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with Chris Lorek G4HCL

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AOR We are pleased to announce that we have been appointed as sole distributors for UK and Ireland for AOR & TenTec products. Richard Hillier, formerly of AOR UK, will be joining us as technical consultant.

TEN-TEC

AR-MINI £219.95 D — Scanner 100kHz - 1300MHz.

AR-8200mk3 £439.95 D — Scanner 530kHz - 3GHz.

AR-8600mk2 £629.95 D — Mobile / Base Receiver. Wide range 530kHz - 3GHz AM NFM WFM SSB 1000 memories Rotary tuning VFO.

AR-ONE £4595.95 D — High Performance Receiver. 10kHz - 3.3GHz computer contolable. All modes with tuning steps to 1Hz.

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ICOM

ID-E880 NEW

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

£429.95 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

£159.95 D

IC-E90

Triple band 6m, 2m, 70cms.

£234.95 D

NEW IC-E80D

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

FREE software on Icom site

In Stock Now

£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

* T-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

£299.95 D

FlexRadio Systems

FLEX-1500 ARRIVES!

NEW

* 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

IN STOCK NOW!

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

Flex-3000 100W 160m-6m

Includes auto ATU! Firewire connection.

£1399.95 D

Flex-5000A 100W 160m-6m

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

£2495.95 D

YAESU

New Mobiles In Stock Now!

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

FT-1900E

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

£129.95 D

FT-2900E

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

£139.95 D

FT-7900E

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

£229.95 D

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.	£2849.95 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	£289 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

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

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

Orderline

01702 206835

Online Catalogue

www.wsplc.com

UK's Lowest Prices

Zero Deposit
Zero Interest

Buddipole BackPack Portable HF-6m

W3-BP	Buddipole 40m-6m kit 250W	£199.95 D
W3-BP-Deluxe	Buddipole + 8' mast, trpod & bag	£399.95 D
W3-MBP	Mini Buddipole (collapses smaller)	£229.95 D
W3-BS	Buddistick (Vertical half buddipole)	£139.95 D
W3-BS-Deluxe	Buddistick + base mount kit etc.	£184.95 D
W3-BPT	Tripod base support	£89.95 D
W3-BM	8' tele. mast for W3-BPT	£59.95 D
W3-BML	16' tele. mast for W3-BPT	£109.95 D
W3-CTA	Mast adaptor for "decorator" poles	£8.95 A
W3-TRSB	Triple ratio balun 1/2/4:1 switched	£79.95 C
W3-STW	Spare stainless tele. whip 66"	£12.95 A
W3-BCC	Spare (3) coil clips	£12.95 A
W3-LBC	80m low band coil (each)	£69.95 C

NOW IN STOCK!
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 SOON - 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.

STOCK ARRIVED - CHECK AVAILABILITY

Order As: WR-G31DDC £649.95 D

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- mkIII New DSP speaker for any receiver or transceiver. £109.95 C NEW

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 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.

£129.95 C

Power-Max-65-NF

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

£239.95 D

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

Watson Cross Needle Meters

NEW

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

WCN-200 £89.95 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*

Butternut 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 ~~£219.95~~ **£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

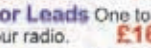
Pro-set-Plus

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 upgrade-able 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	£116.95 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

PEET Bros Weather Stations

SPECIAL OFFER!

FREE Rain Gauge!
With Every Station - Worth £79.95

Ultimeter-100	Basic station	£129.95 D
Ultimeter-800	Station plus	£169.95 D
Ultimeter-2100	Deluxe station	£239.95 D

Check www.peetbros.com for full details

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

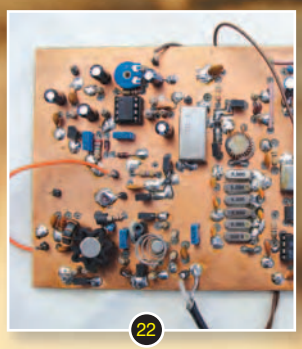
3-Way Switches

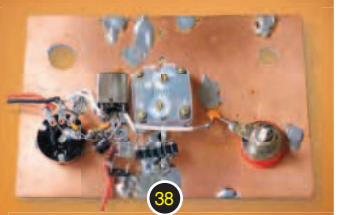
CX-SW3N	DC - 1.5GHz 1.5kW 3x N-Type Connectors.	£49.95 C
CX-SW3PL	DC - 800MHz 1.5kW 3x SO-239 Connectors.	£41.95 C

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





Practical Wireless August 2010

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Front cover design: Our amazingly dramatic front cover design this month is due to the skill of **Steve Hunt** our Art Editor. Nice one Steve!

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Rob Mannion's

keylines

Rob recalls a holiday in Hungary and the good friends in Budapest.

I've often said that as Radio Amateurs, wherever we go – we'll always meet fellow hobbyists. This was certainly the case when my wife **Carol** and I travelled by train all the way to Budapest in Hungary in late May/early June. It was a special holiday to celebrate my 20 years with *PW*.

The last time I'd visited Budapest was in 1972 and though the regime was radically different in those days – even then the nature of the Hungarian people outshone the Communist state. However, our 2010 celebratory trip was to be something really different – I was determined to get away from my car and sit and enjoy the long train ride!

Staying overnight in London on Wednesday May 27th, we left St. Pancras International (a truly beautiful station nowadays) on Thursday morning and were soon – almost flying – through the Kent Countryside en-route for Brussels on the Eurostar. Of course, it was inevitable I'd meet friends and I found out the one of the train managers was a Belgian Amateur!

Changing at Brussels I was enthralled at the 150mph plus speed on the Thalys train to Cologne. Gone are the days when all German and Belgian trains swapped tracks (Belgian trains drive on the left and the Germans on the right!) at Aachen, the attractive German border spa town – something that amused me in years gone by! The ultra modern facilities on the Thalys train also allowed me to E-mail the *PW* offices and show off – but my kind colleagues quickly replied and wished us well.

In Cologne we had a four hour stopover. Carol went shopping I looked around the museum, close by the main station. There again I met several other Amateurs – in fact one young man was operating bicycle mobile on 144MHz – and we ended up chatting for a while under the shadow of the medieval 'Dom' – the majestic Cologne Cathedral.

Overnight To Vienna

Overnight we travelled from Cologne to Vienna in a special sleeper service and we had an en-suite bathroom and shower. Very convenient! Unfortunately, the electrical noises from the train made 144MHz reception difficult but I was able to hear some stations on my Alinco hand-held as the train glided alongside the River Rhine.

Next morning, Friday May 28th, we ended up being over five hours late into Budapest because of missed connections. When we arrived at our hotel – the Royal Corinithia – on the Pest side of the River Danube, we found that **'Jenci' Matzon HA5FA** had already been to the hotel to meet us.

Jenci was to turn out to be an excellent host, though he's busy because he runs the Hungarian QSL Bureau, is President of the Budapest Amateur Radio Society, and President of the MOM Radio Club (150 active members and active under the callsign HA5KFV)! Now retired, Jenci was a commercial airline radio officer/navigator (the job is now extinct).

On the very hot Saturday of May 30th, Jenci drove us to the Buda side of the River Danube. Buda is spectacularly beautiful and hilly with some truly superb views. It seems that the majority of Hungary's population now live in Budapest area. Jenci and his charming wife **Elizabeth HG5YFA** live in a communist era apartment block that had been 'brightened up' outside (very nicely too) and they turned out to be beautifully equipped homes inside! Carol and I were entertained by Elizabeth playing some well known Hungarian tunes on her 'baby' grand piano as we enjoyed the cool flat, a traditional Hungarian meal and wondeful hospitality.

The photograph of Jenci in his shack isn't typical – he's a dedicated c.w. man – but he grabbed the microphone for the photo-shoot! Interestingly, the HA5FA dipole antenna is mounted on top and between two apartment buildings that stand side-by-side. The resulting coaxial feed is very long but Jenci has much success with the antenna and is on good terms with his neighbours.

We thoroughly enjoyed our time in Budapest – and thanks to the hospitality shown by Jenci HA5FA and Elizabeth HG5YFA – it really was special!

Rob Mannion G3XFD/EI5IW

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

readers' letters

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

Digital Radio In Cars

Dear Rob,
I have to say that I use Band II f.m. at home – although QRM will sometimes push me to Freeview TV radio services. Please note that I have Freeview in sound only as I do not have a television set. (I'm told that television is like radio but has pictures on it!).

At the moment DAB radio is being been promoted for use in cars. As a professional delivery driver delivering high specification vehicles, I've had it in several Land Rover Discovery 4 cars. Switching between stations on the same multiplex (MUX), such as BBC Radio 4 and BBC Radio 2, takes about a second. Switching between stations on different multiplexes, such as BBC Radio 2 and Classic FM, takes about four seconds. It's a bit of a pain when I want to break from Classic FM and hit the travel news on BBC Radio 2!

Incidentally, the DAB service 'dies' completely when I'm heading west on the A66 as I drive across country and enter Cumbria. The audio sounds 'brighter' to me on DAB than on Band II v.h.f. programmes – but this is surely due to the a.f. processing rather than the r.f. transmission method? 73.

Ian Brothwell G4EAN
Arnold
Nottingham

Ed: *Thank you Ian. Personally, I've not had any experience with DAB radio in a car, although a number of correspondents have said it's not successful as far as they are concerned. However, on the same lines – I'm grateful for the ability to switch over to the (reliable 198kHz) when Band II v.h.f. analogue f.m. reception is poor. For example, on Saturday June 19th I drove my wife* ***Carol*** *to a meeting in Droitwich in Worcestershire (no 198kHz reception problems there!) and listening to a programme on the way home we had to switch from Band II to 198kHz several times when we were between Birdlip on the A417 and Swindon. Reception on this section is particularly variable, even though my car radio is a RDS type and automatically searches for the strongest transmitter carrying the required service. Long live the 198kHz service I say!*

Silent Key
Wilf Paish MBE G2AIS

Dear Rob,
It's with deep regret that I'm informing you of the death of **Wilf Paish G2AIS** earlier this year. He was aged 77.

Wilf was awarded his MBE for services to athletics. Perhaps his most well known achievement was coaching **Tessa Sanderson** to her gold medal victory in the 1984 Los Angeles Olympics. There she beat **Fatima Whitbread**, who was World Champion at that time.

Wilf is sorely missed by his colleagues in International Athletics and Amateur Radio. I've included – with agreement of Mrs Paish – a page from the magazine *Recreation*, published in April 2010, which includes an obituary by former President of the Institute of Sport and Recreation Management (ISRM) – **David Morby**. The publisher of Recreation is the ISRM. They can be contacted (if Wil's friends would like a copy) from the **Sir John Beckworth Centre for Sport, Loughborough University LE11 3TU**. Tel: (**01509**) **226474**.

Wilf's obituary, which was published in the *Times* newspaper, can be found at **www.timesonline.co.uk/tol/comment/obituaries/article7028073.ece** My regards.

Malcolm Egan M0JSE (on behalf of Mrs. Margaret Paish & Family
Guisely
Leeds
West Yorkshire

Ed: *Thank you for your letter Malcolm and we were sorry to hear of the death of G2AIS. I've also read the obituary online at the* Times*.* ***Note:*** *Although they now charge for viewing, the newspaper grants a free period of viewing after you've signed in and registered. In the past I've met and chatted to Wilf G2AIS on many occasions – but I wasn't aware that he was involved in athletics. He was always a friendly gentleman and I think that the last time I met him was at the final Leicester Show several years ago. He must have been a remarkable man and our condolences go to his family on their loss.*

Radio Reception & Digital Interference

Dear Rob,
I've been rather interested in the debate about digital radio and the reception problems. Some listeners have found that digital radio – and TV units – can cause a great deal of interference to nearby analogue equipment. Yes, some interference can be caused by the cheap switch mode power supplies powering 'Set Top' boxes – but even when they're operated from a transformer supply that can manage 1.5A or so, they can still radiate interference from the decoder itself.

Although what I've mentioned may be common knowledge – nobody seems to have mentioned anything about the interference that's radiated from the incoming telephone line itself. Here in the Lake District, I have a reasonably effective broadband system. Despite this, I was most surprised indeed when I up-graded from a 'dial up' service to broadband, just how potent the harmonics from the broadband are!

Tuning up from 1.8 to 30MHz the harmonics are very strong – at up to 20ft away from our telephone line, which unfortunately for me, passes by my little 'shack' under our stairs!

Much to my surprise – when it was first installed – I found that the harmonics from the broadband were strong enough up on Band II to effect reception of the Isle of Man radio stations – previously a fairly reliable service – and the other services that can be quite clear at times from Dublin and Northern Ireland, due to the sea pathway. In fact, I can say that my broadband has spoiled my v.h.f. listening. Perhaps it's another way of forcing us to listen via the Internet or via DAB radio? Regards.

Steve Wilson
Seacote
St. Bees
Cumbria

Ed: *Thank you for your letter Steve. My broadband service also radiates strong signals up to and beyond Band II, but fortunately it doesn't interfere with Radio 4 on Band II. However, it makes reception on the short wave bands at my working desk in my study at home impossible using a set-top antenna. I have to feed a signal in from outside using coaxial cable. Despite this, I think it's an incredible achievement to be able to transmit r.f. over subscriber exchange lines that were never designed for r.f. It's a remarkable technique. The r.f. nature of the service also comes in useful when 'Super Squirrel' (we're plagued with them in Bournemouth) chews through wires in pole-mounted distribution boxes, disrupting the telephone service. Fortunately, the r.f. 'jumps' the gaps and although our 'phone is dead, I can report the fault to BT via their website. So, there are advantages and disadvantages with broadband!*

An Idea From Dayton For DAB Radio

Dear Rob,

You may remember me from the *PW* organised holiday trip to Dayton back in the mid-1990s. We had a great time and my friend **John Hulme** and I very much enjoyed the trip. However, I'm actually writing to you because I remember seeing something quite remarkable in the huge open sir 'flea market' at Hara Arena. And you've actually mentioned it in *PW* several times in the following years. What fascinated you, myself and many others (judging by the number of people who stopped to listen at the 'booth') – was the large collection of vintage valved and early transistorised radios. Once we had stopped to listen it became obvious that each receiver was reproducing music/news or programmes from the year or era it was made in.

One 1930 radio was playing the famous H. G.Wells Science fiction story *War of the Worlds*, transmitted originally (I think) around 1939, featuring **Orson Welles**. This was the programme that apparently caused a great deal of panic in some parts of the USA because the drama was so convincingly produced. In fact, I think the radio network was forced to announce afterwards it was a play and wasn't for real! They were censured for the scary production later!

All the radio plays, music and news items were being transmitted from the back of a large van, in which was mounted a multi-track tape recorder. Each channels audio output was modulating an extremely low power medium wave frequency transmitter, to which the receivers were tuned to – and it was most effective.

Remembering the Dayton display, I'm considering the idea in a slightly different way so that I can re-transmit the excellent audio from the Freeview BBC Radio services into one of the low power v.h.f. adaptors that can be used legally within cars, to enable MP3 players, etc., to feed into the a vehicle's audio system. Although I realise that most of the r.f. is probably injected into the vehicle's 12+V line, I'm sure that some of the r.f. is by direct radiation. So, perhaps I'll be able to use one of these little devices so I can carry on using our much loved Hacker Band II set.

Our v.h.f. f.m. services aren't good here we're screened from the Emley transmitter and almost under the shadow of a railway viaduct that spans our quite deep valley. Reception of DAB radio is very unreliable at my home and Band II isn't too good and as the Sheffield-Huddersfield trains go over the viaduct we can get 'flutter'. But I can get Freeview radio via the TV very effectively because we have a very good outside aerial.

So, using our u.h.f. TV antenna to feed the Freeview box and using the audio output to drive a little transmitter – I'm sure that I'll be able to get a reliable service enough for the family to use our radios wherever we want in the house – without having to rely on one fixed place to use a connected aerial. When my wife and I retired – from Manchester – to return to my native Yorkshire I had no idea just how poor radio reception would be in my new home. I advise all radio enthusiasts to check this out before deciding on a home. Best wishes

Mike Hartcliff
Penistone
West Yorkshire

Ed: *Thanks Mike! I remember the trip very well – and also you and your friend. It was an enjoyable trip too. The impressive multi-track audio system we saw at Dayton was truly fascinating and the resultant effect on the audience had to be seen to believed. Although I'm not sure how far the in-car f.m. cigarette lighter mounting-transmitters will be effective, I think they would be a good starting point. In fact, I recently purchased one and found that the best reception was at the lowest frequency setting (they're usually stepped in frequency and aren't v.f.o. controlled) below the BBC Radio 2 channels. In fact, I would be interested to hear from anyone who has experimented with this type of (legal) transmitter. Keep us up-dated on your own experiments please Mike.*

Star Letter

Problems With DAB Radio

Dear Rob,
I have just read your discussion in your *Keylines* Editorial in the June edition of *PW*, regarding the problem of the introduction of DAB radio and I believe you, and others, may have missed an extra point. However, first I must introduce myself, necessary perhaps because I don't think I'm a typical reader of your excellent magazine.

I twice managed to fail my Morse test, first at school in the ATC and later when trying to join an Amateur Radio. Consequently, I never obtained a licence! Despite this I have been an active wireless/electronics enthusiast for ever! I first started reading *PW* as a teenager and have taken it again since I retired. Indeed, I'm particularly grateful to *PW* for publishing my first article and I've put it at the top of the list on my CV ever since.

Somehow, I still have my original klystron – mounted on a piece of wood! However, before reaching the main point of my letter – I should state an additional vested interest in the maintenance of a.m. and f.m. broadcasts as I'm interested in crystal sets, as I believe are some of your readers.

I believe an important question must be "Who is going to provide for the huge number of redundant high quality radio sets after the introduction of DAB radio on Band II?

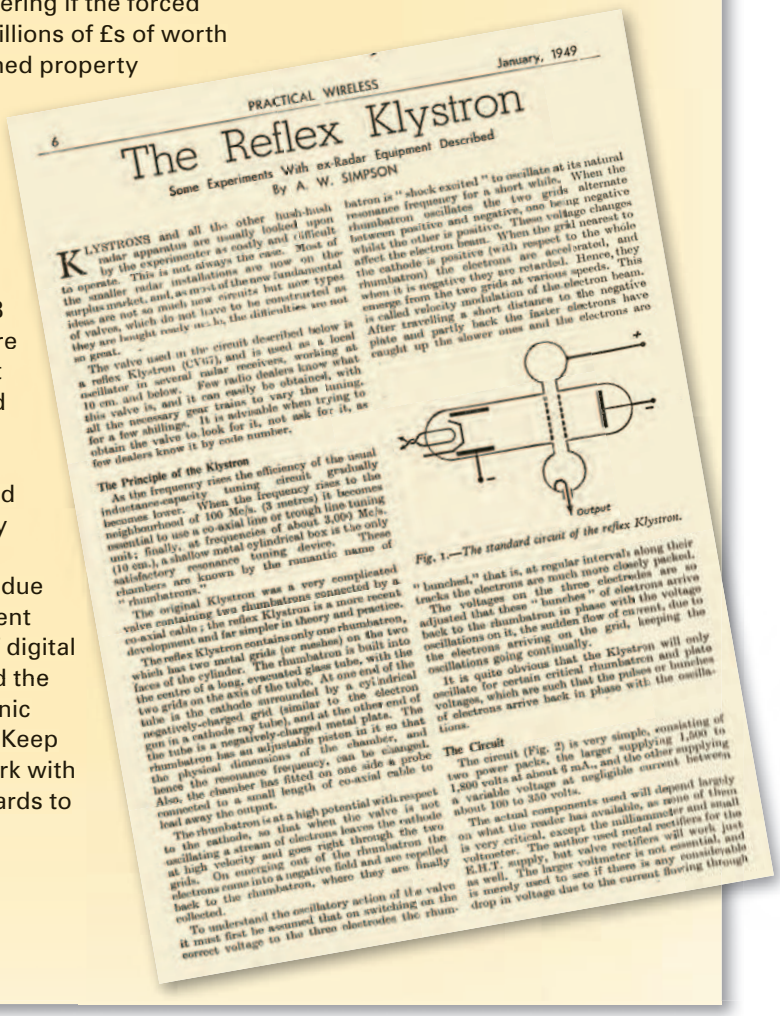
Perhaps one possible – but illegal solution – would be to encourage the introduction of stations such as Radio Caroline on v.h.f.! If this is successful – extra programming it will be taken up by the BBC, which in effect, is what happened before – thanks to the pressure from the 'Pirates'.

Any plans to to establish alternative radio stations must be made well before our masters decide to switch off analogue radio as the prospect of alternative programme providers might help them change their minds.

It seems very unlikely that the more democratic European neighbours will switch off their well established analogue radio systems on either v.h.f. or the other broadcasting bands. Perhaps they could legally include British advertisements. In fact, what was Radio Luxembourg , now transmitting on 234kHz, can easily be picked up in Britain - in the South East it can be received even using a crystal set with a long-wave frame aerial.

I'm left wondering if the forced scrapping of millions of £s of worth of privately owned property (our radio receivers) is legal? As I see it the only people who will benefit from the idiotic and impractical DAB radio scheme are the government – with increased VAT returns coming in from newly purchased receivers, heavy duty battery manufacturers (due to the high current consumption of digital equipment) and the Chinese electronic manufacturers. Keep up the good work with *PW* and my regards to everyone.

Tony Simpson
East Hoathly
Lewes
East Sussex



PRACTICAL WIRELESS January, 1949

6

The Reflex Klystron

Some Experiments With ex-Radar Equipment Described

By A. W. SIMPSON

KLYSTRONS and all the other hush-hush radar apparatus are usually looked upon by the experimenter as costly and difficult to operate. This is not always the case. Most of the smaller radar installations are now on the surplus market, and, as much of the new fundamental ideas are not so much new circuits but new types of valves, which do not have to be constructed as they are bought ready made, the difficulties are not so great.

The valve used in the circuit described below is a reflex Klystron (CV61), and is used as a local oscillator in several radar receivers, working at 10 cm. and below. Few radio dealers know what this valve is, and it can easily be obtained, with all the necessary gear trains to vary the tuning, for a few shillings. It is advisable when trying to obtain the valve to look for it, not ask for it, as few dealers know it by code number.

The Principle of the Klystron

As the frequency rises the efficiency of the usual inductance-capacity tuning circuit gradually becomes lower. When the frequency rises to the neighbourhood of 100 Mc/s. (3 metres) it becomes essential to use a co-axial line or trough line tuning unit; finally, at frequencies of about 3,000 Mc/s. (10 cm.), a shallow metal cylindrical box is the only satisfactory resonance tuning device. These chambers are known by the romantic name of "rhumbatrons."

The original Klystron was a very complicated valve containing two rhumbatrons connected by a co-axial cable; the reflex Klystron is a more recent development and far simpler in theory and practice. The reflex Klystron contains only one rhumbatron, which has two metal grids (or meshes) on the two faces of the cylinder. The rhumbatron is built into the centre of a long, evacuated glass tube, with the two grids on the axis of the tube. At one end of the tube is the cathode surrounded by a cylindrical negatively-charged grid (similar to the electron gun in a cathode ray tube), and at the other end of the tube is a negatively-charged metal plate. The rhumbatron has an adjustable piston in it so that the physical dimensions of the chamber, and hence the resonance frequency, can be changed. Also, the chamber has fitted on one side a probe connected to a small length of co-axial cable to lead away the output.

The rhumbatron is at a high potential with respect to the cathode, so that when the valve is not oscillating a stream of electrons leaves the cathode at high velocity and goes right through the two grids. On emerging out of the rhumbatron the electrons come into a negative field and are repelled back to the rhumbatron, where they are finally collected.

To understand the oscillatory action of the valve it must first be assumed that on switching on the correct voltage to the three electrodes the rhumbatron is "shock excited" to oscillate at its natural resonance frequency for a short while. When the rhumbatron oscillates the two grids alternate between positive and negative, one being negative whilst the other is positive. These voltage changes affect the electron beam. When the grid nearest to the cathode is positive (with respect to the whole rhumbatron) the electrons are accelerated, and when it is negative they are retarded. This is called velocity modulation of the electron beam. After travelling a short distance to the negative plate and partly back the faster electrons have caught up the slower ones and the electrons are "bunched," that is, at regular intervals along their tracks the electrons are much more closely packed. The voltages on the three electrodes are so adjusted that these "bunches" of electrons arrive back to the rhumbatron in phase with the voltage oscillations on it, the sudden flow of current, due to the electrons arriving on the grid, keeping the oscillations going continually.

It is quite obvious that the Klystron will only oscillate for certain critical rhumbatron and plate voltages, which are such that the pulses or bunches of electrons arrive back in phase with the oscillations.

Fig. 1.—*The standard circuit of the reflex Klystron.*

The Circuit

The circuit (Fig. 2) is very simple, consisting of two power packs, the larger supplying 1,800 to 1,800 volts at about 6 mA., and the other supplying a variable voltage at negligible current between about 100 to 350 volts.

The actual components used will depend largely on what the reader has available, as none of them is very critical, except the milliammeter and small voltmeter. The author used metal rectifiers for the E.H.T. supply, but valve rectifiers will work just as well. The larger voltmeter is not essential, but is merely used to see if there is any considerable drop in voltage due to the current flowing through

Ed: *Thanks for a very interesting letter Tony! It's very pleasing to meet an author from the 1940s! I hope you enjoy seeing the small illustration of your article from 1949! I remember reading it myself (quite a few years later) when I'd already started to become involved with the technology. Please join me on the* Topical Talk *page for further discussion on the DAB radio topic. And although you say your too old to get your licence nowadays, as I've told you – that's certainly not the case! See this month's news for 'proof of the pudding' so to speak!*

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**

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news & products

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

Open Day & Car Boot At The Muckleburgh Collection

Fancy a day out in rural Norfolk? If so, *Newsdesk* has been informed of a great day out for *PW* readers!

Tony Smith G4FAI contacted Newsdesk to invite readers to the museum: "An Amateur Radio, vintage radio, militaria and general boot sale will be held at the Muckleburgh Collection military museum, Weybourne, Norfolk on Sunday September 12th 2010. For one day only, admission to the museum, restaurant and shop will be free.

"The Radio Hut at the museum is home to North Norfolk Amateur Radio Group's unique collection of all-service vintage military, Amateur, and other communications equipment, which will also be open to visitors on the day. The Group will be offering surplus items from its collection for sale.

"The Open Day presents an unusual opportunity to visit the country's largest privately owned military museum without charge, providing a great day out for groups, individuals and families.

Radio clubs, radio amateurs, military enthusiasts and general stallholders welcomed. Pitches cost £5 payable on the day. Set-up is from 8am, free public admission from 10am". All enquiries to **Bob Finch G0HYZ**, Tel: (**01263**) **838198**.

See **www.gb2mc.co.uk** for more information about NNARG.

The museum's own website is at **www.muckleburgh.co.uk**

An Old Sea Dog Reg Gets His Amateur Ticket At Last!

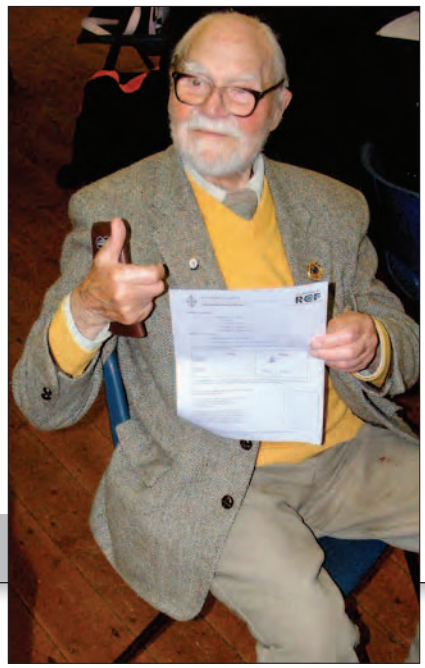
Newsdesk heard from the Poole Radio Society that a remarkable old gentleman – **Reg Noquet** – has become **M6REG**!

