood & Douglas 70cms synthesised radio – I found it impossible to communicate on repeaters using the radio without a continuous tone coded squelch system (CTCSS) tone to access local repeaters on the 430MHz u.h.f. band.

To get round the problem I designed and built a CTCSS system around a programmed integrated circuit (PIC) micro controller, a PIC16F84A-04. This PIC works with a 4MHz crystal with a little more than a handful of components and to produce a highly stable unit.

The unit I ended up with was designed to be small enough to put inside a transceiver's casing, with power coming from the transceiver's own 12V d.c.

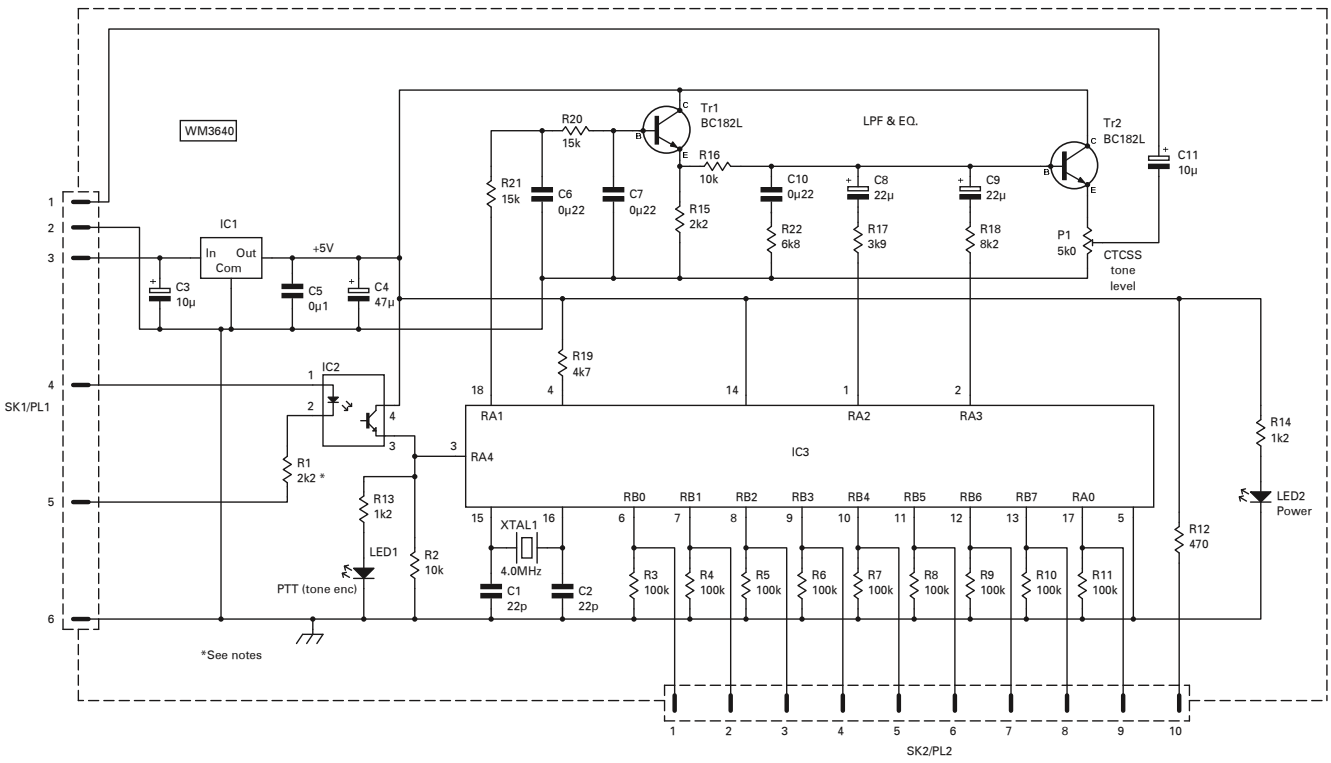


Fig. 1: The simple circuit of the project uses a PIC to perform all the functions and tone generation.

Ken Ginn G8NDL has the ideal solution, in the shape of a practical 'add-on' project for anyone who has older equipment that lacks a CTCSS Tone Encoder.

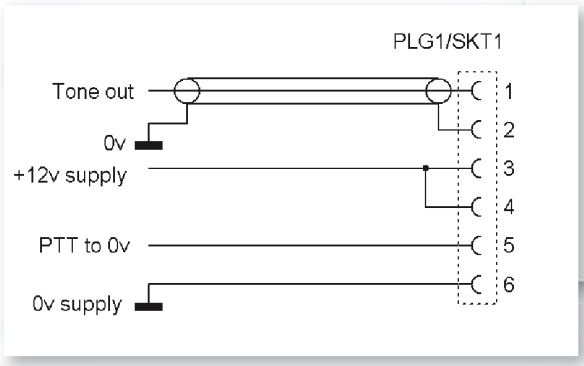


Fig. 2: The interconnections for radios where the p.t.t. line is taken to the 0V line.

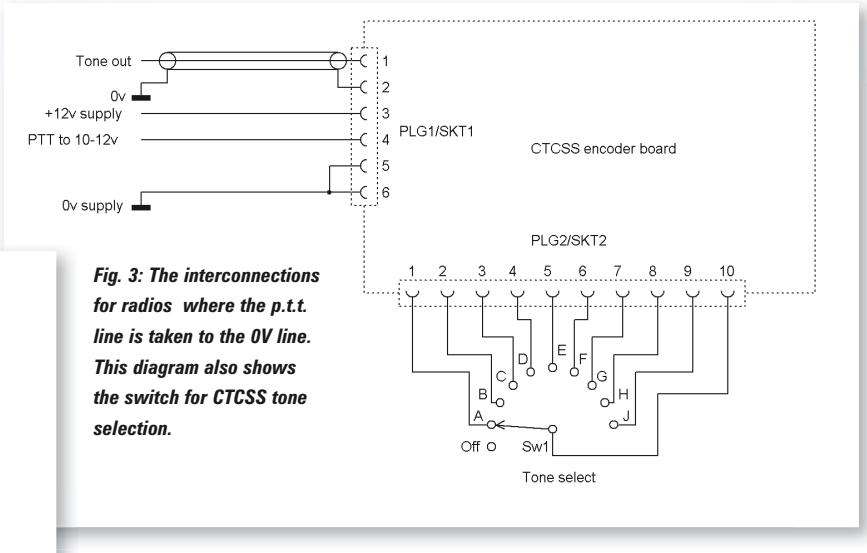


Fig. 3: The interconnections for radios where the p.t.t. line is taken to the 0V line. This diagram also shows the switch for CTCSS tone selection.

supply, needing no more than 20mA current source for the whole circuit.

I designed the project that as an alternative, it could be a separate unit attached outside the main radio. The tone frequency is set either with a rotary switch (as in one prototype), which can be used to set the tone frequency (from A to J), or a wire jumper on the printed circuit board (p.c.b.). In this latter case, the p.c.b. mounting plug PL2 is not used and a wire link made between the two relevant pads.

I've included in the circuit, **Fig. 1**, the provision to adjust the tone level with the aid of a pre-set resistor, which enables it be set to 100mV root mean square (r.m.s.) maximum. This was considered ample for the radios found in my shack. The tone deviation can be set to 250Hz or 500Hz deviation depending on the particular system the unit will be used for. That being 12.5 or 25KHz channel spacing. For my own Wood & Douglas u.h.f. radio, I set the deviation to 500Hz for tone J.

Rotary Switch Selected

In the project presented this month, the required CTCSS tone is selected with a rotary switch that selects one tone from tone A through to J. These are stable and have an accuracy which is derived from the PIC's clock timing crystal.

I've provided, in **Table 1**, details of the tones measured from the prototype with the aid of test equipment, and all are adjusted in the PIC's source code to be close to the desired CTCSS tone frequency. All were calculated and found to be within 0.2Hz this is a maximum error of 0.67%.

Table 1

Tone	Freq. (Hz) (Hz)	Measured Freq. (Hz) (Hz)	Error (Hz)	Max o/p
A	67.0	66.889	0.111	100
B	71.9	71.772	0.128	91
C	77.0	76.946	0.054	89
D	82.5	82.406	0.094	95
E	88.5	88.511	0.011	85
F	94.8	94.688	0.112	84
G	103.5	103.476	0.024	95
H	110.9	110.778	0.122	85
J	118.8	118.620	0.180	81

Why Use A PIC?

In the past I've written articles about projects that were originally produced in the late 1980s. Since that time, the manufacturers of certain components, namely the ZN and SL series of integrated circuits (i.c.s) have now become obsolete and a little difficult to source. The PIC however, is a commonly available device and can be programmed by using the right equipment. And if a specific PIC device becomes obsolete – a new updated PIC device can be programmed and put in its place.

Indeed, the PIC appears to be a simple solution that overcomes the obsolescence problem and the difficulty of sourcing some of the more esoteric components available a number of years ago.

What Is CTCSS?

So, you might now be asking what's CTCSS? The answer is that the system was developed by the American company Motorola to increase the number of users on one radio frequency channel. This is sometimes referred to as a 'Tone Squelch'. This system enables independent groups of users to access to their specific radio system and cause minimal interference to another user on the same channel.

Of course, in reality there's interference when two transmissions are coincident on the same frequency. But it does have the ability to respond to and only open the receiver's squelch when a signal with a valid CTCSS tone that it's set to respond to. In doing so it stops the receiver's squelch from opening due to unwanted radio frequency (r.f.) noise that would otherwise open the squelch. (A receiver without the CTCSS tone decoder will see the noise as a valid signal, which it isn't).

In practice a CTCSS tone is a low level sub-audible tone (less than 300Hz audio frequency, at 10% maximum system deviation) that's added to the speech on transmission. It's this tone that validates the received signal. Without the valid CTCSS tone the receiver ignores the incoming signal and the squelch remains closed.

The system is used commercially and on repeaters in the UK to allow users to access the repeater. This allows

the user to target and open only one specific repeater, rather than open up two or three which frequently occurred during lift conditions; which was often occurred without a CTCSS tone.

The Circuit

Let's now look at the circuit again – and the 'brains' behind the whole circuit is the PIC micro controller a PIC16F84A-04 manufactured by Arizona Microchip. The source code developed in Crownhill's *Proton Plus PIC Basic* is the programmed into the PIC and allows – in development stage – easy development and fine tuning of the software.

In the PIC's software each of the ten input lines assigned, this includes the push-to-talk (p.t.t.) line and the tone select lines RB0 to RB7, RA0 and RA3 are scanned. The ten input ports are scanned and when the p.t.t. line goes high, i.e. port RA3; the PIC starts generating the selected tone (of nine) CTCSS tones.

The relevant tone is selected by searching for a remaining input which is at a logic '1'. The un-selected inputs are each held low with a 100kΩ resistor. Each tone is generated within its own sub-routine and the accuracy is adjusted to match the tone frequency desired.

The output from the PIC is in the form of a square wave and is at TTL logic levels. This is then fed to a two-stage resistance/capacitor (R/C) low-pass filter where there's sufficient filtering to 'smooth off' the edges of the square waves. And, at the output, a sine wave of sufficient amplitude to inject into the audio stage of a transmitter's modulator stage.

The actual tone amplitude is set by the pre-set potentiometer P1 through C11 and is then passed onto the transmitter. If no tone is selected by the rotary switch, then no tone will be generated.

There are two emitter followers in the circuit, one between the low-pass filter and the frequency tailoring components (Tr1), and a second one that acts as a buffer from the circuit to the transmitter's modulator stage (Tr2).

The firmware programmed into the PIC is tailored to also adjust the tone output amplitude. Essentially the nine tones are grouped in three groups of three, A to C, D to F and G to J. Bearing in mind the range in frequencies generated are from 67Hz to 118.8Hz and is essentially an octave spacing.

The output from the low-pass filter stage will vary by a factor of about 6dB over this octave. To compensate for this variation, frequency compensation is switched in and out depending on which frequency group is used. The capacitor C8 and resistor R17 are switched in circuit when a tone of A to C is selected, and C9 and R18 are switched in circuit for a selected tone of D to F. None of the frequency tailoring components are switched in circuit when a tone of G to J is selected.

When the specific tailoring components are selected the PICs port (RA2 or RA3) is set to a logic '0'. When de-selected, the port is essentially made tri-state; that is – so it can act as an input. Using this technique keeps the tone amplitude within 10mV r.m.s. of nominal throughout an octave. This equates to ±30Hz deviation error at 500Hz tone deviation, half of this at 250Hz deviation.

Power at 12V is supplied to the circuit constantly between pins three and two of the connector SK1/PL1. Ground or 0V, being supplied at pin 2, and the 12V supply to pin 3. The p.t.t. switching (if required) is provided as an isolated option. Being isolated, it will allow the tone enable to function from a number of different radios.

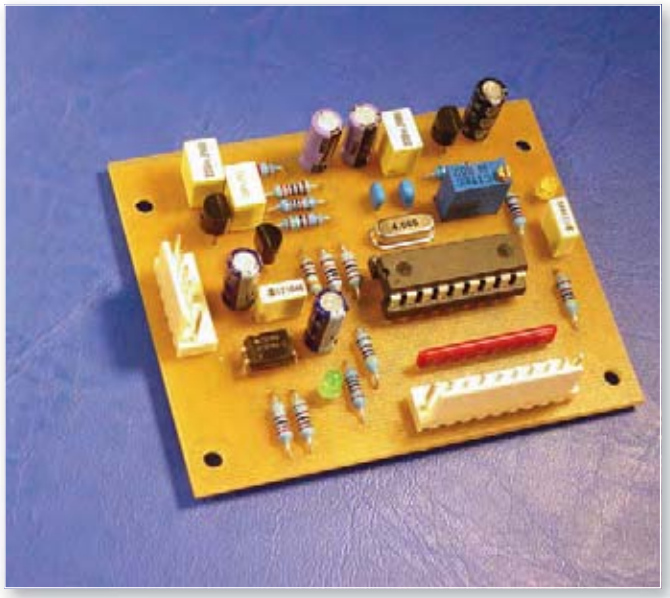


Fig. 4: The assembled project using Ken's p.c.b. layout of Fig. 5.

Most equipment will require a simple input that needs only to be grounded, **Fig 2**. Others will require the p.t.t. line to be connected to an internally regulated 10V supply, **Fig. 3**. As in a number of old Pye PMR sets (Pye Olympics, MX294, MX296 etc.).

Supplying current to the opto-isolator IC2, will cause the internal transistor to conduct, causing the input of IC3 (RA3) to go high. This will provide power to illuminate LED1 indicating p.t.t., and this will initiate the tone generation function within the PIC itself. This can of course be enabled all the time the choice is open to the constructor. The second l.e.d. LED2 just shows power is applied to the circuit.

The Construction

The construction is quite straightforward and all the components are populated onto a single sided p.c.b. shown in **Fig. 4**, with my track pattern in **Fig. 5**. Connections are provided to supply power at 12V, keying signals to initiate the CTCSS tone, and tone output to the transmitter circuitry. Additionally, a ten-way connector is made to give connection to the rotary switch for tone selection. See the photos for the completed circuit.

As with all circuits of this nature, the largest components should be soldered in first, the multi-way p.c.b. connectors. If your using my layout, then you can follow the overla diagram of **Fig. 6**. Following this the resistors and capacitors and the semiconductors and static sensitive devices last, the PIC is the last to be mounted.

Once the board is populated check for correct placement of components, also dry joints and solder bridges on the trackside of the p.c.b. In my prototype a short on one leg of the crystal ground stopped the circuit from working – so keep your eyes peeled for problems!

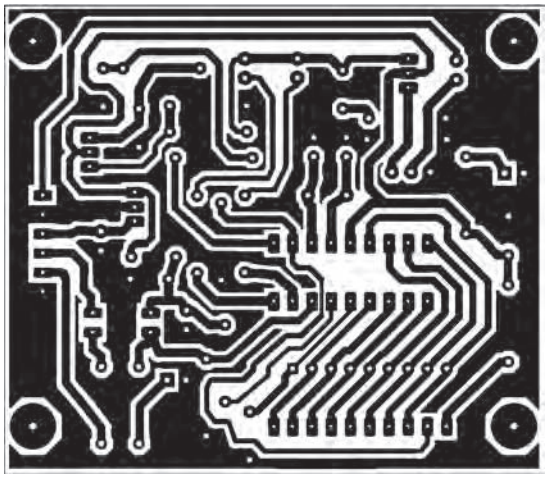


Fig. 5: This is the p.c.b. layout Ken created using Proteus p.c.b. software on his PC.

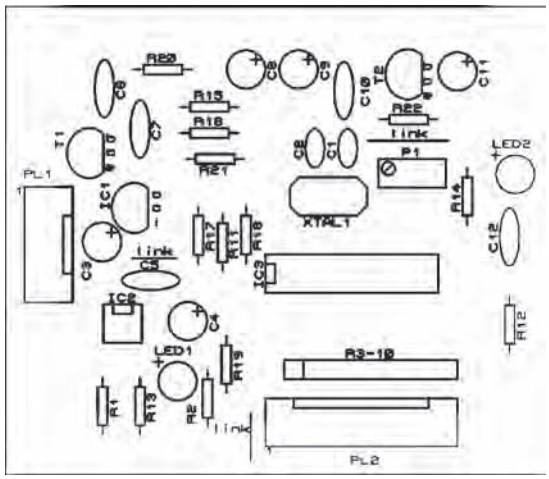


Fig. 6: The overlay diagram created using Proteus software.

Checking Operation

When everything is completed, connecting a current limited supply to the unit at 12V should see a current drawn by the unit of less than 20mA, even when the circuit is put into transmit - tone enable.

The tone can be initialised by supplying the opto-coupler with current, and the resultant tone observed on the unit's output. The pre-set potentiometer P1 is adjusted to a maximum level of 100mV r.m.s. (This can be observed on an oscilloscope though it is to some degree frequency dependent), see Table 1.

Connecting Up the Unit

I actually made two prototypes, one of course sitting quite nicely externally with the Wood & Douglas 430MHz radio. The second was secured inside a Pye MX296. Once installed there are a number of options open to the constructor. If the radio has a point where a CTCSS tone can be injected, you can do so there. On the other hand it can be injected into the same point as the radio's microphone input.

The circuit can be running continuously or run only when the p.t.t. is enabled – the choice is yours! My tests also concluded that the unit is useable with a supply voltage of 7 to 15V.

My QTH

My QTH is located on a hill some 70m above sea level to the south of Dartford and the Dartford toll bridge can be seen from my shack's window looking north. Access on 430MHz to local repeaters is now possible, where before it certainly was not.

From the shack and running at low power, I can now access the GB3NK and GB3OK repeaters. My little CTCSS unit has proved to be highly reliable and made a number of repeaters usable with some very old kit. It could do the same for you! ●

Component List

R1	2.2kΩk
R2	10kΩ
R3-R10	100kΩ SIL resistor
R11	100kΩ
R12	470Ω
R13	1.2kΩ
R14	1.2kΩk
R15	2.2kΩ
R16	10kΩ
R17	3.9kΩ
R18	8.2kΩ
R19	4.7kΩ
R20	15kΩ
R21	15kΩ
R22	6.8kΩ

Note: all resistors are ¼ watt carbon film, with the exception of the SIL resistor R3-R10.

P1	5kΩ multi-turn preset pot
C1	22p ceramic, 0.1in lead spacing
C2	22p ceramic, 0.1"
C3	10µF 35V radial electrolytic, 0.1in
C4	47µF 16V radial electrolytic, 0.1in
C5	100n 63V polyester,0.2in
C6	220n 63V polyester,0.2in
C7	220n 63V polyester,0.2in
C8	22µF 25V radial electrolytic, 0.1in
C9	22µF 25V radial electrolytic, 0.1in
C10	220n 63V polyester,0.2in
C11	10µF 35V radial electrolytic, 0.1in
C12	100n 63V polyester,0.2in
Tr1	BC182L, * note pin outs
Tr2	BC182L
XTAL1	4MHz crystal U4 style case
LED1	3mm green l.e.d.
LED2	3mm amber l.e.d.
IC1	78L05, 3-terminal 5V 100mA regulator
IC2	SFH618A, opto-coupler
IC3	PIC16F84A-04, PIC Arizona Microchip

Miscellaneous Components

Printed circuit board, 6-way p.c.b. mounting socket (0.1in pin spacing), 10-way p.c.b. mounting socket (0.1in pin spacing), both with matching cable plugs. i.c. socket for PIC (18-way). Single Pole 10-way rotary switch. Case, wire etc ,to suit installation.

Feature

Buying Second-hand

Editorial announcement: Both Chris and the Editorial team are delighted by your feedback on the equipment featured. We would also encourage readers to contact us to request that particular rigs and accessories to be featured. Indeed, this series will rely on your requests and comments, along with Chris G4HCL's extensive experience to be the success we intend it to be. So, let's be hearing from you readers!

After a dual-band handheld transceiver, of which I've covered a few types in past columns, about the most-often purchased transceiver for Amateur use is that of a 144/430MHz (2m/70cm) frequency modulated (f.m.) mobile rig, for use on simplex and repeaters, either from your car or from home. As promised in the last column, this time I'll be looking at a couple of these which could well be of interest, and which have been proven second-hand bargains in the recent past.

I've deliberately chosen two sets with fairly similar features – each has 144 and 430MHz coverage with 'one band at a time' operation, i.e. without 'dual receivers' which keeps costs down. Each offers a high power of 50W on 2m and 35W on 70cm, and each has an easily detachable front panel, just like many car radios. So you can feel reasonably safe in keeping the set in view under the dashboard of your car while you're away, while you have the transceiver's front panel safely tucked into your jacket pocket.

I've used both of these sets in the past as well as fully testing a sample of each on my laboratory radio test equipment. In fact the TM-G707E transceiver, which was subsequently given to me as a birthday gift many years ago, I personally used for a number of years in my own car.

Whatever mobile radio you buy second-hand, it may sound obvious but ensure that you get the direct current (d.c.) power lead, microphone, and mobile mounting bracket hardware too. Sometimes, the seller will leave the power lead in the vehicle rather than try to strip it out. In this case you could use a 'choc block' connector with your own lead – but this doesn't help when you're trying to take the radio in and out of your car for safe keeping if it doesn't have a detachable head.

The most common 'fault', if you could call it that, is a scratched display on radios with a detachable front panel. This is usually because the user has repeatedly removed it and simply slipped it in their pocket or bag along with keys and the like.

A small cloth storage bag is a most useful accessory here! If yours does have a scratched plastic display then a proprietary 'scratch remover' paste along with a bit of 'elbow grease' can often restore it to virtually new condition. I suggest that you 'haggle' for a few pounds off the asking price to cover the cost of buying this, unless of course the asking price already reflects the damaged condition of the radio.

Anyway, now for some information on the radios I've chosen this month!

The Kenwood TM-G707E

The Kenwood TM-G707E covers 144-146 and 430-440MHz with a transmit power output of 50W maximum on 2m and 35W maximum on 70cm, with switchable low power levels of 10W and 5W on either band. Extended receive range is available, see below for a modification.

The main body measures just 140mm x 40mm x 189mm. The size is kept down by the use of a controlled fan on the rear panel together with an internal airflow-ducted heatsink.

For frequency control, a click-step rotary knob on the front, steps you through the channels, and pressing the knob face inwards momentarily changes the variable frequency oscillator (v.f.o.) to 1MHz steps so you can get from one part of the band to another more quickly. Further buttons above the tuning knob change between v.f.o. and memory operation, and selection of a quick access 'Call' channel for each band.

There are also 180 memory channels, a 'Priority' channel, and 12 extra channels to store lower and upper limits for six programmable v.f.o. scan ranges. Each of the normal memories can be user-programmed with an alphanumeric channel name of up to seven characters in place of the frequency, so that you can see what you've stored in each channel.

There's a variety of scan modes, such as memory scan, priority scan, selected limit v.f.o. scan, 1MHz range scan, etc. Indeed, there's enough to satisfy virtually all listening needs!