Poole Radio Society G4PRS can pride itself on an impressive age span in its Spring 2010 Foundation Licence intake. Air Cadets as young as 14 as well as nonagenarian war veteran Reg M6REG were steered to success. Reg Noquet's son – **Peter** – feared that his Dad's active mind and avid reading was stopping him going to bed at sensible hours. So, he thought about a way to get Dad to bed earlier!

During his Second World War service as a signalman and later SIGINT operative, listening-in to German E-boats in the Royal Navy, Reg had been familiar with radiotelephony and Morse. Peter hit upon the most effective method of getting his father to turn in. He used a Morse key to tap out the message: "Lights Out - All Die Down!" At home with spouse and three sons (including **Bob Noquet G8ZGI**) Reg, ever the Naval man, kept order with all the phrases and commands and decided to go for his Foundation Licence.

On the PRS Foundation course, Reg passed the Morse assessment with flying colours. He liked the informal but thorough instruction and enjoyed the challenge of the Ohm's Law calculations, finding them easier than anticipated. Reg, who was awarded the Bletchley Park badge for his 'Headache' interception and code-breaking only last year, is now all set to enjoy the bands. So look out for M6REG!

Poole Radio Society website **www.g4prs.org.uk/**



Another Channel Isles Success!

Good news from the Channel Islands! **Rob Luscombe MJ0RZD** reports that **Paul Ahier**, **Steve Huelin** and **Joe Crowder** all took and passed their Foundation Licence exam at the Jersey Amateur Radio Society headquarters at La Moye in Jersey on Thursday June 17th. Additionally, visitor **Eddie Munro** from Scotland, took his full licence exam while in Jersey on holiday – good luck Eddie frrom everyone in the Amateur Radio community on Jersey!

Rob Luscombe MJ0RZD, E-mail **mj0rzd@robluscombe.com** **www.radioclubs.net/GB3GJ**

STOP PRESS NEWS!

Jersey Repeater Now On The Air!

Rob Luscombe MJ0RZD contacted *Newsdesk* as *PW* went to press, with some really good news! "Hi *PW,* it may be too late but attached is a photo of the GB3GJ installation ongoing this last weekend – June 20th – 21st, and the repeater is now on air on 145.637.5MHz with 71.9Hz CTCSS tone for access."
Best wishes
Rob Luscombe MJ0RZD
mj0rzd@robluscombe.com

The Jersey Amateur Radio Repeater Group website is at **www.radioclubs.net/gb3gj/**

Chris Boudier 2J0CMB and Anthony Lang GJ7DTA work on the GB3GJ antennas.
Photo courtesy of Jersey Amateur Radio Repeater Group.

Phil Hadler – Leaving Icom!

Ian Lockyer M3INL reports, "**Phil Hadler**, Managing Director of Icom UK Ltd, is about to leave Icom UK to pursue business opportunities in the music industry. Phil who has been a guiding hand in the development of Icom UK has decided to focus on his love of music, where he will be attending a music recording course and hopes to brush up on his impressive guitar technical skills too. Alongside that, Phil will be spending more time promoting his music company FSC Music which features his famous guitar brand…not surprisingly called 'Hadler' guitars.

Phil said, "Having worked as a professional musician for a number of years in various bands, prior to joining the company, and having kept strong connections within the music trade, I now feel the time is right to concentrate on what is my first love". He added, "I will miss colleagues and customers at Icom. Working at Icom has been brilliant. I have had some fantastic experiences and made some great friends along the way." Phil's last day at Icom was on the 25th June 25th 2010. Everyone wished him well in his new ventures.

Practical Wireless Author Launches Music Album!

Keen *PW* author **Geoff Cottrell G3XGC** contacted *Newsdesk* with some musical news! He reports, "Some great news! **Paul Dunmall** and I have great pleasure in announcing the release of our first album *White Bird*. It's available for immediate download here: **http://cdbaby.com/cd/dunmallcottrell** We hope very much that you enjoy it! Geoff Cottrell and Paul Dunmall.
Geoff's Music Web Site:
www.geoffcottrell.com/

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New Carrier For RS Components

Traditionally, many radio enthusiasts used Radiospares, who then became RS Components. The company is now changing to another carrier to improve delivery services.

Newsdesk reports: Oxford, UK, June 15th – RS Components, who claim that they are the world's largest distributor of electronics and maintenance products, today announced that **Parcelforce Worldwide** has been appointed as its new UK domestic carrier.

Parcelforce Worldwide won the two year contract, which will start on July 19th, following a renewal tender involving a number of delivery carriers. Previously the UK contract was held by DHL.

Commenting on the agreement, **Anne Bruggink**, General Manager Supply Chain at RS said, "With core values that are closely aligned to our own, Parcelforce Worldwide is an excellent choice of partner for our UK domestic business. Both companies have a long history of unrivalled high quality service levels and we will continue to deliver that same level of service to our customers. We will also work with Parcelforce Worldwide to further improve and explore new delivery opportunities."

Nick Landon, Sales & Marketing Director at Parcelforce Worldwide said, "We are delighted to have won the contract with RS who are a respected leader in their field. This contract win underlines Parcelforce Worldwide's commitment to be the B2B carrier of choice in the UK, delivering high quality express services at a competitive price. We're confident that our strong heritage as the UK's trusted express carrier and our wide range of service options will perfectly complement the RS commitment of delivering for their customers".

About RS Components: RS Components is the trading brand of Electrocomponents plc, the world's largest distributor of electronic and maintenance products. The Group serves 1.5 million customers worldwide. Through operations in 27 countries and 17 warehouses, RS distributes 500,000 products from over 2,500 suppliers. The Group has an annual turnover of over £972 million and is listed on the London Stock Exchange. For more details on the Group please visit the corporate website (**www.electrocomponents.com**).
RS Components
PO Box 99
Corby, Northamptonshire NN17 9RS
Tel: (**01536**) **209174** Fax: (**01536**) **405682**
Contacts: **Tracey Taylor**
tracey.taylor@rswww.com
rswww.com/presscentre

Calling All TW Equipment Fans – Website Is Now Active!

Mike Crawshaw G4BLH has some interesting news for those of us who always wanted a TW 'Communicator' and couldn't afford one! – his TW website is now up and running!

Mike G4BLH writes, "The website about TW Radio Equipment that I have set up now has quite a bit of material on it (with more coming in all the time, a lot of it supplied by **Tom Withers G3HGE** who has been searching through his archives). Tom is delighted with the website and is pleased to see that there will be some sort of 'permanent record' of what was, at the time, fairly cutting edge equipment. The two articles that were originally published in *Practical Wireless* are also on the site thanks to the *PW* Editorial staff! The site is at **www.twradio.co.uk**
Kind regards, Mike Crawshaw G4BLH
E-mail: **g4blh@zen.co.uk**

Members of VP8YL DXpedition To Activate Shetland lighthouse

Newsdesk has got wind that a group of fair ladies won't quite get to Fair Isle between Shetland and Orkney – but they will operate from Sumburgh Lighhouse on Mainland Shetland!

Liz Jones M0ACL/ VP8YLB fills in the details: "Four members of the international group of YLs who activated the Falkland Islands in 2009 will meet at Sumburgh Lighthouse on Mainland Shetland to take part in the Lighthouse Activity weekend. **Nicky Elliot M5YLO** and her husband **Tony G0GFL** have organised the trip and will be joined by **Liz Jones M0ACL** and her husband **Brian G0UKB**, plus **Unni Gran LA6RHA** and **Chantal Beer PA5YL** from the VP8YL group. **Elaine Elliot 2E1BVS**, with her husband **John G3WFK**, will also join the group as well as various local amateurs who are offering advice and loan of larger equipment.

For the International Lighthouse weekend, August 21st and 22nd, the operation will by YL only, using the call **GB2SLH**. The YLs intend to be on air for the entire weekend with two stations on most h.f. bands.

Some members of the group will be on the island throughout the two weeks from August 14th to August 28th, using either the GB2SLH call or their own calls with suitable country identifier.

For Nicky, Liz and Unni this will be the third time they have operated together, following on from the SLYRA (Scandinavian Young Ladies Radio Association) activation of Svalbard in September 2009.

The international group of VP8YLs – Back row **Ruth Geering IT9ESZ**, Nicky M5YLO, Liz M0ACL, Unni LA6RHA. Front Row Chantal PA5YL and **Vicky Panagiotou SV2KBS**

Regards Liz M0ACL

Contact details: **Liz Jones M0ACL/ VP8YLB** E-mail **lizowl@gmail.com**

Brownie Guider 11th Chandlers Ford Brownies www.millersdalebrownies.org.uk

Girlguiding UK TDOTA Coordinator www.guides-on-the-air.co.uk

Itchen Valley Amateur Radio Club www.ivarc.org.uk

A Good Stroke – Scottish Radio Club Moves To A Bunker!

Dave Francis MM0DYX contacted *Newsdesk* with some interesting news. Scottish golfers try to avoid bunkers – but Dave's radio club was very keen to get into one!

Dave MM0DYX writes: "We have completed our move to Scotland's Secret Bunker, on the B940 north of Anstruther, Fife, and are getting ready for NFD and Museums On the Air. In keeping with the mood of the Bunker the club's van is painted in very fetching camouflage colours!

There are issues with noise at the site which have to be investigated, as well as a repair to the floor. As we have now lost our towing vehicle this looks like this will be our site for the foreseeable future. There are two verticals antennas on the van, one for h.f. and a v.h.f./u.h.f. antenna – and a possible dipole or two when that can be arranged.

The management at the site are hinting that they would like us to put on a period (1960s) operating set-up, some members have volunteered to do this as it means dressing up!
More news when we've settled in!
Dave Francis MM0DYX
Club Secretary
Glenrothes & DARC
E-mail mm0dyx@supanet.com
Website www.gdarc.org.uk/

Win A Tennamast Adaptamast Worth £460!

You've read the Part 1 Competition Page in the July PW – Now it's time to enter the competition!

You could win a Tennamast Adaptamast (worth £460 – delivered straight to your door if you live in the UK!).

Practical Wireless and **Tennamast (Scotland) Ltd.**, have teamed up to offer one lucky reader an opportunity to win a superbly engineered Adaptamast worth £460. The prize will be delivered right to the winner's door if they live in the UK. (Delivery to other addresses outside the UK at cost and by arrangement with Tennamast (Scotland) Ltd.)

How to enter? To enter the free competition (only one entry per postal address) all you have to do is answer the three simple questions on the form below. The answers can be found on the competition page – page 13 – of the July issue of the magazine. Then you have to send in your three answers on the form printed on this page. Photocopies of this page are acceptable – **but you must include the corner flash published last month and the corner flash on this page**.

The entry must be sent to the ***PW*** offices marked **Tennamast Competition**. The competition closes on August 11th 2010 and all entries must be received on, or by that date. Multiple entries will be disqualified. The competition is open to all *PW* readers and authors (past and present) and by submitting your entry you will be considered to have accepted that the Editor's decision will be final. No correspondence will be entered into.

Winner's choice: If the winner does not wish to have an Adaptamast, Tennmast (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/**

Competition Entry Form
Please write your entry in block capitals. Please ensure you enter your full address and post code (if you live in the UK). Please ensure you have provide us with an E-mail address and/or telephone number for contact purposes. All the entries are confidential and they will not be entered on to a database or passed on to a third party.

Question 1: In which UK country will you find the Tennamast factory?

.....

Question 2: Who are the founders of Tennamast?

.....

Question 3: Who is the new Managing Director of Tennamast?

.....

Name .....

Address .....

.....

.....

.....

Post Code .....

E-mail .....

Telephone.....

Send your entry (with the two corner flashes attached to this form) to:

Tennamast Competition
Practical Wireless
PW Publishing Ltd.
Arrowsmith Court
Station Approach
Broadstone
Dorset BH18 8PW
United Kingdom.

The competition closes on August 11th 2010 and all entries must arrive on or by that date. Unstamped entries will not be accepted. Please ensure your stamp is affixed as the Royal Mail does not deliver unstamped mail unless a surcharge is paid! Multiple entries and late entires will be disqualified. The Editor's decision is final and no correspondence will be entered into.

MFJ

LOOP ANTENNAS

MFJ-1788X **£469.95**
Frequency 40-15m, Size 1m, Power 150W, Auto band selection, Built-in cross needle VSWR/Wattmeter

MFJ-1786X **£429.95**
Frequency 30-10m, Size 1m, Power 150W, Auto band selection, Built-in cross needle VSWR/Wattmeter

MFJ-1782X **£375.95**
Frequency 40-15m, Size 1m, Power 150W, No auto band selection, no VSWR/Wattmet

The MFJ-1786 and MFJ-1788 Super Hi-Q Loop Antenna is ideal for restricted space locations. Rugged all welded aluminium construction, it is fully weatherproof and does not require a separate control cable, the coax carries the signal and the DC control signals for tuning. You can remotely tune to the amateur bands in seconds. It has very narrow bandwidth which reduces harmonic interference and provides super front-end receiver selectivity

Miracle Antenna

MIRACLE-WHIP TX:3.5-460MHz, RX:0.6-500MHz, Power 25W, Length 1.44m **£119.95**

DUCKER-IL ATU for rubber duck, long wire or coax, Power 25W, Connection BNC Plug, Antenna socket BNC **£109.95**

DUCKER-PL ATU for rubber duck, long wire or coax, Power 25W, Connection PL259, Antenna socket BNC **£109.95**

MIRACLE-ADAPTOR Free-Style Adaptor Magnetic Mount kit for Miracle Whip Free-style adaptor magnetic mount, cable & PL259 Plug with 10m ground radial **£14.95**

MOONRAKER 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**

DIAMOND ANTENNA 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**

TA 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**

MOONRAKER 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**

MOONRAKER 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**

MOONRAKER 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**

MOONRAKER 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**

MOONRAKER 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**

MOONRAKER 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**

MOONRAKER 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**

MOONRAKER 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**

MOONRAKER 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**

MOONRAKER 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**
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G5RV-HSH Ha f Size Hard Drawn Version, pre-stretched, 51ft Long, 10-40 Metres **£24.95**
G5RV-FSH Fu l 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 Full 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 half size G5RV to full with these great inductors, adds 8ft on each leg **£24.95**
MB-9 Choke Balun for G5RV to reduce RF Feedback **£39.95**
TSS-1 Pair of stainless steel springs to take the tension out of a G5RV or similar. **£19.95**

MOONRAKER 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)

Moonraker Head Office & Mail Order
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Bucks MK17 8UR
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Moonraker Satellite Shop @ M5 Communications
Moto Services Area, Junction 30 M5 South
Exeter EX2 7HF
Tel: 01392 427269

MFJ Antenna Tuners

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See our website for full details.

AUTOMATIC TUNERS

MFJ-925 Super compact 1.8-30MHz 200W **£169.95**
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MFJ-928 Compact with Power Injector 1.8 30MHz 200W **£199.95**
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MFJ-993B 1.8-30MHz 300W SSB/150W CW ATU **£249.95**
MFJ-994B 1.8-30MHz 600W SSB/300W CW ATU **£339.95**
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MFJ-16010 1.8-30MHz 20W random wire tuner **£69.95**
MFJ-902 3.5-30MHz 150W mini travel tuner **£99.95**
MFJ-902H 3.5-30MHz 150W mini travel tuner with 4:1 balun **£124.95**
MFJ-904 3.5-30MHz 150W mini travel tuner with SWR/PWR **£129.95**
MFJ-904H 3.5-30MHz 150W mini travel tuner with SWR/PWR 4:1 balun **£149.95**
MFJ-901B 1.8-30MHz 200W Versa tuner **£109.95**
MFJ-971 1.8-30MHz 300W portable tuner **£119.95**
MFJ-945E 1.8-54MHz 300W tuner with meter **£129.95**
MFJ-941E 1.8-30MHz 300W Versa tuner 2 ..... **£139.95**
MFJ-948 1.8-30MHz 300W deluxe Versa tuner **£159.95**
MFJ-949E 1.8-30MHz 300W deluxe Versa tuner with DL **£179.95**
MFJ-934 1.8-30MHz 300W tuner complete with artificial GND **£199.95**
MFJ-974B 3.6-54MHz 300W tuner with X-needle SWR/WATT **£189.95**
MFJ-969 1.8-54MHz 300W all band tuner **£209.95**
MFJ-962D 1.8-30MHz 1500W high power tuner **£289.95**
MFJ-986 1.8-30MHz 300W high power differential tuner **£349.95**
MFJ-989D 1.8-30MHz 1500W high power roller tuner **£389.95**
MFJ-976 1.8-30MHz 1500W balanced line tuner with X-needle SWR/WATT **£469.95**

MFJ Analysers

MFJ-229 UHF Digital Analyser 270-480MHz **£199.95**
MFJ-249B Digital Analyser 1.8-170MHz..... **£259.95**
MFJ-259B Digital Analyser 1.8-170MHz..... **£259.95**
MFJ-269 Digital Analyser 1.8-450MHz..... **£349.95**
MFJ-269PRO Digital Analyser 1.8-170/415-450MHz..... **£379.95**

LDG Tuners

LDG Z-817 1.8-54MHz ideal for the Yaesu FT-817 ..... **£122.95**
LDG Z-100 Plus 1.8-54MHz the most popular LDG tuner **£143.95**
LDG IT-100 1.8-54MHz ideal for IC-7000 ..... **£159.95**
LDG Z-11 Pro 1.8-54MHz great portable tuner **£159.95**
LDG KT-100 1.8-54MHz ideal for most Kenwood radios **£174.95**
LDG AT-897Plus 1.8-54MHz for use with Yaesu FT-897 ..... **£183.95**
LDG AT-100 Pro 1.8-54MHz **£194.95**
LDG AT-200 Pro 1.8-54MHz **£214.95**
LDG AT-1000 Pro 1.8-54MHz continuously **£509.95**

AVAIR SWR Meters

AV-20 (3.5-150MHz) (Power to 300W) **£34.95**
AV-40 (144-470MHz) (Power to 150W) **£34.95**
AV-201 (1.8-160MHz) (Power to 1000W) **£49.95**
AV-400 (14-525MHz) (Power to 400W) **£49.95**
AV-601 (1.8-160/140-525MHz) (Power to 1000W) **£69.95**
AV-1000 (1.8-160/430-450/800-930/1240-1300MHz) (Power to 400W) **£79.95**

WATSON Power Supplies

POWER-MITE-NF (22amp switch mode with noise offset) **£69.95**
POWER-MAX-25-NF (22amp switch mode with noise offset & cig socket) **£89.95**
POWER-MAX-45-NF (38amp switch mode with noise offset & cig socket) **£119.95**
POWER-MAX-65-NF 60 Amp cont 65 Amp peak switch mode variable volts supply with V & A meters & noise offset **£209.95**

MASTRANT High Performance Guy Rope

MASTRANT P3 3mm 200Kg **£0.30ppm**
MASTRANT P3 Drum 100m 3mm 200Kg **£22.95**
MASTRANT P4 4mm 400Kg **£0.40ppm**
MASTRANT P4 Drum 100m 4mm 400Kg **£32.95**
MASTRANT P6 6mm 850Kg **£1.00ppm**
MASTRANT P6 Drum 100m 6mm 850Kg **£79.95**
MASTRANT D2 2mm 200Kg **£0.40ppm**
MASTRANT D2 Drum 100m 2mm 200Kg **£33.95**
MASTRANT D3 3mm 400Kg **£0.70ppm**
MASTRANT D3 Drum 100m 3mm 400Kg **£59.95**
MASTRANT D4 4mm 800Kg **£1.25ppm**
MASTRANT D4 Drum 100m 4mm 800Kg **£99.95**

Cable

RG58 Standard, 5mm, 50 ohm, per metre **£0.35**
RG58-DRUM Standard, 5mm, 50 ohm, 100m reel **£24.95**
RG58M Mil spec, 5mm, 50 ohm, per metre (best seller) **£0.60**
RG58M-DRUM Mil spec, 5mm, 50 ohm, 100m reel **£39.95**
RGMINI8 Mil spec, 7mm, 50 ohm, in grey per metre (amateur favourite) **£0.75**
RGMINI8-DRUM Mil spec, 7mm, 50 ohm, in grey 100m reel **£64.95**
RG213 Mil spec, 9mm, 50 ohm, per metre **£1.20**
RG213-DRUM Mil spec, 9mm, 50 ohm, 100m reel **£99.95**
H100 Mil spec, 10mm, 50 ohm, per metre **£1.40**
H100-DRUM Mil spec, 10mm, 50 ohm, 100m reel **£129.95**
WESTFLEX103 Mil spec, 10mm, 50 ohm, per metre **£1.50**
WESTFLEX103-DRUM Mil spec, 10mm, 50 ohm, 100m reel **£139.95**
TV100U Mil spec, 6.7mm, 75 ohm, per metre **£0.60**
TV100U-DRUM Mil spec, 6.7mm, 75 ohm, 100m reel **£49.95**
300-M Ladder Ribbon, best USA quality, 300 ohm, per metre **£0.85**
300-20M Ladder Ribbon, best USA quality, 300 ohm, 20m pack **£14.95**
300-DRUM Ladder Ribbon, best USA quality, 300 ohm, 100m reel **£59.95**
450-M Ladder Ribbon, best USA quality, 450 ohm, per metre **£1.00**
450-20M Ladder Ribbon, best USA quality, 450 ohm, 20m pack **£17.95**
450-DRUM Ladder Ribbon, best USA quality, 450 ohm, 100m reel **£69.95**
FW-M Original high quality flexweave antenna wire, 2mm, per metre **£0.75**
FW-100 Original high quality flexweave antenna wire, 100m reel **£49.95**
FWPVC-M Original PVC coated flexweave antenna wire, 4mm, per metre **£1.00**
FWPVC-100 Original PVC coated flexweave antenna wire, 4mm, 100m reel **£69.95**

Antenna Wire (50m)

Perfect for making your own antennas, traps, long wire aerials etc.

SEW-50 Multi stranded PVC covered wire, 1.2mm **£14.95**
SCW-50 Enamelled copper wire, 1.5mm **£19.95**
HCW-50 Hard Drawn bare copper wire, 1.5mm **£24.95**
CCS-50 Genuine Copperweld copper clad steel, 1.6mm **£24.95**
FW-50 Original Flexweave bare copper wire, 2mm **£29.95**
FWPVC-50 Original clear PVC covered copper wire, 4mm **£39.95**

Rigging Accessories

Get rigged up, for full list of all options visit our website!

PULLEY-2 Adjustable pulley wheel for wire antennas, suits all types of rope **£19.95**
GUYKIT-HD10 Complete heavy duty adjustable guying kit to suit upto 40ft masts **£49.95**
GUYKIT-P10 Complete light duty/portable guying kit to suit upto 40ft masts **£29.95**
SPIDER-3 Fixed 3 point mast collar for guy ropes **£3.95**
PTP-20 Pole to pole clamp to clamp up to 2" to 2" **£5.95**
DPC-W Wire dipole centre to suit either 300 or 450ohm ladder line **£4.95**
DPC-S Wire dipole centre with SO239 to suit cable feed connections **£5.95**
DPC-A Dipole centre to suit ½ inch aluminium tube with terminal connections **£6.95**
DPC-38 Dipole centre with SO239 socket with two 3/8th sockets to make mobile dipole **£5.95**
DOGBONE-S Small ribbed wire insulator **£1.00**
DOGBONE-L Large ribbed wire insulator **£1.50**
DOGBONE-C Small ceramic wire insulator **£1.00**
EARTHROD-C 4ft copper earth rod and clamp **£19.95**
EARTHROD-CP 4ft copper plated earth rod and clamp **£14.95**
G5RV-ES In-line SO239 replacement socket for 300 or 450 ohm ladder line **£4.95**
AMA-10 Self amalgamating tape for connection joints, 10m length **£7.50**

Mounting Hardware & Clamps

We have all the mounting brackets you could possible want – for all options see our website

TRIPOD-HDA Free standing, heavy duty, fold away tripod, which adjusts from 50-65mm **£149.95**
TRIPOD-25L Free standing heavy duty tripod to suit masts 65mm or less **£69.95**
TRIPOD-20L Free standing heavy duty tripod to suit masts 2 inch or less **£59.95**
TRIPOD-15L Free standing heavy duty tripod to suit masts 1.5 inch or less **£54.95**
TK-36 Heavy duty galvanised pair of T & K brackets, 36 inches total length **£49.95**
TK-24 Heavy duty galvanised pair of T & K brackets, 24 inches total length **£24.95**
TK-18 Heavy duty galvanised pair of T & K brackets, 18 inches total length **£19.95**
TK-12 Heavy duty galvanised pair of T & K brackets, 12 inches total length **£17.95**
SO-9 Heavy duty galvanised single stand off bracket, 9 inches total length **£9.00**
SO-6 Heavy duty galvanised single stand off bracket, 9 inches total length **£6.00**
CHIM-D Heavy duty galvanised chimney lashing kit with all fixings, suitable for upto 2 inch **£19.95**
CAR-PLATE Drive on bracket with vertical up stand to suit 1.5 or 2" mounting pole **£19.95**
CROSS-2 Heavy duty cross over plate to suit 1.5 to 2" vertical to horizontal pole **£14.95**
JOIN-200 Heavy duty 8 nut joining sleeve to connect 2 X 2" poles together **£16.95**
PTM-S Pole mounting bracket with SO239 for mobile whips, suits upto 2" pole **£19.95**

Antenna Rotators *See website for full details*

We stock all the most popular rotators to suit all requirements

AR-300XL Great entry level rotator, but strong enough for all VHF/UHF yagi antennas **£79.95**
Yaesu G-250 Entry level again from Yaesu, ideal for all VHF/UHF yagi antennas **£139.95**
Yaesu G-450 Medium duty rotator complete with 25m of control cable **£319.95**

NES10-2MKII noise eliminating speaker **£99.95**

The NES10-2MKII Noise Eliminating Speaker removes unwanted background noise, hiss, hash computer hash, plasma TV interference, white noise etc from speech so that you can hear the speech much more clearly.