The set has full continuous tone codes squelch system (CTCSS) encode and decode facilities, a 1750Hz tone-burst is also built in. A CTCSS scan can also be enabled, to display which, if any, CTCSS tone is being used on the channel you're tuned to.

The radio also has the facility for 1200 or 9600baud

This month Chris Lorek G4HCL takes a look at a pair of high power dual-band 2m/70cm mobile transceivers

packet operation on either band. Removing a small cover at the bottom left of the set's front body reveals a dedicated six-way mini-DIN connector for a packet TNC.

The supplied hand microphone has the usual push-to-talk (p.t.t.) and **Up**/**D**own buttons for frequency/channel control, plus four extra buttons labelled **Call**, **VFO**, **MR** and a user-programmable function such as power on/off, squelch defeat, high/low power selection etc.

All the four microphone buttons are, in fact, programmable in this way, giving you a remote control to suit your needs. Pressing the **PM** button on the front panel brings up a sub-display of '1', '2', '3' and '4', and each is appropriately just above the four buttons next to the liquid crystal display (l.c.d.). All you need do is press the appropriate button to change between 'personalities'. This can be useful when you're switching between, say, shack and mobile use of the rig.

There's also a selectable Advanced Intercept Point (**AIP**), which switches out the front-end pre-amplifier to improve the strong-signal handling of the set, albeit with a slight loss in sensitivity. A transmit time-out-timer is fitted, which limits the transmission time to 10, 5, or 3 minutes. This can't be disabled and personally speaking, I found it a bit of a pain to use – but others may disagree!

On The Air

Within the 77-page user manual is a one-page, seven step, *Your First QSO* guide, which helps to get you on the air quickly. Besides normal operation the transceiver also has an 'Easy Operation' mode, where the first three buttons on the front panel just select between three pre-programmed memory channels, with the fourth button selecting the transmit power level.

Operating the set this way was just like using a car radio. After I'd tuned into a frequency, a press of one of the channel buttons for more than a second automatically stored that into memory, recall being a quick press of the same button.

The detachable front panel contains all the user controls – and an optional 'remote' kit is available so that you can mount the control/display unit wherever you wish, the main body unit fitting elsewhere. When I tested the set over a prolonged period, I found the receiver to be exceptionally sensitive on 144MHz, easily capable of receiving distant repeaters. The high transmit power level allowing me to reciprocate in getting back to the distant repeaters to join in.

Incidentally, I often suffer from strong-signal breakthrough when I use a dual-band rig from home with it connected to my rooftop antenna system, primarily with hand-helds but it also occurs with the occasional mobile. However, I'm pleased to say I've had no problems at all with the TM-G707E here.

Out and about operating mobile, the set performed equally impeccably, with good and loud audio from the set's top-panel mounted speaker. It also has a very easily to read display, which I certainly appreciated. My lab tests confirmed the good on-air performance, and I ended up using a TM-G707E as r y personal choice for quite a number of years.

Extended Coverage Ranges

Let's now look at extended receive and transmit ranges and here, you may find that your transceiver's already had this modification done by a previous owner. But if it's restricted to just the Amateur bands on receive and transmit and you'd like it extended, or indeed 'reverse' the modification to get the radio back to original – here's how.

First, remove the detachable front from the transceiver, and then remove the bottom case lid. Next, position the transceiver in front of you, upside down, with the antenna connecter pointed towards you.

In the upper right hand corner, behind the display adapter, you'll see a small set of vertical printed numbers, 0, 1, 2 and 3, next to a group of four small surface-mount 'zero-ohm' resistor links. For extended receive range, use a soldering iron and carefully lift the resistor marked 0.

You'll find it easier to heat the solder at one end of the resistor, then quickly transfer to the other end and use the soldering iron to lift that end. Then transfer back to the other to remove the resistor. After this, you'll find the receiver will cover the following bands;
Receive band 1; 118-136MHz a.m.
Receive band 2; 136-174 MHz f.m.
Receive band 3; 300-400 MHz f.m.
Receive band 4; 400-520 MHz f.m.
Receiver band 5; 800-999 MHz f.m.

If you'd also like extended range on transmit then, while you've the set open, remove resistor 3 in the same way. After this, the transmitter will cover the following bands;
Transmit band 2; 136-174 MHz f.m.
Transmit band 4; 400-520 MHz f.m.

If you ever want to reverse these modifications, you can just use a short piece to wire soldered across the original resistor positions to restore the original band limits.

Transmit Deviation

If your set has too much deviation on 144MHz, as they originally came set with ±5kHz peak deviation for 25kHz channel spacing for both 2m and 70cm operation. It's relatively easy to adjust and you won't need to open the set up to do this.

You'll first need to place the radio into 'Service Adjustment Mode' by shorting pins 3 (PKS) and 6 (SQC) on the data connector on the front left side of the radio,

you'll find this under the small oval-shaped removable cover.

To locate which pin is which, while you're looking at the connector from the front of the transceiver with the connector on the left hand side, pin 3 is at the 3 o'clock position and pin 6 is at the 10 o'clock position.

If you're unsure of poking wires into the connector, then you could get yourself a PC keyboard extension cable and use this to plug into the set and link the wires on it, the connector is exactly the same.

With the pins linked, simultaneously press the **F** key and **Tone** key while you switch the set on. Then select v.f.o. mode and tune to a 144MHz frequency, which you can monitor on another receiver, or even better a radio communications test set to measure transmit deviation if you have access to one (or use a PC and monitor receiver, read on in this month's column).

Next press 'MNU' to select the adjustment mode, and use the keys to select 'DEVI'. Press the mic PTT and speak into the mic, and use the rotary encoder knob to adjust the transmit deviation until you get to the right level. You'll see the display will indicate a two-character level as you adjust this. Once you're at the right deviation level, ideally 2.5kHz maximum deviation, press the 'OK' button to save this adjustment level into the set's memory.

Then press the **MNU** button to return the set into v.f.o. mode. If you need to adjust the 430MHz deviation level, you can simply tune to a 70cm channel to do the same series of operations. The deviation level for v.h.f. and u.h.f. is stored separately inside the transceiver. When you're finished, switch the set off and remove the wire short on the connector.

The Icom IC-207

Next, I'm turning to the Icom IC-207, a set that provides you a 50W 144MHz rig and a 35W 430MHz rig squeezed into the same box, a 'band' button switching between the two bands. Wide-band coverage is also available (see later for this) the modification for this. The set's case measures a very small 140x40x185mm, so you should be able to fit it in into the tiniest of available positions in a car.

The transceiver's front panel offers a number of operating knobs and buttons. A detachable microphone cover reveals a fully-fledged remote control system for the set, with each button being backlit for night-time use.

The microphone control even provides Up/Down volume and squelch controls, as well as handy facilities such as a reverse-repeater monitor and transmit power selection. There are 150 memory channels plus extra 'call' channels and the like available for frequency storage and one-touch scanning. A bright yellow back-lit liquid crystal display is used, with the functions for the six push-buttons below the panel also being shown on the display.

Along with the detachable front panel, a 'separation kit' is also available, so the transceiver itself can be mounted remotely with just the small display fitted in a more easily-viewed position on your dashboard. Together with a 1750Hz tone-burst facility from the microphone for repeater access, the IC-207H also has full CTCSS (sub-audible tone) encode and decode built in, and 'tone scan' lets you check which, if any, sub-tone is being used on an active channel.

For packet radio use, a 6 pin mini-DIN connector is fitted to the rear panel, the transceiver accommodating both 1200 and 9600baud speeds.

On The Air

When I used the set, I found it was very easy to operate and within a few minutes of switching on I was enjoying a QSO on my local repeater. I found the set's front panel controls were intuitively very simple to use.

With the plastic cover in place on the supplied microphone, it offers a smaller number of controls, such as you'd typically use for 'normal' operation, like Up/Down frequency or channel change, VFO/memory switching, band switching, and so on.

About the only awkward operation mode I found with the set was that of generating a 1750Hz tone for initial repeater access – this needed the microphone's plastic cover removed, with a sequential press of two different buttons beneath the cover. I found this rather awkward in practice, although if you know the CTCSS access tone for the area you're using the set in and pre-program it, this isn't too much of a problem.

This rig also includes a handy facility, which consists of five 'scratch pad memories' for each band. Here, the set automatically memorises the operating frequency every time the p.t.t. is pressed, storing the last five frequencies (including repeater shifts) on each band into separate memory channels. Recalling these just needs a quick press of the 'M/Call' button, the tuning knob then selecting between them – very useful and especially handy when on the move.

Operating from home, with the set connected to my rooftop collinear, it showed a good level of performance without a trace of the 'typical' intermodulation problems I've learned to expect on 144MHz in my r.f. congested location. Icom have also usefully incorporated an automatic attenuator in with the squelch control – turning this beyond around the mid-way point gradually adds up to around 10dB of front end attenuation, to help guard against strong signal problems without a lot of button-pushing.

I found operating with the transmitter on high power for long 'ragchew' periods did cause the heat-sink panel to get very hot and I usually found I needed to drop down to the 'next lower' power level for this. However, programming the set to keep the rear panel fan on continually helped, as long as I didn't mind the fan's constant low-level 'whirring' noise on receive.

My lab tests back in the days when the set was

launched showed the transceiver worked well, especially the strong signal rejection performance, although the 12.5kHz adjacent channel rejection wasn't quite up to the mark of the TM-G707E. But even so it offers very good performance for a dual-band set which was originally sold at a quite reasonable price when new, so second-hand models should (hopefully also they shouldn't be expensive either).

Extended Ranges

As with the TM-G707E, you may find that one of the previous owners has extended the receive and transmit coverage range. But if not and you'd like extended coverage, or in fact if you'd like to reverse the mod – here's how you do it.

First, remove the four screws securing the bottom cover of the set and remove this cover, you might find it's quite a tight fit. Then position the set with the front panel towards you and the opened-up side facing you.

You'll then see a row of three surface-mount diodes at the extreme top right, these will be in a neat row from top to bottom as you look at them. Let's call these diodes 1, 2 and 3 from top to bottom. Next, using a hot soldering iron, lift off diodes 2 and 3.

Then, follow the line of the diodes downwards and you'll see a normal discrete type resistor, vertically mounted (i.e. sticking up), this is 'W14'. Use a pair of wire cutters and make a cut in the lead of this, moving the lead ends away from each other away so they don't connect. Finally, replace the radio's lid and switch the power on while you're simultaneously holding the **Set** and **SMW** buttons down.

This will perform a reset of the radio – you'll lose stored memory information (take a look at page 69 of the user manual for more information on this). So make a prior note of anything important to you which you've programmed into the set so that you can re-program it if needed.
After the reset you'll now have;
118-135MHz receive.
136-174MHz transmit and receive.
320-399MHz receive.
400-479MHz transmit and receive.
849-950MHz receive.

Deviation Adjustment

The IC-207 came supplied from the factory with 144 and 430MHz both set with ±5kHz transmit deviation, for 25kHz channel spacing. If you find you need to reduce the 144MHz deviation down to ±2.5kHz, then with the bottom cover removed and with the controls of the set towards you, you'll see a screened rectangular section at the middle front of the set, this housing the transmit synthesiser.

At the bottom left hand corner of the synthesiser and a little towards you, you'll see a pre-set trimmer potentiometer, R158 – the v.h.f. transmit deviation adjustment. Carefully turn this until you get the required ±2.5kHz 144MHz transmit deviation while you're monitoring on an adjacent receiver, or using a radio test set (or a PC and monitor receiver, see below).

If you need to alter the 430MHz deviation, this is achieved with a further pre-set trimmer potentiometer, R161. This is at the lower right corner of this metal screened rectangular section, again a little towards you.

Easy Deviation Adjustment

Here's an easy way of deviation adjustment without expensive test equipment! This technique applies to any transmit deviation adjustment you may need to do, either now or in the future. Your aim is to get your early production second-hand transceiver's peak transmit deviation to that of ±2.5kHz on 144MHz, typically reduced from the ±5kHz it was supplied with from new. You'll need a monitor receiver for this, and a PC with a sound card input.

First, locate and install one of the many 'PC Oscilloscope' or 'Software Oscilloscope' freeware programs that are readily available. Note: *PW*'s sister magazine, *Radio User* (for example) had a massive 4-DVD collection of all known Amateur Radio public domain, freeware, and shareware software available worldwide, in their December 2009 and January 2010 issues – the collection's still available (an E-mail to **software@qsp73.co.uk** will bring you information).

Then, link up your monitor receiver's external speaker audio jack to the 'virtual oscilloscope' with a 3.5–3.5mm connector audio lead, tune your receiver to your local 144MHz repeater (which will typically be very accurately set to ±2.5kHz peak) and note the levels of the upper and lower peaks of the displayed audio waveforms on your PC screen. (You might use a couple of pieces of sticky tape on your PC screen to mark these levels).

Leave your monitor receiver volume at the same setting and re-tune the receiver to a nearby unused 2m frequency, key up your 2nd hand 2m transceiver on this, and with a loud shout into the microphone (a 'long 'four' works well) adjust the deviation until your displayed audio peak level exactly matches that which you've monitored off-air. That's it, you're up and ready, simple eh?

●

Next Column

Again, as promised, in the next of these bi-monthly columns (in the Sept 2010 cover-dated issue of *PW*) I'll be featuring a selection of 'get you going' h.f. transceivers available at low cost together with a number of tips on how to get the very best out of them. See you then!

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Tony Nailer's

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Tony Nailer G4CFY corrects an error in the previous DIBD and updates the *PW Arun* Peak & Notch Filter from *PW* May 1986.

The last *DIBD* in May *PW* regarding the tri-band pre-selector contained a calculation error, which has kindly been pointed out by **Dave Kimber G8HQP**. When applying the formula Ftot = F1 + (F2-1)/G1, I used dBs instead of gain factors.

The pre-selector has a 3dB noise figure, so F1 is 2. It has a gain of 15dB so G1 is 32. The receiver was presumed to have a noise figure of 20dB, so F2 is 100. Then Ftot = 2 + 99/32 = 5.1. Converted back to dBs this is 7.1dB. The use of the pre-amplifier will have improved the receive system noise figure from 20dB to 7.1dB. Thanks to Dave for correcting me.

A Receiving Dual Peak & Notch Filter

In receivers, audio processors are often used to enhance reception of wanted signals, with the ability to reject or attenuate other unwanted signals. Designs have appeared regularly in radio magazines. Most recently was a *Notch or Peak* filter by **Tim Walford G3PCJ** in *PW* February 2009, which was an interesting design, and included a push-pull output stage to drive a speaker.

Previous to that was *A Versatile Active Analogue Filter* by **Geoff Sims G4GNQ** in *PW* May 2008, which also looked quite interesting, but on closer analysis could not have worked according to the circuit diagram. I painstakingly worked through the circuit using the photograph of the track-side of the printed circuit board and proved there was a missing feedback connection from output to input, not shown on the circuit. During this effort I also found that a number of resistor values shown on the circuit diagram did not agree with the colour codes visible on the photograph of the board.

Back in May 1986, *PW* published the Arun Parametric Filter with two cascaded peak or notch filters. It included a mains power supply giving dual supply and had a printed circuit board (p.c.b.) the size of an A4 page. The unit had controls for gain, frequency, and *Q* for each filter together with an on/off volume control and a filter-in/bypass switch. There was no audio amplifier and the unit was intended to be hardwired into the receiver. The circuit excluding the power supply section is shown in **Fig. 1**.

The *Arun* Reborn

At the time the *PW Arun* was published, many Amateurs and shortwave listeners would have been using relatively inexpensive equipment and may have been keen to hardwire the filter into the receiver circuit. They may even have modified the receiver to include a switched jack socket,

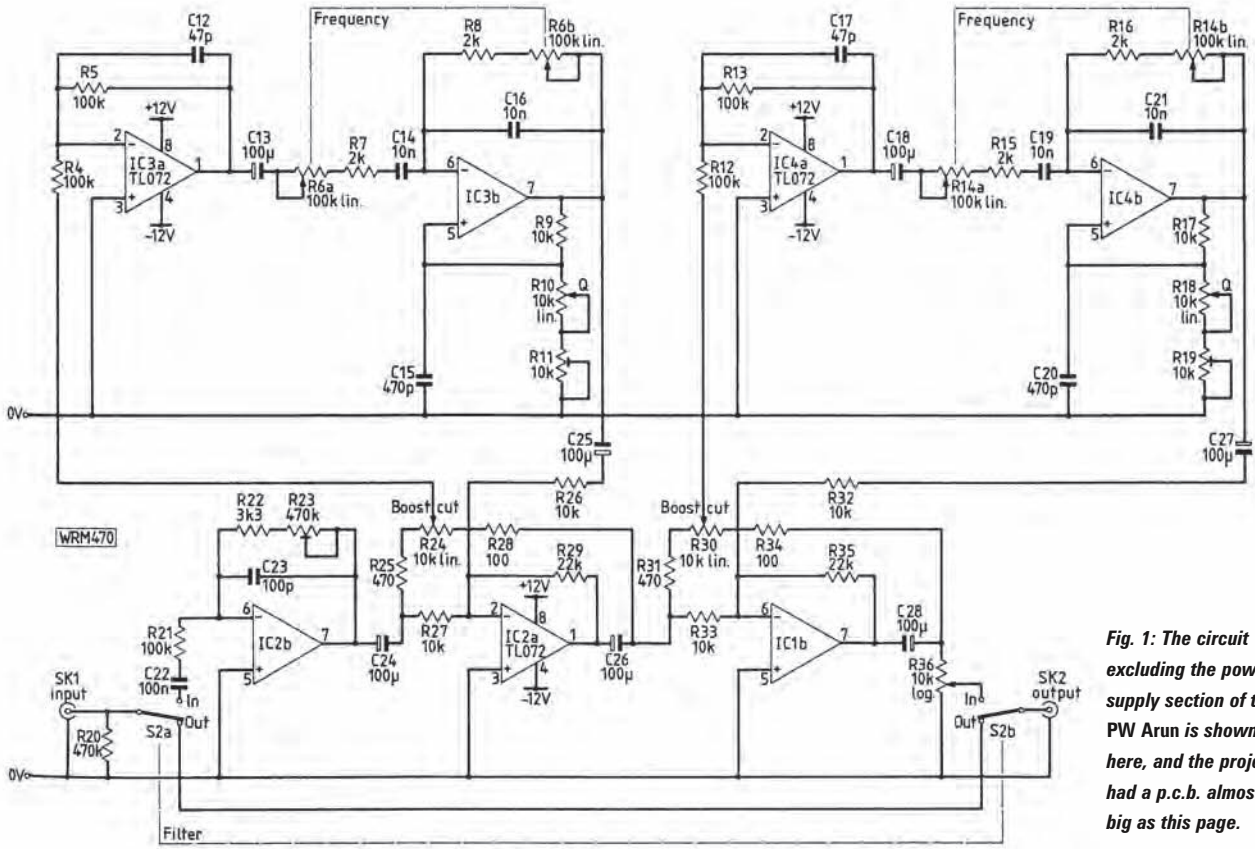

Fig. 1: The circuit excluding the power supply section of the PW Arun is shown here, and the project had a p.c.b. almost as big as this page.

which would have allowed the filter to be plugged into the circuit following the detector. Since those times equipment has become much more expensive, and Amateur and shortwave listeners less willing to dabble with the innards.

The first requirement then is to make the unit suitable to plug into an extension speaker outlet from the receiver or transceiver, and for it to have its own audio amplifier and loudspeaker. What it probably doesn't need is an integral power supply, nor does it need its operational amplifiers (op-amps) to run on dual supplies. There is no problem with the operational amplifiers running from a single rail 13.5V bench supply.

Filter Explanation

The heart of the unit is a Wien Bridge oscillator but with the gain set below the critical value of 3 required for oscillation. A skeleton circuit is shown in **Fig. 2**, with IC3 and its associated components forming the Wien Bridge filter. The values of C1 and C2 are the same, as are VR1A&B. Now VR1A and C1 form a high-pass filter, and VR1B and C2 form a low-pass filter. Together they form a band-pass filter, with a centre frequency corresponding to the overlap at the –3dB points.

The non-inverting input is taken from a potential divider between output and mid rail, this configuration is referred to as voltage controlled voltage source. The gain of this feedback arrangement is A = 1+(R4/R3). So in theory if R4 is twice R3 the gain will be three and the circuit will oscillate. Actually my breadboard prototype model only leaps into oscillation when the gain reaches 3.65, and is quite stable at 3.6. Maybe the final p.c.b will be different, but then I can adjust either R3 or R4 to compensate.

Bandwidth & *Q*

In the description of the Wien Bridge circuit in the original article *Q* = 1/2 -(R4/R3), which is incorrect and is due to way the equation was printed. Actually *Q* = 1/(2-(R4/R3)). This shows that if R4/R3 is 2, the denominator is zero and the *Q* is infinite. In reality, as the ratio of R4/R3 approaches 2 the *Q* rises exponentially.

In the original circuit there was a preset potentiometer the same value as the front panel control in series with it. My understanding of the circuit, is that this trimpot would have been set almost at maximum in order to achieve close to maximum *Q*, which would have made correct setting for stability very difficult.

At this time I don't see the need for the *Q* control at all, as the peak/notch control affects how much peak or notch is achieved and to adjust the *Q* would conflict with this. When the circuit is later evaluated in conjunction with a receiver it may be found that adjusting the *Q* to reduce or broaden the filter pass-band is desirable, and then a *Q* control will be re-introduced.

Circuit Description

The complete peak/notch filter comprising quad operating amplifier (op-amp) integrated circuits, IC1 to IC4 and the associated components are explained as follows. The inverting amplifier IC1 is intended to buffer the unit by providing low impedance at its output whilst providing high impedance to the driving circuit at its input. IC4 is configured as an inverting summing amplifier with two inputs via R1 and R5.

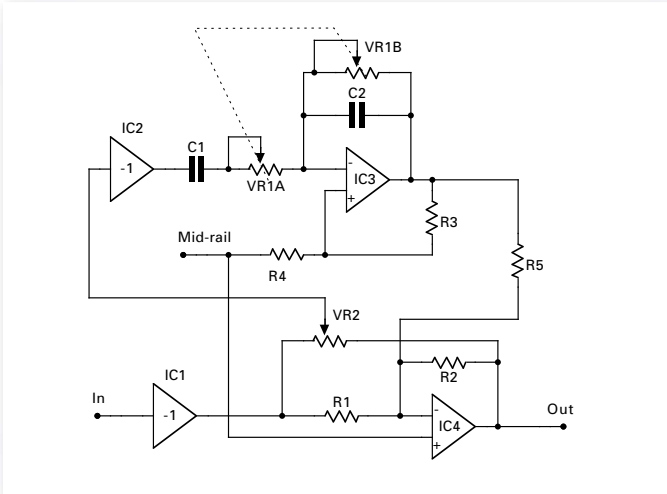

Fig. 2: The heart of the project is a Wien Bridge oscillator but with the gain set below the critical value of 3 required for oscillation.

The peak/notch control is connected between the output of IC1 and the output of IC4. Due to the inverting operation of IC4 the signals at each end of the potentiometer are 180° apart. In effect, when the wiper is at the input end, the signal will be 90 degrees leading, and at the other end 90° lagging, and in-phase in the middle.

The i.c., IC2 is also configured as an inverting amplifier and is used to buffer the wiper of the peak/notch control from the varying input impedance of the frequency control potentiometer VR1A.

The i.c., IC3 is the filter circuit described above and as used in oscillators but with the positive feedback kept below the critical level required to sustain oscillation. The output of the filter is fed into the other input of the summing amplifier IC4, and with the use of the peak/notch control can be varied from being in-phase to give a peak, or anti-phase to give a notch.

Interstage Coupling

I do not know if the *PW Arun* ever gave trouble, because the 100µF electrolytic coupling capacitors C24, C25, C26, and C27 in Fig. 1 are connected between points at the same potential, or within a few millivolts of each other. Also the 100µF electrolytic capacitors C13 and C18 are connected where there was no d.c. potential difference at all, due to being in series with 10nF poly-block capacitors C14 and C19 respectively.

Experiments with a breadboard version of one filter section, revealed that, at maximum peak setting, there was a sinewave signal of 6V peak to peak (p-p). In the *PW Arun* this would have reverse biased these electrolytics and caused them to depolarise. It is always important when using electrolytics to have a greater d.c. bias across them than the p-p swing of the signal.

Op-amp Offsets

Op-amps have an output d.c. level different from the input due to characteristic imbalance between the two inputs. Careful design of the integrated circuits has minimised this, and in the TL072 and TL074 series of op-amps the 'input offset' is typically only about 3mV.

Referring again to the skeleton filter diagram, the d.c. gains of IC1 and IC2 are both unity, IC3 the filter has a gain no more than 3.6, for my breadboard model, and IC4 has a

gain of 2. Amplifier IC2 is d.c. isolated from IC3 by the input filter capacitor.

The claimed typical case then is that IC1 has 3mV offset at its output, and IC3 has 3mV times 3.6 = 10.8mV. IC4 has an input offset of 3mV to which is added 10.8mV from IC3 and 3mV from IC1 totalling 16.8mV. This value is then amplified by its d.c. gain of 2 to give an estimated 33.8mV difference between in and out.

Adding a complete filter section d.c. coupled to the first will only result in a total offset of around 100mV between input and output. Clearly there will not be a problem if there is no d.c. isolation between any of the i.c's, even when two filters are cascaded.

Breadboard Model

To minimise op-amp offsets, I closely matched the resistances 'seen' by the inverting inputs of all op-amps with a resistor connecting the non-inverting input to the mid rail. A buffer amplifier was not included in the breadboard but would have only contributed typically 3mV to the offset. The measured difference between mid rail and the output of the summing amplifier was only 12mV, so my op-amps have offsets well below typical.

The original *PW Arun* used dual-gang 100kΩ potentiometers for frequency adjustment and had 2.2kΩ fixed resistors in series with each, so the minimum loading to the preceding stage was 2.2kΩ. With my breadboard version, I ignored the potentiometers and built the unit just using the 2.2kΩ resistors, knowing the frequency would then be set at maximum.

Adjustment of the peak/notch control revealed that when set in the maximum peak position, the gain of the Wien Bridge should be adjusted so it didn't oscillate. When adjusted towards the notch end while observing a signal being notched out, it went past maximum notch and started to

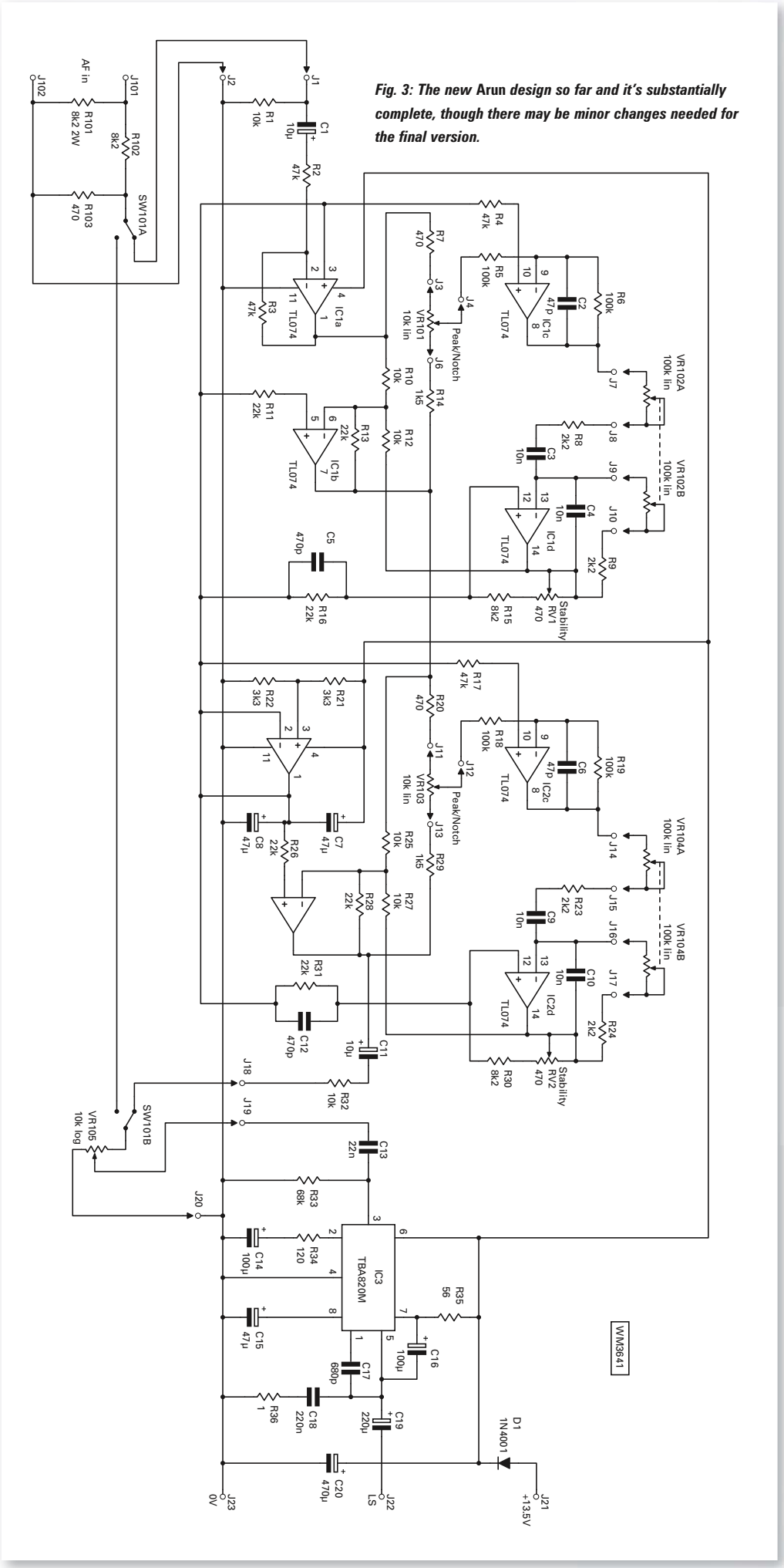

Fig. 3: The new **Arun** *design so far and it's substantially complete, though there may be minor changes needed for the final version.*

Tony Nailer
PW Publishing Ltd.,Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW
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build up again. To correct this I changed the resistor value in series with the peak/notch control so maximum notch coincided with the end travel of the control.

I experimented at length with the feedback resistors of the Wien Bridge filter to determine the optimum ratios and suitable value for the preset control. The best result was with a 22kΩ for R4 as shown in the block diagram, and an 8.2kΩ in series with a 470Ω trimpot for the position. This gives a very limited range of ratio of 2.537 to 2.683, corresponding to gains of 3.537 to 3.683.

New Circuit

Boosted by the success of the breadboard, it is an easy step to cascade two identical peak/notch sections, using one of the op-amps in a quad package as input buffer, and in the second section to use that op-amp for the mid-rail generator.

I opted to use a TBA820M i.c. as the audio power amplifier as used in many of my products for nearly 30 years and which has been used in all *DIBD* projects requiring an audio amplifier. Initially I had a volume control at the input of the filter, but subsequently moved it to the rear of the second section.

Moving the volume control was done because during initial set up it's necessary to allow the filter to oscillate, and to back it off to an unconditionally stable point at the highest possible *Q*. During oscillation, the filter produces a rail-to-rail square wave, which would probably deafen the user. It now becomes clear why the volume control should follow the dual filter sections.

Input attenuator

The input is to be driven from an extension speaker socket of the receiver or transceiver, which may, as a normal listening level, be producing 250mW into an 8Ω speaker. As $P = V^2/R$, then $V^2 = R*P$, and $V = \sqrt{(R*P)}$. $V = \sqrt{(8*0.25)} =$ 1.4V rms. This is 2V peak and 4V p-p.

The audio amplifier stage only needs around 100mV p-p to produce full output, and the effect of the peak function can increase the effective gain by as much as 50 times. So the signal from the receiver's audio line needs to be reduced significantly before reaching the first filter.

The input attenuator needs to provide a load in place of a loudspeaker, which can be done using an 8.2Ω 2W resistor. Across this is connected a potential divider that I chose to use an 8.2kΩ and a 470Ω in series, giving a step down of 17.4:1. This should provide the filter with a nominal input of around 250mV p-p.

Development Circuit

The complete proposed diagram is shown in **Fig. 3**. Nearly all the component values will remain unchanged in the final circuit but it is likely that I will need to adjust the input attenuator step-down ratio. Similarly the series resistor R32 at the output of the second filter section needs to be chosen so the volume control knob of the unit is in a comparable position to that of a rig for normal listening level.

The feedback resistors of the Wien Bridge filters may be found to require a greater adjustment range for stability, or that I might need to revert to a panel control of *Q* and bandwidth.

Parts list

Resistors		
1Ω	1	R36
8.2Ω (2W)	1	R101
56Ω	1	R35
120Ω	1	R34
470Ω	3	R7, R20, R103
1k5	2	R14, R29
2k2	4	R8, R9, R23, R24
3k3	2	R21, R22
8k2	3	R15, R30, R102
10kΩ	6	R1, R10, R12, R25, R27, R32
22kΩ	6	R11, R13, R16, R26, R28, R31
47kΩ	4	R2, R3, R4, R17
68kΩ	1	R33
100kΩ	4	R5, R6, R18, R19
Variable Resistors		
470Ω trimpot	2	RV1, RV2 horizontal
10kΩ log	1	VR105
10kΩ lin	2	VR101, VR104
100kΩ lin	2	VR102A/B, VR104A/B (Dual-types)
Capacitors		
47pF	2	C2, C6
470pF	2	C5, C12
680pF	1	C17
10nF PB	4	C3, C4, C9, C10
22nF PB	1	C13
220nF PB	1	C18
10µF	2	C1, C11
47µF	3	C7, C8, C1
100µF	2	C14, C16
220µF	1	C19
470µF	1	C20
Integrated Circuits		
TL074	2	IC1, IC2
TBA820M	1	IC3
Diodes		
1N4001	1	DI
Miscellaneous		
Pins	24	1mm pins
DPDT switch	1	SW101A, SW101B

The circuit shown in Fig. 3 is wide open to audio signals well above and below the required speech range, so it will be prudent to use a value of input capacitor C1 to work in conjunction with R2 to give a nominal 300Hz corner frequency for a high-pass response. Likewise it may also be a good idea to add a capacitor across R3 to limit the highest audio frequency to no more than 5KHz. These components were included in the original *PW Arun*, and I shouldn't have left them out.

In the next article in this series in the *PW* to come out for September 2010, I hope to have concluded the development and be able to provide a p.c.b. and parts, a box and hardware for the complete unit. If you wish to contact me about this article, then please E-mail me at: **tony@pwpublishing.ltd.uk** Cheerio for now. ●

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Main Features:
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All Windows XP, Vista or Windows 7 Controlled via USB

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Icom IC-7600
See our website for first full detailed review by Adam Farson VA70J
The successor to the IC-7565Pro111, the eagerly awaited new mid-range HF/6M Transceiver will try and set another bench mark like that of its predecessor.

KENWOOD

Kenwood HF Products

TS-480SAT	Remote head HF/6m 100W inc ATU Transceiver	**£749.95**
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2m/70cm/23cm Handie Transceiver. Simultaneous full duplex operation between any two bands. £299.95

NEW!

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A complete remote control system for Amateur radio

Using Microbit's advanced technology, full remote control of your rig is available today.

As used by top DXers throughout the world!

Imagine going on holiday but missing your HF system back home. Well no more! Using the RRC-1258 system all that is required is for you to take the head unit of say your IC-706 or TS-480 together with one half of the RRC-1258, plug into a LAN connection connected to the web and within seconds you are "ON AIR" as if you were sitting in your shack at home. (Minus the cat, TV and any other external interference!)
The previous model is still available.
Microbit-1258 mkI £349.95. Including Lead Set
Microbit-1258 mkII £399.95. Leads included
For more info see **www.hamradio.co.uk/rrc-1258.shtml**
Latest version of the Remote Rig. One version for ALL radio models.
Like the original RRC-1258, the MkII is sold in pairs, assembled and tested but not configured. Included in the package is one USB cable, Power cables (2 pc), Cat 5 cable for making IC-706 cable and a 2xRJ-45 extender.

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Compact metal body Cross Needle Meters. Fantastic value all PEP & Average reading.

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New Range to ML&S, HUGE DISPLAY, PEP & Average reading.

Nissei	TX-102	1.6-200MHz, 2/20/200W	**£59.95**
Nissei	TX-402	125-525MHz, 2/20/200W	**£59.95**
Nissei	TX-101A	1.6-60MHz, 20/200/2kW	**£84.95**
Nissei	TX-502	1.6-525MHz, 2/20/200W	**£89.95**

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

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

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

only £699.95 as reviewed in Radcom May Issue

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

RFSPACE

SDR-IQ™ Software Defined Radio, Spectrum Analyzer and Panoramic Adapter.
Now in stock together with the IF-2000 IF Interface board for the FT2k & FT-950. Both on DEMO at Chertsey.
See http://www.hamradio.co.uk/acatalog/RF_Space.html **£469.95**

The World's Biggest Selling Virtual Radar System

Now includes built-in Airband & FM!

SBS-1eR Pocket Radar **£479.99**

MyDEL

HB-1A Ultra Compact 3 Band CW Transceiver

Offering up to 4 Watts output on 40/30/20M Bands, this tiny HF portable is powered by 8 x AA cells and is aimed at the serious QRP enthusiast and has performance similar to that of the Elecraft KX-1.

- 20 meters, 30 meters and 40 meter amateur bands.
- CW Transceive, SSB receive.
- Receiving from 5 MHz to 16MHz.
- Maximum transmission power of about 4 watts on external 12V.
- Weight 350Grams (approximate).
- Battery compartment to hold 8 rechargeable AA cells.
- Built-in auto function keys.
- DDS VFO with 20 frequency storage memory.
- Digital dial with LCD technology.
- Automatic keyer with the CQ programmable with your call.
- RIT 10 Hz, 100 Hz.
- Frequency conversion super-heterodyne receiver.
- Unit will operate with voltage supply from 8-14 VDC.
- Built in AGC function.

£249.95. Call or see website for further details.
NOW IN STOCK - very limited quantity.

LDG

LDG Auto Tuner Range

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AT-897Plus	Bolt-on Alternative Auto Tuner for the FT-897. Wider tuning range and cheaper too!	£183.95
IT-100	New version of the AT-7000	£159.95
YT-100	NEW AUTO ATU for FT-897/857 or FT-100 with additional Cat Port Control	£173.95
Z-817	Ultimate autotuner for QRP radios, including the Yaesu FT-817D	£122.95
Z-100Plus	Ultimate autotuner for Yaesu FT-817D	£143.95
Z-11ProII NEW	Portable compact & tunes 100mW to 125W	£159.95
RCA-14	4-way DC Breakout Box	£49.95
KT-100	Dedicated tuner for Kenwood radios	£173.95
RBA-1:1	Probably the best 1:1balun out there	£35.71
RBA 4:1	Probably the best 4:1 balun out there	£35.71
FT-Meter	Neat Analogue back-lit Meter for FT-897/857. S-meter, TX Pwr, ALC Etc	£45.95
NEW FTL- Meter	Jumbo version of the famous FT-Meter	£79.95

MyDEL

AS REVIEWED IN PW December Issue 2009

CG SB-2000 USB Radio Interface

Only £99.95

- This small self contained beautifully styled box weighing only 400 grams really is a one stop solution to your data and radio control. It employs a CAT/CIV interface as standard and supports CAT with RS232 protocol.
- The MyDEL CG SB-2000 Interface connects to your PC via USB and Sound Card and connects to your radio via Custom leads.
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- **Only £99.95** High quality ready-made leads for most rigs available at only £18.95.

Palstar New Product

Palstar Commander HF-2500 1.5kW Amplifier

Palstar are pleased to announce a new range of HF Linear Amplifiers built to the highest standard (As you would expect from the USA Manufacturer). We have started with the "Commander HF-2500" which is available from stock. The 2m & 6m versions will be available during early 2010. ML&S: £3499.95. See web for more details.

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NEW AT-Auto Now handles a massive 1500W		**£1099.95**
AT-1500DT 1500W Differential Antenna Tuner		**£449.95**
AT-2KP (2000W) Antenna Tuner		**£459.95**
NEW AT-2KD The AT-1500DT and the AT-1KP have been combined into a new 2Kw Tuner		**£429.95**
AT-4K (2.5kW) Antenna Tuner		**£769.95**
AT-5K (3.5kW) Antenna Tuner		**£999.95**
BT-1500A Balanced Antenna Tuner		**£599.95**
PM-2000AM Power/SWR Meter		**£159.95**
Palstar Dummy Loads		
DL-1500 (1.5KW)		**£119.95**
DL-2K (2kW)		**£229.95**
DL-5K (5kW)		**£349.95**
Palstar R30A Receiver		
Palstar R30A, fitted Collins filters for SSB & AM		**£649.95**
MW550P Active preselector & ATU for AM & 160M reception		**£259.95**
SP30 Matching Desk Speaker		**£69.95**
AA30 Active Antenna Matcher 300kHz-30MHz		**£109.95**

MyDEL

CG-3000

With 200W and 200 memory channels.

ML&S: £289.95

CG-3000 shown with optional remote switch.

See web for full specifications

CG-5000MkII

At last! 600W PEP High Speed Remote Tuner from MyDEL

ML&S: £559.95

NEW! Remote control for the CG-3000 and CG-5000. £39.95

DV-Dongle

NEW

Want to dabble in D-Star without the expense of a radio? The new DV-Don_le is ideal.

The DV Dongle connects to your PC or Apple Mac via a USB port and provides encoding and decoding of compressed audio using the DVSI AMBE2000 full duplex vocoder DSP chip. AMBE technology is used in all D-Star radios to provide efficient voice transmissions. It is also used in some HF digital protocols by vendors like AOR. The DVTool application used with the DV Dongle may be installed and run on Microsoft Windows XP/Vista, Mac OS X Leopard, or many flavors of Linux.

In stock, works with MAC or PC. £199.95

MyDEL **Power Supplies**

New MyDEL PS-30SW11

Latest high performance switch mode PSU. Die-cast Alloy chassis, full over-voltage protection and short circuit design. **RRP £119.95. ML&S only £84.95**

SPS-8250	25A continuous, fully metered power supply	£79.95
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MP-8230	13.8V DC, 25A power supply	£69.95
MP-925	Linear 25-30A, 13.8V DC power supply	£99.95
MP-9600	60A switch mode power supply	£179.95
MP-6A	13.8V DC, 6A power supply	£29.95

NEW Mini VNAPro Now with Bluetooth!

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

ML&S: £349.95

MiniVNA original still available (without Bluetooth): £259.95

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

David Butler's

antenna workshop

David Butler G4ASR presents a very practical antenna project that should appeal to v.h.f. fans.

An 8-element dual-band Yagi antenna for the 50 and 70MHz bands.

If you're interested in making the most of the DX capabilities at v.h.f. you may probably want to install a Yagi antenna for each separate band. This approach is perfectly okay and many hundreds of v.h.f. enthusiasts do exactly this. However, one of the more significant problems is that many operators, often with a reasonably large 50MHz antenna, are now finding it necessary to install a similar size 70MHz Yagi further up the mast.

The issue here is that to minimise any detuning effects and degradation of the polar patterns the antennas should be spaced up to 4m in distance or more apart. Of course, there are numerous stations that are also active on the 144 and 430MHz bands as well and have simply run out of space. What would be very useful in these circumstances is a single Yagi structure that can work on both the 50 and 70MHz bands at the same time – a dual-band antenna.

The dual-band Yagi is a little compromised in terms of forward gain with regards to a conventional single-band Yagi on the same length boom – but despite this the performance can still be excellent and it will save considerable space on the antenna mast. This antenna also compliments the Yaesu FT-847 transceiver that can operate on both the 50 and 70MHz bands (with a small modifcation to operate on 4m). Both frequency bands use the same antenna socket and it is very easy with this radio to switch between them.

Dual-Band Yagi Antenna

The dual-band Yagi that I'm describing has been designed by **Justin Johnson G0KSC** for use on both the 50 and 70MHz bands. Justin mentions that of all his duo-band designs the best performer for boom length and number of elements is the 8-element Yagi that sits on a 2.08m boom, as shown in the photograph, **Fig. 1**.

Fig. 1: The dual-band Yagi antenna designed by Justin Johnson G0KSC for use on both the 50 and 70MHz bands.

If you take a look at the diagram, **Fig. 2**, you will see that the elements for both bands are interlaced along a common boom. This design presents a huge advantage over a structure that relies on common elements using traps or coils. The spacing of common elements will always be a compromise to make the best of a bad job for both frequency bands and the use of traps also presents an ohmic loss that reduces the antenna efficiency.

An interlaced, single feed point Yagi is difficult to model as there's always some interaction between the individual parasitic elements. In this design the front-to-back ratio has been slightly compromised in an attempt to maintain the standing wave ratio (s.w.r.) curve as flat as possible across each band. The main reason for doing this is that any small dimensional errors in sizing and spacing by the builder will not make a tremendous impact on the overall performance of the antenna.

An interesting feature of this design is that the **none** of the 70MHz elements are physically connected to the feed point. Instead, the 70MHz antenna structure is simply fed by its closeness to the 50MHz driven element, a technique known as 'open sleeving'.

With an open-sleeve design

Performance Figures @ 50.250MHz
Forward Gain: 8.6dBi free space
Front-to-Back: 20.43dB

Performance Figures @ 70.250MHz
Forward Gain: 8.54dBi free space
Front-to-Back: 18.76dB

Web Link
http://www.g0ksc.co.uk

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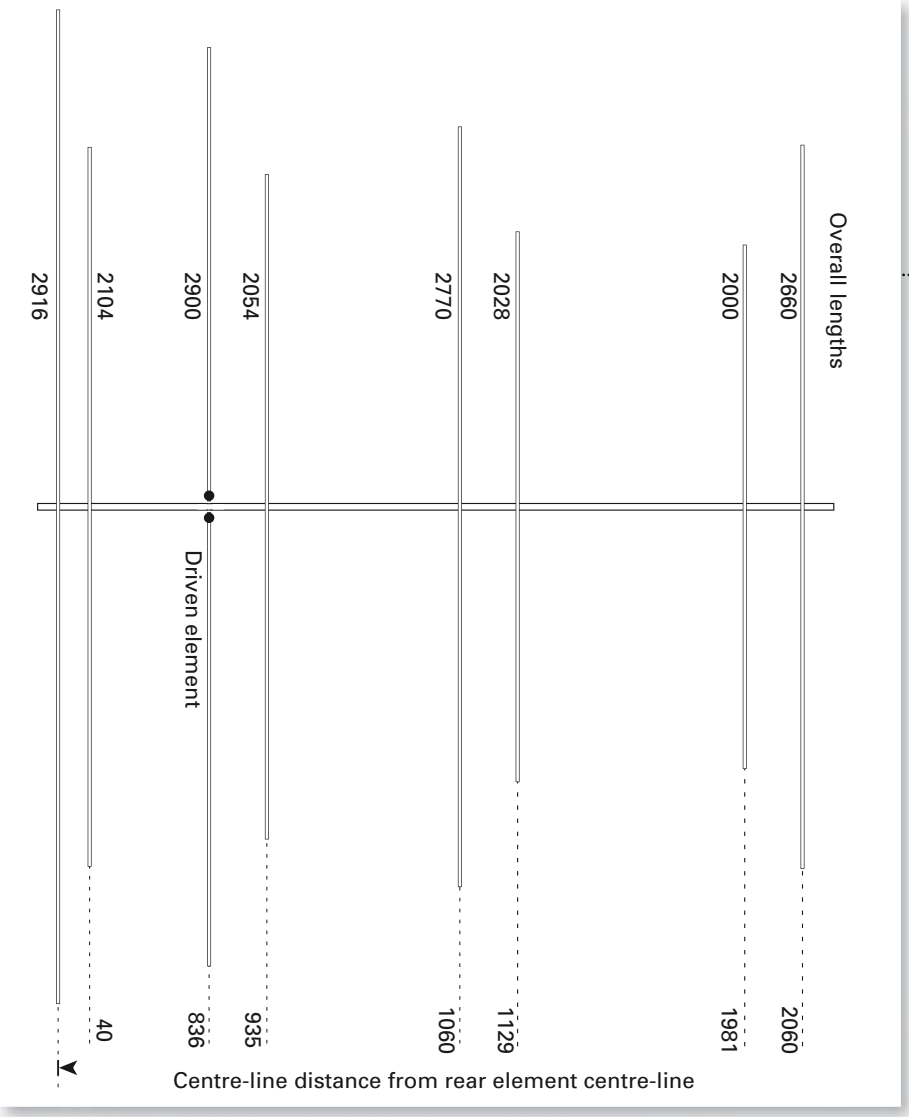

Fig. 2: The elements for both bands are interlaced along a common boom (not to scale), see Table 1 for dimensions.