DESKTOP "noise away" robust base station speaker **£154.95**

The Desk Top "Noise Away" is a stylish robust base station speaker for use in radio communications, especially amateur radio

Telescopic Masts (aluminium/fibre-glass opt)

TMA-1 Aluminium mast ★ 4 sections 170cm each ★ 45mm to 30mm ★ Approx 20ft erect 6ft collapsed **£119.95**
TMA-2 Aluminium mast ★ 8 sections 170cm each ★ 65mm to 30mm ★ Approx 40ft erect 6ft collapsed **£199.95**
TMF-1 Fibreglass mast ★ 4 sections 160cm each ★ 50mm to 30mm ★ Approx 20ft erect 6ft collapsed **£129.95**
TMF-1.5 Fibreglass mast ★ 5 sections 200cm each ★ 60mm to 30mm ★ Approx 30ft erect 8ft collapsed **£179.95**
TMF-2 Fibreglass mast ★ 5 sections 240cm each ★ 60mm to 30mm ★ Approx 40ft erect 9ft collapsed **£199.95**
TMF-3 Fiberglass mast * 6 sections 240cm each * 65-23mm * Approx 50ft erect 9ft collapsed **£249.95**

Portable Telescopic Masts

LMA-S Length 17.6ft open 4ft closed 2-1" diameter **£79.95**
LMA-M Length 26ft open 5.5ft closed 2-1" diameter **£89.95**
LMA-L Length 33ft open 7.2ft closed 2-1" diameter **£99.95**
TRIPOD-P Lightweight aluminium tripod for all above **£44.95**

20ft Mast Sets

(5ft Sections)

These heavy duty masts sets have a lovely push fit swaged sections to give a strong mast set. Ideal for portable or permanent installations . . . also available singly

MSP-125 4 section 1.25inch OD mast set **£29.95**
MSP-150 4 section 1.50inch OD mast set **£39.95**
MSP-175 4 section 1.75inch OD mast set **£49.95**
MSP-200 4 section 2.00inch OD mast set **£59.95**
MSPX-150 4 section 1.50 inch 5mm scaffold gauge (very heavy duty) **£69.95**

Patch Leads

PL58-0.5 ½m Standard RG58 PL259 to PL259 lead **£2.95**
PL58-10 10m Standard RG58 PL259 to PL259 lead **£7.95**
PL58-30 30m Standard RG58 PL259 to PL259 lead **£14.95**
PL58M-0.5 ½m Mil Spec RG58 PL259 to PL259 lead **£3.95**
PL58M-10 10m Mil Spec RG58 PL259 to PL259 lead **£10.95**
PL58M-30 30m Mil Spec RG58 PL259 to PL259 lead **£24.95**
PL213-10 10m Mil Spec RG213 PL259 to PL259 lead **£14.95**
PL213-30 30m Mil Spec RG213 PL259 to PL259 lead **£34.95**
PL103-10 10m Mil Spec Westflex 103 PL259 to PL259 lead **£29.95**
PL103-30 30m Mil Spec Westflex 103 PL259 to PL259 lead **£59.95**

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

Connectors

PL259/6mm Standard plug for RG58 ..... **£0.75p**
PL259/9mm Standard plug for RG213 ..... **£0.75p**
PL259/7mm Standard plug for Mini8 ..... **£1.00p**
PL259/6C Compression type for RG58 ..... **£2.50p**
PL259/9C Compression type for RG213 ..... **£1.95p**
PL259/103C Compression type for Westflex 103 ..... **£5.00**
NTYPE/6 Compression type plug for RG58 ..... **£3.50**
NTYPE/9 Compression type plug for RG213 ..... **£3.50**
NTYPE/103 Compression type plug for westflex 103 ..... **£6.00**
BNC/6 Compression type for RG58 ..... **£1.50**
BNC/9 Compression type for RG213 ..... **£3.50**
SO239/N Adapter to convert PL259 to N-Type male **£3.50**
NTYPE/PL Adapter to convert N-Type to PL259 ..... **£3.50**
BNC/PL Adapter to convert BNC to PL259 ..... **£2.00**
BNC/N Adapter to convert BNC to N-Type male **£3.50**
BNC/SMA Adapter to convert modern SMA radio to suit BNC **£3.95**
SO239/SMA Adapter to convert modern SMA radio to suit SO239 ..... **£3.95**
PL259/38 Adapter to convert SO239 fitting to 38th thread **£3.95**

ALL PICTURES ARE FOR REFERENCE ONLY

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

July

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 Frisknet 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

August 29th
The Bletchley Park Rally
The Milton Keynes Amateur Radio Society rally will be held in the grounds of Bletchley Park (MK3 6EB), home of Britain's code breakers during Word War II and soon to be the site of the RSGB's new National Centre for Amateur Radio. Doors will be open from 9.30am to 3.00pm. There will be trade stands, a special event station GB2BP and attractions for the family. Admission will be £2.00 for adults and 50p for children under 14 – adult ticket holders will be able to get £2.00 off the normal price of entry to Bletchley Park itself. Please note that unless you are visiting (and paying for entrance to) Bletchley Park, there is no rally parking on site. Parking is available on the street locally and there is a multi-storey car park immediately opposite at Bletchley Park Station (Sunday charges apply).
Steve
Tel: 07866 673192
www.mkars.org.uk

August 30th
The Huntingdonshire Rally
The Huntingdonshire Amateur Radio Society Bank Holiday Monday Rally will be held at the St Neots Community College, Barford Road, St Neots, Cambridgeshire PE19 2SH. The doors will open at 10.00am (traders from 8.00am) and there will be a large car boot sale, indoor traders, a Bring and Buy and refreshments.
E-mail: hunts.hams@yahoo.co.uk
www.hunts-hams.co.uk

September

September 5th
The Telford Hamfest
The Telford Hamfest will take place in the Enginuity Technology Centre, Coalbrookdale, Telford TF8 7DU. The doors will open at 10.30am and there will be talk-in on S22 and GB3TF (433.200MHz), trade stands, special interest groups and discounted admission to the Enginuity Centre.
Martyn G3UKV
Tel: 01952 255416
www.telfordhamfest.co.uk

September 12th
The Muckleburgh Collection Boot Sale
An amateur radio, vintage radio, militaria and general boot sale will be held at the Muckleburgh Collection military museum, Weybourne, Norfolk. For one day only, admission to the museum, restaurant and shop will be free, providing an unusual opportunity to visit the country's largest privately owned military museum without charge.

The North Norfolk Amateur Radio Group (NNARG) will also welcome visitors to their unique collection of all-service vintage military, amateur and other communications equipment in the Radio Hut at the museum. Radio clubs, individual amateurs, military enthusiasts and general stallholders welcomed.
Bob Finch G0HYZ
Tel: 01263 838198
www.muckleburgh.co.uk
www.gb2mc.co.uk

September 12th
The Torbay Communications Fair
The Torbay Annual Communications Fair will take place at Newton Abbot Racecourse, Newton Abbot, Devon TQ12 3AF. There will be trade stands, catering, a Bring & Buy and facilities for the disabled.
Mike G3LQX
Tel: 01626 773934
Mike G1TUU
Tel: 01803 557941
E-mail: rally@tars.org.uk

September 18th
The Fog on the Tyne Rally
The Angel of the North Amateur Radio Club, in conjunction with STARS Radio Club, Fog on the Tyne Rally will take place at the Whitehall Road Methodist Church Hall (at the corner of Whitehall Road and Coatsworth Road – the car park entrance is in Whitehall Road), Bensham, Gateshead NE8 4LH. Doors will open at 10.30am and admission will be £1.50.
Nancy Bone G7UUR
Tel: 07990 760920 (Day)
Tel: 0191 477 0036 (Night)
E-mail: nancybone2001@yahoo.co.uk
www.anarc.net

Alan VK2DRR takes a look a lightning – something that can cause many problems for Radio Amateurs!

Lightning & Amateur Radio

Photographs by Michael Bath: www.lightningphotography.com

It's little wonder that primitive mankind developed the idea of Gods as originators of lightning and thunder. Both are frightening phenomena about which much superstition and untruths were and still are propagated!

Lightning protection strategies long ago ranged from crouching in laurel bushes — not altogether silly since laurel bushes are lower than most trees, to ringing church bells to keep the lightning at bay — somewhat unfortunate as many bellringers were killed when their church spires were struck!

Lies, Damned Lies & Statistics!

It's said (though not by Statisticians!) that there are lies, damned lies and statistics! Despite this, statistically there's surprisingly little chance of a direct strike to an ordinary home. This has given rise to one of the superstitions about lightning – that it never strikes in the same place more than once! This is entirely untrue!

High buildings like the Empire State Building in New York are repeatedly struck by lightning. But, such high sites apart, the odds against a given point being hit directly once are already huge. A repetition is in normal circumstances is altogether remote.

Even a direct strike often causes little if any visible damage to structures although sometimes parapets can be dislodged or windows blown in by the physical shock, and buildings largely made of wood can ignite due to the heat. But Radio Amateurs are particularly concerned with the electrical and electromagnetic effects of lightning activity on electrical and electronic equipment and here – unfortunately – a direct strike is not necessary to cause damage.

The thermionic valves, that were once common, although apparently fragile, are relatively robust electrically, mainly because of their thermal inertia (slowness to respond to very fast electronic events). However, although the transistors and integrated circuits (i.c.s) that have largely replaced them today have many benefits – they are far more sensitive to excess voltages experienced for fractions of a second.

What Is lightning?

Although we're all familiar with lightning many people aren't aware what causes the phenomenon. Lightning is, in fact a complex series of sparks: either between clouds, between one or more clouds and the ground or to objects on the ground. These sparks are manifestations of static electricity, the result of extremely high voltage differences between the bodies concerned and consist of multiple very short pulses of energy usually many thousands of metres long.

Thunder is the audible manifestation (a sound pressure wave) of both the rapid combustion of air in the lightning strike path and the equally rapid

Alan Ford VK2DRR lives in part of the world where lightning can be quite spectacular – and dangerous for radio enthusiasts!

replacement of air in the resulting vacuum.

The visual evidence of a lightning strike can be seen almost instantaneously, as light waves travel at a speed of 300,000km/sec. But thunder, although generated virtually simultaneously, is heard later by an observer unless the strike is very close. This delay is because sound waves propagate much more slowly than light, in fact at a rather more leisurely rate of roughly 330metres/sec, depending on such things as altitude, humidity and ambient air pressure.

The enormous difference in speeds of the visual and audible propagation has given rise to the rule of thumb method of determining distance from a direct strike, which is about three seconds per kilometre of distance. So, if you can count three seconds from the flash to the crash you are approximately kilometre away from a direct strike.

At very close proximities the thunder is heard as a clap or crash. Further away, this becomes a rumble due to the effect of absorption and reflection of and by clouds, trees and buildings, as well as decreasing in amplitude as it spreads in all directions.

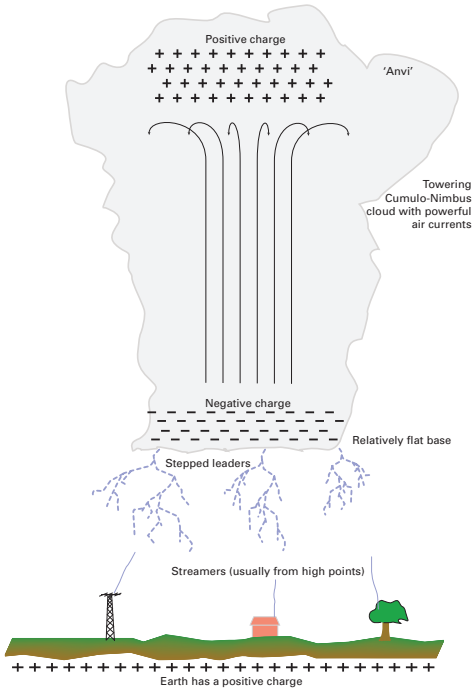

Fig. 1: The powerful air currents in the Cumulo-Nimbus cloud cause the base of the cloud to take on a strong negative charge, and the top to have a corresponding positive charge.

Effects Of Friction

Lightning's dramatic demonstrations of static electricity are caused basically by the effects of friction. This occurs because all matter is made up of molecules, containing various parts including electrons and these parts are usually individually in balance with each other.

Friction can cause electrons to be torn away their molecules, creating an electrical imbalance. An imbalance that creates a state of tension between molecules that are short of electrons and those that have an excess. Nature does not like imbalances and seeks to correct them.

For each imbalanced molecule the passage of a small electric current takes place to restore the molecular balance. Multiply this by the billions of molecules that make up a typical thundercloud – and you then have the ability to create a massive spark.

The friction is caused by the constant rising of hot air and falling of cold air to take its place (a question of balance again). The action of the sun (the cause of all weather) allows some parts of the air to become hotter than others and the resulting re-arrangement of bodies of air is what causes all winds. Additionally, there's the effect of evaporation of sea and other water, and its subsequent part condensation into clouds (water vapour on the brink of falling as actual rain (or snow!).

Within A Cloud

All it takes is a combination of the right bodies of cold and hot air to create a constantly moving mass – usually vertical – of water droplets within a cloud. This creates the friction and the 'tearing' of individual molecules, resulting in turn in the build-up of an electrical charge.

Eventually the charge rises to a level where a flash-over occurs as the voltage becomes enough to overcome the natural resistance of the air.

Most lightning is seen emanating from the classic cumulonimbus cloud. This is a development of the harmless white fluffy cloud, growing larger, rising and spreading out at the top in the shape of an anvil, usually becoming darker and higher by the moment. The bottom of such a cloud is relatively flat.

The formation of towering cumulonimbus clouds can happen at any time of the year but is common when conditions are unusually hot or where there are extreme changes of temperature. Certain regions of the World have a greater than normal exposure to thunderstorm activity, notably Florida in the USA, which has been dubbed 'thunderstorm alley'.

Normally a cumulonimbus thundercloud accumulates a negative charge at its base and there will eventually be a flash-over to the relatively positive charge of the earth. However, it's possible for a cloud to accumulate a charge that is positive with reference to the earth – there is always some charge between the earth and the air above it. Even on a sunny day there can be potentials of up to 400,000V present. In a thunderstorm this rises to around 40,000,000V (40MV) or more at (let's say) 2160m (7,000ft) or so.

Typically, the actual lightning flash starts with a 'stepped leader' stroke from the thundercloud to the earth, 'forked' as the energy 'probes' for a low resistance path. At the same time, positive 'streamers' travel upwards from suitable (usually high and often relatively sharp) objects on the earth (see **Fig 1**).

When a leader and streamer meet, the main stroke then flows through the ionised path, often more vertically (see **Fig 2** and the **photo**). This all happens in minute fractions of a second. Lightning currents vary greatly but are typically in the region of 30,000A (30kA).

Powerful Pulse

A lightning strike, as well as producing heat together with visual and audible effects, also produces a powerful electromagnetic pulse at the origin and of course this becomes weaker as the distance from the strike grows. Close to a strike, the electromagnetic waves emanated are sufficient to induce excess voltages in electronic solid-state equipment and cause damage.

Typically, depending on the strength of the strike, damaging effects to electronic equipment may be experienced as much as 100m or more from the point of strike! Such radio waves can of course be received by an ordinary receiver even when they are hundreds of kilometres away, although at that distance they are certainly not harmful.

So far, in considering electronic equipment I have discussed the propagation of electromagnetic waves through the air (space in fact, but in the troposphere we live in there is air anyway). However, lightning can induce excess voltages in various conductors, including antenna and power cables, which are in turn connected to electronic equipment. In many cases this can increase the range over which damage can occur.

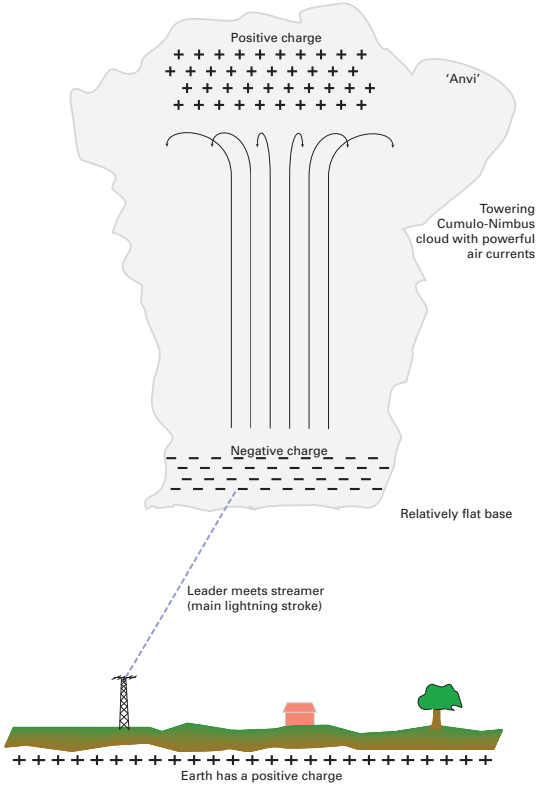

Fig. 2: When leader and streamer meet, the main lightning stroke follows the easiest path to ground.

Precautions Against Lightning

When it comes to lightning precautions – Radio Amateurs naturally thinks first of his or her transmitting and receiving equipment and antennas. And first, if there's a possibility of a thunderstorm approaching or starting, all rigs should be physically disconnected from antennas. Personally, I don't feel that a simple coaxial switch is good enough for this task, as the connections to the rig and the antenna are too close. This is because after lightning has sparked across kilometres – it's unlikely to be deterred by air gaps of a few more millimetres (or even centimetres!).

Secondly, in my opinion rigs should be unplugged from the electricity supply. Again, the simple on/off switch on a power outlet is not enough. Again, if the spark has travelled many kilometres then the amount of energy involved will have no problem with the tiny gap of a mains on/off switch!

Human Safety

However, what about human safety – especially if the storm approaches quickly and unexpectedly? By the time thunder is heard (unless in the very far distance as a vague and faint rumble) I feel it's too late to take those precautions. The risk of a lightning strike while we're physically handling the connections is just too great as far as I'm concerned.

To avoid the risks I personally keep all antenna and power plugs disconnected unless I am actually on the air or listening. Additionally, I always disconnect them overnight or before leaving home.

A number of simple precautions will greatly reduce the risk of human injury or death. When adjacent to a storm it is best to remain indoors and away from windows, and to avoid using any telephone except a cordless type. It's also advisable to keep clear of such things as chimney breasts or any earthed bodies, such as electrical white goods ('fridges, dishwaters, etc.) and metal sinks.

If you're outside when a storm approaches, taking shelter inside a substantial building is advisable. Many injuries (and some deaths) happen on golf courses. Continuing play in thunderstorm conditions is reckless. Some courses even have lightning detection apparatus ('field mills') to warn players of an impending storm. The '19th hole' – enjoying a nice 'pint' – is probably the safest place to be!

While a motor vehicle offers reasonable protection from a lightning strike, driving may be hazardous as a result of other accompanying weather effects such as flooding and fallen trees, as well as driving conditions generally. Naturally, portable or mobile operating during thunderstorms is to be avoided!

Insurance Claims

If you're unlucky enough to suffer lightning damage and wish to make a claim on your insurance policy, the all-important document is the policy 'wording' itself. In the world of insurance lightning is what is known as a 'standard peril'. The peril itself is covered by household policies. But – here's a possible catch – does your policy require there to be 'visible evidence of a direct strike'?

Is your Amateur gear itself covered as part of household contents? Does the cover extend to a separate shed if that is your shack? Is the sum insured for contents sufficient to include all the Amateur rigs that you own? Are Amateur Radio antennas covered? Is a tower separate from the home building covered and are there any height limits?

What is the basis of settlement (depreciated or 'new for old')? You'll most likely see that insurance coverage possibilities are somewhat of a minefield! And obviously, specific advice cannot be given here because the details and conditions of cover vary so widely amongst insurers and the 'optional' covers that can be involved.

Please remember that it's **always important to read and understand your insurance policy when or even before you enter into an insurance contract** – it's far too late when you have to make any kind of claim! The services of an insurance broker who is familiar with amateur radio are invaluable. **Note:** There are insurance products created specifically for the Radio Amateur, and the RSGB can point you at sources of further information.

Exploding Myths!

Finally, I'd like to explode a couple of myths! I started this article with some myths so I'll end with two more that should be demolished! First – there are still people who think that lightning is magnified by a mirror! The mirror only intensifies the visual impression.

Secondly, people sometimes talk about 'sheet lightning'. This isn't some distinct phenomenon, while in fact it's simply normal lightning seen distantly through clouds or rain.

If you have any stories to tell of your own experiences with lightning – please share them via the *PW* Letters pages. I'm sure there'll be some interesting tales told! ●

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Circuit boards without Etching

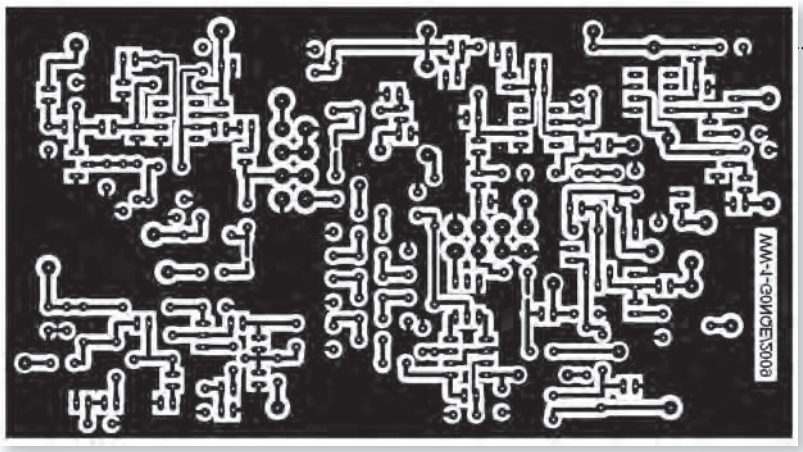


Fig. 1: An example of the foil pattern that Colin G0NQE works from.

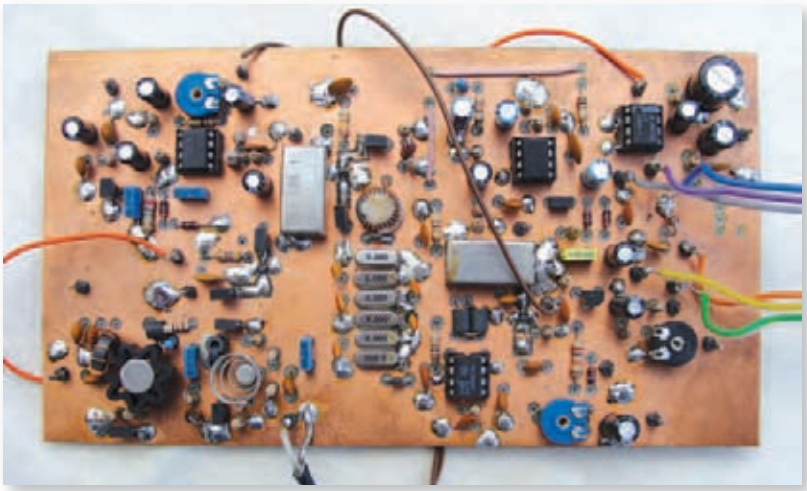


Fig. 2: The finished article could be mistaken for a standard etched p.c.b.

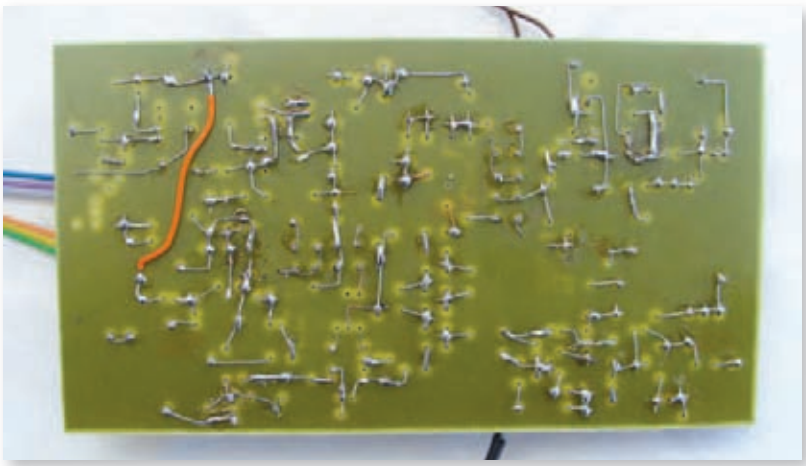


Fig. 3: The underside of the board designed by Colin G0NQE, is where the real work is done.

Colin Wilkinson G0NQE describes his method of making practical printed circuit type boards without the need for 'messy etching'.

My ideas may sound like a bit of a tall order and if I were making a conventional printed circuit board (p.c.b.) – you would be right. However, I have some other ideas!

Over many years of constructing I have tried many different p.c.b. construction techniques from 'dead bug' to the full blown etched p.c.b. method. What I want to show you here is a simple method of using a p.c.b. foil pattern to create a circuit board without using any chemicals or expensive photo etch p.c.b. laminate.

I use a p.c.b. computer program to design my own foil patterns but you can use any foil patterns that are available, there are many projects on the internet where a foil pattern is supplied for anyone to download and use. As you can see from **Fig 1**, it's possible to do quite complicated boards using this method.

Process Begins

The process begins with firstly printing off the foil pattern onto plain white paper. Then, with a black felt tip pen I blank out all of the holes in the pattern that connect to ground. Next, I then cut a piece of single sided p.c.b. laminate to fit the pattern.

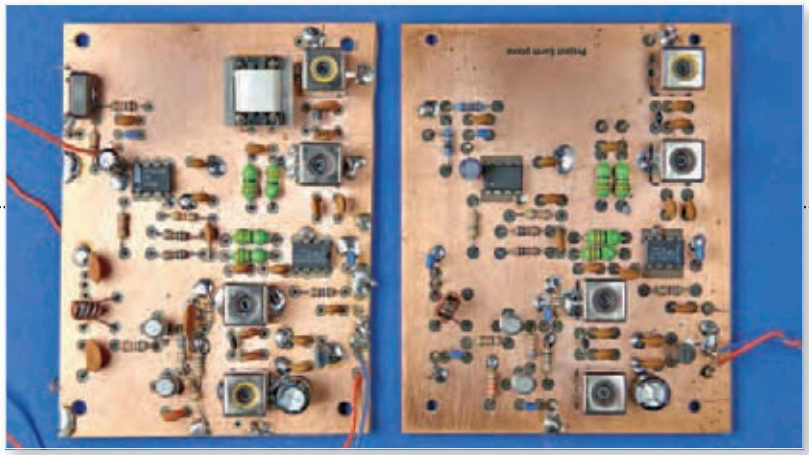
The next stage is to place the foil pattern face up on the copper side of the laminate. I then hold the foil pattern in place with suitable tape.

After this all that's required for me to do is to drill all of the holes on the foil pattern through the p.c.b. laminate, making sure that the pattern doesn't move! When all the holes are drilled remove the foil pattern. After that job, all that's left for me to do to finish the board off, is to countersink all of the holes by hand with a sharp 5mm drill bit.

Looking at **Fig. 2**, you can see that the finished article would easily pass as an etched p.c.b. from this view. And a big plus for radio frequency (r.f.) work is that you'll have a ground plane to solder directly to.

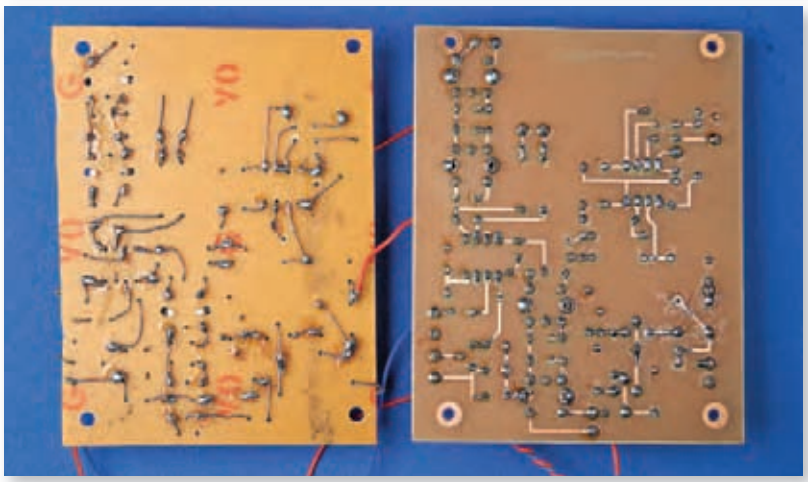
The underside of the board, **Fig 3**, is where the real work is done. Although the point-to-point wiring doesn't

Looking at both the initial prototype transceiver on the left and the first etched version, shows little difference to the casual observer.

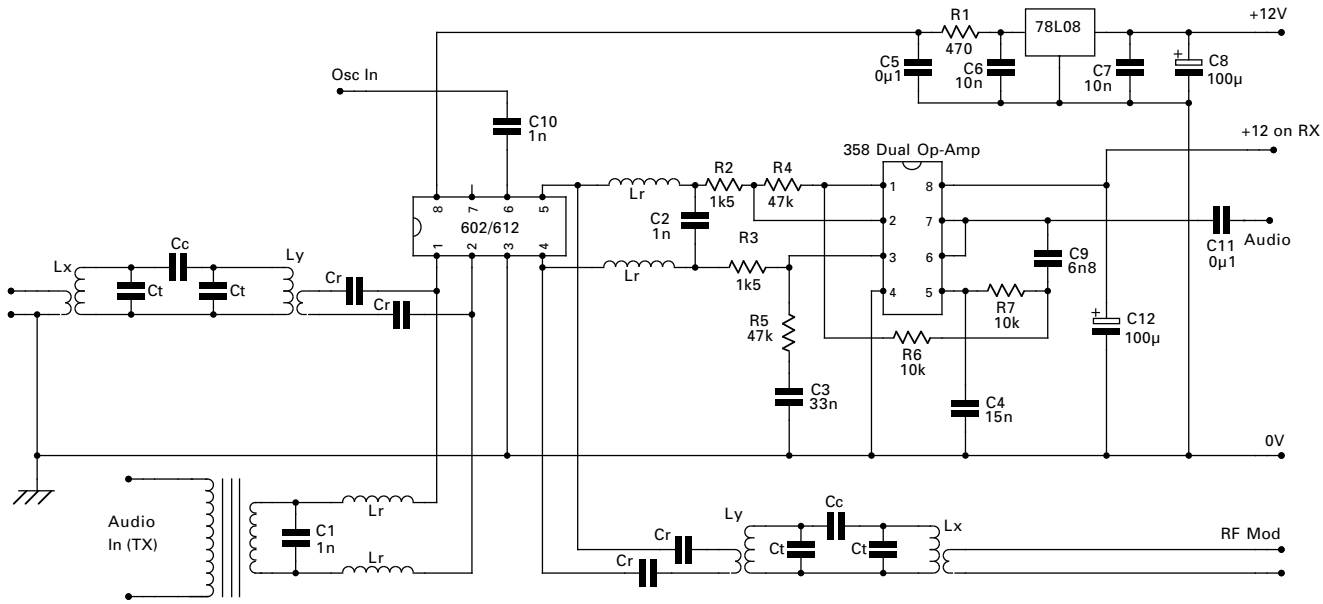


look pretty – it does exactly the same job as p.c.b. tracks. There's a plus too – because any omissions on the foil pattern are easily rectified by drilling and countersinking extra holes for that missed component or addition. The latter feature makes this method very good for prototyping, as small changes can be made without it been a major disaster.

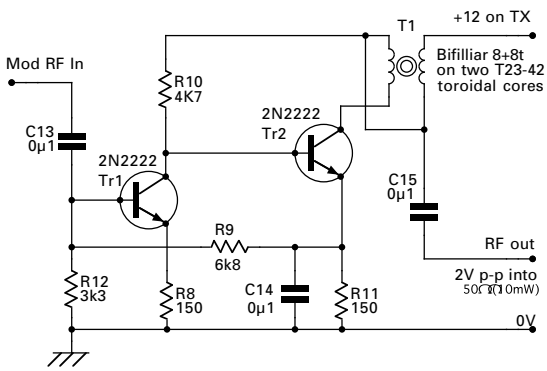
I hope that this practical and easy way of making p.c.b.s that I have shown here is as useful to you as it has been for me. There's no need to clear up after that messy etching fluid either! Good luck and 73 Colin. ●



Now you can see the difference of the two prototypes. Though the initial layout follows the same pattern, it just looks a little rougher.



Lx is Lo-Z winding transformer
Ly is Hi-Z winding transformer
Ct is the tuning cap. for the band
Cc is the coupling cap. for the band
Lr is RF blocking coil
Cr is the RF coupling cap.



The circuit of the heart of a single-band transceiver, that's being developed.

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MA5B	Mini beam 10, 12, 15, 17, 20m.....	WOW £449.99
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"We've sold 100s all over Europe"

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

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No tuning required

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40cm flexible whip for the ultimate in gain. **£29.99** P&P £5.00
Tx:- 2m + 70cm (Rx:- 25MHz-2.9GHz).

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A fully adjustable deluxe desktop stand for hand-helds. Includes BNC to SO-239 lead. **£19.99** P&P £4

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A superb, no mess, quick fit in-car holder (fits airvent) for hand-helds. **£6.99** P&P £3

Tony Nailer's

technical for the terrified

This month Tony Nailer G4CFY looks at the different methods of undertaking measurements of resonant circuits, coils and filters.

In the past – particularly 40 to 50 years ago – Radio Amateurs often had a grid dip oscillator, (g.d.o) in their shacks. The early versions were valved oscillators with a selection of coils that could be plugged into a socket on the outside of the box. (See the picture **Fig. 1**.)

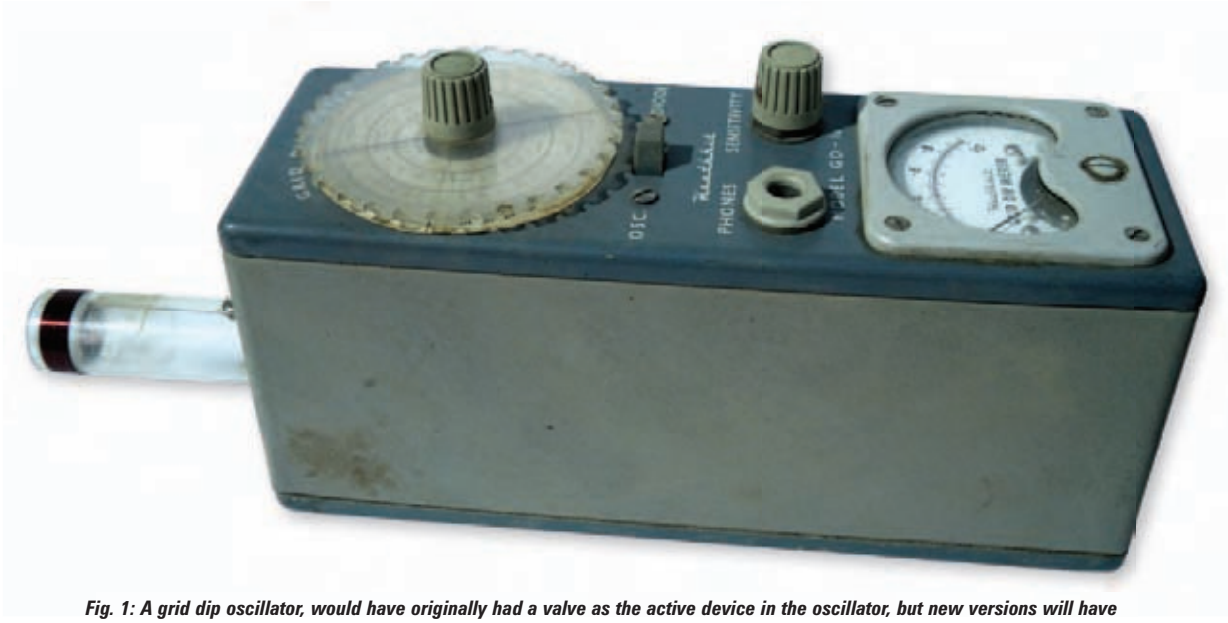


Fig. 1: A grid dip oscillator, would have originally had a valve as the active device in the oscillator, but new versions will have an f.e.t. or transistor instead.

When in use, the g.d.o.'s coil was brought into close proximity with the coil of a resonant circuit and the oscillator adjusted until mutual resonance occurred. At that frequency the passive circuit would 'steal' power from the coil of the g.d.o. and the grid voltage of the valve would drop noticeably.

However, there's a snag with using a g.d.o. for measurements: tight coupling of the g.d.o.'s coil to the circuit under test, would significantly affect the mutual inductive reactance and operating frequency. The act of taking the measurement distorts the result. To overcome this as much as possible, the g.d.o. coil can be moved away from the circuit under test until the dip is barely noticeable. Then the affect of the g.d.o on the circuit is minimal and the frequency error is relatively low.

In more recent years dip oscillators were made using bipolar and field effect transistors (f.e.t.s). Indeed the abbreviation g.d.o now referred to gate dip oscillator, and operation is much the same as with a valved g.d.o.

The Wavemeter

In resonant circuits carrying high signal levels, such as oscillator or multiplier, or amplifier stages, measurements can be taken using a wavemeter. This is really a crystal set with a variable capacitor and a dial marked in frequency, with output from the detector used to drive a meter.

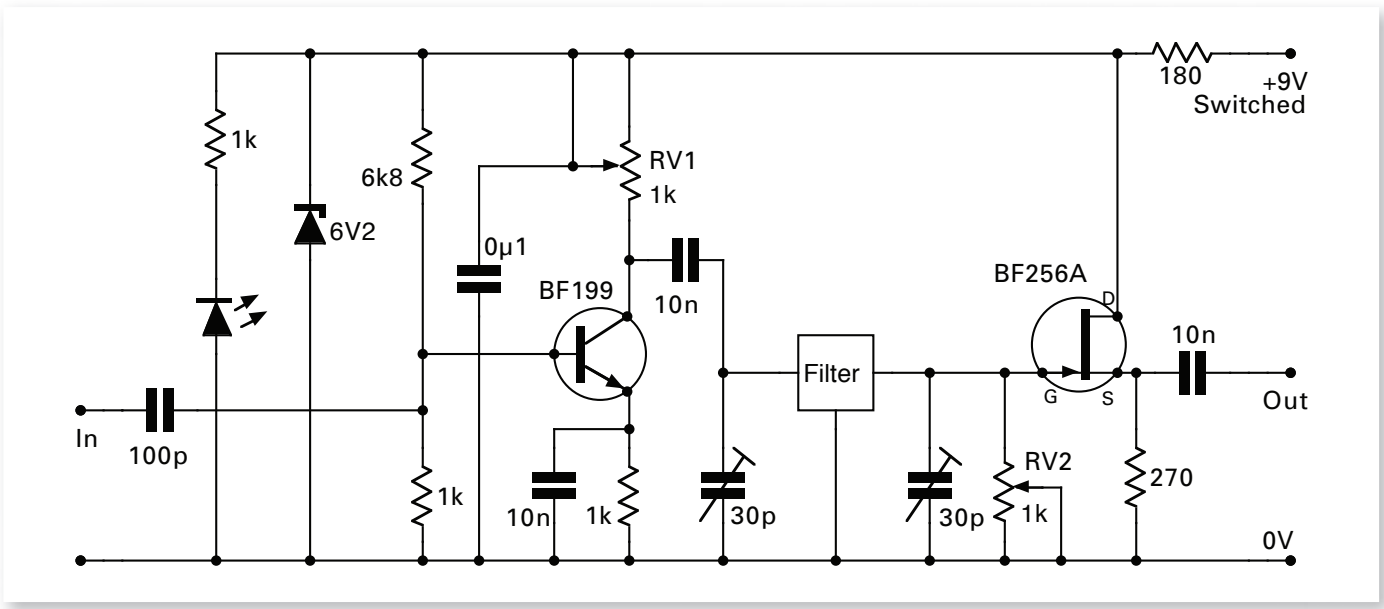
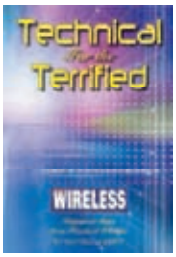


Fig. 2: The circuit of a suitable filter test jig that may be used to check out crystal and ceramic band-pass filters.



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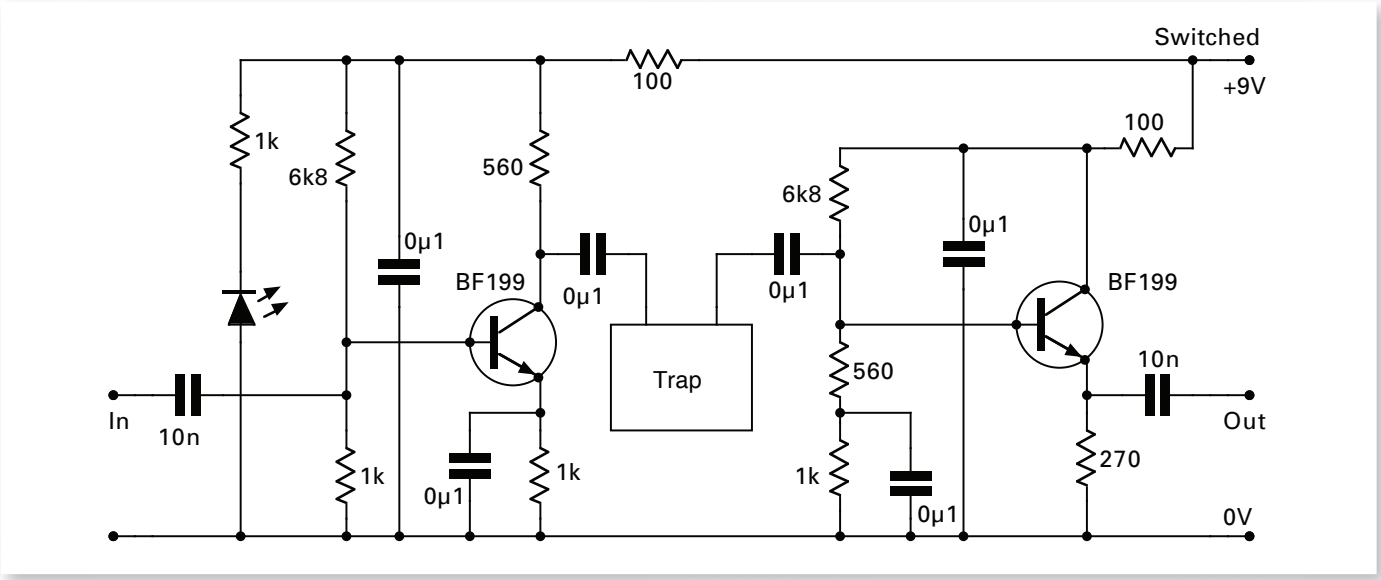

Fig. 3: The circuit of a suitable jig, to measure the resonance of an antenna trap without 'pulling' it off frequency.

Again, by placing the coil of the wavemeter close to the active resonant circuit, it 'steals' maximum power from that circuit at the mutual resonant frequency. The great advantage of the wavemeter is that, provided the range is great enough or there are substitute coils for higher frequencies, the harmonics in the active circuit can also be measured. Many g.d.o.s also had the option to switch off the oscillator and to use the unit in wavemeter mode.

Filter Testing

Ceramic, mechanical, and crystal filters cannot be tested using a wavemeter or a g.d.o. The characteristics of these parts are also affected by source and load resistance and capacitance.

Accurate determination of centre frequency and bandwidth can only be achieved if a highly stable signal generator with frequency readout is employed. The ideal kit is a spectrum analyser with tracking generator, but not many individual constructors own these.

Measurements can be carried out using a suitable signal generator in conjunction with an oscilloscope and a test jig. The circuit of a suitable filter test jig is shown in **Fig. 2**. The filter source is provided by the input amplifier with pre-set resistor in the collector, together with the trimmer capacitor to ground.

If the termination details of the filter are known, the trim-pot can be pre-set to the correct value initially, and the trim-cap adjusted to the approximate capacitance required. The collector to emitter capacitance of the transistor can be assumed to be about 4pF.

The filter load is provided by an f.e.t. source follower with adjustable input resistance and capacitance. The gate to drain capacitance can again be assumed to be about 4pF. Together the source and load circuit allow the filter to operate as it would in a piece of equipment without being affected by the signal generator, or oscilloscope or connecting leads and probes.

To use the set-up, link the source circuit directly to the load circuit and adjust the input level so the output signal does not exceed about 1.5V peak-to-peak (p-p). Then record the amplitude of the observed signal (V1. Then remove the link and wire the filter into circuit. Sweep across the required frequency to find the centre of the pass-band and again record the signal amplitude (V2).

The difference between the filter in circuit and filter out is the insertion loss, which can be calculated in decibels using dB = 20 Log(V2/V1). As an example, if the direct path gives 1.5V p-p on the oscilloscope, and through the filter gives 1.2V p-p, then dB = 20 Log (1.2/1.5) = 20 log (0.8) = -1.58dB.

Having done the insertion loss, now re-install the filter and take measurements across the passband and down the sides of the characteristic. The separate measurements can be calculated as a ratio against the signal at the centre of the passband. These results can be converted to dB and drawn on graph paper to produce a filter shape.

Usually a filter will exhibit approximately 11dB of stop-band attenuation for each pole. So a two-pole 10.695MHz crystal filter in a CB radio will offer about 22dB of stop-band attenuation. The six-pole ladder filter used in the *Poundbury* receiver has a measured stop-band in excess of 65dB.

Testing Pass-Band Ripple

A particularly useful test with the set-up I've described is

to check the pass-band ripple. First determine the point each side of the pass-band where the level has fallen by a factor of 0.7, or 3dB. Then sweep slowly across the passband between these two frequencies and observe the amplitude. If it goes up and down noticeably then either the filter is incorrectly matched or there is a fault in one of the poles.

Try adjusting the trimmer capacitors equally and repeating the sweep. In most cases the filter will need minimum capacitance loading. Often the pass-band is flatter when the termination resistance is higher than specified, but the stop-band performance might not be so good if the loading is lighter.

Antenna Trap Measurements

When I purchased the Trap Dipole business from **Richard Holman G2DYM** in October 2006, he had previously used a Heathkit g.d.o to measure the traps' resonant frequencies. More recently he'd used an MFJ Antenna Analyser in g.d.o. mode with a one turn loop on a length of coaxial cable.

Earlier I mentioned the problem of de-tuning caused by the coupling of a g.d.o to a passive resonant circuit. However, I had immediate reservations about this method, especially when he demonstrated to me the measurement of his traps and comparisons with ones from other companies. He actually showed his traps differed by about 100kHz from those of other makes.

The G2DYM traps consisted of 14 turns of RG58 coaxial cable, so the effect of putting a one turn sampling loop around it was to severely load it. I wondered how to measure the trap resonance without the loading effect. It was quite a challenge, it took a fair amount of dog walking and deep thought before a possible solution developed!

Transmission Line Theory

Firstly, I needed to consider what an antenna looked like theoretically, in respect of being a transmission line. Actually it's a conductor suspended above an 'infinite' ground plane.

Provided the wire diameter 'd' is very small in relation to the distance to the ground plane D, the impedance is $Z = 138 \log (D/d)$. In the case were the wire diameter is 3mm and the height above ground is 10m (10,000mm), $Z = 486\Omega$. If the wire diameter is 2mm and the height the same, $Z = 510\Omega$.

So, I made a jig like the one used for the filter test, with a source and load impedance of 560Ω. Testing a trap in the jig gave a result 80kHz higher than when tested with the MFJ analyser. Therefore the jig wasn't pulling the trap down in frequency, and it was actually testing the trap as is used in the antenna top wire.

The circuit arrangement is shown in **Fig. 3** with 560Ω resistors de-coupled to ground at source and load ends of the jig. Capacitance at the collector of the source transistor will be about 4pF and at the base of the load transistor it will be about 2pF. This means that the jig will only add the series equivalent of these capacitors, which total about 1.3pF. A picture of the Trap Test Jig is shown in **Fig. 4**.

Testing Screened Coils

As many of my regular readers will know, I now stock a range of 10mm screened coils similar to the obsolete

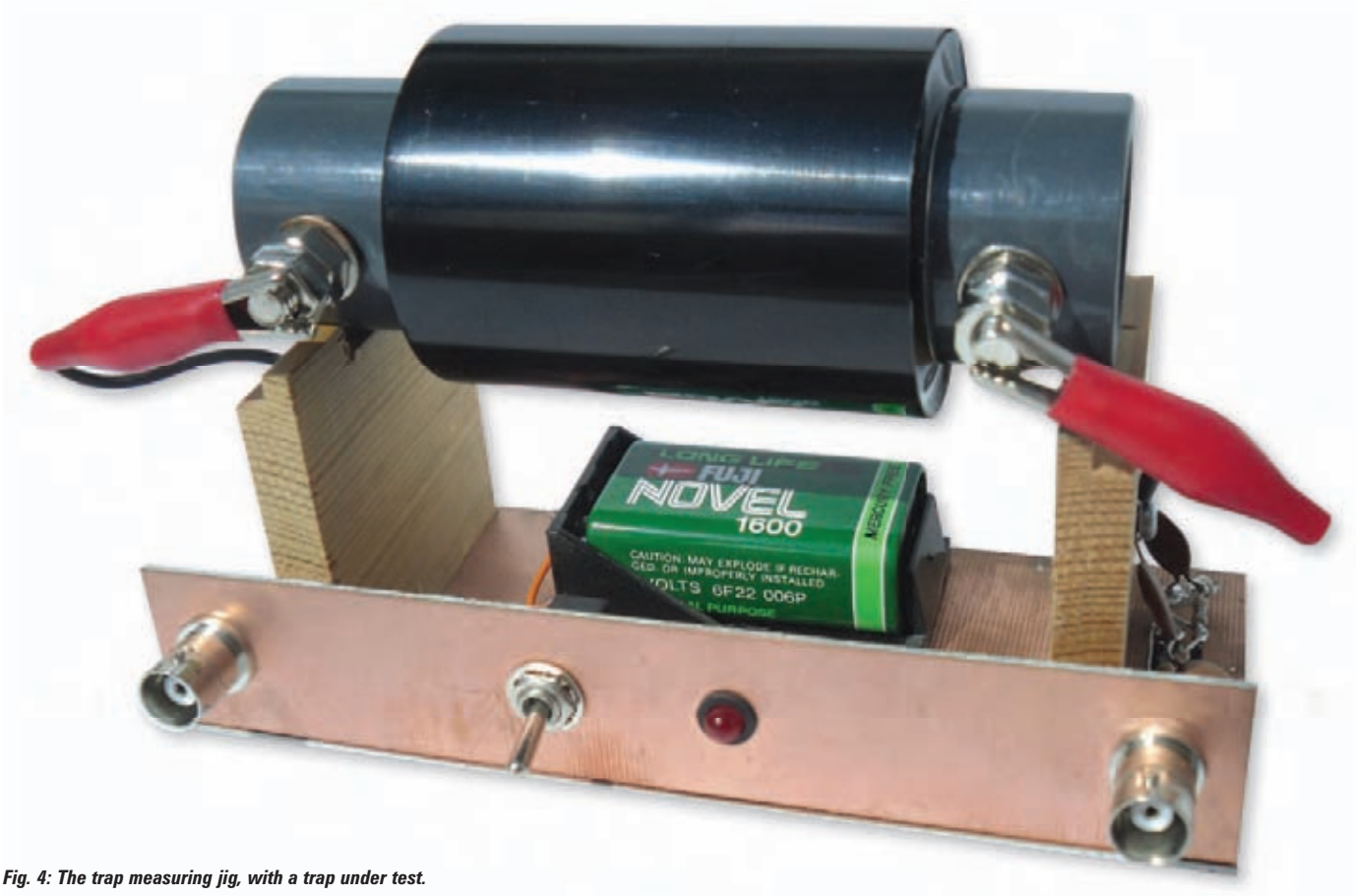

Fig. 4: The trap measuring jig, with a trap under test.

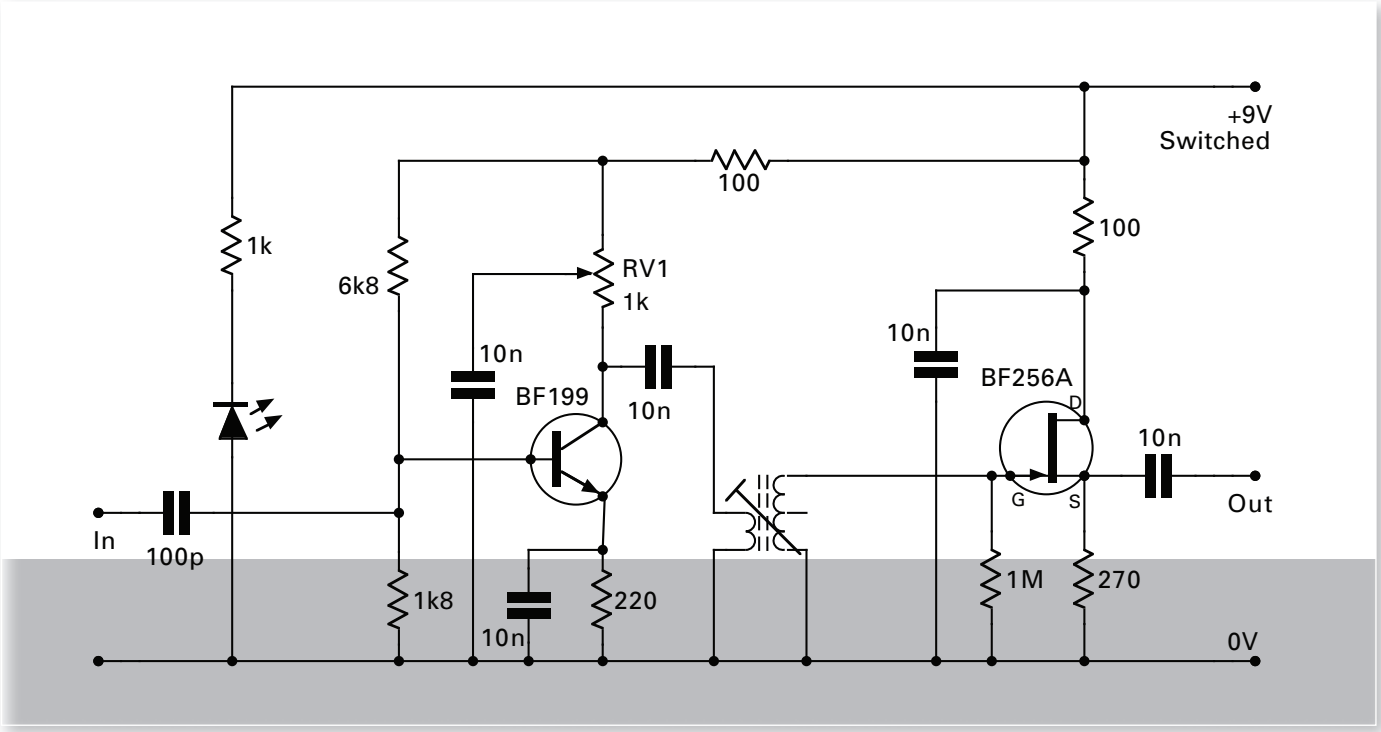

Fig. 5: A jig to test turns ratio and resonant frequencies of coils.

TOKO 10K series. I have already produced several tables of data, giving turns ratio, impedances, and operating frequencies. Recently a new coil of 90μH was received from the manufacturer but without details of the primary and secondary turns.

It should be just a simple matter to determine the turns ratio, by feeding the low impedance link winding from the signal generator, and using the oscilloscope probe to measure the voltage across the link and volts generated across the main winding.

How wrong I was! The ratios didn't look anything like they should have. Additionally, when the resonance was searched for, it was way below the expected frequency. I also checked several of the other coils in the serie for resonant frequency and they all seemed far too low. This gave me a clue to the cause of the unexpected result.