Element Sizes (in millimetres)

(6m) Reflector	2916mm
(4m) Reflector	2104mm
(6m) Driven 6	2900mm
(4m) Driven	2054mm
(6m) D1	2770mm
(4m) D1	2028mm
(4m) D2	2000mm
(6m) D2	2660mm

Table 1: The element lengths.

Element Spacing (in millimetres)

(6m)Reflector	0mm
(4m) Reflector	40mm
(6m) Driven	836mm
(4m) Driven	935mm
(6m) D1	1060mm
(4m) D1	1129mm
(4m) D2	1981mm
(6m) D2	2060mm

Table 2: Element spacing from the centre-line of the 50MHz reflector element.

Fig. 3: All elements in this design are insulated from the main boom using specialist insulators, that can be obtained from Justin G0KSC.

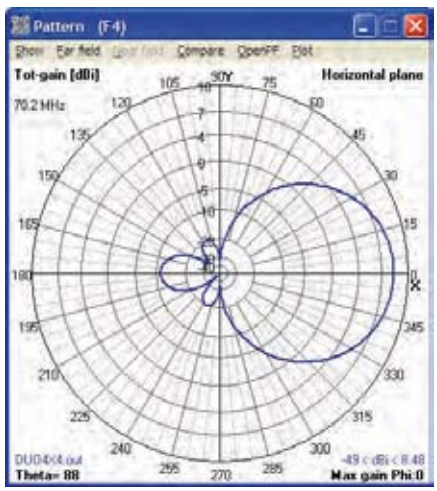

Fig. 4: The polar diagram of the Yagi at 70.2MHz, the 50MHz results are very similar.

even the type of insulator is critical. It should be made of non-radio frequency (r.f.) absorbent material, have the least amount of physical contact and yet be sufficiently strong to support the lengthy elements. All elements in this design are insulated from the main boom using specialist insulators, shown in the photograph, **Fig. 3**, that can be obtained from G0KSC (**see Web Link**).

This dual-band antenna performs as a 4-element Yagi on both the 50 and 70MHz bands and possesses approximately 8.5dBi* forward gain on either band. I've shown the polar diagram of the Yagi at 70.200MHz in the diagram, **Fig. 4** and the 50MHz results are very similar.

**the 'i' represents gain referenced to an isotropic antenna – about 2.16dB more than the dipole referenced gain figure.*

Construction Details

Let's now look at the construction details and to start, each element is made from a single piece of 0.5in (12.7mm) aluminium tubing cut to the precise dimension given in **Table 1**. You can if you wish use 13mm diameter tubing using exactly the same dimensions. This will produce a slightly higher forward gain and front-to-back ratio – but at the expense of a narrower s.w.r.

curve. The boom can be either 1in or 1.25in square aluminium as all the elements sit high enough above it to have no influence.

The list of dimensions, Table 1, should be read in conjunction with Fig. 2, which shows the general layout of the 8-element Yagi antenna.

Cut the boom to 2.10m in length so as to accommodate the elements that are spaced over 2.06m of its surface. Next, cut the eight elements to the size given in Table 1. The 50MHz driven element (2.900m) is then cut into two equal lengths of 1.450m.

Remember to always measure twice and cut once and always cut the longest element first. If you do cut an element too short you can always use it for the next element size down. But this won't work if you cut the shortest director first!

Next you need to place the insulators so that the elements are exactly in the position given in **Table 2**. Measure all spacing dimensions from the 50MHz reflector position rather than marking out between each element. By referencing all dimensions to one starting position you reduce inaccuracies that might accumulate along the length of the boom.

The 50MHz driven element is best supported by two insulators as shown in the photograph, **Fig. 5**. You can conveniently use two small pieces of boom section to support these insulators.

A short length of solid 10mm diameter nylon rod is then placed between the centre of the split dipole to create a gap of a few millimetres. It may be a tight fit but with a squirt of '3-in-1' oil and a rubber mallet it can be persuaded to fit!

This Yagi requires the use of a 1:1 coaxial choke balun. If you use RG213 (for example), just wind five turns around an air freshener size can and cable tie together. Make pig-tails at the end of the feeder and attach to the driven element with stainless steel hardware.

Note: A word of warning here though. As soon as the coaxial cable is split it effectively becomes part of the driven element and electrically lengthens the dipole.

So, try to make the coaxial cable connection look more like a very short 'T' rather than a droopy 'Y' shape. In practice the two short pig-tails **plus** the 50MHz driven element sections should be 2.900m in total length. To finish just seal with self-amalgamating tape or use a hot-glue gun.

Fig. 5: 50MHz driven element is best supported by two insulators as shown here before and after weather sealing.

Fig. 6: A diplexer manufactured by Cross Country Wireless has a good separation and low insertion loss.

The Diplexer

Assuming you have separate transceivers (or transverters) for both bands you could manually plug the antenna into either of them one at a time as your mood dictates. That may be all that's required for the casual operator – but if you're like me then you'll want to be able to listen and transmit on either band without swapping the feeder around. To achieve this you need a diplexer and I've shown an example manufactured by Cross Country Wireless in the photograph **Fig. 6**. This device handles 100W of continuous power with only 0.3dB insertion loss on either band.

If you want to transmit with even higher powers you could make a high power diplexer from quarter wavelength sections of coaxial cable as described in the March/April 1996 editions of the RSGB *Radcom* magazine. Using RG-213 cable this diplexer easily handles 400W of r.f. power with an insertion loss of 0.35dB.

Although copyright of this article belongs to the RSGB I can supply a PDF copy reproduced with their kind permission. Just send an E-mail to **g4asr@btinternet.com** and I'll provide you with the article. Enjoy the project! ●

The Rev. George Dobbs'

carrying on the practical way

The Rev. George Dobbs' says he has 'More on s.w.r. measurement' this month – after the appropriate quotation!

"A little inaccuracy sometimes saves lots of explanation"
Anon

Welcome to *Carrying on the Practical Way* (*COTPW*) where, over the years, I have described several standing wave ratio (s.w.r.) meters. My more technical friends would say I ought to call them voltage standing wave ratio (v.s.w.r.) meters. My friends can also tell me a lot about what such instruments can and cannot do.

In my early days of Amateur Radio I simply measured 'smoke up the chimney'. That is we had some form of r.f. power detection attached to the output of a transmitter – and we then tuned the output for maximum.

My first transmitter, a two-valved transmitter for 1.8 to 2MHz, or 'Top Band' had a light bulb connected in series with the antenna and I tuned for maximum brightness. However, these days no Amateur Radio station is complete without an in-line s.w.r. meter – often called an s.w.r. bridge.

Most modern transmitters have a nominal output impedance of 50Ω and are designed to feed the antenna via 50Ω coaxial cable. So ideally, the antenna should also have an impedance of 50Ω.

More commonly, an antenna tuning unit (a.t.u.) is inserted between the transmitter output and the antenna. The adjustment of the antenna tuner requires an s.w.r. bridge to show the a.t.u. matching the antenna system to the transmitter.

Simple Terms

To put it in simple terms, s.w.r. is a measure of a transmitter's output power against the portion of that power reflected by the antenna system. If the antenna system is working efficiently, most of the forward power will be radiated by the antenna with very little power reflected back to the transmitter.

The difference between the forward power and the reflected power is the actual power radiated by the antenna. If the output impedance of the transmitter, the impedance of the transmission line, and the impedance of the antenna are all perfectly equal then the s.w.r. will be 1:1. This is the ideal condition with all of the transmitter's output power being radiated by the antenna.

In the real world of Amateur Radio transmission the ideal condition is never achieved but the object of the exercise is to get the ratio as equal as possible. (I now steel myself to receive the flack from our more technical brethren about my over simplification of the subject!).

As the s.w.r. bridge is simpler to build than fully explain, let's look at a practical example. The diagram, **Fig. 1**, shows the circuit of a very simple and inexpensive-to-make, s.w.r. bridge. A casual glance at Fig. 1 will show that it's a bridge circuit. Perhaps readers will recall the 'Wheatstone Bridge' so beloved by school physics teachers! The resistors R1, 2 and 3 form three equal sides of a resistive bridge.

The fourth side 'looks' at the impedance presented by the tuner or the antenna if no tuner is being used. The diode, D1, and associated components form a voltage detector across the bridge. This will indicate a minimum voltage (a dip) when all four elements of the bridge are at 50Ω. Here an l.e.d. (light emitting diode) is used as a cheaper alternative to a meter. This should be a 'super bright' l.e.d. as these illuminate to low levels.

The simple bridge is easy to use but does require a by-pass switch S1a/S1b. In normal operation the bridge is switched out of the signal route while it's in the **Operate** position. With the switch set to the **SWR** position the bridge comes into the signal path. The resistors R1, 2 and 3 should then be capable of handling the power of the signal and shouldn't be wire-wound types as these will introduce some inductance.

The tuner is adjusted for minimum illumination output from the l.e.d. indicator. In this condition the signal is 'seeing' the tuner as a 50Ω load with a minimum of reflected signal. The circuit is simple but has the disadvantage of not being in-line during normal operation of the transmitter.

Bidirectional Coupler

Perhaps the most popular in-line s.w.r. bridge is based on the bi-directional coupler shown in **Fig. 2** . This is often called the 'Stockton' bi-directional Wattmeter after **David Stockton GM4ZNX**. The original article by David appeared in the Winter 1989/1990 edition of the **G QRP Club** journal *Sprat*. It has also appeared in the G QRP Club *Antenna*

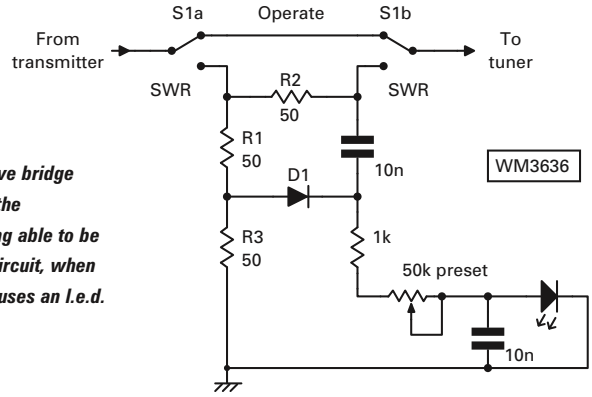

Fig. 1: The resistive bridge s.w.r. circuit has the advantage of being able to be switched out of circuit, when now needed and uses an l.e.d. as the indicator.

Handbook and in the 1996 ARRL *Handbook*.

The design came from some professional work that David GM4ZNX had done in the early 1980s on return loss bridges. He describes it as a "four port hybrid" with some very useful properties. The circuit is symmetrical and can be used either way round with no effect on function. **Note:** A hybrid contains nothing to set its operating impedance and this is set by terminations on the ports. But it's a deceptively simple circuit!

As David said in the *Sprat* article, *"This circuit nicely illustrates one of my favourite points. There is not necessarily any relation between number of components and complexity. The operation of this circuit is extremely difficult to understand, yet it only uses two components. Fortunately it is easy to build and easy to use.*". So, having been warned about technical complexity let's move on quickly on to look at the practical application of the Stockton bridge!

The circuit can be used either way round but in the version shown in **Fig. 2** the signal passes from left to right. In this configuration the reflected sample appears across the left-hand 50Ω resistor and the forward sample appears across the right-hand resistor. Measurements are taken by measuring the voltage across each of the resistors.

In the original *Sprat* version the secondary of the transformer (Nt) was wound on a wideband ferrite core made by **Salford Electrical Instruments** of Heywood. These are no longer available as their factory has closed – in fact I sometimes shop at the supermarket now occupying that site in Heywood!

The single turn (1t) was made using a short length of coaxial cable passing through the ferrite core. This method works well but does require a little space and some simple mechanics and small versions aren't easy to make. My original Stockton bi-directional coupler (still in use) is housed in a 90mm x 110mm die-cast box hidden behind the pair of meters used as indicators.

Recently, an alternative method of making such a bridge was suggested to me by my old friend **Johnny Apell SM7UCZ**. Johnny has featured in this column many times and is a fruitful source of ideas for radio construction. Johnny had been helping his friend **Tore SM7CBS**, provide simple antenna tuning for local two way radios in the Dominican Republic.

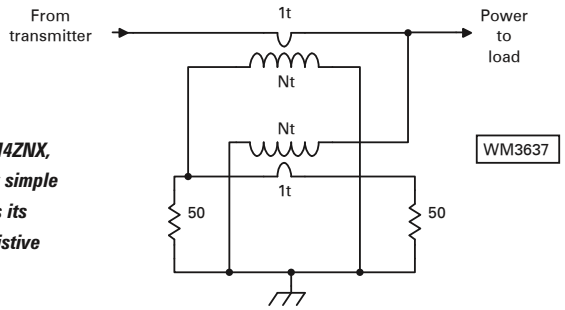

Fig. 2: David Stockton GM4ZNX, designed this deceptively simple 'four-port hybrid', that has its impedance set by the resistive loads in the lower circuit.

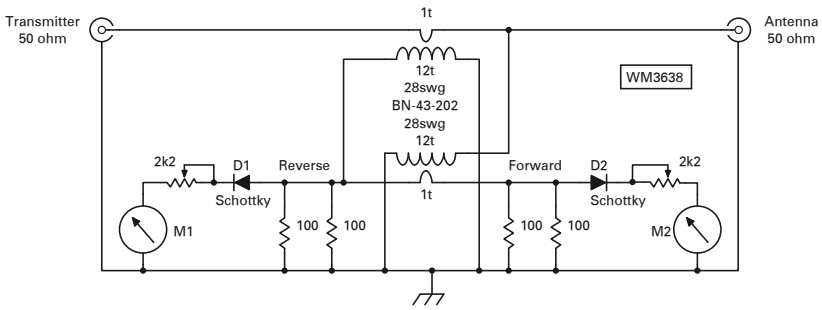

Fig. 3: Adding the impedance defining loads and the other parts needed to create an s.w.r. indicator.

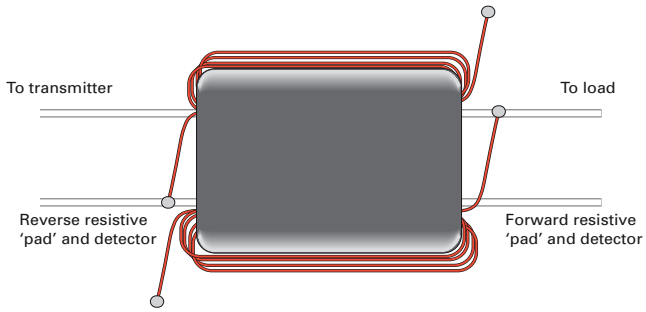

Fig. 4: Winding the four-port hybrid on a binocular core. See the photograph of Fig. 5 for more detail.

Johnny had made up a bi-directional coupler feeding two light bulbs to indicate forward and reflected voltage. The novelty, for me, was that Johnny used a single ferrite binocular core to make the coupler – a considerable saving of space. I thought, "This I must try".

The circuit I built is shown in **Fig. 3**. It follows the coupler configuration in Fig. 2, except each side of the coupler is formed on the two holes going through the binocular core (BN-43-202 ferrite core). Again, the signal passes through the coupler from left to right. The forward voltage appears at the right-hand side 50Ω load and the reverse (reflected) voltage appears at the left-hand 50Ω load.

Note that two 100Ω resistors in parallel have been used to form the two 50Ω load resistors. The load resistors should be able to handle enough power to cope with the power of the signal – the two parallel resistors share the total power.

The diagram, **Fig. 4**, shows the physical arrangement of the coupler. A 12 turn winding of 28 s.w.g. enamelled copper wire is wound through each hole of the binocular core and I have called these the 'pickup windings'. A single wire carrying the signal passes directly through the top hole and the sensing winding is another single wire passing through the bottom hole of the core.

Making the coupling transformer

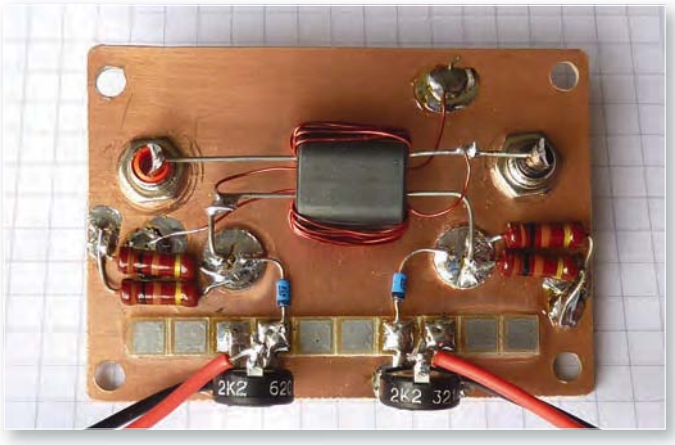

Fig. 5: The four-port hybrid s.w.r. indicator wound on a ferrite binocular core. The smaller version uses fewer turns of thinner wire due to the reduced size of the core.

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

is easy but does require a little dexterity. For a right-handed person it's easiest to hold the core in the left hand and put the winding through the left-most hole first.

Each time the wire passes through the hole counts as one turn. Pull the wire to be against the side of the hole as each turn is made but avoid scratching off the enamel coating on the edges of the hole. As far as possible make the windings lie side-by-side. After winding the left-hand side, wind the 12 turns through the hole on the right-hand side.

The single turn (single wire) through each hole is best made with fairly stiff wire; I used 22s.w.g. tinned copper wire. The stiffness of these wires holds the coupler in place as shown in the photograph.

The coupler is suspended between the input and output sockets. I used phono sockets; not ideal for r.f. work – but this was to match a small transmitter I wished to use – and that also had a phono output socket.

Individual constructors can use input and output sockets to match their equipment. However, wiring the pickup windings in the correct place is critical. Thankfully this is easy because the physical connections exactly match the coupler layouts in Figs. 1 and 2.

The photograph, **Fig. 5**, shows how I laid out my version of the circuit. The whole unit is mounted on a piece of copper clad board with the core suspended between the pins of the sockets. The rest of the board follows the so called Manhattan (Island) method of construction where insulated pads are glued to the board and used for the interconnections. I used two large round pads for the termination resistors.

The stiff wire passing through the bottom hole of the binocular core is shaped, with pointed pliers, to suspend the bottom portion of the core and connect to the pads. The rest of the circuitry is wired on a strip of square pads. These square pads are produced by **Rex Harper W1REX** of **QRPme.com**. However, it's very simple to make your own pads from printed circuit board material and stick them down with 'super glue' (Cyanoacrylate glue).

The forward and reverse voltages appear across the two 50Ω resistors and these radio frequency (r.f.) voltages need to be converted to direct current (d.c) voltages to drive an indicator. I used a pair of Schottky diodes (BAR28 in my case) to reduce losses but germanium diodes, or even the common silicon diodes would do the job, albeit with slightly reduced output.

The pre-set resistors and meters provide voltage measurement. The output from this coupler was somewhat less than my old Stockton coupler but it was sufficient to drive both types of meter that I tried. Both meters are shown in the photograph, **Fig. 6**. I have several surplus 'VU' type edgewise reading meters. These usually have a full scale deflection in the order of 100 to 200μA (microamps). Using pre-set resistors of 2.2kΩ these give a useful reading to levels as low of 1 watt of r.f. output.

Fig. 6: two meters that George has found suitable for his s.w.r. and power indications.

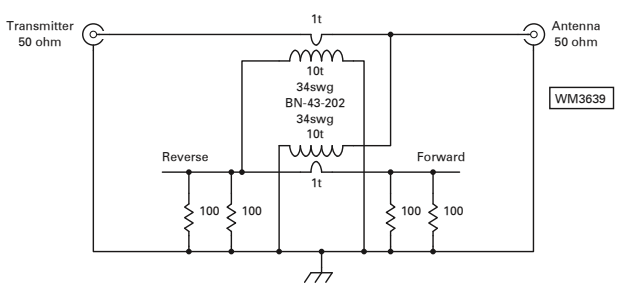
I suspect the meter will indicate lower outputs but I didn't have a handy lower output signal source. I also had a splendid pair of new 50μA meters. Naturally these worked very well but I'm not sure I want to dedicate them solely to this project.

The pre-set resistors could be replaced by appropriate fixed resistors once the meter deflection settings have been determined. But I think there's some merit in retaining the pre-set controls. This enables the circuit to be reset according to the power levels being used; for higher powers values above 2.2kΩ will be required. It's also possible to set the reverse voltage indicator to read lower voltages – so that the reverse voltage can be monitored more closely.

Johnny also suggested a smaller version for QRP use based upon a smaller binocular core: the BN-43-2402. The outline of the circuit is shown in **Fig. 7**. This was rather tricky to make as the hole size is small and I only managed to get 10 turns of thin (34 s.w.g.) wire through the holes with enough space to add the thicker wires. It did work well although I used 1kΩ pre-sets in the voltage indictor circuit.

Note: I intend to add two very small VU meters to this version for a small s.w.r. bridge for portable work. So, on behalf of all readers, may I thank Johnny SM7CBS for a very useful idea!

Fig. 7: A smaller version of the four-port hybrid bridge must use fewer turns of thinner wire due to the smaller core.



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what next?

Colin G6MXL looks at a number of antennas to help readers take advantage of the improving h.f. band conditions.

Antennas for the higher h.f. bands

In case you haven't noticed, in recent months propagation on the higher high frequency (h.f.) bands has started to improve. The main reason for this improvement is the re-appearance of sun spots. These sun spots appear as dark spots on the surface of the sun, **Fig. 1. Note: never – please – try to look directly at the sun.** High numbers of sunspots are indicative of higher levels of radiation causing ionisation in the ionosphere that surrounds the earth.

When ionised, the ionosphere refracts (bends) h.f. signals back to earth rather than letting them pass through the ionosphere and out in to space, **Fig. 2**. The numbers of sunspots follows an approximate 11 year cycle, see **Fig. 3**. We appear to be at the start of a new cycle, with the number of sunspots expected to increase for several years which will result in improving h.f. propagation.

With the increased number of sunspots, plus the normal improvements to propagation associated with the summer, propagation on the h.f. bands above 14MHz (20m) is certainly better than it has been for the last few years. If you haven't tried any of the bands above 14MHz in the last six months or so, then you have been missing out on some good contacts!

With the number of sunspots finally starting to increase from a prolonged minimum, I thought it would be a good idea to look at some simple antenna designs to make good use of the higher h.f. bands. For the purposes of this article, I'm going to consider the h.f. bands above 14MHz (20m). So this means the 18MHz (17m), 21MHz (15m), 24MHz (12m) and 28MHz (10m) bands.

Please note, that I'm not claiming any originality in any of the designs presented here – quite the contrary – they're all well tried designs that have been used by numerous Amateurs over the years. However, I'm conscious that many newcomers to the hobby will not have experienced a sunspot maximum, and I think it is a good idea to be prepared so that the opportunities

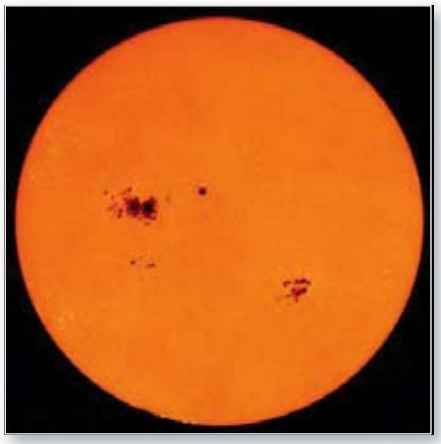

Fig. 1: The sun with many sun spots visible but please DO NOT look at the sun directly!

Fig. 2: Sunspots cause higher levels of ionisation in the ionosphere (shown in blue) which refracts h.f. radio signals back to earth.

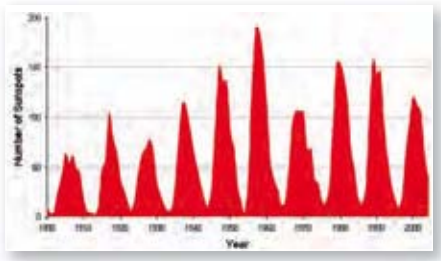

Fig. 3: Graph showing the approximately 11 year sunspot cycles over the last century.

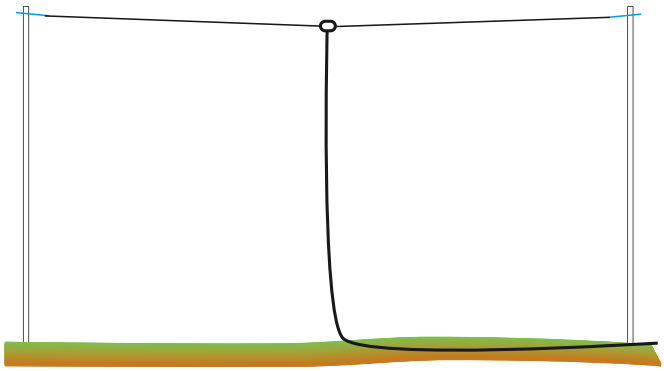

Fig. 4: Horizontal dipole. Note the insulators at the end of each leg. The centre can either be fed by twin feeder, or using coaxial feeder with a balun.

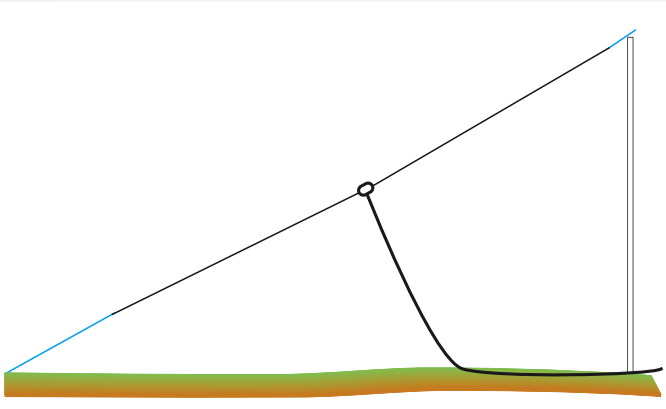

Fig. 5: Sloper dipole – this is just a dipole that slopes. If using coaxial feeder, the braid (outer) should be connected to the lower leg.

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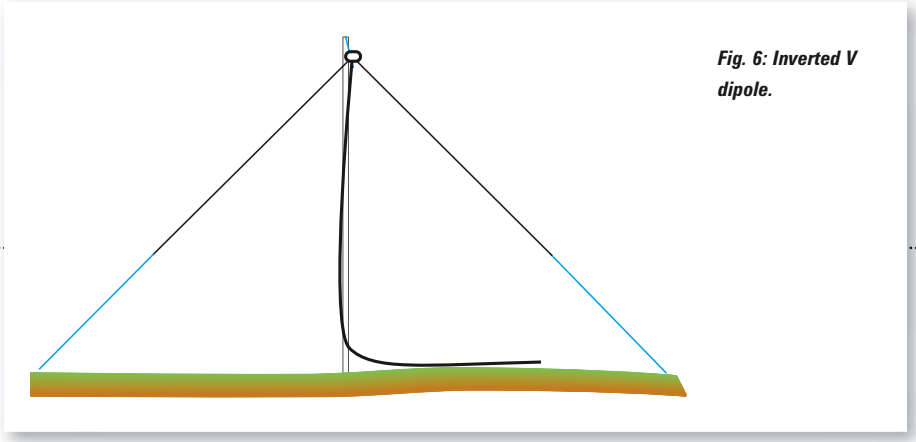

Fig. 6: Inverted V dipole.

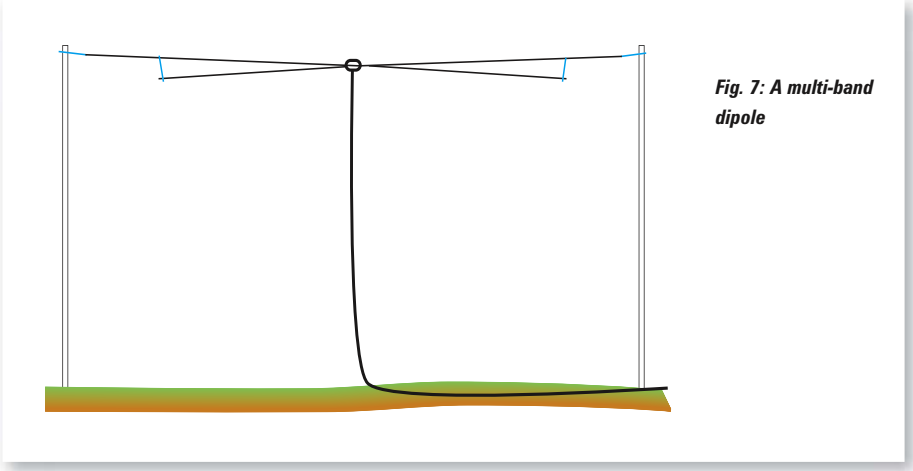

Fig. 7: A multi-band dipole

to work stations on the higher h.f. bands are not missed.

Some of the designs require two high-level supports, others just one high-level support. Many of the designs can be easily made by readers, but they're all available commercially if you prefer. I'm hoping that from the designs presented, that you will all be able to find one or more, that suits your particular location so, that you can get on the air and make some contacts on the higher h.f. bands.

The Popular Dipole

I'm going starting with the ever-popular dipole. When operated horizontally, this antenna ideally needs two high-level supports as in **Fig. 4**. I've used dipoles where one end and the centre are high and the other end is somewhat lower. Being a balanced antenna, the centre can either be fed by twin feeder, or using coaxial cable feeder with a balun. The list shown in **Table 1** presents some suggested dimensions for each 'leg' of a dipole, for each of the bands.

For the somewhat wider bands, I've offered dimensions at several points in the band, just in case you are planning to use the antenna for a specific purpose. You may need to cut up to 50mm off each leg to get the antenna to resonate in the part of the band you wish to operate. However, I suggest cutting off no more than 10-20mm at a time.

Sloper Dipole

A 'sloper dipole' is simply a dipole that slopes. One end might be fixed to the top of a building, mast or tree and the other will be close to ground level, **Fig. 5**. So a sloper can be quite useful if you only have one high-level support.

The dimensions are the same as a normal horizontal dipole. Unlike a normal dipole, the direction of maximum radiation is in the opposite direction from the feeder 'side'.

Ideally the feeder should come away from the centre at right-angles from the dipole itself for at least one-quarter wavelength. If using coaxial feeder, the braid (outer) should be connected to the lower leg. Ideally the end of the lower leg should be at least one-sixth of a wavelength off the ground.

Inverted V Dipole

If your location only permits a high support in the centre of the antenna, fear not there's a design that might suit! An inverted V dipole is an excellent antenna, **Fig. 6**, in this situation. It also has the small advantage that the length of the legs can be up to 5% shorter than a standard dipole. Again I am offering lengths to suit three parts of some wider bands.

Two For The Price of One

If you are attracted by the 'two-for-the-price-of-one' offers at the supermarket, here's a similar bargain for Radio

Band	Frequency (MHz)	Length of Leg (m)
18MHz (17m)	18.10	4.14
21MHz (15m CW)	21.10	3.55
21MHz (15m SSB)	21.30	3.52
24MHz (12m)	24.94	3.01
28MHz (10m CW)	28.10	2.6
28MHz (10m SSB)	28.20	2.6
28MHz (10m FM)	29.00	2.59
28MHz (10m Satellite)	29.50	2.54

Table 1: Suggested starting lengths for Dipole Antenna for various h.f. bands.

Band	Frequency (MHz)	Length of Leg (m)
18MHz (17m)	18.10	7.69
21MHz (15m)	21.20	6.41
24MHz (12m)	24.94	5.45
28MHz (10m)	28.20	4.82
28MHz (10m FM)	29.20	4.65

Table 2: Suggested starting lengths for Inverted V Dipole Antennas for various h.f. bands.

Amateurs with a 7MHz (40m) dipole (including a sloper and inverted V). You may be pleasantly surprised to find that a 7MHz dipole will also be quite effective on the 21MHz (15m) band.

Multi-Band Dipole

Taking the any of the designs above it's possible to combine one or more of the bands above into a multi-band antenna. The design is simply a set of dipoles, slopers or inverted V dipoles wired in parallel, so that all the bands share a common feed point, **Fig. 7**.

At first you might think that this will be difficult to match. Fortunately the lengths not being used on any particular band present a higher impedance and so can effectively be ignored, as the signal will in effect 'seek out' the antenna with the lowest impedance.

I built such an antenna for 7MHz (40m) and 24MHz (12m) a few years ago and was very pleased with the results on 24MHz. I have seen such antennas built using ribbon cable, although I'm a little sceptical about the long-term viability of an antenna using such thin wire.

Trapped Dipole

A trapped dipole is a multi-band antenna and the 'traps' (that give it the name) are in each leg are tuned circuits that present a low impedance to frequencies below their resonance point. So, on the lower band, the full length of the wire appears as the antenna, **Fig. 8**. But on the higher band the trap's high impedance effectively shuts off the outer section of wire from the signal. When buying or building traps, it's important to chose traps of the correct frequency, **Fig. 9**. It's possible to install more than one trap in each leg, and thus get an antenna that is resonant on several bands.

One nice by-product of the traps, is that the wire that makes up the inductor in the trap, effectively reduce the overall length of the antenna. So, if you are in a situation where you can't quite make a particular dipole fit, using a trapped version of your antenna might make the difference and you'll get an additional band as well!

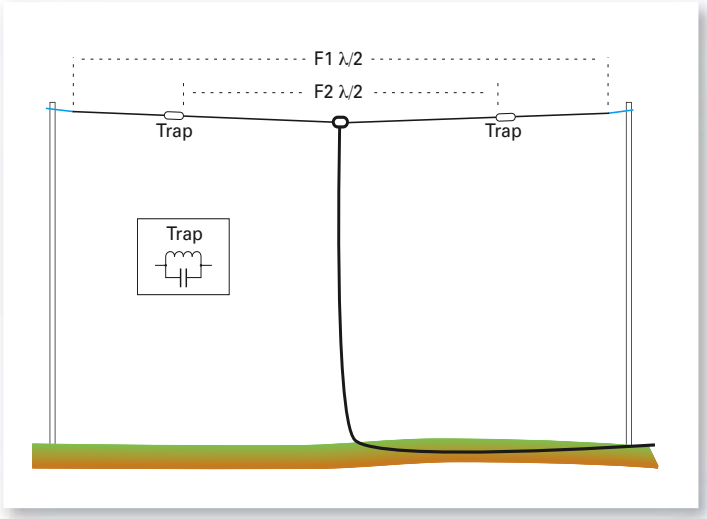

Fig. 8: Trapped Dipole: Showing the role of the traps. F1, the lower frequency makes use of the blue, the trap shown in red (which presents a low impedance) and black parts of the antenna. F2, the higher frequency uses the blue part of the antenna, whilst the trap presents a high impedance preventing most of the higher frequency r.f. from reaching the black part of the antenna. Both frequencies 'see' a resonant antenna. The feeder is shown in brown.

Trapped V Dipole

Over the years, commercial antenna manufacturers have come up with numerous antenna designs. The Comet H422 trapped dipole uses three traps in each leg of a 'V'-shaped dipole, made from aluminium, to give 7, 14, 21 and 28MHz coverage in a surprisingly compact antenna, **Fig. 10**.

End-Fed Vertical

If you're really restricted for space, then a bottom-fed vertical can be a good choice. I have been very impressed with the performance of the **Snowdon Radio Company**'s (SRC) X80 Vertical Multi-Band antenna, **Fig. 11**. At the base a 9:1 ratio unbalanced to unbalanced (Un-Un) transformer is used to bring the high impedances to a more acceptable level, **Fig. 12**.

I've used the SRC X80 on 7, 10MHz (30m), 14, 18MHz (17m) and 21MHz (15m) with success with a 100W transceiver with a built-in antenna tuning unit (a.t.u.). In a few weeks I worked five continents, and 39 countries as far apart as Uruguay, Kazakhstan, Iceland and Martinique using a mixture of upper sideband (u.s.b.), PSK31 and RTTY. The data mode QSOs were made with less than 50W.

At a price of just £47 plus £6 for UK postage and packing, I can't help feeling that this is one of the best bargains to be had in Amateur Radio. Cheerio until next month! ●

Fig. 9: A trap is just a parallel tuned circuit, however it's created.

Fig. 10: The Comet H422 rotary trapped dipole (used in a V form in this photograph) antenna for 7, 14, 21 and 28MHz. It can be used either 'flat' ordinary dipole form) or in the V form as shown.

Fig. 11: The Snowdon Radio Company's X80 Vertical Multi-Band antenna.

Fig. 12: The 9:1 ratio UnUn transformer on the X80 antenna.

Some interesting websites you might like to look at:
www.burtonarc.co.uk/dipole.htm
www.hamuniverse.com/dipivcal.html
www.angelfire.com/mb/amandx/dipole.html

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David Butler's

vhf dxer

This month David Butler G4ASR has reports of improving propagation conditions on the v.h.f. bands.

Note: *This is David G4ASR's last* VHF DXer *column. Please see* Keylines *for a tribute and information.* ***Ed.***

Welcome to the world of radio above 30MHz! Isn't it surprising how just a few weeks can make a significant change to propagation conditions on the v.h.f. bands? There was little to report during February and March with a lack of tropospheric enhancements, no auroral back-scatter openings, no Sporadic-E (Sp-E) propagation and little in the way of meteor scatter activity. There was however, a flicker of life on the 50MHz band during March with reports of trans-equatorial propagation (t.e.p.) between southern Europe and countries in deepest Africa.

Within a few weeks though, the conditions had significantly improved with 50MHz openings being reported throughout April via aurora (Au), auroral-Es (Au-Es), Sporadic-E (Sp-E), meteor scatter (m.s.) and some tropospheric enhancements (tropo) on the 144MHz and 430MHz bands. There was even activation of the large Aricebo dish on the 430MHz band that allowed low power stations to make a moon-bounce (e.m.e.) contact with the station in Puerto Rico.

Calling CQ Aurora!

The auroral and auroral-Es ionospheric modes were initiated when a sharp gust of solar wind hit the Earth's magnetosphere late on April 4th, sparking the strongest geomagnetic storm of the year so far. Indeed the event registered a 7 on the 0 to 9 K-index scale of magnetic disturbances and was the biggest event recorded since 2006. It enveloped Earth for four days with openings on the 50, 70 and 144MHz bands being reported on April 4th, 5th, 6th, 7th and 8th.

As expected the series of openings were first to be spotted on the 50MHz band. That's because ionospheric events such as Au or Sp-E always start at the lower end of the v.h.f. spectrum and as the ionisation intensifies so the maximum usable frequency (m.u.f.) tracks upwards. This shift in the m.u.f. can occur quite slowly and yet at other times can be very rapid. So it always pays to be on your guard (especially where Sp-E is concerned) and keep an ear out on the 70 and 144MHz bands in case they open up as well.

Geographically a similar state of affairs occur especially during auroral propagation. You may hear that stations in the north of England and Scotland are working DX but you cannot hear anything at your (southerly) QTH. So it's just a matter of waiting for the ionisation to intensify and as it does so, the propagation should slowly move southwards allowing some contacts to be made. Of course it doesn't always work out like that!

The station of **David Gillies MM0AMW** first detected the aurora on the 50MHz band at 2300UTC on April 4th, when he heard the beacon stations of OY6BEC (Faroe Islands) on 50.035MHz and GB3LER (Shetland Islands) on 50.064MHz both with a tone 'A' signal. However the best auroral conditions occurred during the late afternoon and evenings of April 5th and 6th.

A number of Scottish stations were active during the auroral events that included GM4DZX (IO88), GM4JPZ (IO86), GM4PMK (IO66), GM4WZD (IO67), GM4WZL (IO75), GM8IEM (IO78), GM8LFB (IO88), MM0AMW (IO75), MM0BQN (IO75), MM0GPZ (IO75) and MM5DWW (IO89). Their 50MHz contacts included the c.w. and s.s.b. stations of DK3WG (Germany), EI4EY (Ireland), G1SWH (England), LA8SMA (Norway), OY6FRA (Faroe Island Club Station, shown in the photograph **Fig. 1**), OZ6PI (Denmark) and SC3DX (Sweden) amongst others.

The auroral event also effected the 70MHz band with inter-UK contacts being reported between 1530-1700UTC on April 5th and between 1430-1630UTC on April 6th. The station of **Clive O'Hennessey GM4VVX** (Inverness IO78) running 30W into a 6-element Yagi featured in many 4m station log books. His contacts included the 70MHz stations of G4PBP (IO82), GM0USI (IO75), GW8IZR (IO73) and OZ2LD (JO54).

Clive was also very active on the 144MHz band where he runs 400W into a 10-element Yagi. He made many c.w. and s.s.b. QSOs, including contacts with the stations of G7RAU (Isle of Wight), DJ6JJ (Germany), OZ6OL (Denmark) and PA5DD (Netherlands).

The 144MHz station of **Stewart Cooper GM4AFF** (Dundee IO86)

Fig. 1: The Faroe Island Club Station OY6FRA.

Fig. 2: The 430MHz antennas at the QTH of Reg Woolley G8VHI.

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

reported making c.w. contacts with DK1FG (JN59), G4HGI (IO83), G4PBP (IO82), G8HGN (JO01), M0VRL (IO70), PA4EME (JO21) and PA5MS (JO21). Other DX stations known to have been worked from the UK during these Au openings included the stations of F6KHM (IO78), OZ1ALS (JO45), OZ2TF (JO46), PA4VHF (JO32) and SM7GVF (JO77).

Interestingly, the station of **John Wilson G3UUT** (Cambridgeshire JO02) was the only one to spot a possible Au-Es opening when he heard the OZ7IGY beacon (50.021MHz) coming in at 599 at 0958UTC on April 7th. On the other hand it could have been part of an Sp-E cloud as an opening of this type was reported between Scotland (GM) and Austria (OE) / Hungary (HA) a few minutes later.

The solar wind storm that sparked the openings on April 4th and 7th finally subsided but another coronal mass ejection (c.m.e.) hit Earth's magnetic field at approximately 1230UTC on April 11th. The impact created a G2-class geomagnetic storm with auroras being reported over Scandinavia, Scotland, Canada and the northern USA states.

This was a weaker event and very little was reported on the 50MHz band other than the beacon stations of GB3LER, OY6BEC and SK3SIX (Sweden) operating on 50.070MHz. Nothing was reported on the 70MHz band but some GM stations did hear the SK4MPI beacon (Sweden JP70) transmitting on 144.412MHz around 2300UTC on April 14th.

Sporadic-E

A total of 10 Sp-E openings on the 50MHz band were reported during April with the most intense of these on April 8th reaching up as high as the 70MHz band. The first Sp-E opening of the month (indeed the first of the summer Sp-E season) was reported on April 7th by the station of **Cris Henderson GM4FAM** (Inverness IO77) when he copied the HG1BVB beacon (Hungary 50.007MHz) around 1005UTC.

Cris also eard the OE3XAC beacon (Austria 50.066MHz) and then went on to make c.w. QSOs with the stations of HA1FV and OE3VIE both located very close to each other in the JN87 locator square.

A more substantial 50MHz Sp-E opening was reported between 1015-1245UTC on April 8th by stations as far apart as GJ0JSY (Jersey IN89) and MU0FAL (Guernsey IN89) in the south and MM0AMW and MM0BQN (both in IO75) in the north. The propagation was over a north-south path with c.w. and s.s.b. contacts being made with the stations of CT1DHM, CT1EKD, CT1ESJ, CT1IZW (Portugal), EA1HDD, EA4EOZ, EA4SG, EB4IC, EA5AMM, EA7AH (Spain), EA9AK (Ceuta, Africa) and ZB2EO (Gibraltar).

At 1100UTC and later between 1200-1230UTC 70MHz operators in southern England reported hearing the CS3BFM beacon (70.163MHz) and the CS5BFM beacon (70.166MHz). It's worth noting the significance of these callsigns as CS5BFM is in Portugal (IM59) whereas CS3BFM is located in the Madeira Islands (IM12) over 2500km distant from the UK. Not a bad distance for the 70MHz band so early in the Sp-E season!

Other openings on the 50MHz band were reported on April 9th between 1015-111UTC to Portugal, on April 17th between 1145-1230UTC to Italy and Israel, on April 19th between 1820-1845UTC to Italy and Greece and on April 20th at 0830UTC to Italy and around 2045UTC to Hungary.

All of the openings were quite short in duration so it was good to report a lengthier Sp-E opening that took place between 1515–1730UTC on April 22nd. This event enabled stations in southern England and Wales to make c.w. and s.s.b. contacts with Italian stations such as IK0FTA (JN61), I4EWH (JN64), I4ZQS (JN63), I6DVX (JN63), IK7UFL (JN71), IK7UXU (JN81), IZ7EUH (JN81) and IW8EDJ (JN80).

Other Sp-E openings on the 50MHz band were reported on April 26th between 0930-1100UTC to Portugal, Spain and Gibraltar, on April 29th around 0925UTC to Gibraltar and finally on April 30th between 1730-1745UTC to stations in Spain. Don't worry if you missed these openings as there is plenty of time to catch up!

The best months for working DX on the 50, 70 and 144MHz bands is during the months of June and July although there will be occasional openings throughout much of August on the lower v.h.f. bands. You just have to make time to be in the shack!

Trans-Equatorial Propagation

I mentioned last month that the best period to note t.e.p. on the 50MHz band is during the equinox months

of March-April and September-October. In March 2010 there were 20 days when reports were made of t.e.p. activity between Europe and countries within southern Africa.

The propagation got stronger as the month progressed and on March 27th the station of G4IGO exchanged JT65 signals with ZS6WAB and the station of G3IBI heard the low power beacon ZS6JON over a 9000km path.

During April I noted that there were 12 days when southern European stations made contacts via t.e.p. deep into the African continent. Stations located in the Balearic Islands (EA6), Croatia (9A), Cyprus (5B), Greece (SV), Italy (I), Malta (9H), Portugal (CT), Serbia (YU), Sicily (IT9) and Spain (EA) reported making contacts with TL0A (Central African Republic), TN5SN (Congo), TR8CA (Gabon), V51PJ (Namibia), ZS6NK and ZS6WAB (South Africa), Z22JE (Zimbabwe), 5N7M (Nigeria) and 9J2BO (Zambia).