The oscilloscope probes and leads are just RG174 with a BNC one end and 'tails' with test-clips at the other. The lead lengths are insignificant proportions of a full wavelength at any frequency under 30MHz. Unfortunately the capacitance of RG174 is 100pF per metre. One of my leads from the generator is one metre long and the lead to the oscilloscope is 1.5 metre long. So the source lead was 100pF and the oscilloscope lead was 150pF.

Coil Test Jig

To test screened coils a test jig is needed. In this case the source needs to be adjustable from 50Ω to 1kΩ, though it is important to refer to the Spectrum coil data to find the link impedance at a given frequency and adjust the jig accordingly.

The load needs to be as high impedance as possible so the loading effect is insignificant. Again the Spectrum coil data shows that the 45u0L coil has a dynamic resistance of 32kΩ at 1.9MHz. In this case a 1MΩ gate bias resistor for the f.e.t would give only a 3% loading effect. A suitable circuit is shown in **Fig. 5**. Now the jig can be used in a similar manner for the coil as it was used for a filter.

Fit the coil to the jig and adjust the input signal so the display on the oscilloscope is about 1.5V p-p. Then remove the coil and link across from source to load. The level on the screen will be reduced by the factor of the turns ratio.

To find self-resonance of the coil, tune the signal generator until the display voltage is maximum. That is the resonant frequency, and the ratio of link voltage to main winding voltage should still be the same. A capacitor can be added across the main winding and the resonant frequency again measured.

At a required resonant frequency it will then be possible to determine the frequency each side of resonance where the amplitude has fallen by a factor of 0.7 (3dB). The difference between these frequencies is the bandwidth and the centre frequency divided by the bandwidth gives the *Q* of the circuit.

Amazing Learning!

It is really amazing just what can be learned about resonant circuits and filters with the use of a good signal generator, an oscilloscope and a test jig. Measurements such as these allow the constructor to get the components working properly without just hoping for the best. So, I hope this work will be of value both to the constructor and the radio student! Cheerio for now. ●

If you like this series, did you know, the first 27 articles have been compiled into a spiral-bound book *Technical for the Terrified*, available from the *PW* Bookstore? Or from myself at Spectrum Communications!

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**.

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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**.

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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.**

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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**.

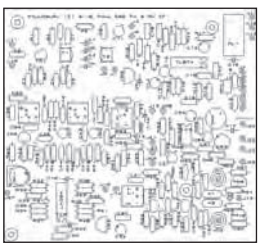
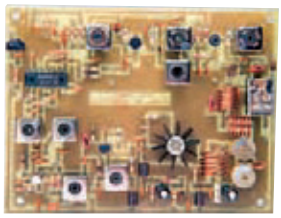
POUNDBURY 4 METRE SSB TRANSCEIVER PROJECT

This comprises six parts.

1. POUNDBURY (ver2) 9MHz SSB TX GENERATOR & RX IF. Speech processor and diode ring modulator with carrier suppression greater than 50dB. IN/OUT termination impedance 560Ω to match external SSB filter. Receive section FET and MOSFET IF amplifiers and a singly balanced diode product detector, discrete audio derived AGC, 0.5W IC audio amplifier. Includes USB and LSB carrier crystals, which are DC switched. PCB size 125 x 115 x 17mm.
PCB and components £66.00.
2. 6 pole crystal ladder filter ready built £18.00.
3. POUNDBURY 70MHz FRONT END. Receive preamp and mixer, transmit mixer and three stage amplifier. Receive sensitivity together with main board 0.1uV (MDS), output 250mW on transmit. PCB and components £41.00.
4. PORTLAND VFO, a rock stable FET VFO for 7.900 - 8.400MHz with buffer board (1A) to drive Mixer/Oscillator board. Drilled Box and PCB kit with potentiometer and feedthroughs £27.00.
5. MIXER OSCILLATOR (ver2). Comprises an overtone oscillator, balanced IC mixer, filter and buffer amplifier. Adds 53.1MHz crystal oscillator signal with 7.9-8.4MHz from the Portland VFO to give a local oscillator signal 61-61.5MHz. Recently redesigned to include a cascode output amplifier. PCB size 80 x 41 x 17mm. PCB and components including crystal £25.00.
6. TRANSMIT AMPLIFIER. Two-stage PTT switched class AB linear amplifiers for 4 metres giving a minimum of 25W. PCB size 127 x 58 x 16mm. Type TA4S4, PCB and components with heatsink £81.00.

PCB kits 1-6 including Special Delivery £255.00

Optional extras, Potentiometers (4K7 log mic gain, 100K log volume, 10K log RF gain, 10K log TX power) £1.75 each. Signal Meter £9.00. 8 ohm 2½" loudspeaker £2.00. Slow motion dial drive with knob £18.00. P&P on optional items £2.50, unless included with PCB kits.

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

7MHz DSB RECEIVER. A simple but sensitive receiver featured in PW Jan 2007 with Mosfet RF and Mixer stages and an IC audio amplifier. Works in conjunction with a Portland VFO detailed above. **Receiver PCB and parts with volume control £20.00**.

7MHz DSB TRANSMITTER. Discrete microphone amplifier, diode ring modulator, driver and 300mW RF output stage. As featured in PW November 2006. Works in conjunction with the Portland VFO, and 7MHz DSB Receiver to make a complete transceiver. **Transmitter PCB and parts including wound toroids and heatsink and mic gain control £23.50**.

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

TRANSMIT AMPLIFIER & RECEIVE PREAMP, for 2 or 4 or 6 metres. Receive gain adjustable 0-20dB. Switching for either part or straight through. RF switched on transmit. Diecast box with suitable heatsink and SO239 connectors. RF input and output as detailed in paragraph above. **TARP6SA, TRRP4SA, or TARP2SA complete kit £89.00, ready built £123.00. TARP6SB, and TARP4SB complete kit £92.00, ready built £126.00**.

SYNTHESIZER CONVERSION CB to 10FM, suitable for the old style UK CB rigs with LC7136/7 or TC9119P synthesiser IC's. Puts the rig onto 29.31-29.70 MHz. Each board is aligned prior to despatch. State rig type when ordering. PCB size 64 x 40 x 17mm.
Type **SC29**. **PCB Built & aligned £26.50**.

G2DYM / G4CFY AERIALS

TRAP DIPOLE for 80/40/20/15//&10m. 106 feet long. Supplied with 70 feet of low impedance twin feeder. Low TVI and low noise. 2S points quieter than a G5RV with same feeder length. PVC covered wires with lugs. Regular duty 150W rated £157.00.
600W rated £161.00, inc. carriage.

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

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

TRAPPED INVERTED L AERIAL 80/40/20/15 & 10m, for a small garden. Coax driven from far end of garden and tuned against ground. A good all round aerial with 6dB more gain than a 24 foot trapped HF vertical. That's 4 times power on TX and one S point extra on RX. £74.00 inc. carriage.

E-mail: tony@spectrumcomms.co.uk

Web site www.spectrumcomms.co.uk

Prices inclusive of postage unless stated. Payment by Credit/Debit card, Cheque or Postal Order. Cheques or Postal Orders payable to Spectrum Communications.

Feature

A Radio Amateur at War

I've had an interesting life and would like to share a few of my memories with *PW* readers. I was born on May 3rd 1922 in Camberwell, in south east London and became a Chartered Engineer in 1955. (It was MIEE but has now changed to MIET.)

I've been fortunate to have been in radio all my working life. In early 1941 (aged 18) I was working at Radio Transmission Equipment (part of the Philips Group), Balham, in south west London. My work was testing and aligning radio communication receivers, type R107. One day at around midday I was having my lunch in the firm's canteen – and then suddenly I wasn't!

When I regained consciousness I was laying on top of a girl and was covered with broken glass, money and plaster dust. The glass was from the kiosk where the girl had been taking money for the lunches.

Both of us appeared to be unhurt and after helping her up, I started to pick up the scattered money from all around the broken kiosk. I was told later that two draughtsmen had been killed in the Drawing Office adjacent to the canteen, only 15ft away from where I was sitting on the other side of the separating brick wall. Luckily for me and the others in the canteen, it had been only a small bomb which had exploded.

Apparently, according to eye-witnesses in the street, the bomb had been dropped from an aircraft with French markings. At the time no air-raid warning sirens had been sounded. After continuing work until the normal finishing time, I caught the Tube home from Clapham to Morden (Northern Line) and then by bus to North Cheam in Surrey where I was living with my parents.

Order Of The Bath

I had just got inside the front door when my mother took one look and said, "What have you been doing? You're filthy – straight into the bath! Then I a got a second scare! On undressing, I discovered that my whole body was covered in dried blood – mine! However, a warm bath (only five inches of water was allowed in those days!) got rid of most of it, revealing that I had scratches all over my body.

On trying to sponge my back, I could feel some rough patches and wondered what they could be. "You've got bits of glass sticking in your back!" I was told. I screamed when we started to pull the bits out – it hurt like hell! A bit more bleeding, but it soon stopped.

There were tiny slivers of glass in my hair and even between my toes, but no serious cuts. All my clothes, even my shoes, had to be thrown away as there were little bits of glass embedded in them. It was a miracle I'd survived!

Move To Marconi

Later, in July 1941, I moved to Marconi's Wireless Telegraphy Co., in Hackbridge, near Mitcham, in Surrey. The factory was producing radio receivers and transmitters for use in RAF aircraft, that included Lancaster and Halifax bombers.

The receivers were type R1155 and the transmitters type T1154. My work was mainly on the R1155 receivers where I was an electrical tester and fault-finder. The job was mostly using radio test equipment to diagnose electrical faults.

The faults were mostly due to incorrect wiring, wrong value components fitted, components which were themselves faulty or badly soldered connections such as 'dry joints'. The dry joints would quite often just fall apart during vibration testing of the equipment. The faults were so numerous that I had a team of ten girls doing nothing else but rectify them!

On average, some 25 type R1155 radio receivers passed through my hands every day. At that time the working day was from 8am to 6pm with a break at lunchtime. We worked a six-day week, having Saturday off one week and Sunday off the next.

A colleague of mine at work, **Eric Taylor**, had been an amateur radio operator (**G3FK**) before the war, and he and I often discussed radio, Morse code, and what we would do after the war. For a short period I was a member of the Home Guard – formerly known as the Local Defence Volunteers (LDV) – or more often as 'Dad's Army'.

NAME

FILE No.

Day | Month | Year

GROUP OR G.S. BAND

CENTRE

kc/s to kc/s

Sheet No.

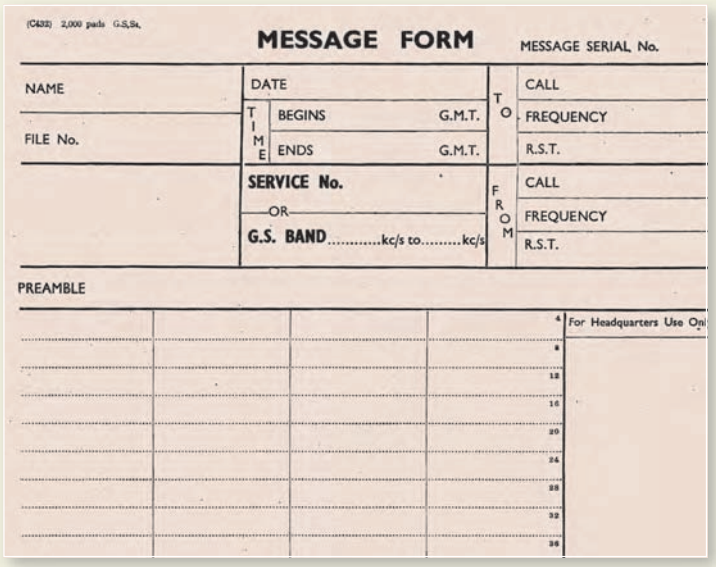
SIGNALS HEARD, ETC.

N.B. (i) ENTER PREAMBLE AND FIRST GROUP OF TEXT. (ii) WHEN ON A.W. ENTER SERVICE NUMBER. (iii) ALL OBSERVATIONS OR NOTES TO BE IN BRACKETS.

Dial Read'g	KC/S	R.S.T.	CALL AS SENT	TIME G.M.T.	* CONTROL	* ANSWER	Message Serial No.

Fig. 1.

Ray Fautley G3ASG, looks back at his Second World War adventures as a special listener in the Radio Security Service.



(C432) 2,000 pads G.S.Sa.

MESSAGE FORM MESSAGE SERIAL No.

NAME	DATE		TO	CALL
FILE No.	TIME BEGINS	G.M.T.		FREQUENCY
	TIME ENDS	G.M.T.		R.S.T.
	SERVICE No.		FROM	CALL
	—OR—			FREQUENCY
	G.S. BAND.....kc/s to.....kc/s			R.S.T.

PREAMBLE

For Headquarters Use Only

Fig. 2.

After a full day's work I didn't take kindly to being shouted at and marched up and down the street for no apparent reason! Neither did I enjoy trying to master the intricacies of the Sten gun (a dreadful thing which was only spot-welded together) and which I'm sure was equally dangerous to the user as anyone it was being aimed at!

The only satisfaction I had at that time was that I was the only member of the group with a knowledge of the Morse code. However, this fact did not go down very well with the Non Commissioned Officers (NCOs)! On one occasion, it was a Sunday and my day off, we had an all-night so-called 'exercise'. From my point of view it was an absolute disaster!

It was pitch dark (remember no lights of any sort allowed) pouring with rain and I, with others, were crawling along on our bellies (with the stupid 'Sten' gun on my back) through wet grass and muddy puddles for hours. God knows to what purpose! We were never told! I got back home, filthy, soaking wet and starving at 6am. After a bath and a change of clothes I was ready for my breakfast – but no time for that – I had be at work by 8am!

So, when I eventually got to work on that Monday morning, I was not a 'happy bunny'. My friend Eric asked me, "What's the matter?" as he said I looked terrible. Well, he'd asked for it! – I told him what I thought about the weather, the black-out, the Home Guard, NCOs, and in particular night exercises.

I also mentioned that I'd not had any breakfast. (Remember, I was a growing lad of 19 then.) However, the language I used then will not appear in *PW* now! A few days after the night exercise episode, Eric asked me what my Morse speed was. "Don't know", I replied, "I've never been tested although I taught myself the code when I was 14 years old."

So, for the next few weeks, during our lunch breaks, I had tuition in the art of reading Morse and writing it down. Always in capital letters, never in longhand, although at the time I didn't know why.

Soon I was copying some 18 words per minute without errors – much to my amazement! Then Eric said that perhaps I could assist the war effort rather better in my spare time than being a very reluctant part-time soldier. "How? I asked, but got no reply at all! I was to find out some time later, on one of my Saturdays off.

On my day off there was someone at the front door opening. Incidentally, I say door opening, because the front door itself had been blown off its hinges by the explosion of a land-mine the night before!

Bowler Hat Arrives

Anyway at the 'door opening' a bowler hat, rolled up umbrella and a dark suit appeared – indicating very much that our visitor was a figure of authority – and he was asking for me! My parents were agog! What had the little perisher (me) been up to?

In those days our front room, or 'parlour', was only used for special occasions and that's where we talked. Well rather – he talked and I listened as well as I could. For I felt very intimidated by him!

Ordinary people like us never met authoritative people like him. Then, when he said that I had to sign a piece of paper, I did it without realising what it was that I had put my name to! The next thing he said was something that really scared me. "You have signed The Official Secrets Act of the United Kingdom and anything we discuss must not be repeated to anyone. That includes your parents, relatives, friends or girl friends." What the hell was I into now?

Bowler Hat then questioned me about where I was born, where my parents and grandparents came from and asked me about my political opinions. I told him that as I was only 19, and therefore not yet entitled to vote, I was not a member of any political party and would probably not think about such things until I was 21.

He said nothing about where he was from – I could only guess! The next day (Sunday) I went to work and mentioned to friend Eric that I had been visited by this gentleman (careful not to say that I had signed anything) and did he have any idea what it could be about. Eric replied, "Yes, I expected something like that would happen" and that was all I could get out of him. I was still none the wiser!

Radio Security Service

A few weeks later I received a parcel through the post, which included a letter telling me that I had been recruited as a member of the Radio Security Service (RSS) and that I was now a Voluntary Interceptor (or VI). My work would be General Search (GS) and that I had been allocated that part of the radio spectrum between 7 and 7.5 Mc/s (now of course MHz) to listen for any radio Morse signals.

Several pads of 'Signals Heard' log sheets (**Fig. 1**) were included which had columns for writing in the date, time (GMT), frequency, callsigns and any text received. Also, there were some pads of 'Message Form' sheets (**Fig. 2**) which had provision for writing the actual messages intercepted (i.e. received) by me.

Also in the parcel were some envelopes stamped 'Secret' and some slightly larger plain envelopes, a whole sheet of postage stamps and some gummed labels printed with 'PO Box 25, Barnet, Herts'. That address I have never forgotten!

My listening period was usually from 8pm to 10pm after my usual working day. This was for four or five nights during weekdays, so I told my girlfriend, **Barbara** (some years later to be my wife) that it would be best if we met only at weekends. This didn't go down very well with her because I couldn't tell her why!

However, one Wednesday night she called at my house

with one of her girlfriends and my parents actually let them in. I was concentrating on writing down what I was receiving and then suddenly – I don't who was most shocked, them or me! – Barbara took one look at me and shouted, "You're a spy, I'm going to call the police!"

In a state of near-panic I babbled that I was just testing a radio for the firm (Marconi's) but the look on Barbara's face indicated that she didn't believe a word of it – clearly, she thought at that moment that I was a spy! What could I say? In fact, it was only many, many years later (but not until after 1980) I was able to tell her what I had actually been doing on that fateful evening.

I was given a uniform of the Royal Observer Corps (ROC) as a cover, although I knew nothing about spotting aircraft! It was only worn when attending the occasional 'pep-talks' by a Royal Signal Corps officer from Box 25. We used to meet in a pub in Sutton and **Fig. 3** shows me in my ROC uniform in 1941.

Fig. 3.

Soon I developed a routine of copying Morse code signals on the log pads; writing any messages (nearly always five-letter groups) on the message pads; putting the sheets into the 'Secret' envelope; then placing that envelope into the larger, plain, envelope and sticking the 'Box 25' label on to the envelope. Then – finally – sticking on the postage stamp.

The following morning I would post it on my way to work. A few days later the log sheets would be returned to me by post with remarks such as 'Suspect' or 'More please' stamped on such items that interested whoever was reading them.

Red Pencil Numbers

Sometimes a number – such as 2/34 in red pencil – would be written over the callsigns. These numbers meant absolutely nothing to me at that time but I learnt (over 40 years later) that they were numbers given to radio networks of which 'Box 25' was already aware.

As an aside at this point, I must include my admiration for the Post Office for operating their Royal Mail service under extremely difficult conditions. London was being bombed fairly regularly, yet the mail continued to be collected and delivered with much more speed and accuracy than we can expect today! So, back to the listening!

During my first few weeks of listening, I began to notice that there were some stations that seemed to be regularly transmitting. They used the same callsigns, same frequencies and the same operating times. One of these stations (Box 25 told me) was as Reuters, a press service station. Machine sent Morse code at around 18 words per minute – a delight to copy! Although its messages were not required (the station was very well known by Box 25) it did provide a means of frequency calibration for my home-built receiver.

There were some other stations, however, that did interest Box 25 very much. These stations were using three letter call-signs (e.g. 'NJT de VRL') which I, and many other VIs, had logged. They were using procedures that were very similar to those used by Amateur Radio operators such as '73' (best wishes), and at the end of transmission, 'AR' (end of message), 'SK' (end of transmission) 'GB' (goodbye). I was only able to copy one end of the communication between the two stations, because the answering station would be operating on a different frequency.

Some of the stations that I intercepted, when sending messages using 5 letter groups, would sometimes use the Morse letters 'II' ('dit dit dit dit' a series of the letter i) apparently to indicate that a mistake had been sent during the preceding 5 letter group. Many of these signals were very weak, fading into the noise background at times, indicating that the signals were probably sent from hundreds, or even thousands, of miles away.

The illustration, **Fig. 4**, shows a different type of log sheet sent in by a VI who was living in Belfast, dated 26-1-42. As it was originally written in pencil, the quality of reproduction is not very good. A question mark above a letter meant that the VI wasn't sure that he had heard it correctly.

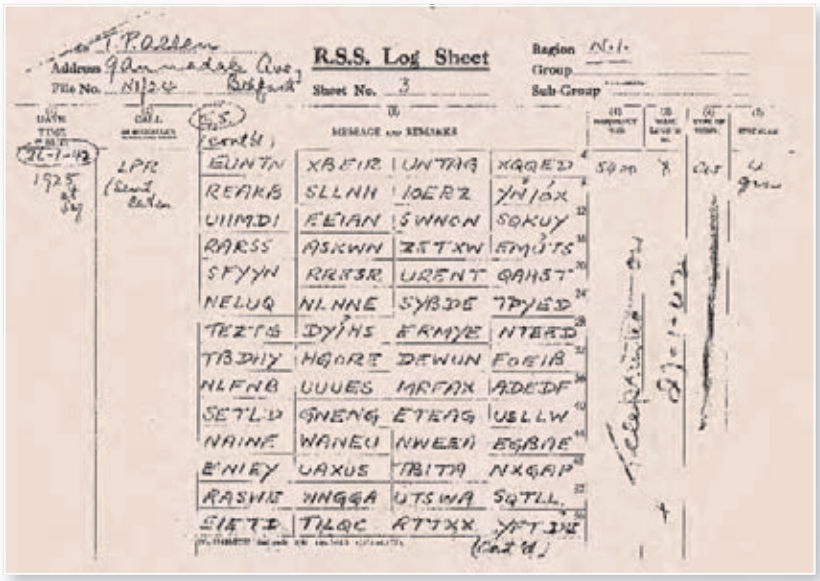
Bletchley Park

Apparently (as I discovered many years later) the Message Forms, which I had filled in with the encoded messages usually comprising groups of five letters, were sent by dispatch riders from Box 25 (Barnet) to a place called Bletchley Park in Buckinghamshire. This was where a brilliant group of code-breakers, mathematicians and linguists decoded the signals which had been intercepted by the VIs and other services such as the 'Y' Service, the official intercept services of the Army, Navy and RAF.

At Bletchley Park (BP) the network, using the three letter call-signs, that had been intercepted, was found to be that of the Gestapo and the German Secret Service. That service operated from headquarters in Germany to the German Embassies around the world.

Now for an interesting bit about Bletchley Park. Some

very high-speed signals had been received using teleprinter machines. It was found that these signals were sent from German stations (after being encoded) using machines such as the Lorentz types SZ40 and SZ42. It was these messages that were decoded much more rapidly with help from the 'Heath Robinson' machine and then later, 'Colossus'.


R.S.S. Log Sheet

Region N.I.
Group
Sub-Group
Sheet No. 3

Fig. 4.

The Colossus Machines

Many books have been written about 'Colossus' and how the system worked, so I won't try to explain the technology. The important thing is that at the end of the war, although there were ten 'Colossus' machines operating with two more spare, all of them were destroyed together with the drawings and circuit diagrams, etc.

However, a complete machine has been rebuilt and is fully operational. It can be seen whenever Bletchley Park is open to the public, which is now every day except for Christmas and New Year. See **www.bletchleypark.org.uk/**

Secret After The War!

For many years after the war ended, the VIs (myself included) weren't able to disclose what they had been doing during the war years. This was because the work was covered by the Official Secrets Act – something you can't 'unsign'!

However, during 1979 the BBC made a documentary half-hour programme called *The Secret Listeners*. It was presented by **René Cutforth** and presented by BBC *Look East* programme in Norwich.

As I understand it, the programme was only transmitted once, by BBC2, during 1980. It was in this programme that the Voluntary Interceptors were first mentioned and the presenter gave the viewers (including the VIs, who were as much in the dark as everybody else) a few clues as to what they had been doing when copying down all that Morse code stuff. I've also recently learned that the Radio Security Service was known as MI8c, part of MI5/6.

Many books and documentary programmes have appeared since around 1980 about the work of the Bletchley Park (BP) teams, and Winston Churchill said of BP, that it was "The goose that laid the golden eggs, but never cackled!" By that he meant that BP was so secret that nothing was known of its existence by anyone – apart from those who worked there – and they never revealed anything.

The nearest that the VIs got to being discovered was in a *Daily Mirror* contribution by a 'Special Correspondent' entitled "Spies tap Nazi code", see **Fig. 5**. The issue was dated Friday, February 14th 1941 and referred to 'hush-hush' men who listened to Morse code messages. It was very embarrassing for the Radio Security Service! and I have an original copy of that issue of the *Daily Mirror*.

The Box 25 Net

So much for the past – now to the present time! Nowadays, several radio amateurs who were either VIs, or connected in some way with the RSS, get together on Monday and Friday mornings at 0845 local time around 3.715MHz for a chat. They are known as the 'Box 25 Net'. If you can, have a listen – you might learn something! And I hope you've found my story of interest. ●


THE DAILY MIRROR

Friday, February 14, 1941

SPIES TAP NAZI CODE

BY A SPECIAL CORRESPONDENT

BRITAIN'S radio spies are at work every night. During the day they work in factories, shops and offices. Colleagues wonder why they never go to cinemas or dances

But questions are parried with a smile—and silence. Their job isn't one to be talked about.

Home from work, a quick meal, and the hush-hush men unlock the door of a room usually at the top of the house. There, until the small hours, they sit, head-phones on ears, taking down the Morse code messages which fill the air.

To the layman these would be just a meaningless jumble of letters.

But in the hands of code experts they might produce a message of vital importance to our Intelligence Service.

No pay is given to the men who tap the air for these messages.

Their Reward

They are drawn from the radio enthusiasts who operated their own short-wave transmitters before the war.

"We are glad to serve the country in this way," one of them told me. "A letter of thanks from headquarters telling us that we have been able to supply some useful information is all the reward we ask."

Naturally we have no idea of the codes used by German agents.

"But it is a great thrill to feel you might be getting down a message which, decoded, might prove of supreme importance."

CENSURE FOR SOCIALISTS

SEVENTEEN Socialist M.P.s who voted last night against the Determination of Means Bills are to be officially censured.

The Parliamentary Labour Party is to hold a special meeting next week to discuss their action, which was absolutely contrary to the official policy of the party.

They voted against the Bill because they consider it does not completely abolish the means test when public assistance is sought, and that it ought to do so.

When the House divided after listening to the winding-up speech of the Minister of Labour, the second reading of the Bill was passed by 172 votes to nineteen.

This small minority is thought to have included at least two M.P.s—Mr. William Gallacher and Mr. D. N. Pritt—who are not members of the Labour Party.

It is understood that the seventeen who are members will not be expelled from the party. Instead they will be "reprimanded."

Improvement

Every M.P. agreed that the Bill is an improvement on the present position, but the critics led by Mr. Nesta Edwards, a Welsh miner, contended

NAME FASCISTS IN KEY JOBS

To criminals danger to the State

Works Won for Wavell

BY A SPECIAL CORRESPONDENT

HUNDREDS of men and women worked day and night, gave up their holidays, to enable the Army of the Nile to advance on the capture of Cyrenaica.

Their unceasing toil, backing the inventive genius of Mr. Cecil Gordon Yokes, an engineer who has never failed to solve any problem of fitting set before him, enabled British tanks and aeroplanes to be fitted with filters to beat a more persistent and dangerous enemy than the Italians—sand.

Sand very quickly choked the engines of tanks and aeroplanes operating in the desert. It got into the bearings, rapidly wearing away good engines, shortening the life of valuable mechanised vehicles.

Cure in 10 Days

Some time ago it was realised something would have to be done to our forces were to advance across desert with any chance of success.

In ten days Mr. Yokes designed and made a filter that enabled our tanks and other vehicles to travel 500 miles without the least trouble or sand.

Tests on machines in this country occupied another fortnight, but factories buckled to working night so that the filters could be flown out to Egypt in time for General Wavell to launch

Fig. 5.

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TS-480 SAT HF/6 100 watts, includes ATU @ **£739.95**

TS-480 HX HF/6 200Watt High power version, No ATU @ **£839.95**

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TM-V71E 145/430Mhz Dual bander, 50watts, wide band receive @ **£294.95**

THF-7E 145/430Mhz Handheld Wide band receive inc SSB @ **£234.95**

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FT-950 HF 160-10 + 6M All modes, 100 Watts, DSP @ **£CALL**

FT-450AT HF 160-10 + 6M All modes,100W, DSP including internal ATU @ **£CALL**

FT-897D HF 160-10 + 6M All modes, 100 Watts @ **£CALL**

FT-857D HF/50/145/430Mhz @ **£CALL**

FT-817ND the ultimate portable rig HF/50 145/430MHZ all mode QRP @ **£CALL**

FT-8900R 10/6/2/70 dual receive + DTMF 50watts @ **£CALL**

FT-7900E 145/430 mobile @ **£CALL**

FT-1900 145 Mobile 75w @ **£CALL**

ALINCO

DX-SR8 New HF Transceiver 1-34MHz 100w All mode @ **£539.95**

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A Judicial Review would likely cost in the region of £75,000 but could be a lot more as we'd be taking on organisation with almost unlimited funds to defend their corner who could, if they so desired, play a very long game that in turn we'd have to match. If every amateur in the UK pledged £10 to the Spectrum Defence Fund we'd probably have enough to fight the case and so we need your donations (no matter how small) to help us meet the threat.

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The Rev. George Dobbs'

carrying on the practical way

The Rev. George Dobbs G3RJV says it's time to look at 'Small Things' – after reading the appropriate quotation!

"Be faithful in small things because it is in them that your strength lies."
Mother Teresa

This month I originally planned to just describe a follow-on from the June column describing another application for the Spectrum Communications 10mm coils. However, the article proved to be too small a thing to fill my column – so I followed Mother Teresa's advice and remained faithful in small things, adding another couple of little items that might interest readers.

Surprisingly perhaps, over the years in *Carrying On The Practical Way* (*COTPW*), it has often been the smaller projects that have appealed most to readers. Maybe that is because completing a simple project in an evening sends the radio constructor to bed with the satisfaction of something achieved?

In my June column I described a very simple Hartley regenerative receiver using the **Spectrum Communications** 5u3L 10mm coil. As I mentioned in the May column, *PW* author and designer **Tony Nailer G4CFY** of Spectrum Communications is now selling a very useful range of 10mm coils with adjustable slug cores covering the shortwave range.

The 5u3L has proved to be the most popular of the range. The designation '5u3L' means a coil with a nominal inductance of 5.3uH (microHenries) with a low impedance link winding. These are very useful coils in that the inductance allows the tuning of the 3.5, 7, 10. and 14MHz Amateur bands with reasonable values of capacitance.

It's not surprising that the Spectrum coils have proved to be popular. The Hartley type regenerative receiver I described in June uses the tapped point in the tuned winding to provide an inductive feedback for the Hartley oscillator configuration.

The Armstrong Receiver

It also occurred to me that the link winding on the 5u3L coil might also provide the feedback path for an Armstrong type regenerative receiver. The basic configuration of the Armstrong receiver is shown in **Fig. 1**.

The inventor of frequency modulation (f.m.) radio, **Edwin Armstrong**, also invented and patented the regenerative receiver circuit while he was only a junior in college, in 1914. The Armstrong regenerative circuit uses inductive feedback.

The main tuning coil is inductively coupled to a feedback winding. In Fig. 1, a field effect transistor (f.e.t.) replaces Armstrong's valve; the tuned circuit being the tuning coil and variable capacitor in the gate of the f.e.t. device.

The smaller feedback winding is in the drain of the f.e.t. This was often called the 'tickler coil' for obvious reasons as it 'tickled' the tuned winding with feedback from the f.e.t. output.

In the circuit of Fig. 1, the amount of feedback available to the tuned winding is controlled by a variable

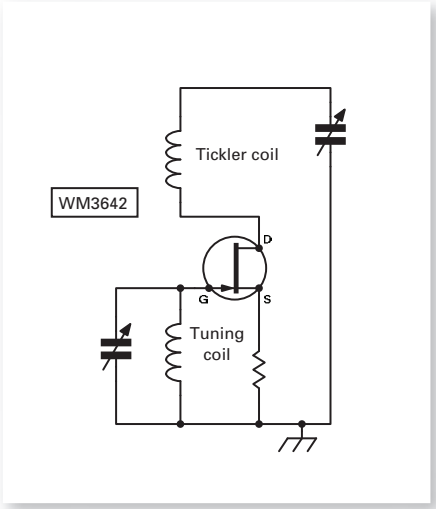


Fig. 1: The skeleton circuit of the regenerative receiver, The phasing of the 'tickler' coil must be such as to form positive feedback.

capacitor. I thought it might be worth trying an Armstrong type regenerative receiver using the link winding on the 5u3L coil as the tickler coil. The resultant circuit is shown in **Fig. 2**.

The 5u3L coil provides the inductance for the input tuned circuit along with a variable capacitor and C1. To give lower input impedance, the antenna is fed to the tapping point

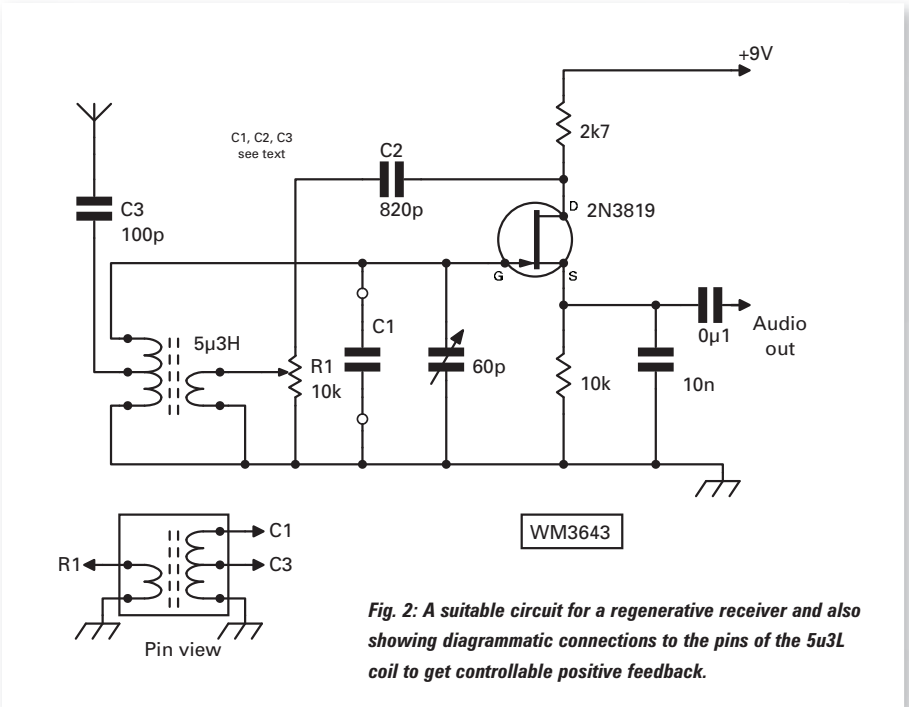
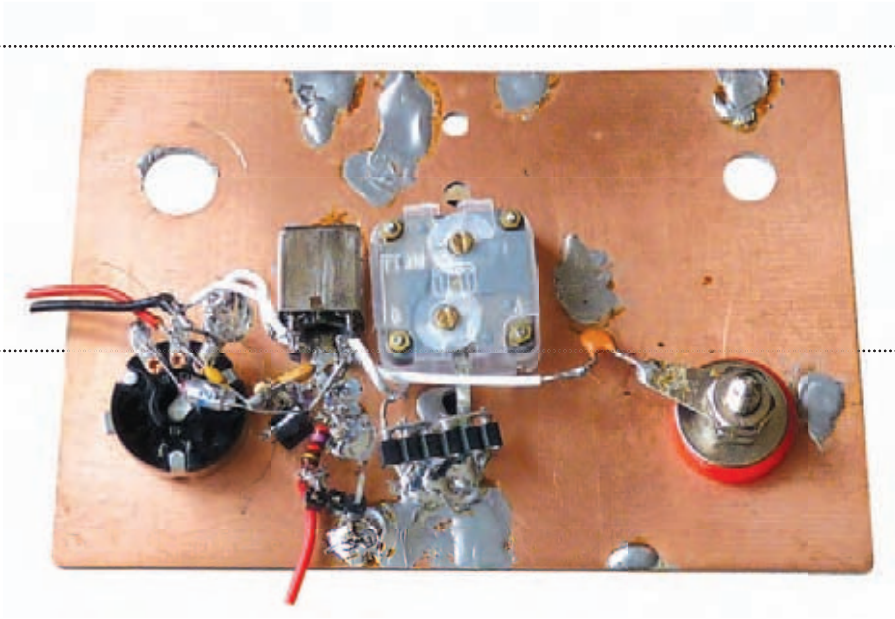


Fig. 2: A suitable circuit for a regenerative receiver and also showing diagrammatic connections to the pins of the 5u3L coil to get controllable positive feedback.



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on the tuned winding via C3.

If a higher impedance antenna is being used C3 could be connected to the top of the tuned winding, the connection that goes to C1. A 2.7kΩ resistor provides the load for the output of the f.e.t. A 2N3819 device was used but the popular MPF102 would also do the job. A portion of the output signal is taken via C2 to a potentiometer, R1.

The potentiometer should have a linear track and a value of 5k or 10kΩ. Note: Avoid the use of a wire-wound potentiometer which will introduce extra inductance to the circuit. The potentiometer acts as the 'regeneration' control; allowing a chosen amount of the signal to reach the tickler coil.

As with all regenerative receivers, the secret of successful operation for an Armstrong receiver is to finely adjust the amount of feedback from the f.e.t. to just above the point where oscillation occurs for c.w. (Morse) and single sideband (s.s.b.) signals and just below the oscillation point for amplitude modulation (a.m.) signals.

The feedback must be positive; that is, it must add to the input signal. In order to do this the tickler winding must be in phase with the tuned winding. That means that if you connect the tickler winding the wrong way round it will not provide the necessary feedback.

The diagram, Fig. 2, has an illustration of the base of the 5u3L coil showing the correct way to wire the pins for positive feedback. The tuned winding has three connections; the centre one being for the tapping point and the link winding (tickler winding) has two connections.

The value for C1 is not given because this parallel capacitor helps to determine the desired listening frequencies. As I've already mentioned, the 5u3L coils covers a useful range of the shortwave bands and several of the Amateur bands could be received depending upon the value of C1. For my circuit, I used a 60pF polyvaricon type variable capacitor for the tuning capacitor but use whatever you can find in the 50 – 60pF range.

The typical values for adjusting the capacitance for the tuned circuits are as follows: 14MHz – 27pF, 10MHz – 47pF, 7MHz – 100pF and 3.6MHz – 350pF. Remember this is the total capacitance of the variable capacitor and C1.

Also bear in mind that 5.3uH is only a nominal value for the inductance of the 5u3L coil and naturally this will vary with the position of the adjustable slug (core). That's the great advantage of adjustable inductance coils; it's easier to hit the desired frequency by adjusting the slug. The capacitor C1 can be adjusted to roughly hit the desired frequency and (hopefully) there will be enough variation of inductance, using the slug, to arrive at the desired frequency.

Two other capacitors may require adjustment – C2 couples some of the f.e.t. output to the regeneration control (R1). The value of 820pF was obtained through experimenting with the circuit to achieve smooth and reliable regeneration control. The value need to be such that for the desired listening frequencies R1 is roughly in the centre of travel to achieve the oscillation point.

Readers might like to experiment with this value but I suspect that using 820pF will work for most frequencies. The antenna coupling capacitor (C3) may require some adjustment depending upon the antenna in use. It is possible to swamp the regeneration action with too much input signal. If using a large antenna, reduce the value of C3.

Again experiment with the value according to your set-up. The aim is to find a value that gives a good signal level with reliable regeneration control.

Using The Receiver

Using the Armstrong receiver is like any other regenerative receiver. Connect the antenna and power up the receiver and adjust R1 until a distinct 'rushing' sound is heard – this is the f.e.t. breaking into oscillation. For c.w. and s.s.b. signals set R1 so that it's just past the point that oscillation occurs.

For a.m. signals set R1 just short of the oscillation point. This setting will vary according to frequency and signal strengths. A regenerative receiver needs operating – that is part of the fun! The operator needs to make adjustments of the regeneration control according to the frequency and strength of the signals.

I was pleasantly surprised at how well the 5u3L regenerative receiver worked. The circuit of Fig. 1 was fed into a small bench amplifier to drive a loudspeaker. Readers can use an audio amplifier according to what they have. Computer type amplified speakers would probably work well.

George's Hobby Horse!

As I mentioned at the beginning, describing the receiver was too small to fill the whole column this month, even with all the G3RJV waffle! In adding addition material I decided to use a pet hobby horse of mine – after I was surprised, when talking to a club group recently, that few of the constructors present ever used any polarity protection on their homemade equipment.

When bench testing projects, it is so easy to connect the power supply the wrong way round and damage

circuit components. Polarity protection is so simple. I have described it before but not for a long time and the **Fig. 3**, **a**, **b**, **c** and d shows four simple methods of polarity protection.

The diagram of Fig. 3a shows the simplest system; just putting a diode in series with the power line. As all readers will know a diode only allows current to pass one way – it's a form of valve. Connecting the diode as shown in the positive line means that current will flow only when this line is connected to the positive side of the power supply.

The disadvantage of this system is that there is a small voltage drop across the diode; in the order of 0.7V. This may not be critical for the circuit but has to be considered.

The suggestion show in Fig. 3b is an absolute fail-safe. A diode bridge is connected in line with the power supply.

The bridge is such that whatever way round the power supply is connected, the correct polarity will be applied to the equipment. This circuit is very safe but suffers from the problem of Fig. 3a, only more so.

The supply passes through two diodes on the way to the equipment and therefore more than a volt of the supply voltage is lost.

Shown in Fig. 3c is yet another approach. Here, a diode is connected across the supply as shown. If the polarity of the supply is wrong, this diode will short the supply to ground causing the fuse to blow. This approach does rely on the fuse blowing before any damage is cause to the equipment. A fast-blow fuse should do this successfully but there's a chance it may not stop damage in time.

The circuit illustrated in Fig. 3d is my favourite and a very reliable protection – although it is far more complex than the others. The positive side of the power supply passes through a relay switch that only switches on the supply if the polarity is correct.

The positive line is connected to the relay switch and the equipment is attached to the normally open contact (n.o.) of that switch. This means that until the relay is energised, the supply does not reach the equipment.

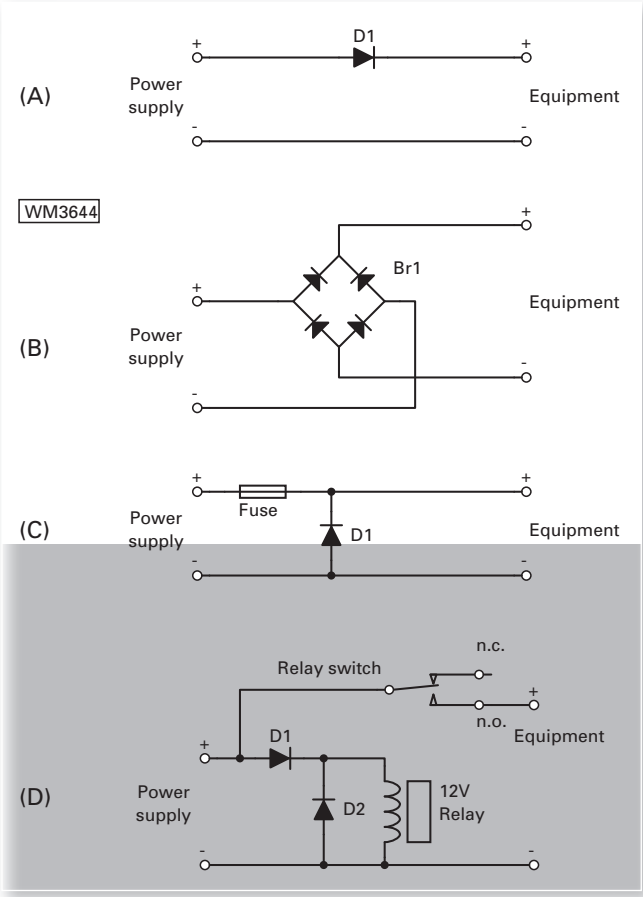

Fig. 3; four methods of achieving reverse polarity protection for projects. See text for more details.

A 12V relay is required as the coil is energised by the supply line. The diode, D1, is connected so that only a positive voltage will energise the relay coil. If the supply line is at positive D1 will pass current to allow the relay switch to close and power to reach the equipment. Diode D2 is added to reduce voltage spikes in the relay coil and I can commend this circuit to any equipment builder.

The Promised Small Things!

Now for the other quick circuit in the 'small things' that I promised! Many times I have suggested simple receivers and simple transmitters in this column and readers have sometimes enquired as to how to use the receivers in conjunction with the transmitters.

Some time ago I did suggest a radio frequency (r.f.) change-over system but the simplest possible arrangement is shown in **Fig. 4**. This allows the connection of a receiver and a transmitter. The critical elements of the circuit are the capacitor (C1) and the two back-to-back diodes.

The transmitter is connected directly to the antenna, as shown via a screened lead. The receiver is loosely coupled to the antenna via C1. The value of C1 is open to experiment. I have suggested somewhere in the range of 33 to 86pF. Select a value for full output from the receiver.

The receiver input is protected by the back-to-back diodes. This allows only about 0.6V to enter the receiver input. When the transmitter is producing output a signal will still be present in the receiver but not enough to cause any harm to the input tuning circuits. This simple circuit does not include any muting of the receiver during transmit periods.

In use the operator has to turn down the gain of the receiver to avoid very loud signals. This is a disadvantage – but it does monitor the transmitter output! I have used this simple idea many times and it represents the very simplest way to connect a transmitter and a receiver.

The circuit is ideal for many of the little projects I have described in this column. It's far better than a manual switch to change from transmit to receive. I look forward to meeting you again next month!

●

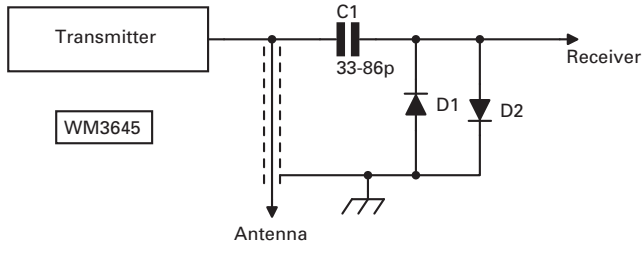

Fig. 4: George suggest that this simple receiver input protection method is adequate for most lower powered transceivers.

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ML&S Price: £89.99

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

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Nissei	TX-101A	1.6-60MHz, 20/200/2kW	**£84.95**
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MyDEL

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

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NEW SHIPMENT JUST ARRIVED!

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Z-100Plus	Ultimate autotuner for Yaesu FT-817D	£143.95
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RCA-14	4-way DC Breakout Box	£49.95
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MyDEL

AS REVIEWED IN PW December Issue 2009

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Only £99.95

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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 are still available. ML&S: £3499.95. See web for more details.

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With 200W and 200 memory channels.

ML&S: £289.95

CG-3000 shown with optional remote switch.

See web for full specifications

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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

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NEW

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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**

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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!

ML&S: £349.95

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! **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

Tim Kirby G4VXE's

the world of vhf

Incorporating VHF DXer

Tim Kirby G4VXE introduces himself and the concepts behind his new column – devoted to all Amateur Radio activities above 30MHz.

Editorial comment: *It's with great pleasure that we welcome* ***Tim Kirby G4VXE*** *as he presents the first of* PW*'s entirely new look v.h.f. column. While incorporating coverage of the DX aspects of the hobby – Tim is determined to make his new column much more inclusive by covering literally all activities we enjoy on v.h.f. So, if you've got some news of DX you've achieved using f.m., or you need support for your local v.h.f./u.h.f. repeater – Tim's the man to contact. Indeed, the entire Editorial team, which of course, includes our new regular Author – will be very pleased to hear from our readers. If it involves v.h.f. and above – we want to hear from you!* ***G3XFD****.*

Welcome to *The World of VHF (TWOVHF)*! It's a real pleasure to find myself writing this column and I'd like to take the opportunity to thank the *PW* Editorial team for their really warm welcome and encouragement they've given me as I joined the the team – and their confidence in my abilities! I'll do my best to repay it! And of course, I'd like to thank **David Butler G4ASR** for all his work on his column that eventually grew into *VHF DXer* over the years. David created a really excellent column, which both reported news and inspired people to take up VHF DXing. We all wish him well in his new column in the **Radio Society of Great Britain's** monthly member's journal *RadCom*.

Introducing Myself!

The Editor has asked me to take a little time to introduce myself, so here goes. I was first licenced at the age of 20 in 1983 as **G6TTU**. I'd been a short wave listener (s.w.l.) for several years. I was encouraged to take an interest in radio by both my father and my grandfather who was, incidentally, a keen *Practical Wireless* reader. At the end of the same year, I passed my Morse test and became G4VXE.

Since becoming an Amateur, I've taken an interest in many branches of the hobby but the v.h.f. and u.h.f. bands have been a consistent fascination, particularly in the area of propagation. In the mid-1980s, I was a member of the **Square Bashers Expedition Group** who activated many locator squares around the UK on the v.h.f. and u.h.f. bands.

When the 50MHz (6m) became more widely available, the group travelled further afield, using call signs such as ZB2IQ, G4VXE/CT3 and 9H3LF. More recently, I've had the opportunity to operate with the **Five Star DX Association** from the Comoros as D68C and Rodrigues as 3B9C, both of which gave me the chance to experience some fascinating 50MHz paths as well as some 432MHz EME, along with a lot of h.f. contacts.

At home in rural Oxfordshire, I'm active on the h.f. bands, mostly on c.w. or the data modes, but more often on 50, 70, 144 and 432MHz using c.w. and single sideband (s.s.b.). Additionally, there are, as yet unrealised plans to use the **K1JT** suite of WS-modes.

The digital mode D-STAR has been a new interest this year and I've enjoyed finding my way around the technology and enjoying some exciting contacts as a result. I'm often active as G4VXE/M on 50, 144 and 433MHz f.m. as well as 50MHz s.s.b. and enjoy many QSOs whilst I'm out and about. I'm a committee member of the **Ridgeway Repeater Group**, which looks after the **GB3WH** and **GB3TD** repeaters, as well as some packet and APRS installations.

My own v.h.f./u.h.f. station is quite modest. I'm lucky enough to live on top of a small hill which helps, but I have quite small antennas so as not to 'frighten' the neighbours in our small rural community. On 50/70MHz I use a vertical whilst on 144MHz I have a 5-element beam and on 432MHz a 10-element beam. So, I hope you will be encouraged too, that you don't need massive antennas to work DX or have interesting contacts. Of course, if you have got massive antennas, it does help!

Magical Things

One of the magical things about v.h.f./u.h.f. for me, is that signals that are weak or inaudible one day can be overwhelmingly strong on another day – to the extent that you wonder how you missed them before! I find it fascinating to find new beacons or repeaters and monitor them over the days and weeks to see how signals vary, day-by-day.

We don't need a flashy multi-mode set to do this – just keep an eye (and ear!) on one of the repeater channels where you only normally hear noise or a weak signal – and see what you hear over time. In the column, I'll share with you some hints and tips on when to listen and some simple indicators that you can use to tell you when it's especially worth listening. I hope you'll find it interesting and above all, great fun!

However, life isn't all about Amateur Radio, of course! Indeed, my wife **Julie** and I keep bees, chickens and have a 55m (180ft) long allotment which keeps the whole family very busy, but happy!

Introducing *The World of VHF*

When the Editor and I discussed the format of the new column we were determined to build on the success

The Faroe Islands club station of OY6FRA is very active on the v.h.f. bands. Here's a great aerial view of the site taken by Olavur Frederiksen OY1OF.

Tim Kirby G4VXE
Willowside
Bow Bank
Longworth
Oxfordshire OX13 5ER
E-mail: tim@g4vxe.com
Twitter id: G4VXE

of *VHF DXer* (hence it is still in the title of the column) – but to try and add to it as well. Without taking anything away from v.h.f. DXing, there are many people who operate on the bands above 30MHz who wouldn't see themselves as DXers – but would consider themselves v.h.f. enthusiasts.

Together, the *PW* team and I want to create a column which will interest the general v.h.f. enthusiast as well. So, we'll be including news about all the different types of activity that takes place above 30MHz; DXing, f.m. operations , repeaters, D-STAR to name but a few. If we're not including news about your favourite v.h.f./u.h.f. interest, it won't be deliberate - it's just because you've not told us! So, just write in and tell us what you've been up to – we'd love to hear from you!

If I do my job correctly, I would like *The World of VHF* to inspire you to try new things on all the bands above 30MHz – and hopefully to increase your interest in this exciting part of the radio spectrum.

All About Activity

One of the criticisms sometimes leveled at the v.h.f./u.h.f. bands is 'I listened, but I didn't hear anyone'. That's sad and, of course, in some remote areas of the country then it's certainly quite possible. But let's look at it a little bit more deeply.

How long did you listen for? Operating on v.h.f. can be a bit like, let's say, wildlife photography. You can't expect to turn up and immediately take a great picture. You have to wait a little while – sometimes a long while – for your quarry to appear. It's just the same on the v.h.f. bands. You need to listen a lot and the more you listen, the more you'll hear!

Where did you listen? This is more tricky – and it may depend on what gear you have available. If you have c.w./s.s.b. equipment, then one of the places you'll want to listen will be the calling channel/centre of activity. On 144MHz, this would be 144.300MHz.

You might well want to listen to some beacon frequencies too, to keep an eye on how propagation is. In the southern part of the UK, the **GB3VHF** beacon on 144.430 – now operated by **Chris Whitmarsh G0FDZ**, is now located at its new QTH in Fairseat, Kent (see **www.g0afh.com/gb3vhf/**) is widely heard and hopefully this will be a useful indicator for you.

If you have f.m. equipment, you'll want to monitor 145.500 (S20) which is the f.m. calling frequency. But perhaps you might monitor some of the other simplex and repeater channels as well. You should now realise where this is heading! (Keep listening!). Don't forget also, that the scan feature on your rig is a really useful one – and the more frequencies you scan the better!

Remember also that if everyone listens and nobody calls – what happens then? The bands would be quiet! So please do call "CQ"!

New Year Resolutions

The great thing is that each one of us can easily influence activity and a couple of years ago, I set myself some specific radio type New Year's Resolutions which were aimed at improving my activity. I'd like to share them with you in the hope that you will try them too.

Tim's Resolutions: Call 'CQ' every day on at least one of the v.h.f./u.h.f. bands that you're active on. Don't just call a friend or into your local net but call 'CQ' in the hope of making a 'random' contact.

Let no CQ call go unanswered. If you hear a CQ call, answer it! It maybe that you are just leaving the shack, but far better to reply something like, "G3XFD from G4VXE – I'm really sorry, I can't stop, but you're 5/9 near Oxford.73.' – than leave the person wondering if they're getting out!