It's worth noting that the following beacon stations were also heard. These included TR0A (Gabon 50.048MHz), Z21SIX (Zimbabwe 50.002MHz), ZD8VHF (Ascension Island 50.032MHz), ZS6TWB (South Africa 50.044MHz) and 9Q1D (Republic of Congo 50.021MHz). Although propagation didn't make it into the UK on this occasion, it's definitely worth keeping the beam due south next September/October time.

Tropospheric Enhancements

Tropospheric propagation is very different from the ionospheric modes of aurora and Sporadic-E that I've just described. Those ionospheric modes are always detected first at a lower frequency and as the ionisation increases so the maximum usable frequency (m.u.f.) rises. However, with many tropo modes it's often the case that the higher frequency bands are the first to be enhanced whereas on the lower frequencies there may not be a whiff of DX.

The reality of this is that you're infinitely more likely to make a long-distance tropo contact on the 430 and 144MHz bands than you are on the 70 and 50MHz bands. For example, I've made several hundred 144/430MHz tropo contacts well in excess of 1000km into Scandinavia (OZ, LA, SM) but only one tropo QSO with Denmark on the 70MHz band and none that I can recall on the 50MHz band.

Tropo conditions during April were fairly average for the time of year but there were a few v.h.f. contests during the month that helped create activity and with it the chance of making a longer distance contact.

Reg Woolley G8VHI (Northamptonshire IO82) mentions that he participated in two RSGB activity contests during April and found them most enjoyable. The 144MHz event on April 4th was quite busy with Reg making 124 s.s.b. contacts during the 90-minute contest period. Although the tropo conditions were not particularly good his best DX contacts included the stations of ON5AEN (407km), MM0GPZ/P (422km), GM4AFF (481km), PA0WMX (530km) and DF0MU at 602km.

Incidentally, these s.s.b. contacts were made using a Kenwood TS-2000X transceiver running 100W into a small 9-element DK7ZB Yagi. The 430MHz event was held during the evening of April 13th, another 90-minute session, during which the station of G8VHI made a total of 77 s.s.b. QSOs. Running 100W into an array of 4 x 23-element DK7ZB Yagis (shown in the photograph **Fig. 2**) Reg's longest distance contacts were made with the stations of PI4DEC (433km), GM4ZUK/P (495km), GM4GUF/P (505km), DF0MU (602km) and DK5QN at 682km.

The 70MHz News

There hardly seems a month go by without another new country being allocated access to the 70MHz band! Last month, I mentioned that all Estonian (ES) Radio Amateurs have received permission to use the band 70.000-70.300MHz. This month I can announce that all Romanian (YO) Radio Amateurs now have access to the band 70.000-70.300MHz with a power limit of 20W and a maximum transmission bandwidth of 12.5kHz. The decision by their telecommunications regulator was effective from April 14th 2010.

I am also hopeful that Polish (SP) Radio Amateurs will obtain permission to access the 70MHz band some time this year. A computer-translation of a news item on the Polish Amateur Radio Society (PZK) web site gives, "UKE (the Polish Regulator) took part on February 26th this year in a meeting in Warsaw to mark the 80th anniversary of PZK and the 85th anniversary of the IARU. At this meeting, a speech given by Ms. Strezynska (director of the Office of Electronic Communications) mentioned that Polish Radio Amateurs will be able to work in three new frequency bands, 5MHz, 70MHz and 3.4 GHz. Communications in these bands will be possible when the Table of Frequency Allocations is printed and this is expected soon".

Signing Off!

I first started writing this v.h.f. column in July 1989 exactly 21 years ago. My aim then was to record the DX capabilities that occur on the v.h.f. and u.h.f. bands and to inspire many of you to become more interested and to try out new techniques. I hope I've achieved that!

Unfortunately all good things must come to an end and this will be the very last *VHF DXer* that I'll be presenting. However, I think that *PW* readers are most fortunate that I am able to hand over the column into the very capable hands of my friend **Tim Kirby G4VXE**. However, I'm pleased to say that I'll be continuing my regular contributions to the *Antenna Workshop* series. So, farewell for the moment and I hope to meet up with you again sometime on the v.h.f. bands.

73 David G4ASR.

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Phil Cadman's

valve & vintage

Phil Cadman G4JCP

Greetings, fellow enthusiasts, from a much warmer *Valve & Vintage* (*V&V*) 'shop' this time. Now that the weather has improved here in the wild wastes of the West Midlands, there's no further need for any thermal insulation under my brown dust coat! Sorry I'm a month late but this was due to space problems in the June issue.

Before continuing with my valiant quest to encourage more of you to construct valved equipment, there are a few points which have arisen from my last two columns. Firstly, late last year I received a letter from **Mark Garton G8WJY** (sorry Mark, I should have included your letter last time). In it Mark mentioned several pop groups who incorporated Morse Code in their recordings, including **Kraftwerk**, **Depeche Mode** and **Joy Division**. Also the performer **Gary Numan**.

Mark tells me that he had two Philips Electronics kits when he was young, and agrees that they were very educational. In fact, it makes me wonder just how many electronics engineers owe their professional careers to those kits, and even perhaps Triang's Trionic radio kit, like the one I began with? Now that too reminds me, I received an E-mail from **Michael Neale** – now living in California – who asked if I had any information on the Trionic kit.

There's nothing (that I could find) available on the Internet, so I offered to scan my Trionic instruction book and E-mail the images to him. That I did, and I've also placed a copy on my Web site at: **www.g4jcp.freeserve.co.uk/data/index.htm**

At the same time, I also scanned a 1966 price list, which shows the spare parts available for the Philips Young Engineers electronics kit. That's on my Web site too. So, thank you Mark and Michael!

Transmissions From GBR

In my December 2009 column, I said that transmissions from **GBR**, the v.l.f. government communications station located near Rugby, had been found hidden - by accident - in commercial recordings. That prompted **Geoff Voller G3JUL** to E-mail, telling me that the story reminded him of the time when, during the 'Cold War', coded signals were suspected to be hidden within transmissions from Radio Moscow.

Similar clandestine signals may well have been contained within the transmissions from Radio Free Europe going the other way. I suppose we'll never know what precisely went on during those days – but one thing's for sure – the **Numbers Stations** are still active even today. Some things never change! Thanks, Geoff.

Amplitude Modulation On 144MHz

My reminiscences, last time, about the days of a.m. on the 144MHz band, prompted a most interesting Email from **Julian Moss G4ILO**. Julian says that when he was first licenced in the mid 1970s as **G8ILO**, his station – like many at that time – was mainly home-brew. His receiver was a *PW* valved project, designed by **Frank Rayer G3OGR**, fed via a **Microwave Modules** 144MHz converter. The transmitter – another G3OGR design – was also from *PW.* Ah, 'Mickey Mouse' converters – remember them? State of the art for us in those days!

However, time was moving on, and narrow band frequency modulation (n.b.f.m.) operation was beginning to appear on 144MHz. Initially, a varicap diode was wired across the 8MHz crystal to give (genuine!) f.m. But alas, with tempting new commercial f.m. transceivers appearing, the homebrew gear was sold off and the money put towards the purchase of a Trio TR2200. That was a six channel, 1W, 144MHz 'handbag' transceiver, a little larger than the Yaesu FT-817.

I wonder who bought Julian G4ILO's old home-brew gear? Does anyone know? It's not impossible for it to still be around. For instance, an article by **Roger Spear G4BXM**, in the **Vintage and Military Amateur Radio Society** (**VMARS**) June 2001 *Newsletter*, tells of how an interesting h.f. transmitter was found at a Louton boot sale.

The accompanying documentation – and reference to old **Radio Society of Great Britain** (RSGB) *Bulletins* – confirmed it was a prototype for the Mark 2 Elizabethan transmitter, designed and built by **Louis Varney G5RV**. The design was published in 1952 to commemorate the coronation of Elizabeth II in that year. (Hands up all those who thought G5RV's only claim to fame was his internationally known antenna!)

Actually, it occurs to me that we ought to preserve our (reasonably decent) home-brew equipment. Home constructed radio sets from the 1920s are regarded as valuable today, so who knows. In another few decades, perhaps our own humble efforts might be looked on with similar reverence? Better get polishing those front panels!

Soldering Iron Warm?

Right, I trust your soldering irons have warmed up sufficiently? This is because I now have a little 1.8MHz a.m. transmitter circuit to show you. Yet another G3OGR design, it can also cover the 3.5MHz band by changing one coil and using a suitable crystal.

By the way, I tend to feature G3OGR designs simply because they are often typical of the home-brew equipment being constructed at a particular time. So please take a look at **Fig. 1**.

The circuit, which was published in the February 1968 issue of *PW*, with a matching v.f.o. appearing the following month. It's very simple and could be made very compact, as an accompanying photograph showed. In fact, its 6 x 5 x 3 inch dimensions (152 x 127 x 76mm) are similar to those of the Trio TR2200 transceiver I mentioned earlier. Of course, those

Phil Cadman
G4CJP
21 Scotts Green Close,
Scotts Green,
Dudley,
West Midlands DY1 2DX
E-mail:
phil@g4jcp.freeserve.co.uk

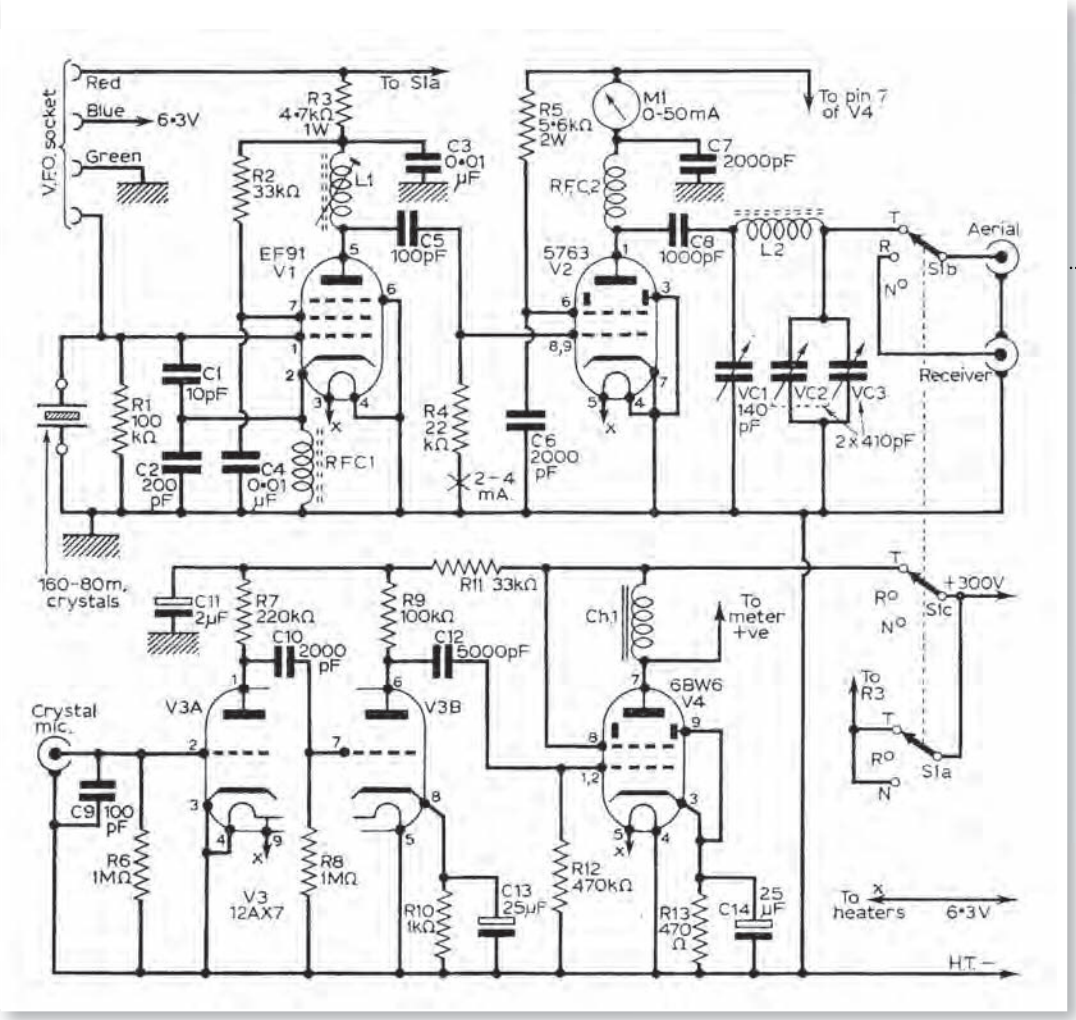

***Fig. 1: The Frank Rayer G3OGR 1.8MHz transmitter circuit, that first appeared in the February 1968 issue of* PW.**

dimensions do not include a power supply, which would have been of a similar size.

The G3OGR design can be built readily today, and its simplicity may just prove an antidote to the complex digital modes and transceivers we're becoming used to. No need for a Cray supercomputer to receive transmissions from this little rig! However, before you start chassis-bashing, there are a few points I need to mention.

First, the power amplifier (p.a.) valve V2: you can use a 6BW6 here, the same valve type as in the modulator (if only because it's cheaper than a 5763). By the way, the 6BW6 is electrically the same as the 6V6G/GT but with a B9A base. There's also a B7G version in the 6AQ5 (maximum ratings are a little lower, that's all), and there are even other versions which differ only in respect of their heater voltage.

Both the radio frequency chokes (r.f.c.) RFC1 and RFC2 are specified as 2.5mH types. A modern miniature type will be okay for RFC1 but it's better to either find a 'proper' valve type for RFC2, or else wind your own on a bit of ferrite rod.

In fact, G3OGR uses a ferrite rod as the former for L2, the p.a. pi tank coil. Normally this coil would be a rather large air cored affair, but to keep the size down to a minimum, 20 turns of 22 s.w.g. wire around a two inch length of 3/8th inch diameter ferrite rod is suggested in the original article.

The only coil which may cause trouble is L1: it's given as an Osmor type QA5. I've found that this is a Medium Wave aerial coil which, I assume, is self-resonant around 1.9MHz. To operate the transmitter on 3.5MHz, 70 turns should be taken off this coil.

The inductance of the QA5 is nominally 180uH, so that would make the self capacity of the coil 39pF for it to be resonant at 1.9MHz. So, either try a surplus Medium Wave aerial coil (you may need to add a small parallel trimmer capacitor), or wind a coil yourself using published coil design charts. Make it about 150μH and tune it with a 50pF trimmer.

Note: Do take note of the voltages involved – don't forget it's in the anode circuit. Safety first!

Choke Modulation

The p.a. uses what's known as **Heising** or **choke** modulation. This is reputed to be the earliest method of generating an amplitude modulated transmission. It only needs a choke capable of carrying the combined anode and screen currents of V2, plus the anode current of V4.

The disadvantage of Heising modulation is poor efficiency and lack of adjustment in matching the modulator to the p.a. In addition, the circuit as shown is incapable of 100% modulation. Nevertheless, it's preferred here because of its simplicity and small space requirements.

The anode coil L1 (or its associated trimmer, if one is needed) should be adjusted to give maximum grid current as measured at the lower end of R4. By the way, rather than disconnecting R4, it's easier to wire a 1kΩ resistor between the earthy end of R4 and **the 0V rail**. Connect a 1nF capacitor across this resistor and then the p.a. valve's grid current can be checked at any time simply by measuring the voltage across this RC combination. The reading will be 1V = 1mA, and so on.

Tune the pi-tank in the usual way: begin with VC2/VC3 at maximum capacitance and tune VC1 for a dip in anode current. Then gradually open up VC2/VC3 (while adjusting VC1 for a dip) until the required anode current is drawn. With the specified 300V h.t. don't exceed about 30mA. The 5763/6BW6 will stand significantly more than this but you won't be able to get enough

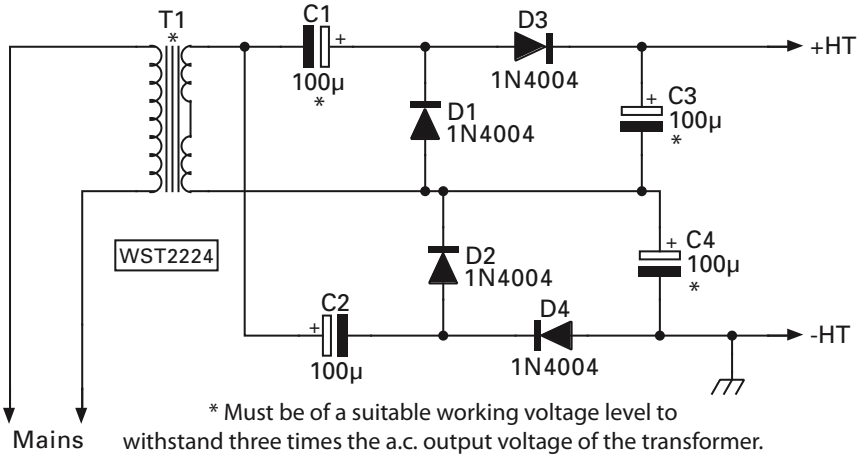

Fig. 2: The voltage quadrupler circuit which Phil G4JCP prefers to use. Starting with a 36V to 50V secondary, an off-load output of some 200–300V should be available, but it will fall relatively quickly under loading.

modulation depth, so stick to 30mA.

On the subject of power supplies, if you haven't got a suitable h.t. transformer, then an l.t. transformer plus a voltage quadrupler may be a cheaper – and safer – option. The circuit shown in **Fig. 2** is the arrangement I prefer. It's two half wave voltage doublers connected in series, both sharing the same winding on the transformer.

The transformer T1 needs to have a 36V to 50V secondary (or 18-0-18V to 25-0-25V), and the capacitors should be 220µF (minimum) at 100V working. Four 1N4004 (or better) silicon rectifiers will be fine for the diodes. I also think it's prudent to put a 1A anti-surge fuse in series with the secondary winding.

Even if the transformer itself has good regulation – a 30VA rating or more is preferred – the output voltage from a quadrupler will drop significantly as more current is drawn. That shouldn't be a problem here as all the valves draw a steady current when the transmitter is operating correctly. That is, no overdriving the modulator. Oh, and despite the specified 300V h.t. rail, the transmitter ought to work down to 200V h.t., but with reduced input, of course.

Now, I realise that I keep pushing these simple a.m. transmitters – but they really are quite easy to make. And anyway, the idea is to experiment and enjoy yourself! Whether you get across the street, across town or across the country, you'll have the satisfaction of communicating using a transmitter you've made yourself.

Thinking about it, little transmitters like this one were often used mobile, sometimes with a 1.8MHz receive converter feeding a normal car radio. The base loaded whip with a huge coil was a dead giveaway! Who's for /M operation?

High Level Modulation

I've said that Heising modulation is simple but not particularly efficient, but it is one form of **high level** modulation. That is, the modulating signal varies the anode voltage on the p.a. valve. There are other modulation techniques where the anode voltage is kept constant and the voltage on a different valve electrode is varied in sympathy with the modulating waveform.

One of these so called efficiency modulation technique is where the voltage on the suppressor grid of a pentode valve is varied. Briefly, the p.a. stage is adjusted for full output as if it were for c.w. operation, then the voltage on the suppressor grid (g3) is made negative so that the anode current falls to half its c.w. value.

The modulating waveform is then impressed on the suppressor's negative bias. The famous RAF T1154 transmitter uses two parallel connected, suppressor modulated VT104/CV1104 (GEC commercial type PT15) valves driven this way.

However, suppressor modulation isn't common. And although in principle any pentode valve can be used, in practice only a few valves are amenable to this modulation technique. Checking through my data, it seems all the suitable valves were specifically designed that way. Their data sheets always mention suppressor modulation and give typical operating conditions. And they're all old types, dating back to the 1940s and before.

I've not come across a 'normal' pentode valve used in this way, so I wonder if anybody has experimented with suppressor modulation using modern valves? Clearly the choice is limited to genuine pentodes (not beam tetrodes, for example), and the suppressor grid (g3) must be brought out to a separate pin. Valves like the EL84, while being a true pentode, are not suitable because their suppressor grid is connected internally to their cathode.

Question Time!

Now before I 'throw the big switch' (nowadays it's more like 'press the little button'), I have a couple of questions for you. A *PW* reader has found an old photograph of a local radio shop. Above the front door are the letters **AIPRE** (there may be an additional 'S' on the end). They must have something to do with radio or radio dealers, so does anybody know what the letters stand for?

And here's one of my own queries: can any reader provide me with some information about a gentleman by the name of **Norman Preston Vincer Minter**? He used to contribute construction articles to *Wireless World* in the 1920s. Any help with these questions would be much appreciated – thank you!

Do please get in touch either via E-mail to: **phil@g4jcp.freeserve.co.uk**, or by mail to: **21, Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX**.

73 Phil

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tune in: to life

Carl Mason's

hf highlights

Carl Mason GW0VSW presents his monthly round up of your activities on the h.f. bands as conditions improve.

As usual, information, reports and photographs to me by the 15th of each month please.

Welcome to where we report what's going on in the world of high frequency operating! Well band conditions did improve recently and have been very good at times with openings throughout many days. However, as I write this column there is only a limited amount of activity mostly on the 7 and 14MHz bands.

Currently (as I write this) there are no sunspots and with propagation being variable still, hopefully things will improve again soon. You can keep up to date on the latest space weather conditions and predictions at **www.spaceweather.com/** and a summary of the latest calculated h.f. conditions by band can be found on the home page of the DX Summit at **www.dxsummit.fi/**

The DX News

Space is tight this month so straight on to the DX News now and to Australia where the special callsign **VK100WIA** will be aired until October 31st to celebrate the 100th anniversary of the **Wireless Institute of Australia** (WIA). The celebration is in recognition of the foundation of the WIA and the very start of organised Amateur Radio in Australia during 1910.

The callsign is helping to focus attention on the early history of Amateur Radio in Australia as, prior to the Wireless Telegraphy Act of 1905, there was no real regulatory control of the radio spectrum in Australia, although early demonstrations and experimentation began in the late 1890s. All contacts will be confirmed via the bureau and further information can be found at **www.wia.org.au**

Next, active from Japan will be three calls **8J1P**, **8J4P** and **8J6P** licensed to the **Japan Amateur Radio League** (JARL), which will be active on various bands and modes until the end of June. This is to celebrate International QRP Day, which Region 3 Societies help to promote "the IARU objectives for QRP operation" on June 17th each year. The QSL route will be via the individual operator's instructions and more information is at **www.iaru-r3.org/news/QRPday.htm**

Back to Europe now, where a team of Belgium Amateurs will be operating both c.w and s.s.b. from the Chausey Islands EU-039 between July 23rd and 26th during the IOTA Contest as **TM7T**. This is a group of small islands, islets and rocks off the coast of Normandy lying in the English Channel (la Manche 'the Sleeve' in French). They will be active before and after the event using F/Homecall and the QSL is via ON7EQ direct or via bureau. Further details of this years IOTA contest which always takes place over the last 'full' weekend of July can be found at **www.rsgbcc.org/hf/iota.shtml**

Carl Mason GW0VSW
2 Golwg-y-Bryn
Woodland Road
Skewen
Neath
Port Talbot SA10 6SP
Tel: (01792) 380882
E-mail: gw0vsw@btinternet.com

Your Reports

On to your reports now and the first is from **Bill Ward 2E0BWX** in Edwinstowe, Nottinghamshire who used PSK31 again with an Icon IC-7400 at 25W to a Diamond CP-6 vertical antenna to work the 7MHz band. Bill logged contacts with DL3HQ (Germany) 0835, LA9UJ (Norway) 1010, ON3WLS (Belgium) 1022, UX7QL (Ukraine) 1855, IW2KOY (Italy) 1922 and OE1ZKM (Austria) 2025UTC.

Llanfairtalhaiarn, near Abergele North Wales is where **Tony Tuite GW0NSR** lives. Tony moved into his new home a year ago and looked forward to operating some h.f. with his favourite 'proven' antenna, a 3.5MHz (80m) dipole erected at about 12m above ground. However, he did not count on a complaint from his neighbour who claimed Tony's 16s.w.g. wire 100ft from his boundary was spoiling his view! (Must have been to Specsavers!) So down the dipole came.