I found doing these simple things **really did** make a difference to my activity and I had a lot of new contacts as a result. And, of course, the great thing about activity is that it breeds more activity!

The 50MHz News

After a slow start to the season, there's been plenty of interest on 50MHz. There have been plenty of European contacts to be had as well as longer distances, with a number of contacts into the Caribbean and Middle East.

During the second half of May there have been several openings into Puerto Rico with KP4EIT and NP3CW reported on several days. Signals were so strong on the 27th May that I could hear the stations on my 50MHz vertical antenna!

Another interesting path that has been reported regularly has been into Bahrain. Dave Court, A92IO has been particularly active and has been worked from the UK by a number of stations. A92GR is also active and being reported on the band often.

This summer, I decided to add 50MHz s.s.b. capability to my mobile installation. I'm often driving home at 18:30 local time or so which is, of course, a great time for Sporadic E! I mounted my IC-706 carefully and used an old 50MHz magmount antenna – the results have been excellent! Already, I've had lots of contacts around Europe and it gives me a good feel for what is happening on the band.

I've been surprised about how well the mobile set-up works, so I do encourage you to have a go. If you have a multi-mode like the IC-706 or even an FT-817, they will work very nicely with a whip antenna. In fact, I found a nice article from **Tony Vernucci I0JX** on how to modify a 144MHz 5λ/8 whip for use on 50MHz (see **www.qsl.net/i0jx/mobile.html**). The reverse too is true and I regularly use my 50MHz mobile whip on 144MHz! So, please do have a go at 50MHz mobile operation, I think you'll be surprised how effective it is.

The 70MHz News

Via the **Four Metres** website, (**www.70mhz.org**) , Tony I0JX reports that the Italian permits to allow 70MHz operation should soon be renewed and will be valid until October 31st, 2010. Operation is allowed around 70.100, 70.200 and 70.300 up to 12.5kHz either side of each centre frequency.

Let's hope the permits will soon be issued allowing some interesting contacts to take place. In fact, I'm assuming the permits have been renewed as just as I was about to send this copy off to *PW* on May 31st, as I'd just worked **IZ8DWF** (JM78).

Another new country on 70MHz is Estonia and **Ian Kennard G4PDS** was pleased to make two contacts with Estonia on May 27th. And ES1CW, ES2JL and ES3RF have all been reported as being active on the band.

Don't forget to listen for the North American beacon WE9XFT on 70.005MHz. It's running 3kW Equivalent isotropically radiated power (e.i.r.p.) so, if there's any propagation, it ought to be audible! The beacon is only active for this summer, so take the opportunity to listen to it.

Optimum Times

I'm guessing that one of the optimum times will be in the mid to late evenings during June and July when there is multi-hop Es across the Atlantic. However, if there's a US opening on 50MHz, it will probably be worth listening on 70MHz. The most distant report of WE9XFT so far has been from VE9AA (Keswick Ridge, New Brunswick in Canada), at 1400km. So, if you hear the beacon, **Brian Justin WA1ZMS/4**, would love to hear from you (E-mail: **wa1zms@att.net**).

It's not all about DX on four though. I was speaking to **Walt Davidson G3NYY** the other day and he said that he had been active on 70MHz f.m. using a Wouxun KG699E handheld. This looks like an extremely economic way of getting on the band. Walt mentioned that the supplied 'rubber duck' antenna is not particularly efficient so he had constructed a 'Slim Jim' for the band which had been a lot more successful for longer distance contacts. It would be great to think that the availability of these handhelds will really encourage local activity – with of course, the possibility of working some Europeans from time to time. We hope to have more about these rigs in the magazine in due course*.

Editorial comment:** Reviews of the Wouxon 70MHz transceiver and the 144/430MHz model will be published very soon in* PW. ***G3XFD.

The 144MHz News

The big news has been the return of the GB3VHF beacon (briefly mentioned earlier) on 144.430MHz from a new location after the move from Wrotham. The beacon seems every bit as loud as it was before. Particular thanks go to Chris Whitmarsh G0FDZ for all his efforts in getting the beacon returned to service.

Keeping beacons on the air is a costly affair and I know that Chris would welcome donations to support GB3VHF. You can read more about the beacon project and how to donate to the upkeep of the beacon at (**www.g0afh.com/gb3vhf/**)

Some early Sporadic E propagation (SpE) has been reported this year, with a great opening on the May 17th with a number of stations (including our old friend David Butler G4ASR) reporting QSOs into Greece on 144MHz. Stations worked from the UK included SV2DCD (KN00), SV3BSF (KM08), SW6KRV (KM09), SV3CYM (KM08) and SV2JL (KN10).

News On 430 & 1296MHz

We've run out of space this month, but rest assured that we shall be covering the 430 and 1296MHz bands in the column. As a starter, I'd be interested to hear from any of you that are active on 1297MHz f.m., either from home, mobile or portable. If you are, please get it touch! ●

I hope you have enjoyed the first edition of *The World of VHF*. However, to make it really work well, I really need to hear from **you**, so I hope readers will take the opportunity to get in touch. You can E-mail me **tim@g4vxe.com** or find me on Twitter where my id is G4VXE. If writing a letter works better for you, then you'll find my address at the top of the article. I look forward to hearing from you!

Colin Redwood's

what next?

Colin Redwood G6MXL encourages readers to explore the v.h.f. and u.h.f. bands using s.s.b. and c.w.

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Welcome to *What Next?* (*WN?*) where, having looked at h.f. antennas to take advantage of the improving h.f. propagation last time, this month I'm turning my attention to the very high frequency (v.h.f.) and ultra high frequency (u.h.f.) bands.

I'm going to look at equipment including transceivers, transverters and feeders for operating on the v.h.f. and u.h.f. bands. I'll be concentrating on s.s.b. and c.w. modes as narrow band modes are more likely to enable distant stations to be worked than f.m. Although some of the information will also be relevant to other modes such as f.m., I really am placing the focus of the article on s.s.b. and c.w. Next month I will move on to look at v.h.f. and u.h.f. antennas.

But before looking at the equipment used on the v.h.f. and u.h.f. bands, there's a question that needs to be answered. Why bother with very high frequencies (v.h.f.) and ultra high frequencies (u.h.f.),when you can talk to the world on high frequencies (h.f)? And to be honest – it's a fair question! The answer lies with the real sense of satisfaction that's to be had by making contacts with stations over the horizon and further still on the v.h.f. and u.h.f. bands.

To work stations in other countries on the v.h.f. and u.h.f. bands gives a sense of achievement. I simply don't think the achievement is the same on the h.f. bands where working other countries is to be expected.

Transceiver Categories

Broadly speaking, transceivers with s.s.b. and c.w. modes for the v.h.f./u.h.f. bands fall into three categories. The first of these are transceivers with just a single v.h.f. or u.h.f. band, which – 20 to 30 years ago – were by far the most common. For portable use they generally have the lowest power consumption on receive, so they can make the best use of battery power.

These transceivers are generally easy to use, using switches for the main functions. Although these are all now discontinued models, they are frequently found on the second hand market. I've listed a range of them by band from each of the main manufacturers in **Table 1**.

In the second category we come to s.s.b./c.w. transceivers that cover more than one v.h.f./u.h.f. band. Many of these have facilities for cross-band operation through satellites. In some cases the range of bands can be extended by the addition of optional modules. As with the first category, these are all discontinued models, but can be found on the second-hand market from time to time. I have listed a range of them in **Table 2**.

In the final category are transceivers that cover some v.h.f. and u.h.f. bands in addition to the h.f. bands. These tend to be more modern and feature-rich transceivers. This doesn't mean that they are all expensive. Some offer incredible value for money, costing little more than a single band transceiver when bought new 20 or 30 years ago!

Yaesu FT-290. A popular 144MHz multimode from the 1980s (category 1).

In my opinion, there are just two drawbacks to these types of transceivers: complexity (many use multi-level menus), and they generally have a higher current consumption on receive in comparison with category 1 transceivers. I have listed these in **Table 3**. Some of these are popular transceivers with h.f. operators, who may never have tried using their transceivers on the v.h.f. and u.h.f. bands.

Choice Of Transverters

As I have already mentioned, nowadays days there are many transceivers that

Table 1
A selection of Single Band s.s.b./c.w. transceivers from the main manufactures. These are now discontinued models.

Manufacturer	Band	Models			
ICOM	50MHz	IC505	IC551D		
Kenwood	50MHz	TS60S			
Yaesu	50MHz	FT690	FT680		
ICOM	144MHz	IC202	IC251E	IC271E	
Kenwood	144MHz	TS711	TS751E	TR9000	TR9130
Yaesu	144MHz	FT290	FT480	FT221	FT225
ICOM	432MHz	IC402	IC471E	IC475H	IC490E
Kenwood	432MHz	TS811	TR851E	TR9500	
Yaesu	432MHz	FT790	FT780		

Table 2
A selection of Multi-Band v.h.f./u.h.f. s.s.b./c.w. transceivers from the main manufactures. These are now discontinued models.

Manufacturer	Model	50MHz	144MHz	432MHz	1296MHz
ICOM	IC821H		Yes	Yes	
ICOM	IC910H		Yes	Yes	Optional
Kenwood	TS780S		Yes	Yes	
Kenwood	TS790E		Yes	Yes	Optional
Yaesu	FT726		Yes	Yes	
Yaesu	FT736	Optional	Yes	Yes	Optional

cover 50, 144 and 4320Hz, so there's less need for transverters than 20 years ago. However, transverters are by far the most common way of getting onto the 70MHz band and nearly all microwave bands.

"But what is a transverter?" I hear you asking? The answer is straightforward – a transverter allows a transceiver designed to operate on one band to transmit and receive on another band. On transmit, it takes a low-level output from the transmitter (usually in either the 28MHz or 144MHz band) and mixes it with a local oscillator signal to arrive at the band you want to operate on. On receive the transverter converts the v.h.f./u.h.f. signal down to 28MHz or 144MHz (**Fig. 1**).

Some transverters, particularly for the microwave bands, adopt a modular approach, with the down-converter and the up-converter each sold as a separate item. In some cases the local oscillator is also sold as a separate item. Be particularly careful to check what switching is or is not included. If it's not included then you'll also need to budget for coaxial relays which I'll be looking at on another occasion.

Unlike transverters for the microwave bands, transverters for the v.h.f. bands, such as those sold by *PW* advertiser **Spectrum Communications**, are usually complete in every respect. Spectrum Communications supply many of their transverters in a choice of kits or ready-to-use versions.

When operating, the display of the transceiver shows the low-level output frequency from the transmitter, but (of course) you are actually transmitting on another band. So, for example when the transmitter is showing 28.200MHz, the transverter is actually transmitting on 50.200, 70.200MHz, etc., depending on the particular transverter.

However, when using a transverter it's easy to transmit out of band because you are not 'seeing' the actual frequency. For example, when the transmitter is showing 28.600MHz, a 70MHz transverter would actually be transmitting on 70.600MHz. This, of course, is above the UK 70MHz band, which is from 70.000 to 70.500MHz.

In addition to Spectrum, there are a number of foreign suppliers of transverters including **Kuhne Electronic** (**DB6NT**) in Germany, **DownEast Microwave** in the USA, and **Bo Hansen OZ2M** who supplies 70MHz transverter kits. There used to be three other suppliers in the UK: Microwave Modules, RN Electronics and Mutek. As far as I am aware, none of these three still operate in the Amateur Radio market but their transverters appear from time to time on the second hand market.

Table 3
A selection Multi-Band transceivers from the main manufactures covering v.h.f./u.h.f. s.s.b./c.w. bands in addition to h.f. These are a mixture of current and discontinued models.
* The Yaesu FT-847 is the only transceiver in any of the categories to include 70MHz in its range of bands. The Kenwood TS-2000X (unlike the cheaper TS-2000E) includes 1296MHz. An optional 1296MHz module is available for the Icom IC-9100.

Manufacturer	Model	HF	50MHz	144MHz	432MHz
Alinco	DX-70	Y	Y		
Icom	IC-703	Y		Y	
Icom	IC-706 MkIIG	Y	Y	Y	Y
Icom	IC-726	Y	Y		
Icom	IC-736	Y		Y	
Icom	IC-746	Y		Y	
Icom	IC-756	Y	Y		
Icom	IC-7000	Y	Y	Y	Y
Icom	IC-7200	Y	Y		
Icom	IC-7400	Y	Y	Y	
Icom	IC-7700	Y	Y		
Icom	IC-7800	Y	Y		
Icom	IC-9100 *	Y	Y	Y	Y
Kenwood	TS-480	Y	Y		
Kenwood	TS-570S	Y	Y		
Kenwood	TS-690	Y	Y		
Kenwood	TS-2000 *	Y	Y	Y	Y
Yaesu	FT-817	Y	Y	Y	Y
Yaesu	FT-857	Y	Y	Y	Y
Yaesu	FT-897	Y	Y	Y	Y
Yaesu	FT-847 *	Y	Y	Y	Y

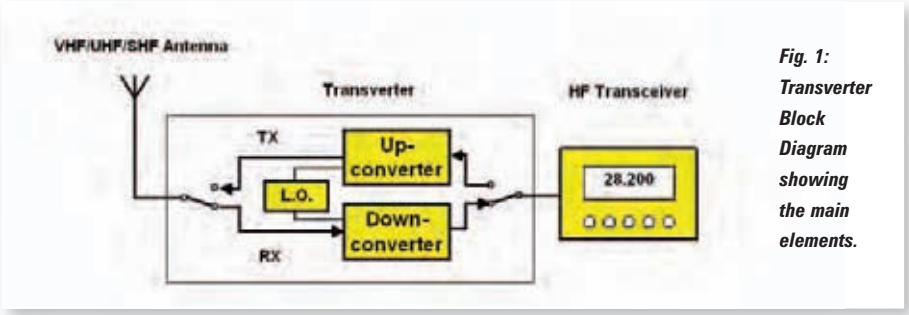

Fig. 1: Transverter Block Diagram showing the main elements.

Kenwood TS-790. A popular 144 and 432MHz multimode with optional 1296MHz module (category 2)

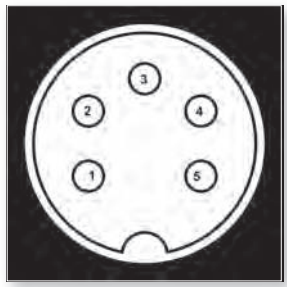

Fig. 2: The 5-Pin B socket used on Microwave Wave Modules. The pins are numbered when looking at the socket from outside the equipment (so this will be the same as looking at the solder tags on the plug). Pin 1 is switching, Pin 3 is Negative/Earth and Pin 5 is +12 Volts)

Transverter Considerations

The main considerations with transverters are the low level power – sometimes referred to as the intermediate frequency (i.f.) from the driving transceiver that they require, and switching from receive to transmit. The i.f. power required is usually quite small, sometimes as low as a few milliwatts. Getting the i.f. power from the main transceiver low enough can be a bit of a challenge! The current range of Spectrum Communications range of transverters generally can handle up to 10W of i.f. power.

To switch from receive to transmit,

Table 4
Feeder losses in dB of a 20m length of some popular feeders on various v.h.f./u.h.f./s.h.f. bands, assuming brand-new feeder with no losses associated with connectors. In some cases the data has been estimated for amateur bands based on published data for other frequencies.

	20m	50MHz	70MHz	144MHz	432MHz	1296MHz
UR76	2.4dB	2.8dB	3.8dB	6.4dB		
RG58			4dB	8dB	18dB	
UR67	0.9dB	1.1dB	1.7dB	3.1dB		
RG213U			1.64dB	3dB	5.2dB	
H100	0.64dB	0.76dB	0.98dB	2dB		
W103	0.4dB	0.5dB	0.9dB	1.5dB	3dB	
Ecoflex 15	0.4dB		0.68dB	1.22dB	2.28dB	
Ecoflex 10	0.56dB		0.98dB	1.78dB	3.3dB	
Aircell 7	0.9dB		1.52dB	2.72dB	4.97dB	
Aircell 5	1.32dB		2.27dB	4dB	7.14dB	

Table 5
Feeder loss is usually expressed in decibels (dB). The table shows what this means in reality to the available power from the original amount.

3dB	half available
6dB	quarter available
9dB	eighth available
10dB	tenth available
20dB	one-hundredth available

some transverters will detect that there is r.f. present on the i.f. and will automatically switch to transmit and this is known as r.f. sensing. Some require the grounding of a spare pin on a connector, and others rely on some direct current (d.c.) being present on the i.f. input in addition to the radio frequency (r.f.). Some transverters offer a selection of switching techniques.

The use of an r.f. attenuator permanently in circuit between the transceiver and the transverter was the technique favoured by Microwave Modules, who included extra gain on receive to overcome the effect of the attenuator. Another company– RN Electronics – used an external switched attenuator, whilst Mutek handled this inside their transverters.

Most Microwave Modules equipment use locking 5-pin DIN B plugs **(Fig. 2)** to supply +12 Volts (Pin 5), Negative/Earth (Pin 3). On some models (particularly transverters), Pin 1 is used for switching. When Pin 1 is connected to ground, Microwave Modules transverters switch to transmit mode. Pins 2 and 4 are left un-connected.

Receive Converters

Let's now look at receive only converters – these are essentially just the receive half of a transverter. Most receive converters don't have any switching incorporated, so they're are best used with a receiver, or by a well disciplined operator who will always remember never to transmit into a receive converter!

Transmit Up-Converters

As you might expect, transmit up-converters are just the transmit side of a transverter. They can be particularly useful for satellite work, where only transmission is needed on a particular band.

The Essential Feeder

No matter whether we use a transceiver or transverter, we need the essential feeder to connect it to the antenna. Almost without exception nowadays, Radio Amateurs use coaxial cable feeder on the v.h.f. and u.h.f. bands. However, the feeder will have losses that are linked to frequency and length. Doubling the length doubles the loss – please bear this in mind!

Icom – IC-703. A popular h.f. and 144MHz multi-mode rig (category 3)

Please also remember this also – increasing the signal frequency increases the cable loss. **Table 4** illustrates the losses in decibels (dB) of some popular feeders on various v.h.f./u.h.f. and super high frequency (s.h.f.) bands, assuming it's brand-new feeder with no losses associated with connectors.

For readers who aren't familiar with the deciBel (dB) measurements in electronics, these are ways of measuring losses or gains. By referring to **Table 5** you can see that a 3dB loss means that half of the signal going into the feeder at the final output of a transmitter (or transverter if one is being used) isn't making it to the antenna.

So, a 10W transmitter on 144MHz using 20m of RG213 feeder will only result in 5W getting to the antenna. The same is true when receiving – so in this example only half the signal received at the antenna will get to the receiver.

Using Pre-Amplifiers

To overcome feeder loss and lack of r.f. gain in some older transceivers, a range of pre-amplifiers have been marketed over the years. Some pre-amplifiers have been made without switching. Just as with receive converters, these are fine for receiving only. Transmit into them, and they will almost certainly be damaged.

Ideally, the best place to locate a pre-amplifier is close to the antenna. This will result in the lowest signal-to-noise ratio.

However, tempting though it may be to go for a high level of gain, too much gain can result in strong signals overloading the front-end of the transceiver or receiver! So, because of this I think it's best to keep gain reasonably low, sufficient to overcome feeder loss and any lack of sensitivity in the receiver. I also think it makes sense to be able to switch the pre-amplifier out of circuit in case of strong signals causing problems.

For pre-amplifiers that are mounted outside near the antenna, a further consideration will be how to get power to it. Some transceivers provide a voltage on transmit for this purpose. Alternatively a 'Bias Tee' can be used, to supply the necessary d.c. on transmit.

Next Month

Next month, I'll be looking at antennas to go with the transmitters and transverters I've described this month. Until then, please bear in mind that much of the equipment I have mentioned is only available second-hand, so beware and keep a look out for it on the second-hand market!

Ben Nock's

valve & vintage

Judging by the military and Eddystone equipment on show – it's Ben Nock G4BXD's turn in the 'vintage shop' this month!

A big 'hello' once again as it's my turn to welcome you and man the *V&V* shop. It's been a good start to the year for the 'Kidderminster Kollection' (KK), with several new arrivals. The unusually fine weather we've had in the West Midlands has meant I was able to do some restoration work outside, spray-painting and the like, which is difficult to do indoors as most will know. So, on with the show!

British Manpack

One interesting new addition to the KK is an example of one of the early transistorised British Army man-pack sets. These first appeared in and around the late 1950s and early 1960s. The A13 or Station Radio A-13 was apparently developed primarily for infantry use in situations when very high frequency (v.h.f.) operation was deemed unsuitable. It was also used by the amphibious forces, possibly the Marines or Special Boat Service (SBS) and unspecified special task forces.

The frequency coverage of the A13 transceiver, **Fig. 1**, is 2 to 8MHz with a power output of approximately 800mW using amplitude modulation mode (a.m.); 1.5W using the phase modulation and Morse (c.w.) modes. The set had a quoted range of around 5 miles in man-pack role, using whips, etc. but this could be increased when using bigger antennas, dipoles, long wires.

In addition to the soldier carrying the basic set, an additional amplifier could be mounted on the same frame. The equipment was then called Station Radio A13 HP (High Power), which raised the output power to approximately 8W on a.m. and 16W on c.w. mode.

In the high power role the additional equipment needed, more batteries, bigger antennas, etc., changed the team from a one-man operation to a two or three-man team.

In the HP configuration the radio was mounted on its side on the carry frame, Fig. 1. In the carry frame the amplifier is mounted below it, with the antenna tuning unit for the whip antenna mounted on the side.

A 12V battery is carried in a space at the bottom of the main set while a second 12 battery is mounted in the amplifier unit. This is placed in parallel with the set's battery during receive, providing a 12V supply, and in series with it to give 24V for the amplifier when it's transmitting.

Although the set was described as fully working when I purchased it, I soon found after it arrived that there was in fact no transmit function – in fact there was no radio frequency (r.f.) output at all. As it's an early transistorised set, the unit is populated totally with discreet transistors – not one single integrated circuit (i.c.) at all! The circuit and construction, **Fig. 2**, are extremely complicated to derive less than 1W of signal output – despite this, I made a start was made on trying to locate the fault.

Eventually, I found that the driver and power output transistors were 'blown', these were replaced and I'm now getting some output from the transmitter. Despite this, I'm not

Fig. 1: The A13 on its carry frame, set at the top, amplifier below with antenna tuning unit on the left.

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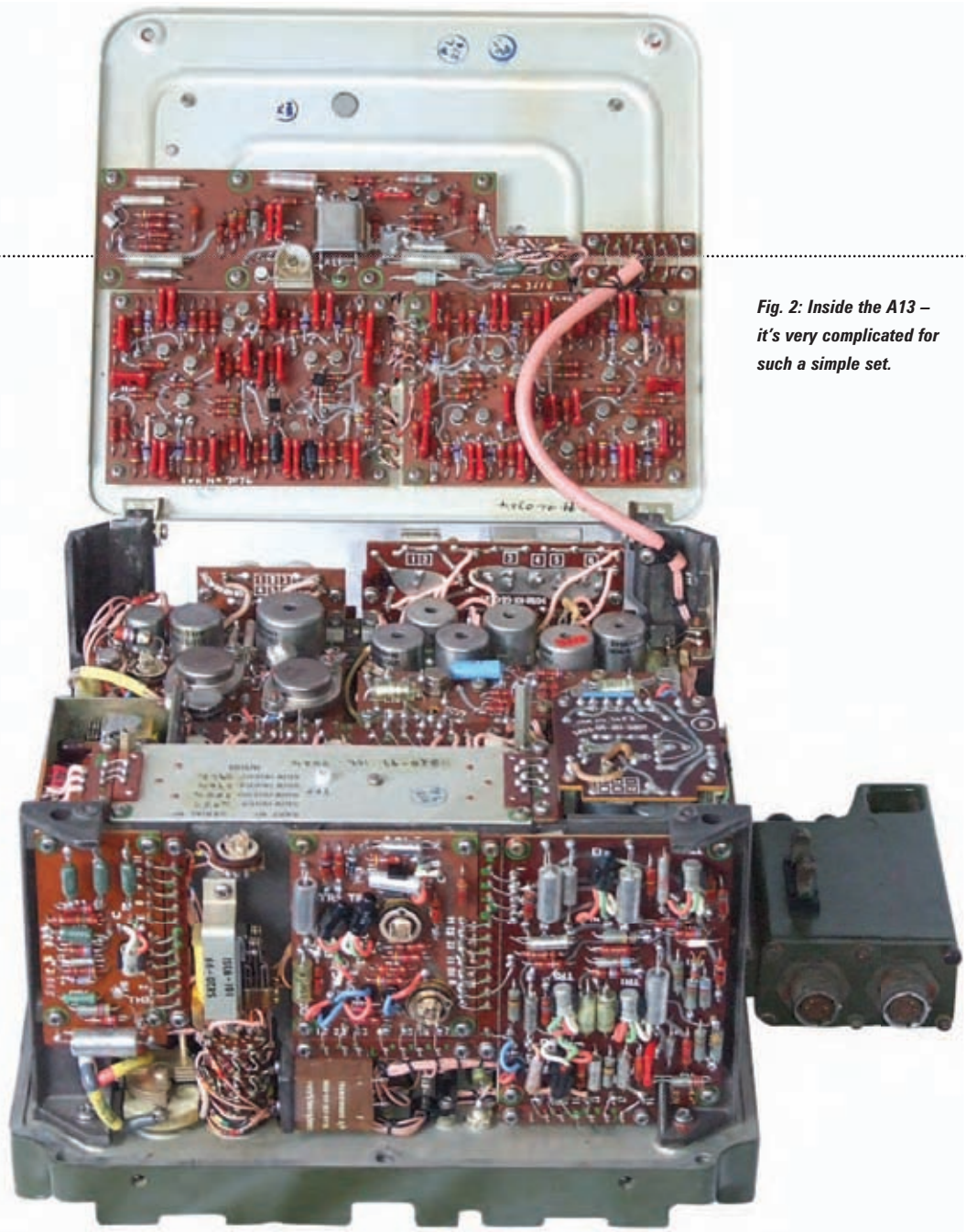

Fig. 2: Inside the A13 – it's very complicated for such a simple set.

yet fully happy with the set – so further work is needed. This will include getting the crystal calibrator to work correctly, not helped by the fact the circuit diagram showed a *pnp* transistor, which turned out to be an *npn* type when I checked the military CV number for possible equivalents. So, it's an ongoing project!

Another Eddystone Arrives

As regular readers will know, I'm always happy to add new Eddystone receivers to the Kollection, **so** I was pleased to find another little set recently. The model is a 930/5A, which is a single band receiver that was made with various frequency coverages available.

The particular model, **Fig. 3**, covers a tuning range of about 97 to 122MHz and can receive a.m. or f.m. signals. However, there's a little mystery about the role of these sets. Many were sold to government agencies for use in 'listening' to (so I've been told) certain factions in a certain 'off-shore' enclave of the United Kingdom.

According to the Eddystone group site and the very useful Quick Reference Guide (QRG) the 930 is known to have been made in models covering 70-90MHz, 85-102MHz, 27-28MHz, 80-96MHz, 80-100MHz, 110-130MHz, 90-110MHz, 60-76MHz and 45-55MHz. But there might well be other ranges out there, so please do let me know if you have any other examples.

The receiver uses 10 valves, **Fig. 4**, in a single conversion superhet design with an intermediate

Fig. 3: The neat little Eddystone 930 receiver, with its simple controls.