Resigning himself to wire located on top of his fence Tony remembered an article that had appeared in an edition of *Sprat*, the magazine of the G QRP Club, which had described 'Slinky' antennas*.

Tom Kelly EA/EI2AJ operating QRP on 14MHz from Spain.

4S7BRG QSL for Mike Dwyer 2E0BTK for a PSK contact on 14MHz

F8NUH QSL worked by Geoffrey Powell M1EDF on 10MHz c.w.

KP2/NE1RD QSL worked by Tom 2I0JTR on 14MHz s.s.b.

PP1CZ QSL worked by Eric Masters G0KRT on 21MHz c.w.

FG1PP worked by Peter Lowrie MI5JYK on 14MHz s.s.b. QRP

A quick trip to a local toy shop and a few hours later three of these coiled spring toys were fashioned into a 6m long helical dipole centre fed with 300Ω feeder and suspended on a strong cord from the ridge of his bungalow's roof. Not expecting the antenna to work Tony was pleasantly surprised to hear and work DL1NFF (Germany) 1501, LZ3LD (Bulgaria) 1916, IN3IYD (Italy) 1955, LA9GHA (Norway) 2003, EA1SU (Spain) 2010 and F5TKP (France) at 2030UTC with c.w. and running just 16W. Tony's success showed that with just a little ingenuity you can get operating on the h.f. bands and at little cost!

Also featured (various versions) by John Heyes G3BDQ in* PW's Antenna Workshop*). **Ed.*

Someone else experimenting with antennas was **Peter Lowrie MI5JYK** in Newtownabbey, Northern Ireland who said, "I have been playing about with linked dipoles covering the 7, 14 and 21MHz bands to use over the summer for a spot of portable work. I soon realised that it was a chore to drop the mast to change bands although proof of concept was achieved. I then scrapped the linked dipoles and put up two mono-band inverted Vs for the 7 and 14MHz bands."

"The 7MHz one has its apex at 30ft with the 14MHz one further down the portable mast at right angles to the other so that both dipoles act as guys. Both worked really well and although I haven't had much joy using the 7MHz one on 21MHz in the 'V' configuration."

Peter's 7MHz log included s.s.b. contacts with V25Y (Antigua & Barbuda) NA-100 at 0805, K1LZ (USA) in Natick, Massachusetts at 0813, CQ8X (Azores) EU-003 at 0847, OY6A (Faroe Islands) EU-018, VX3AT (Canada) in Islington, Ontario at 2345 and EB8AH (Canary Islands) AF-004 at 2356UTC. All were achieved using a Yaesu FT-817 and just 5W.

The 7MHz band also provided **George Davis G3ICO** in Mudford, Yeovil with a few QSO, such as HF80PZK (Poland) a special call celebrating the 80th anniversary of the establishment of the **Polish Radio Amateur Association (PZK)** at 0803 (QSL via SP5PSL). Then came CT3FT (Madeira Island) AF-014 at 0814, PI65AAG (Netherlands) 1512 (QSL via PA3BNT). Next into the log came TM7CC (France), an operation from Ouessant Island EU-065 at 1520 (QSL via F9IE). Finally, Peter worked OL1AMPER (Czech republic) at 1956UTC made it into his log. Peter was using an Elecraft K2 at 10W to 40m long doublet antenna.

Mike Dwyer 2E0BTK in Wilmslow, Cheshire used a Yaesu FT-897D with LDG AT-100Pro auto tuner and a home made 'Cobweb' antenna to work on 10MHz. And operating with PSK31 he logged SP2WED (Poland) 1852, LY2CG (Lithuania) 1859, EA3HBG (Spain) 1901, SM2EKA (Sweden) 1916UTC.

The 14MHz Band

On the 14MHz band Mike 2E0BTK found RU3WR (European Russia) 1928, 4S7BRG (Sri Lanka) 1934, DB7HH (Germany) 2038, OE6SQD (Austria) 2110 and WB4MNK (USA) in Port Orange, Florida at 2151UTC.

Meanwhile, George G3ICO worked YI9PSE (Iraq) 1035, LY20INDP (Lithuania) celebrating 20 years of the Independence of Lithuania at 1127, VO3A (Canada) 1358, K3MD (USA) in Winfield, Pennsylvania at 1451 and LZ132GO (Bulgaria). This is a call to commemorate the 132nd anniversary of the re-establishment of Bulgaria as independent country at 1926UTC (QSL via LZ1ZF).

Peter MI5JYK used QRP s.s.b. again to work 5D5AB (Morocco) 0730, T77GO (San Marino) 0753, VP50V (Turks & Caicos Islands) NA-002 at 2227 and FG1PP (Guadeloupe) NA-102 at 2235UTC.

In Little Milton, Oxford **David Bambrook 2E0DAB** found the band "in fair shape" and logging s.s.b. stations RW3XZ (European Russia) 0854, S59AKR (Slovenia) 0917, E73EPA (Bosnia & Herzegovina) 0937, SQ1EIA (Poland) at 1100. Then came AI2C (USA) in Leesburg, Virginia at 2135UTC and all QSOs were achieved using a Yaesu FT-747GX and 50W to a loft installed dipole for the band.

Now it's on to **Tom Ruddell 2I0TJR** in Portadown, County Armagh who has been enjoying a short break that gave him more time to operate on h.f. His 14MHz log included YB4IR (Indonesia) 1548, VE6BBP (Canada) 1725, ZS6RF (South Africa) 1821, ZP8VAO (Paraguay) 1955, 8P6FX (Barbados) NA-021 at 2054, V21ZG (Antigua & Barbuda) NA-100 at 2153. Then he logged J38CW (Grenada) NA-024 at 2200, VP5/W5CW (Turks & Caicos islands) 2210, CE3PG (Chile) 2213 and KP2/NE1RD (Virgin Islands) NA-106 at 2220UTC.Tom was running a Kenwood TS-570DGE with 50W to a home-brew vertical antenna for the band, mounted 3.5m above the ground.

Tom said, "I hope this further illustrates what can be achieved using relatively low power and simple vertical antennas. How many times have you heard verticals described as dummy loads? Verticals can't compete with mono-band beams on high towers, but they do work. And if you are on the right frequency at the right time before the pile-ups start, they can be very effective when there are good conditions."

Down in Cambridge, New Zealand **Peter Leng ZL4TE** has been trying various modes this month using

ZS6RF worked by Tom 2I0JTR on 14MHz s.s.b.

HF80PZK QSL worked by George Davis G3ICO on 7MHz c.w.

his Yaesu FT-1000MP MkV with an interface from G3LIV, software from Ham Radio Deluxe with a Cushcraft AV-3 vertical antenna and up to 500 watts. His log includes s.s.b. stations CR1Z (Azores) EU-003 at 0838 QSL via SP5UAF, SJ2W (Sweden) 1023, M0HKB Keiron in Ipswich at 1115 and ON7CD (Belgium) 1140 while PSK31 found RX0AT (Asiatic Russia) 0108, CX7BBR (Uruguay) 0120, RA3PKV (European Russia) 0506, EA5XC (Spain) 0800, KE6MGW (USA) in Dallas, Texas at 0830, JH1EEB (Japan) 0848, IK1BXN (Italy) 0857 and RTTY found VK7AD (Australia) in Margate, Tasmania at 0951 and FO5QB (French Polynesia) 0854 and SSTV worked FK1TK (New Caledonia) OC-032 at 0735, EA5FO (Spain) 0827 and UA0LIH (Asiatic Russia) at 0954UTC.

Next, we come to someone – John Wakefield M0XIG – who was busy Operating the Special Event Station **GB2TT** 'Townhill Telegraph' from the Hampshire County Cricket Ground (*The Rose Bowl*). John made 459 contacts over a four day period with most of these coming from European stations. John commented, "Sunspots were low or non-existent and conditions generally were poor throughout the day." Some station who make it to John's 14MHz s.s.b. log were SV1GRJ/8 (Greece) 0710, ZL1BD (New Zealand) OC-036 North Island at 0732, 9H5PC (Malta) EU-023 and at 0742, RX9WN (Asiatic Russia) at 0757.

Then came LY4Y (Lithuania) 0810, TF3IG (Iceland) EU-021 at 0858, CN8GR (Morocco) 0913, 5B4AIX (Cyprus) AS-004 at 0945. HE managed a transatlantic QSO with KG8CZ (USA) in Cumberland, Ohio at 1041, then over to 4Z5KV (Israel) 1105, and back across the pond to VE3OWV (Canada) in Kinburn, Ontario at 1113. Finally, there was TL0A (Central African Republic) at 1122UTC.

As in earlier operations, John used a Yaesu FT-1000MP MkV, ACOM 1000 linear amplifier and Comet H422 antenna in a 'V' configuration at 7m from ground (slightly higher than normal) for propagation in an East/West direction.

Operating while on holiday in the South of Spain was **Tom Kelly EA/EI2AJ**. Using his Yaesu FT-817 running 5W to a WS Multi Ranger 9 (Mobile whip) clamped to a balcony rail of the apartment. Tom said, "Although conditions weren't great I did manage some 'mid morning' QSOs using c.w. which included David GW3TYI in Swansea, HA5JI (Hungary), OK2BHS Czech republic), DL3A0 (Germany), LY2J (Lithuania), TM7CC (France), LA9LE (Norway), I5QNJ (Italy) and ON5SY (Belgium) between 1030 and 1200UTC.

The 18, 21 & 24MHz Bands

On to 18MHz now and a first report from **David Harrison G0FXD** in Malvern, Worcestershire who said, "This is my first report to *HF Highlights* and I'm extremely pleased to say that I was able to have a short QSO with Takanori Chiba JA7BXS (Japan) AS-007 at approximately 1040UTC. He was able to give me a signal report of 44 and at the time there were many Amateurs wishing to speak to him. I have a very modest station here which includes an Icom IC-718, running 90W into a G5RV in inverted 'V' configuration with the feed point being some 25 feet in the air. I have no doubt it was his station that was doing most of the work. Nevertheless, this was one of the furthest contacts made by me since gaining my Class A licence in 1986". Well done David!

The 18MHz band was also used by **Robin Trebilcock GW3ZCF** in Bishopston, Swansea who said, "There is very little to report this month as band conditions have been poor lately" Using an Icom IC-756PRO and 40W to a 40m horizontal loop, Robin worked the usual European stations as well as KE4EX (USA) in Shackelfords, Virginia at 1704 and VP8NO (Falkland Islands) SA-002 for a new country using PSK at 1730. Then, after moving to the 21MHz band – where there was a short opening one afternoon that allowed CU7AJ (Azores) EU-003 at 1731, J38CW (Grenada) NA-024 at 1724 and K4VAE (USA) in Plantation, Florida at 1809UTC.

Also active on 21MHz was **Eric Masters G0KRT** in Worcester Park, Surrey who used a Kenwood TS-570 at 100W and home-brew modified W3EDP antenna 84 feet long with counterpoises. These were tuned with an SGC SG-230 auto tuner and Eric completed c.w. QSOs with AI2N (USA) in Oswego, New York at 1719, VE3EJ (Canada) in Grasse, Ontario at 1719 and PP1CZ (Brazil) at 1951 while s.s.b. produced 3V8SS (Tunisia) 1210, 5B/US8ITL (Cyprus) 1542 and TA7KA (Turkey) at 1551UTC.

Finally, George G3ICO managed c.w. QSOs with YB1ALL (Indonesia) 1410, 5S1S (Madagascar) AF-013 at 1421 and 7Z1HL (Saudi Arabia) 1449 while using s.s.b. Eric G0KRT tried 24MHz and found 5B4AIX at 1142, I0IFO (Italy) 1539 and a new country TL0A (Central African Republic) at 1613UTC.

Signing Off

It's signing off time now and although, unfortunately, the bands seem to have been very poor again this month – although most reporters have found some DX to report.

I'd also like to take this opportunity to thank all those who telephoned or E-mailed to enquire about the power level used by **Geoffrey Powell M1EDF/M3UXB** in his report which appeared in the May column. I should say that Geoff was not in breach of his licence conditions as his callsign should have read **M1EDF** not M3VAM as written – so I offer my apologies for any confusion caused.

My thanks to all our reporters and to **Maurio Pregliasco I1JQJ/KB2TJM** Editor of the *425 DX Newsletter* for all the DX information. Until next month I wish you all good DX.

73, Carl GW0VSW

Harry Leeming's

in the shop

This month Harry Leeming G3LLL looks at some annoying faults and provides some clues on how to find them.

Welcome to *In The Shop* (*ITS*) – where I remember my days in the trade and where I'm starting by remembering a potentially damaging fault that **Fred** reported in an E-mail, when he was having trouble with his FT-401. He reported that when he pressed his push-to-talk (p.t.t.) or Morse key and increased the drive, the pilot lamps dimmed, but the front panel I/C meter did not indicate any increase of power amplifier (p.a.) current.

Fred's reported fault is a pretty common problem with valved transceivers, which if not recognised can cause a lot of damage. Despite the reading on the meter, it can be taken that when the lamps dim, the p.a. valves are passing a lot of current – the problem being that although the current is flowing, but the meter isn't indicating it. If you own a rig like this and the same symptoms appear, reduce the drive to minimum, and you will then notice that the standing current of around 50mA (0.05A) is not registering either.

If the meter works okay as an S-meter on receive, then it's obviously not faulty and there are two main possibilities. Firstly the IC/ALC/PO switch on the front of the rig may not be making contact (Or it has been left in the wrong position!). Or secondly, the transmit-receive relay that switches the meter from its use as an S-meter on receive, to a current meter on transmit, may not be making contact.

To check the rig, 'wiggle' the I/C switch whilst it's in the transmit mode at minimum drive and see if the meter then starts to indicate the standing current. If this fails try tapping the relay and flicking the p.t.t. One way or the other, you should then usually get a reading on the meter. Once you have established as to where the problem lies, you should clean the offending item.

The slide switch is best cleaned – **believe it or not** – with WD40 penetrating fluid, while it's in situ. The relay should be unplugged and the cover removed. Obtain some sparking plug feeler gauges, and draw these through the contacts whilst applying a cleaning fluid, such as Aero-Klene 50, which does not contain a lubricant that's obtainable from Maplin.

In 95% of cases following the above procedure should result in a cure. If this fails, measure the small voltage that appears on the cathode pins of the output valves in the transmit mode at minimum drive. You should then be able to follow this voltage through the switching and relay wiring to the meter and then find where it disappears.

Computer Monitor Resurrection

Most men like to show off, (I'm not expecting to be deluged with letters from lady readers disagreeing with that!) and we all have our favourite party pieces! At the shop, we sold among other things the odd second-hand computer monitor and occasionally one would be returned with a large 'splodge' of unwanted colour on the screen.

When faced with such a such monitor I would connect it, look at the picture, agree with the customer that all wasn't well and then plug in an electric drill. This was switched on, and while watching the look of surprise or horror on the customer's face, I approached the screen with the drill.

Of course, the picture on the screen went wild due to the magnetic field of the drill. However, as I 'wiped' the screen and then drew the drill away, the unwanted band of colour disappeared, and the monitor was returned in good order.

What happened to cause the problem originally? The answer is that a monitor's cathode ray tube screen is covered with millions of coloured dots, at the back of which is a fine mesh, the 'shadow mask'. This is critically aligned so that the red, green and blue electron guns at the rear, can only hit their own colour of dot.

If the shadow mask, or any part in the vicinity of the tube becomes

Fig. 1: Using a drill can be a useful tool to fix colour 'splodges' that sometimes appear on older, but otherwise still useful monitors. But it is a 'non-contact' fixing method! My screen (shown) survived the drill treatment!

Harry Leeming G3LLL
The Cedars
3a Wilson Grove
Heysham
Morecambe LA3 2PQ
Tel: (07901) 932763
E-mail: G3LLL@talktalk.net

Fig. 2: One intermittent fault with an FT-747, caused its owner to ask 'How much do you charge an hour Harry?"

magnetised the beam alignment is thrown out, and the beams hit the wrong dots. The purity of the colours is then degraded-hence the coloured splodge.

Early colour TVs were so sensitive to magnetic fields that even the magnetism of the earth upset them. They had to be finally aligned and tiny 'purity' magnets adjusted once the set was installed in a customer's house. More modern cathode ray tube (c.r.t.) TVs and monitors, have an automatic de-gausser built in, which is intended to neutralise any unwanted magnetism. In most cases this is in operation before the picture itself appears after a 'cold' switch-on.

Sometimes the automatic system isn't powerful enough and needs a little help. But as not everyone has a de-gausser in their tool kit, a substitute is required. A powerful mains operated electric drill, has a very strong external magnetic field, which is reversing at mains frequency. If you switch the drill on a few feet away from the monitor and then bring it near to the screen, the tube will be alternatively magnetised north/south, and then south/north 50 times a second.

Gradually draw the drill away, and as the magnetic field reduces, so will the unwanted residual magnetism in the monitor. (A similar idea, on a much larger scale, was used to de-magnetise ships during the Second World War, to stop them setting off magnetic mines)

I must emphasis that whilst this trick has always worked for me, it's only to be tried when all else fails! Don't get too enthusiastic with the drill, and let it come near to the rear of the tube – as it would then be possible to demagnetise some of the purity magnets!

Incidentally, you may think that c.r.t. monitors are 'old hat' nowadays. Despite this, I'm typing this onto my computer while watching using a 19in NEC c.r.t. monitor that I picked up for £15 at a charity shop and I much prefer it to my previous flat screen model, **Fig. 1**!

Power Output Tests

After repairing a rig, one of my final tests was to check the power output. For some reason the FT-901 that I had just finished would only deliver about 65W and I tried a few moves, such as swapping the output bottles but it was no go. I then started checking voltages and they all seemed to be rather low, but there was no obvious reason!

Eventually 'the penny dropped' and I checked the mains voltage. For some odd reason I found that it had dropped to well below 220V – no wonder the power output was low. I managed to step up the voltage using a transformer but after struggling on like this for a few days I gave the electricity supplier a phone call. Within a few hours they had corrected the situation. That was years ago – now I would have nothing to complain about.

As most readers are probably aware, the standard mains voltage in the UK was 240V ±6%. However, there had been moves for many years to standardise the mains voltage throughout Europe, and as a compromise it was decided that the voltage within the EEC would be 230V.

Now while this sounded a good idea, it was likely to be an expensive project. Just think of the tens of thousands of substations that would have to be adjusted, a lot of people were going to have to work overtime, and perhaps in some cases new transformers would be required. But then the bureaucrats solved the problem.

Without the need for a single adjustment, at the stroke of a pen, the mains voltage throughout the EEC became 230V overnight! Their magic? With the stroke of a pen, they merely widened the tolerance to 230V +10-6%! From now on then you can be sure that anywhere in the EEC the voltage will be (or at least should be) somewhere between 216 and 253V. Now wasn't that clever way to solve the problem? Or was it?

Nothing has changed as most of us in the UK are still get around 240 volts and the rest of Europe 220 – but on paper the mains voltages are harmonised. Any new equipment made in, or imported into, the EEC has to be set at 230V and must of course be designed so that it will function – not getting too hot, on any voltage supply within the stated limits.

Note for our Continental friends: Please don't plug your FT-101 set on 220V into a UK mains socket without checking the voltage with a meter first. It might not like having 253 volts applied to it and our friends at Brussels will not buy you a new one!

Intermittent Faults

Let's look at intermittent faults now and here, I was asked "How Much do you charge an Hour Harry?" The question arose, as an FT-747, **Fig. 2**, came in which occasionally went almost dead on either receive or transmit. Touch it, move it, or re-key the microphone and it was then okay then for a few more hours. So, I re-soldered various connections, and several times I was sure that I had cured it but every time I returned it to the customer – within a couple of weeks it would be back again!

Leaving the rig in a 'fridge, or blowing hot air on it from a hair dryer would sometimes trigger the fault. In fact, I eventually managed

to established that the signal was disappearing in the vicinity of the crystal filters.

On the '747 there's a separate board that's mounted over the main circuit board, which looks like something of an 'after thought' and which contains an a.m., c.w., and an s.s.b. filter, along with the necessary diode switching, as per **Fig. 3**. I suspected that something was wrong with the switching, and so I left a meter measuring the voltage at point **X**, which from memory I think was about 1V.

After a few hours the rig went dead, and a glance at the meter showed that the reading had increased by a few volts. An increase of voltage indicated that current was no longer flowing through the switching diodes, and down to chassis via R01 and L01, hence the diodes were switched off, making the set dead. This indicated that R01 and L01 were no longer connected between chassis and the diodes, but of course as soon as I tried to check, the fault cleared again.

A careful examination of the board revealed two things. One that L01 and R01 and also their 'twins' on the other side of the filter were reversed, so that the resistors and not the chokes were at the earthy end of the chain, and two that as they relied on a 'plated-through' connection to make their contact. I suspected the plated-through connection (see later) as being the source of the trouble

I ended up wiring L01 and R01 directly between the pin on J01, and the earth plane of the printed circuit board (p.c.b.), and to make really sure, did the same with L02 and R12. The set never failed again!

So what did I charge? Prices have increased somewhat since I was in business, but I then aimed at around £25 an hour. I reckoned that I had spent around 15 hours on this job. So does an invoice "To soldering and remaking four connections £375 + VAT", sound reasonable, No ? Well I obviously charged a lot less – but as this has since proved to be quite a common fault with the '747, I have been able to recoup my loss by charging other customers with the same fault for my knowledge and experience!

Experience and knowledge are worth money! How about Google? Started by two university students in a bedroom, **it gives away free access to other people's knowledge and experience – including even mine!** By doing so it has somehow managed to become one of the richest companies in the world. It makes you think!

Plated-Through Connections.

Finally, let's take a look at plated-through p.c.b. connections. As you will appreciate, if it's necessary for conductors to crossover each other, this cannot be done using tracks on the same side of a printed circuit panel. To get over this problem both sides of the circuit board can be used (a double sided p.c.b.), but then it's necessary to make connections between the tracks on the opposite sides. There are various ways of doing this – and all of which can cause intermittent problems.

A component such as a transistor or a resistor can be mounted so that its connections are soldered on both sides of the board. This is difficult, the top side of the board cannot then be flow soldered in a bath of hot solder without destroying the components. So it has to be hand soldered, with the risk that the operator will make a dry joint.

Similarly a pin can be soldered into the board to make the connection, but as owners of the FDK-750 found out, this can also result in dry joint problems. The best way, as used on many modern double sided p.c.b.s, is to use plated-through connections. Here the tracks on both sides are connected together through a hole, as part of the circuit board manufacturing process. Even these are not 100% fool proof, (what is?).

Finally, I get quite a few requests for a source of touch-up paint for the older equipment, has anyone any suggestions? Cheerio until next time! ●

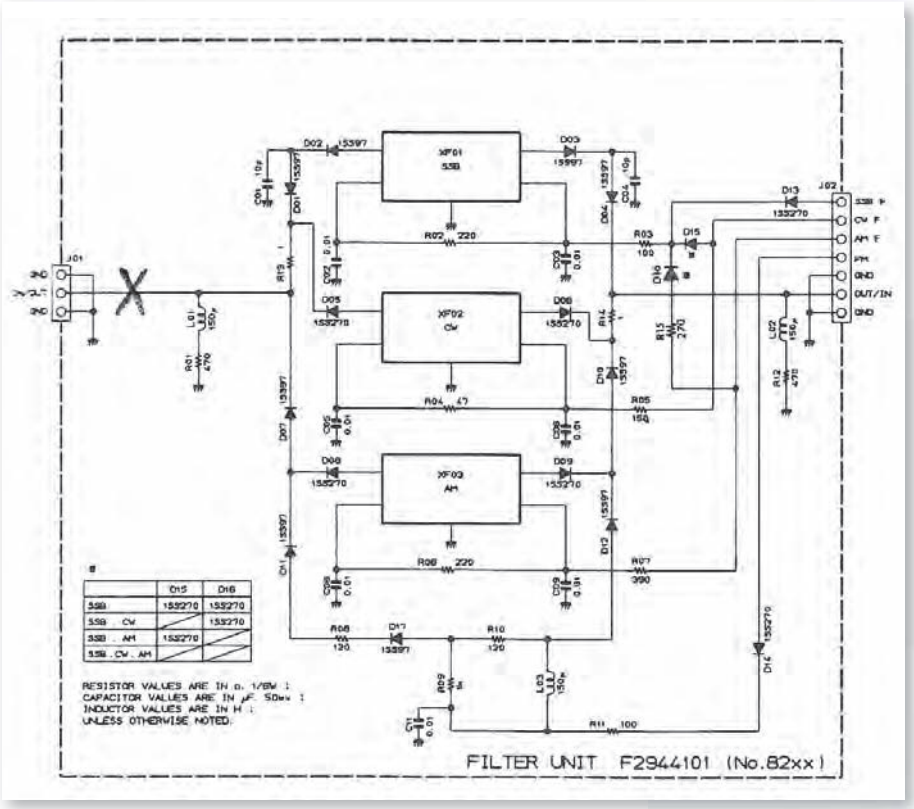

Fig. 3: The area the filter board, that was the cause of the intermittent fault on the FT-747.

Harry & Problems

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

TRADERS TABLE

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WATERS & STANTON

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Make	Model	Description	Price
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Microset	PT-110	12V Stabilized 10A PSU with Over V / A protection	£69
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Alinco	DJ-X3E	100kHz-1300MHz AM, FM, WFM Hand Held Receiver 700Ch, 8.33kHz + Ni-MH & Charger	£109
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Panasonic	GX-3700	Portable Receiver with 32 presets FM LW MW	£29
Alinco	DJ-X7E	100kHz-1300MHz AM, FM, WFM Hand Held Receiver 1000Ch + 8.33kHz step .	£115
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Nissei	RS-402	125-525MHz SWR,PWR meter 5/20/200W	£39
Midland	SWR-25	3.5-150MHz SWR / Power Meter 100W	£29
Kenwood	TM-V7E	2m,70cm FM Mobile Transceiver 50W,35W + Full Duplex, CTCSS & Remote Head feature with seperation kit	£249
Roberts	R-862	HF/VHF receiver AM/WFM 0.15-0.281 / 0.522-1.62 / 4.6-21.95 / 87.5-108 MHz 3 VDC (2*R6 / AA)	£49
Alinco	DJ-X3E	100kHz-1300MHz AM, FM, WFM Hand Held Receiver 700Ch + 8.33kHz step	£95
Roberts	R-9914	Portable World Radio with SSB 45Ch. 4x AA or 6V DC	£69
Microset	RV-45	2m 3-15W in, 45W(Max) out SSB / CW / FM Linear	£89
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Academy	CB-34	3-way SWR Bridge and Field Strenght Meter 25W (3.5MHz) 15W (7MHz)	£15
Dewsbury	Supa-Tuta	Morse Tutor	£29
Microset	PRH-145A	2M 500 Watt Version 20db gain - 0.9dbNF	£125
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Microset	PM-110	10Amp 13.5V PSU with inbuilt Speaker and Transceiver Frame	£110
Microset	PT-1012	13.5V 10A (12A max) Stabilized PSU with Cigar Lighter Socket	£49
Microset	PR-430A	70cms 100 Watt Version 15db Gain -1.2db NF	£130
Microset	RU-45	70cm 3-15W in,45W out Linear + GaAsFET Preamp	£149
Microset	RV-45	2m 4-25W in,100W out all mode + GaAsFET Pre-amp	£89
Microset	PT-105A	12V 5A (max) Protected Stabilized PSU	£29
Microset	PR-145A	2M 100Watt Version 16db Gain -0.9db NF	£79
Microset	RU-20	70cm 0.8-3W in,20W out Linear + GaAsFET Preamp	£119
Icom	IC-2800H	2m,70cm FM Mobile Transceiver 50W,35W Remote Head + 3"colour LCD & Video In	£249
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Kenwood	TH-77E	2m/70cm FM H/Held Full Duplex Transceiver + Sp. Mic & Cigar Lead	£89
Kenwood	BC-10	Desk Charger for PB-5, 6, 7 & 8 Ni-Cd's with PB-6	£29
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Ampere	APB-82A	2m Linear Amplifier 144-148MHz 10W in, 80W out 12V DC	£59
Icom	IC-T8E	6m,2m,70cm FM Transceiver + wide RX & CTCSS	£149
Roberts	R-861	Portable 150kHz-30MHz SSB , FM stereo RDS	£139
Pal-star	PS-30	12V Variable 25A (30A max) PSU with meters	£69
Alan	B-110	2m 140-150MHz 0.5-25W in, 100W out AM, FM, SSB, CW Linear Amplifier 13.8V 15A	£65
Alinco	DM-330MW	12V Variable 25A (30A max) Switch Mode PSU with Noise Offset	£59
Yaesu	FT-920	HF, 6m SSB, AM, CW Base Transceiver with Gen.Cov. 100W 12v + FM Option	£725

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AKD 6001 6m FM Trx	£ 115
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Yaesu FT-767GX	£599
Yaesu FT-736R 2m/70cm Base Multimode	£599
Kenwood TS-850S /AT	£699
Icom IC-746 HF/6m Transceiver	£699
Yaesu FT-920	£799
Yaesu FT-736R 6m, 2m & 70cm Base	£799
Icom IC-7000 1.8 - 70cms Mobile Transceiver - IC-7000	£799
Yaesu FT-920AF HF / 6M Base	£899
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Icom IC-R8500 Receiver	£1,099
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Yaesu FT-2000 IN STOCK 100W with internal power supply	£1,599

Classified Ads

To advertise on this page see the booking form below.

DISCLAIMER Some of the products offered for sale in advertisements in this magazine may have been obtained from abroad or from unauthorised sources. ***Practical Wireless*** advises readers contemplating mail order to enquire whether the products are suitable for use in the UK and have full after-sales back-up available. The publishers of ***Practical Wireless*** wish to point out that it is the responsibility of readers to ascertain the legality or otherwise of items offered for sale by advertisers in this magazine.

For sale

X-tals 100kHz-250MHz. Std 10.106, 10.245, 10.7, 11.155MHz @ £1.50. Callg 3.56, 7.030, 14.060, 28.060MHz @ £1.50. 1.7468MHz X-tal Clansman 321 ex-stock p.o.a. 10.7MHz 10kHz filter @ £5.75, 1.4MHz SSB filter p.o.a. P&P £1.50 + VAT. IQ Electo
Tel: 0208 391 0545.
E-mail: vincentvoy@hotmail.co.uk

Antenna Analyzer WE-030A 0.3-30MHz, graphical, fast, small and hand-held. £195. www.rfequipment.co.uk

RADIO CAROLINE Big L, pirate radio nostalgia, Wi Fi, internet, DAB, short wave, UK, Ireland, Holland, International. Radio Review the regular newsletter features all these and more. For a sample issue (new subscribers get free pack of offshore radio stickers/ postcards), send medium size SAE to Radio Review, Dept. PW, P.O. Box 46, Romford, RM7 8AY.

Whilst prices of goods shown in advertisements are correct at the time of going to press, readers are advised to check both prices and availability of goods with the advertiser before ordering from non-current issues of the magazine.

Aerials

GAREX ELECTRONICS VHF/UHF accessories and aerials, TVI Filters, 4m & 6m Transceivers.
Tel: 07714 198374
www.garex.co.uk
PO Box 52, Exeter EX4 8WX

TWO NEW UNIQUE ANTENNAS!
Multi Band Rotary HF Antenna 5m span.
A ground mounted Multi Band 5m Vertical Dipole.
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REPAIRS TO ALL AMATEUR AND VINTAGE Rx/Tx Cost effective service. Phone or call in for details. Kent Rigs, 52 Salisbury Road, Chatham, Kent ME4 5NN. Tel: 07903 023437.

RELIABLE REPAIRS for all amateur and vintage equipment. Professional service, reasonable rates.
Tel: 01807 580376.
E-mail: radiorepairs@btconnect.com

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VALVES AND ALLIED COMPONENTS IN STOCK Ring for free list. Valves/ books/magazines wanted. Geoff Davies (Radio).
Tel: 01788 574774.

TOP PRICES PAID
for all your valves, tubes, semi-conductors and ICs.
Langrex
Unit 4, Daux Road, Billingshurst, W. Sussex RH14 9SJ
TEL: 01403 785600. FAX: 01403 785656.
www.langrex.co.uk

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FULL COLOUR QSL CARDS for all your QSL needs. Shirts and caps with callsigns and also ham cartoons by GW3COI. For free samples contact Chris M0DOL.
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The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 70p extra. Semi-display setting £13.90 per single column centimetre (minimum 3cm). Please add 17.5% VAT to the total. All cheques, postal orders, etc., to be made payable to PW Publishing Ltd. Advertisements, together with remittance, should be sent to the Classified Advertisement Dept., Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: 0845 803 1979, Fax: 01202 659950.

Please insert this advertisement in the ..... **issue of *Practical Wireless*** (if you do not specify an issue we will insert it in the next available issue of *PW*) for ..... insertion/s. I enclose Cheque/P.O. for £.....(42p per word, 12 minimum, please add 17.5% VAT to total).

Name: .....

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Box Number @ 70p: Tick if appropriate

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Please photocopy this form or write on a separate sheet if you prefer

BARGAIN BASEMENT

SEND YOUR ADVERT TO:-

PRACTICAL WIRELESS, BARGAIN BASEMENT, ARROWSMITH COURT, STATION APPROACH, BROADSTONE, DORSET BH18 8PW

For your advert in Bargain Basement please remember to include your dated, coloured corner flash from this page along with your entry.

BARGAIN BASEMENT RULES - £4 per advert

Please write your advert **clearly** in **BLOCK CAPITALS** up to a maximum of **30 words**, plus **12 words f**or your contact details on the form provided and send -it together with the dated corner flash and your **payment of £4** (**subscribers** can place their advert **free of charge** as long as they provide their **subs number and corner flash**), cheques should be made payable to **PW Publishing Ltd.**, credit card payments also accepted.

Send your advert to **Bargain Basement, Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW** or E-mail your advert to **peter@pwpublishing.ltd.uk** (If you don't want to include your credit card details on your E-mail, just 'phone us on **0845 803 1979**.

Please help us to help you by preparing your advert carefully. Any advert which contains **??** marks indicates that the advertiseing dept. could not read/interpret the wording.

Please avoid FAXing your advert - it could delay publication.

Advertisements from traders or for equipment that it is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. **No responsibility will be taken for errors and no correspondence will be entered into on any decision taken by the Editor on any of these conditions.**

You should state clearly in your advert whether equipment is professionally built, home-brewed or modified.

The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

FOR SALE

19 INCH steel desktop case for rack equipment, radios, etc. Grey cream colours with rubber feet. In perfect condition, £150. Tel: 01483 861293 (Surrey).

ALL TYPES OF VALVES for sale. All tested. Tel: 0113 240 3496 (Leeds).

CHA 250B wide-band vertical 80-6m. No ATU. No radials required and in excellent condition. All complete, used once and original owner, £250. Tel: 07760 232315 (Cumbria).

DIAMOND CP-6 HF 6-band vertical antenna, £100.
Tel: John 024 7664 5371 (Coventry).

ICOM IC-706MkII boxed with mic, manual, DC lead and in pristine condition, £500. Palstar ATU: at 1500CV, (ceramic inductor) in perfect condition. Boxed with manual, £230. Tel: Martin G0HRZ 07985 326903 (Macclesfield).

MULLARD BRIMAR OSRAM etc. valves for sale. All tested. Tel: 0113 240 3496 (Leeds).

TEN-TEC ARGONAUT II 535 QRP transceiver with superb filtering, £325. Icom IC-R100 communications receiver. 0.1-1856MHz, £100. MFJ 4335 twin meter 25 amp PSU, £45. Tel: John G4XYY 01937 844197 evenings (Bramham, Yorks).

W2IHY 8-BAND EQUALIZER and noise gate plus one EQ Plus audio processor and cables. This can run three micks and is in VGC. I paid six months ago, £650. Will sell at half price, £325 o.n.o. M.6.SGM due to health problems. Tel: 01484 515831 (W. Yorks).

YAESU FT-101E with speaker, mic and phone. In mint condition. Yaesu FT-101Z also in mint condition. Both in very good working order, £250 o.n.o. each. Oscilloscope in mint condition 60MHz, £175. Frequency counter 200MHz in mint condition, mint, both top quality, £75.
Tel: Steve M6SGM 01484 545831 (W. Yorks).

WANTED

MICROWAVE MODULE 23cm transverter in good working order. Tel: G4IBH 01795 430608 (Kent).

OLD HALF INCH FERRITE RODS must be half inch, 12.7mm, in diameter and be six inches long or more. Will pay very good money for the rods. Tel: Peter Tankard 0114 2316321 between 9am and 9pm (Sheffield).

SCRAP HEATHKIT MOHICAN or one in very poor condition for spare parts to make one good receiver. E-mail: ron.gw4jqq4@ntlworld.com

Please make any cheques for Bargain Basement advertisments made payable to PW Publishing Ltd.

Bargain Basement order form

Please insert this advertisement in the next available issue of Practical Wireless.

☐ For Sale ☐ Wanted ☐ Exchange

PLEASE NOTE: as a security measure, you must include your house number and postcode.

Name .....

Address .....

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..... Post code.....

Telephone Number .....

PLEASE WRITE IN BLOCK CAPITALS

		(30)	

CARD NUMBER

VISA SWITCH AMERICAN EXPRESS MasterCard

Signature..... Security number

LAST THREE DIGITS ON THE BACK OF THE CARD

Switch issue number (if on card) .....

Start date of card..... Expiry date of card.....

My Subs Number is.....(or mailer label) .....

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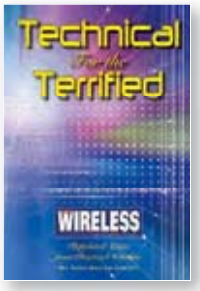
B.B. July '10

THE PW PUBLISHING
RADIO BOOKSTORE

mail order...huge range in sto.....st delivery



NEW!

TECHNICAL FOR THE TERRIFIED

This book started out as a series of articles by Tony Nailer G4CFY in *Practical Wireless* aimed at introducing the more technical aspects of the hobby to readers who, unnecessarily perhaps, felt that it was beyond them. It is aimed at bridging the gap between basic understanding, as gathered by students of the Intermediate and Advanced Radio Amateur courses and other – more project-based articles. Aimed at the less-experienced radio enthusiast, the articles are of a general nature, written to remove the fear of technology/techniques and theory.
As Tony says, when it gets technical, there's no need to panic!
New, easy-to-read design, spiral bound, 124 pages, £12.99.

NEW!! AIRWAVES 2010

£11.50

There have been a variety of changes to AIRWAVES since 2009. Quite a number of Military Discrete frequencies have been added, plus many existing frequencies have been reconfirmed. Further changes are likely in 2010, as it appears that the top of the Military Airband from 380 - 400 MHz will be handed over to the emergency services to increase the frequency management capability for the London Olympics. Some frequencies have already been moved out of this band recently, including three at Brize Norton. Seven London Military (East) frequencies have been moved to Scottish Military, which has been split into North and South areas and expanded. Manchester Area Control has closed and has been relocated to the Scottish Centre. All Upper Airways have been withdrawn from Shannon Control and the Oceanic Transition areas, leaving just Reporting Points, including many new ones.

NEW IN STOCK NOW

NEW!! CALLSIGN 2010

£11.50

The Military callsign database has surprisingly seen over 260 new callsign's or callsign ranges added to the text in the past year. The database contains just over 2000 Military callsign's, of which a large percentage have been confirmed in 2008 - 2010. Almost all of the entries in the Civil database have been cross checked against a variety of sources and also confirmed by our readers personal monitoring. The Airline world still remains uncertain with a number ceasing operations. However a number of new Airlines have started operations in the past year, with others planned for 2010

AIR TRAFFIC CONTROL 10th EDITION

Since the last edition of abc Air Traffic Control in 2005, there have been many changes in the air traffic control industry in the UK and UK-related airways.

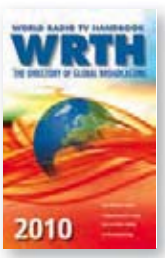
IN STOCK NOW

SCANNERS 6

£9.95

The Scanners books, originally created by Peter Rouse, have been consistent best sellers. They are the UK's leading guides to the short wave radio equipment employed by enthusiasts to monitor the VHF/UHF frequencies used by airfields, the maritime and emergency services and many other users. Scanners 6, the sixth revised and updated edition, includes up-to-date frequency listings and information on the latest digital technologies, mobile radio, using PCs (home, laptop and palm) with radio receivers, shareware/freeware software for monitoring and decoding and radar-style displays on palmtop computers.

NEW IN STOCK NOW



WORLD RADIO TV HANDBOOK 2010 EDITION

The 64th edition of the best selling directory of global broadcasting on LW, MW, SW and FM.
The Features section has a stimulating introduction to the art of FM DXing, reviews of the latest equipment and a fascinating account of visits to five All India Radio stations.

The remaining pages are, as usual, full of information on:
- National and International broadcasts and broadcasters
- Clandestine and other target broadcasters
- MW and SW frequency listings
- Equipment reviews and articles
- Terrestrial TV by country
- Extensive Reference section and much more!

ONLY £23.00

	Pages	Price
AIRBAND		
● NEW **VIRTUAL RADAR EXPLAINED** Mike Richards (RSGB)	64	£6.99
● NEW **GUIDE TO THE AIRNAV RADAR BOX** (Seldec)	tba	£12.95
● NEW **THE RADARBOX COMPANION** (Seldec)	tba	£12.95
● NEW **AIR TRAFFIC CONTROL** 10th Edition (abc)	112	£9.99
● **THE UK & IRELAND FLIGHT ROUTES SUMMER 2009** (Seldec)	275	£12.95
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10th edition
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AMATEUR RADIO EXPLAINED

Written by well-known author and radio amateur Ian Poole, G3YWX, this book provides the ideal introduction to the wonderful world of amateur radio. Amateur Radio Explained is for people first taking an interest in amateur radio and those ready to move on from Foundation level. Written in a readable and easy-to-understand fashion, Amateur Radio Explained is the perfect introduction to the exciting world of amateur radio. 80 pages.

£5.79

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NEW!

Before entering the subject of airband radio and other monitoring systems, an overview of the processes involved in handling air traffic may help to give a better understanding of how it all works

Contents include; The UK airspace system, The legal position, How the System works, What can I hear?, Choosing a scanner, Antennas, High frequency radio, Virtual radar systems, VHF and UHF receivers, Airline callsigns, Airfield directory, En route frequencies, Worldwide high frequency coverage, Weather broadcasts and Useful addresses.

£9.99

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Includes ALL Airports in England, Scotland, Wales, Channel Island, Northern Ireland and the Republic of Ireland, ACARS Frequencies, Alphabetical Airfields & Airport Frequencies with Company Frequencies, Numerical Frequency Listing, ICAO Airfield Designator Decodes, Radio Call signs, 2 & 3 Letter airline Prefixes, Civil Aircraft HF (SSB) Frequencies, OACC HF (SSB) & VHF Frequencies, Abbreviation List, Phonetic Alphabet & Morse Code. VOLMET frequencies.
INCLUDES REPUBLIC OF IRELAND

146 pages A5 spiral bound "Lay Flat"

£8.99

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A 32-page soft-covered book that takes you through the syllabus, reinforcing what you will learn on the Foundation Course. The course has been designed and introduced for people of all ages and abilities. To take the course you need no formal qualifications. **£4.99.**

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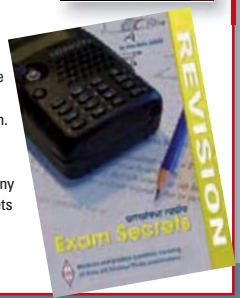

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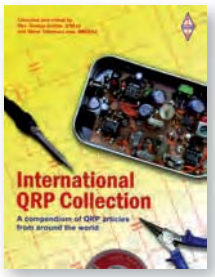

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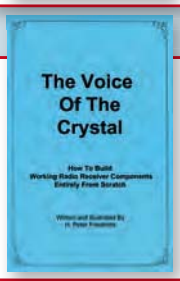

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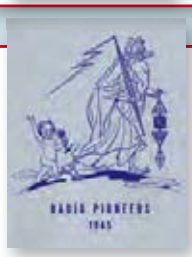

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Rob Mannion's

topical talk

This month the Editor discusses points raised by readers who have attended mobile rallies and experienced differing welcomes.

Although I'm unable to attend as many Amateur Radio mobile rallies as I've done in the past – I still enjoy the occasional event. I've previously mentioned in *PW* that I enjoyed travelling all over England and Wales to attend rallies with my friends **Mike Coolley G3XOC**, **Chris Tarran G8DXF** and the late **Richard Woodley G8CEH** in my *Morris Minor* car. We'd often drive from Southampton, up to the Peterborough Rally, or Derby – even though petrol then seemed very expensive – at **50p a gallon!** – sharing the costs really helped us all get the most out of our hobby.

The welcome we received by rally organisers often started at the entry gate with a smile. In those days – the late 1960s and early 1970s – rallies tended to be more about 'mobile' equipment, 'bring & buy' and junk type sales, rather than the 'mini Amateur Radio shows and trade exhibitions' they've tended to become in recent years. However, one thing hasn't changed – they're a great place to meet old friends and make new acquaintances!

Occasionally we would meet an officious type – and I think we've all met **them!** Give them a fluorescent jacket or tabard over their shoulders and leave them in charge of the car park and they can turn into 'Sunday Dictators'! Mind you, having said that – I've often seen erratic driving come to the fore as soon as some drivers leave the main road and enter a grass field. Indeed, some very strange things can happen – as I'm sure other rally visitors have noticed.

So, on reflection I have to admit that the rally parking attendant's job is one that I'd certainly not like to do! But despite the difficulties they have to face, some people really do get it right. And I can certainly say this was the case at the **Dartmoor Rally** in Tavistock, Devon on Monday May 3rd. The reception I received made the visit to my home town very enjoyable indeed.

Helpful Approach

As I drove into the traders' and disabled parking section, at the local college, where the rally was held, the gentlemen in charge spotted me. He greeted me on first name terms – with a smile – and asked how close I needed to be to the building. I told him and I was soon safely parked. A great welcome and friendly service – but I observed that other people got the same service. It was obvious that everyone was getting the same treatment – not just Amateur Radio magazine Editors!

After my own experience at the Dartmoor Rally I was very pleased when **Mike Dennis** from Polgooth, near St. Austell in Cornwall wrote into *PW.* Both Mike and his wife **'Liz** are disabled by arthritis and they appreciated the help they received at the rally. At the rally I told them that I had experienced the same treatment. However, as Mike is retired from his work in the granite quarry industry I hadn't expected a letter from him. He's finding – as most people seem to do in retirement – that he's surprised he ever found time to go to work as he's so busy with community activities and gardening! But I've still put pressure on him to get his Foundation Licence – he dabbled in CB in the 1980s and has retained an interest in radio and just needs a little encouragement. So, I wish you good luck with your Foundation training Mike!

Judging by the feedback we've received from visitors to the Tavistock rally – thanks for all your letters – the organisers seem to have got the planning just right. They've got excellent staff monitoring the rally on the day and everyone seems to be so helpful. I've only got two suggestions where I think they could improve things a little more.

The first suggestion is that the catering service should consider taking a larger stock of food to serve hot (they ran out this year!) and the second involves toilet facilities for the disabled. As it is a school, the toilet cubicles aren't large and I hope they can provide a larger disabled toilet for those who are in wheelchairs, etc. Apart from that it was – as *Wallace* (from the famous *Wallace & Gromit* cartoon series) says – "It was a grand day out". Thanks everyone!

Rob Mannion G3XFD/EI5IW

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