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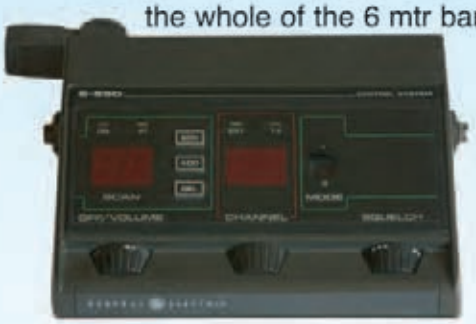

Contact us

If you have any questions regarding the above then you are welcome to give me a ring on 01604 234333 or 07836 600700, Gary G6NYH
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frequency (i.f.) of 10.7MHz. Automatic frequency control (a.f.c.) was employed in both modes to lock reception onto the incoming signal and the set is mains powered with an internal loudspeaker.

Unfortunately, I seem destined to always find the non-working or modified sets these days! I say this because the example in the photograph had been mutilated by having its peculiar a.f.c. arrangement removed and the set re-tuned to cover more of the Band II f.m. broadcast band. With the regard to the loss of the a.f.c. circuitry, I think I'll have to put up as it used a special coil arrangement – but at least I can realign the set to its correct tuning range.

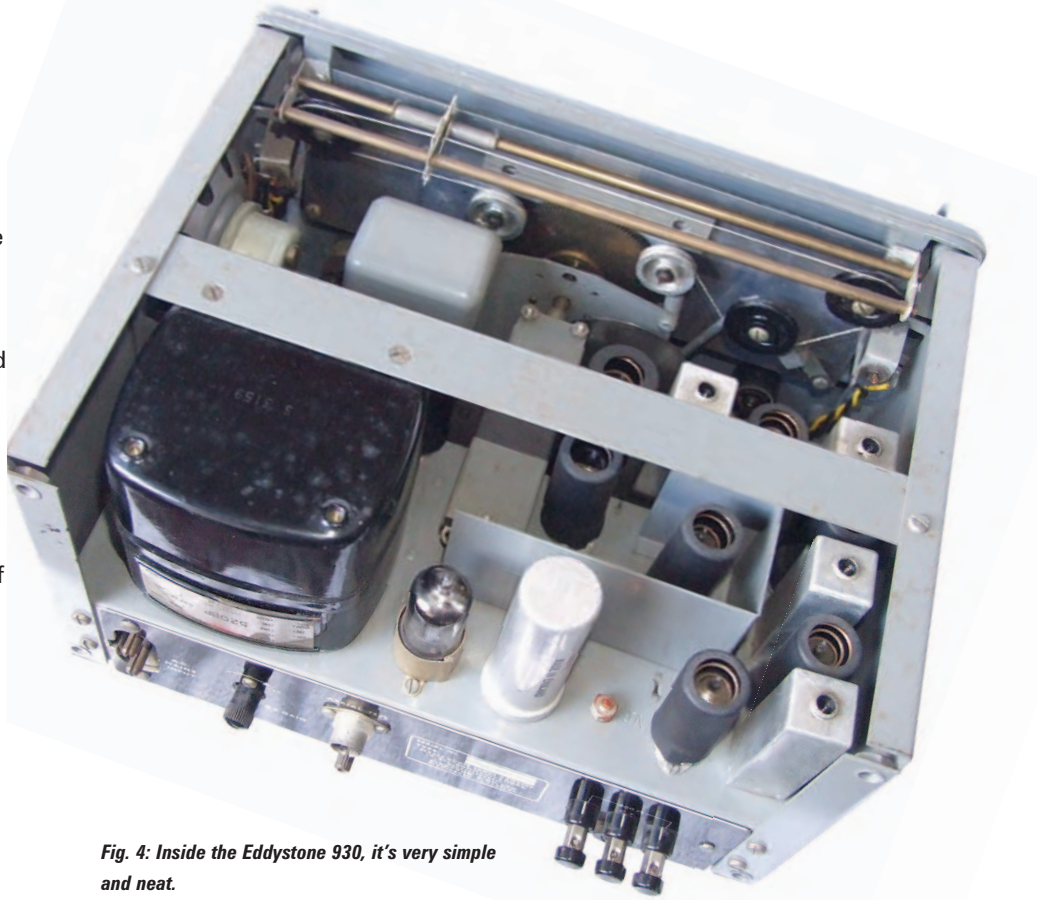

Fig. 4: Inside the Eddystone 930, it's very simple and neat.

Eddystone Tuner

The arrival of the 930 reminded me that I had not got around to checking what – at a first glance –appears to be the same receiver, already in the collection. This set though, the S820, is in fact just a tuner, covering the Band II broadcast band and one pre-set long wave station and two pre-set medium wave stations. It provides a low level audio output to a hi-fi amplifier.

On reflection, the '820, **Fig. 5**, does look very similar to the 930. It has the same style case, the same Type 898 tuning dial and main control layout. The set tunes the 85 to 101MHz band and allows three a.m. stations to be pre-set and selected by the front panel switch. The receiver is self-contained with its own mains power supply inside and originally cost around £38 between 1955 and 1958. (The the BBC began nationwide broadcasting on Band II in 1955).

The idea was the purchaser bought the tuner and built it into their own enclosure, which could then also house an audio amplifier of their own choice along with speakers, etc. The audio output of the 820 is of course mono, stereo broadcasting was yet to come along (which it did in the mid 1960s).

Fig. 5: The S820 Tuner and again, this has very simple controls.

And Finally!

It was very nice indeed to meet one or two readers at the **National Vintage Communications Fair** in May when I helped out on the Eddystone stand – and thank you for your comments on the column.

Well that's about it for this stint at the *V&V* shop. I hope you've enjoyed the selection I have bought you this time and there are more pictures at **www.qsl.net/g4bxd** As always I can be contacted at my email address **military1944@aol.com** Cheerio for now!

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Feature

Emerging Technology

Chris Lorek G4HCL says you may in the future be using your car windscreen as your mobile transceiver!

Welcome to *PW*'s glance at future possibilities and I'm starting by looking at underwater radio communications on 5MHz. I've explained in detail the new technology for underground radio communication in a past column, but underwater communication has always been rather difficult.

Traditionally, very low frequencies (v.l.f.) have been used, with extremely long antennas trailed behind submarines. together with narrow bandwidths and very slow communication rates employed in order to provide at least some form of communication. Water is a very powerful absorber of radio frequency (r.f.) energy, especially if it's high-conductivity ocean saltwater.

In the past, the use of acoustic modems was attempted using ultrasound, but these were plagued by reflections from coastlines and from the surface of the water itself. The transmission rate is also fairly slow, due to the relatively slow speed of sound compared with that of electromagnetic waves.

With the possibilities of getting much more out of acoustic modems being unlikely, attention has now changed to r.f. and optical techniques. Even though r.f. has been shown to be absorbed quite quickly, and lasers have difficulty penetrating through the murky waters we can find around the UK!

However, researchers at the Liverpool John Moores University have now managed to develop a couple of r.f. based systems for underwater communications. The first method is called 'SeaText', which is used for low bandwidth communications of around 100 bits/sec.

The second method is 'SeaTooth', which is an undersea version of Bluetooth which operates at a much higher speed of 100 kilobits/sec over a shorter range, typically that of radio Bluetooth above water which is around 10m. Now 10m may not sound that much – but for people such as a diving group wishing to communicate with each other it can be far, far better than using things like hand signals such as 'Okay' and 'thumbs up' or 'help'.

Both systems currently operate at frequencies below 200kHz but the Liverpool University team are right now working on higher frequency systems that exploit a little-known effect of through-water transmission. Interestingly, this includes transmissions on 5MHz, and Andy Shaw from the University says, "It flies in the face of conventional theory." This could be due to an effect called 'Debye Relaxation', which is a concept developed by chemist Peter Debye and describes how molecules in a conductive fluid align themselves temporarily with an electromagnetic field before reverting to a random orientation. This in turn alters the ability of the fluid to transparently pass an r.f. signal. Andy Shaw says, "We were surprised that it could be applied down to 5MHz."

As many UK Radio Amateurs know, we've an experimental frequency allocation at 5MHz, so could we Amateurs be the first again to show that communication using this frequency range might astonish otherwise sceptical experts? We're specifically allowed by Ofcom to use this for propagation tests and to communicate with the military who also use this allocation. So, don't be surprised if you get a reply, or a QSL card, from someone on a submarine saying they heard you at 59+ underwater!

Common Battery Charging

Contactless battery charging is increasingly being used.

Right now, portable equipment manufacturers, especially cellphone manufacturers, are coming together to agree on a common battery charging connector. This is in order that that one connector type can be used across all makes of equipment.

Coincidentally, around 23 years ago, in my first (and last job) working for an international radio communications company, I was the Design Team Leader (promoted from a lowly Design Engineer!) specifically tasked to investigate new and emerging technology in the field of two-way radio.

It was a job I thoroughly enjoyed – and I certainly did find some new methods of doing things, two-way radio wise. These included a 'Spirical' built-in v.h.f. antenna which would fit into the top part of a 144MHz hand-held transceiver case and worked just as well as a set-top helical.

My fellow workers wouldn't believe it could work, the computer-

aided simulations said the same, until I demonstrated by accessing a distant amateur repeater on 2m from the laboratory, where replacing the 'Spirical' with a much larger helical gave exactly the same signal strength both ways. But it never caught on!

Now think about cellphones, in the early days these used external set-top antennas, they all have internal types now. It's a long story but I left the company a little later for a smaller competitor, and I've had over 20 years of very happy times with them since then and my significantly much larger, former company – having gone bust a couple of years after I left, no surprise there eh?

One other thing I looked at was contact-less charging of two-way radio batteries. This was preferable to physical electrical connections that don't lend themselves to reliable operation in wet and dusty environments. That again wasn't taken up at the time in the two-way radio field – but it certainly was by an electrical toothbrush manufacturer, Braun. Yes, they do manufacture lots of other things as well!

The system works on a simple transformer principle, with a primary coil on the base charger and a secondary coil within the portable equipment. Placing the two together, typically with the primary insulated and encapsulated coil slotting into a small 'hole' in the portable equipment with the secondary coil wound around this inside the unit. This had been successfully used now for over a decade.

It's no surprise that this idea has now been resurrected as a possible solution for a universal charging system across differing types of equipment! There have been some issues such as maximum charge rate and magnetic fields, but all of these have been tried, tested and used in the past within plug-in wall chargers. This, and the technology is being adapted for contact-less charging with higher frequencies used together with ferrite technology. So it looks like charger connections on our radios may soon be a thing of the past!

Secure Radio Communications?

Right now, people using digital two-way radio often think their conversations are secure from eavesdroppers. This is certainly not so! There are currently a number of standards for digital two-way radio, including dPMR (Digital Private Mobile Radio), DMR (Digital Mobile Radio), and TETRA (TErestrial Trunked RAdio). The common thing about all these are that they are public protocols, so that all manufacturers can, if they wish, develop equipment to operate using these standards, there are no 'secrets' in the digital protocols.

Yes, some manufacturers may like to suggest to users that their conversations are secure. Many years in the past one manufacturer decided to call the publicly available and widely published CTCSS (Continuous Controlled Squelch System) or 'sub-tone', which is the system we Amateurs commonly use to access v.h.f./u.h.f. repeaters, as 'Private Line' or 'PL'. Some users mistakenly thought this prevented others from listening in.

Indeed, I recently read that a couple of years ago an overseas police force was the subject of an (unsuccessfully) attempt into using CTCSS by a USA based radio supplier who claimed this would prevent others listening in – but we know better!

However, the same goes for more modern digital two-way radio systems. If you'd like to listen in to digital PMR then you can simply use an off-the-shelf p.c.b. module, in line with the audio output from your receiver, which is available from Consumer Microcircuits Ltd. (This has been widely covered in *PW*'s sister magazine *Radio User* over the past year or so. It's the same for TETRA decoding, with off-the-shelf systems available, this is again detailed in *Radio User*.

Radio Amateurs have had a history of writing PC-based programs for over-air data use. The BayCom team in Germany for example arguably pioneered this with their Amateur Radio packet modem system, using a simple circuit connected to a PC's RS-232 serial port and with *BayCom* software running on the PC.

The BayCom team (L-R) Fritz Raab DF2RF, Flori Radlherr DL8MBT, Christian Lachner DL5RL, Johannes Kneip DG3RBU and Rudi Dussmann DK5RQ, enjoying a traditional Bavarian activity!

I was privileged to join the BayCom team in Friedrichshafen many years ago over a meal and a few beers, especially so **Johannes DG3RBU** and **Flori DL8MBT** who joined together to start BayCom in the late 1980s.

The PC-based programs are currently available for off-air decoding of a plethora of digital signals, not just Amateur modes such as packet, PSK, RTTY, SSTV and the like. There are also programs available for de-coding commercial data modes such as POGSAG and FLEX paging, DSC maritime digital selective calling, over-air data from taxis/ambulances, Fire and Rescue services, MPT1327 data, and lots more.

Over on the 'other side of the pond' in North America, digital modes such as P25 for government security are now commonly included as decoding modes on hand-held, mobile and base scanners including trunk-tracking of these. The common factor is that these have been publicly-available protocols and all it needs is either a hobby radio equipment manufacturer to include these in their equipment, or enthusiastic amateurs to develop PC based decoding programs. This has, of course, been done many times in the past – or for add-on in-line decoder units to be commonly available (this has already begun). ›

Batteries & Super-Capacitors

A new report, by **Dr Peter Harrop**, into batteries, super-capacitors and alternative storage devices has, not surprisingly, shown that looking back at past technologies gives a grossly misleading view of the future. This is because, as regular readers will have seen in this column, radically different components are arriving all the time.

The new components include transparent and flexible components including those within clothes and other fabrics and various items with electronic and electrical components and circuits printed onto them. This leads to completely different markets including bio-degradable, stretchable and disposable electronics appearing, possibly replacing non-electronic products. It means that we can look to moving beyond electronic books and low cost netbooks, to e-labels, e-posters, e-packaging and even intelligent self-adjusting use-by dates depending on storage conditions.

A collection of printed organic light emitting diodes (o.l.e.d.s) can of course have several uses, from a simple illuminating light to a complex video display screen. In the past, someone involved in lighting design would not have had much in common with someone designing batteries or a radio transceiver.

But the state of affairs is now changing, especially in the emerging world of self-powered devices such as wearable radio equipment. Designers are now planning household windows and wallpaper that are combined with solar cells, video displays and wireless receivers and transceivers. Your car windscreen and side windows could soon be your self-powered mobile transceiver, complete with frequency display and S-meter!

Batteries, capacitors and self-generating kinetic and solar power sources will be increasingly used for portable equipment, maybe along with fuel cells which have the highest energy density of all. But most energy harvesting still needs some kind of energy storage. This is where 'super-capacitors' come in.

The battery of a 1920s' analogue transceiver occupied around 5% of the device volume, but today the batteries in a typical portable wireless sensor take up 90% of the device volume and weight. We're now seeing the replacement of some batteries with other forms of energy, even batteries used for high current applications, in mobile electrical and electronic devices like transceivers.

A totally new world of portable power is emerging, with traditional batteries being virtually replaced with other new technologies. We'll undoubtedly be seeing super-capacitors used together with self-power generation, an end to tradition? Watch this space!

Cognitive Radio

In the past, I've discussed Cognitive Radio (CR) as well as Software Defined Radio (SDR) in this column-and I'm sure we're soon going to see the two merge. Radio Amateurs have already been developing and using SDR, and together with software-based signal encoding and decoding technology as above this means a software-based radio isn't just a pipe dream at all.

What's more interesting is that, linked to a CR (which determines which parts of a radio spectrum to use on a dynamic basis) this could bring a whole new meaning to Amateur 'conversions' of commercial and professional two-way radio equipment. I can see the day when we'll be able to get an off-the-shelf surplus radio from a radio rally stall, maybe one that was originally used for, let's say, cellphone or TETRA communication, load a piece of Amateur-created written 'freeware' or 'shareware' software into it and end up with a 144/430MHz multi-mode hand-held transceiver.

Another Mobile Health Risk?

Just when you thought it was all clear and done and dusted – after years and years of tests, we've been told that 'mobile 'phones are quite safe and don't carry any health risks whatsoeve, there's something 'new on the block!

Yes, that's right – it's recently been highlighted that you can get a potentially life-threatening illness by using a mobile phone. But not because of radio frequency emissions – instead, it's the bugs they can carry! That well-known organisation, the Ondokuz University in Turkey, have come to this conclusion. However, this research has been brought to the attention of UK mobile users by the public relations division of the Purelight UK company.

Now, Purelight **just happen** to manufacture UV-C anti-microbial sterilisation systems, including a portable 'flip' light which they say kills the germs and viruses responsible for causing disease. I've a simpler answer – don't let others use your phone. Make sure to disinfect that surplus cognitive software-defined radio in years to come before you load your freeware Amateur software to convert it to a hand-held rig!

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

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You must have, at times, thought into the past,
Where some things go out, while others last,
What comes to my mind is the Old Morse Code,
That has weathered the storms from any abode.

To talk with ones fingers, is surely an art,
Of any info you care to impart,
In most conditions the signals get through,
While the same about phone is simply not true.

Those dits and dahs cut through the trash,
Of nearby noise or lightning's crash,
To the sensitive ears of the ham receiver,
Who records this data with ardent fever.

He knows he's doing something unique,
In such poor conditions, that's quite a feat,
To roger the message that came off the air,
These brass pounders sure do have that flair.

They say Morse ops are a dying breed,
But don't despair, there's always that need,
That when conditions get rough for the new automation,
Be rest assured, there'll be need for your station,

CW is dying? Believe it never!
This mode will be 'round forever and ever,
But one thing is sure, what we really need,
Is to relay our knowledge to the younger breed.

To carry the torch, long after we're gone,
To send Morse Code through the air like a song,
When at last, Silent Keys pull that final lever,
We can rest in peace, it's CW forever.

The WA1TBY Poem

I thought you might like to see the poetry. It was written by **Jim Hatherly WA1TBY**, in April 1985. The poetry may be old, like Morse, but the sentiments and Morse will last me out!

Strange Keys

Have you ever wanted to send c.w. using a revolver, or a hammer? How about a set of nail clippers? Well, now you can – but please don't take it too seriously! See **http://sites.google.com/site/oh6dccw/strangecwkeys** This was brought to my attention by **Steve Nichols G0KYA** just to prove that Morse is still being used commercially. It might be a dying mode here – but it's not dead just yet! Of course it never will be for Radio Amateurs.

While trying to work out what was sending 'TAH' in Morse on 8.433MHz – a marine band frequency that is often used by KSM in San Francisco (a long story there!) I found the following page **https://sites.google.com/site/somaliaamateurradio/somaliaphotos4**

Anyway, take a look and more importantly, take a listen too.

I had a very nice surprise recently – from **John Griffin M0CDL**, Membership Secretary of **Fists**. I was made an Honorary Member of Fists with a membership number of 14580. This shows how popular Morse is in itself with that sort of membership number! Anyway, I shall do my best to take part in some of Fists events and I am at present enjoying reading the winter edition of Key Note. Many thanks for the honour Fists!

Now, if your Morse is up to scratch but you just dare not go on the air, worry no more! The following is an offer seen on the Southgate Web site. It stated, "Do you want your first c.w. QSO?"

If you've always wanted to plug-in your Morse key and have that first c.w. QSO, then **Ian Keyser G3ROO** – the author of the news item – has an invitation for you. In an E-mail to Southgate News, Ian wrote: "If you do want a QSO, come on 3.564MHz (plus or minus QRM) at 1830 clock time and most nights you will find me there calling 'CQ QRS NET.'

I call at 12w.p.m. but will come back at the speed you call me." So, make sure you give Ian a call!

Essex CW Amateur Radio Club

As c.w. increases its popularity and another Club has been formed by the **Essex Amateur Radio Club**. Basically it's a "Group passionate about the survival of c.w., formed to maintain and promote use of Morse Code."

The group hope to encourage the use of Morse on the Amateur bands and show that c.w. is extremely effective under poor signal-to-noise conditions. They also aim to show just how much DX can be worked on this mode.

Although formed and based in Essex, the welcomes members from anywhere in the UK or abroad who share the passion for c.w. The club is Affiliated to the RSGB and will use the callsign G1FCW on air and be affiliated to the RSGB.

The club welcomes proficient c.w. users, as full members, and those aspiring to become proficient, as associate members. **Andy Kersey G0IBN** is a **GB2CW** volunteer and provides on the air Morse practice.

The group plans to undertake a range of activities which involve c.w., including, but not limited to, contesting, practice sessions and encouragement for those learning the code. There will also be club talks about Morse, c.w. proficiency awards competitions and on-air code nets.

The founder members of the club include past Morse examiners, c.w. contest operators, and experienced Morse users who share a passion for the mode. The Club hopes that many existing members of other clubs with an interest in c.w. will also join as members.

Further information may be obtained from visiting the club's website: **www.essexcw.org.uk** 73 and May the Morse be with you!

Roger G3LDI.

Graham Hankin's

in vision

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This time Graham Hankins G8EMX poses a question about the future of Amateur Television.

Welcome to the world of Amateur TV (ATV) reflected by *In Vision* (*IV*). This month I'm starting by posing a question – can the British Amateur Television Club (BATC) continue to justify holding its Bienniel General Meetings at a luxury country hotel? That was my dominant thought after leaving this year's event, held on Sunday June 6th.

20 year old Link studio camera still in action at BATC's convention.

Certainly, last year the lectures had been filled with more than 60 members, with four rows of small traders and exhibitors occupying the adjacent room. Not so this year! Less than half those numbers at the hotel, with a dozen watching by the internet streaming service at the start of the lectures, rising to 30 by lunchtime. For the first time ever, I did not stay for the General Meeting itself in the afternoon as only three of the committee were able to be there.

However, the morning's lecture stream was certainly packed with information and I sense a growing 'gulf' between ATV and the wider Amateur Radio. Nowadays much of Amateur Radio can be bought 'off the shelf' – and this isn't the case for ATV. Most of the hardware being demonstrated – or talked about – in the lectures had come from E-Bay, usually for US Dollars. I can only see the most dedicated new Amateurs doing this. And will they have the bands to operate on?

Aircraft Radar

Aircraft Radar has always been an ever-present problem for the once-popular 1.3GHz (24cm) ATV band and now even the sea is causing problems, with warships mentioned here! These vessels apparently do not turn off their radar while in port! But in the contest ATV versus warship – I think there would only be one winner.

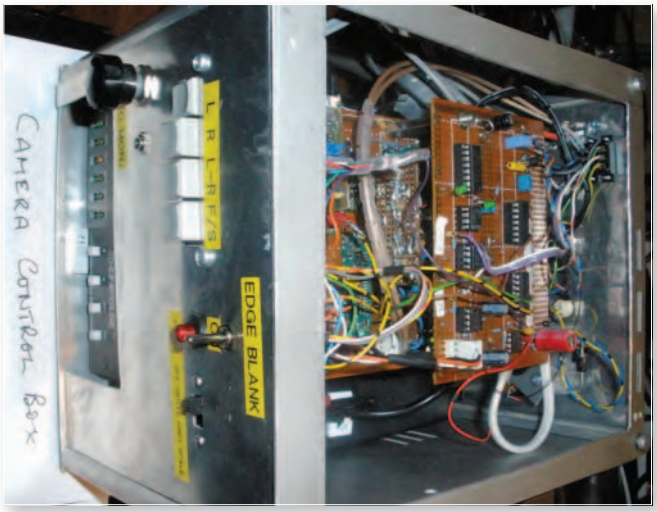
Unfortunately, there's no escape by 'running' to 2.4GHz (13cm) as Wi-Fi systems are 'live' here and they're also growing problem for ATV. It was acknowledged at the meeting that pressures on band usage would only rise, hence the need for digital ATV at as small a bandwidth as possible, consistent with acceptable pictures.

Noel Matthews G8GTZ provided the talk entitled *Digital Update*. This covered not just amateur but broadcast too and begged the question: "What is **'broadcast quality'** anyway?" Quality to the 'end-user', i.e. us viewers, is always a trade-off between bit rate, bandwidth and Forward Error Correction (FEC).

The more 'bits' that are allocated to error correction, the fewer are available for encoding the picture. The more the compression, the lower the bandwidth, more room for more channels. Noel's presentation was so full of algorithms, modulation systems, standard definitions and High Definition encoding and compression variants that it is clear that television technology is becoming – no, has become extremely complex!

Vision control and mixing desk for BATC's internet streaming feed.

But some intrepid Amateurs are still developing DATV and there were demonstrations and videos of 430MHz (70cm) and 10GHz DATV. It seems that 2Mbit/s is the accepted bit rate for 70cm, with a suggested FEC of 3/4. One very basic explanation



Mike Cox's Homebrew camera control and synchronisation box for his 3D TV experiment.

Mike's 'Two camera' 3D setup

of this was that 3/4 is the ratio of 'picture' bits to error correcting 'bits'.

The other common term is Symbol Rate – this is what I think it is: A symbol represents something. A symbol is usually an object, picture or icon, but it could be a specific change from a normal condition. In Digital Amateur TV the carrier will be phase shifted to one of four specific degree angles away from its unmodulated state, this is Quadrature Phase Shift Keying, QPSK.

Each shift indicates – or symbolises – one of four binary codes. So each angle or 'symbol' represents two 'bits' of binary code. Are you still with me – assuming you ever were hi? So, in QPSK a carrier shift of 45° is used to represent binary 00, 135° sends 01, 225° 11 and 315° represents binary 10. So, I understand Symbol Rate to be how many times the carrier will be phase shifted per second. But I might be wrong – there is always a 'First time'!

Back To The Meeting!

But now it's time to go back to the BATC BGM! There, the 'show-stoppers' had to be the 3D television theory lecture and the home-brew demonstration. Noel looked back at early 3D in films – remember the red and blue images and coloured spectacles? Well, viewers of current 3D films and 3D television still use 'glasses' but the technology is now **very** different!

'Side by Side'; 'One Above the Other' and 'Checkerboard' were all different methods of transmitting two images to a 3D receiver – which then has to sort out how to display them. Both 'active' and 'passive glasses' were explained, if you could keep up with the torrent of information.

'Active shutter' glasses are expensive and control each lens in synchronisation with the TV image; passive glasses are very cheap and use left and right circular polarisation of each image. But how do you 'circularly polarise' the light source (i.e. the TV) screen images? Personally, I'm not quite clear about this at the moment.

But the 'star of the show' just had to be Mike Cox's demonstration of his home-brew 3D system! Mike used two basic camcorders mounted side-by-side, mixed and synchronised by some home-brew electronics, then fed to two projectors equipped with circular polarisation filters in front of their lenses. The two images were perfectly registered as one and presented a marvellous 3D picture of the lecture room when viewed through passive glasses!

As for the BGM reports and elections, you will have to go on line to see this, at **www.batc.tv** Club chairman **Trevor Brown G8CJS**, secretary **Brian Summers G8GQS** and web master **Ian Pawson** were the only committee able to be at the BGM. However, I'm sure all will have been voted back into their respective offices. ●

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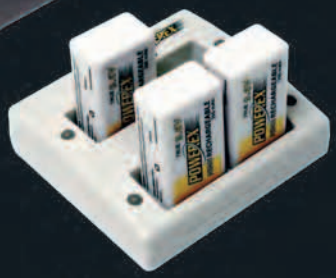

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Carl Mason's

hf highlights

Carl GW0VSW's monthly round up of activities on the h.f. bands. Reports to Carl by the 15th of each month please!

Welcome to the world of high frequency (h.f.) operation! As we all know, propagation in this region is very dependent on the ionosphere reflecting our signals back to earth – and that experience shows that particular modes suit different operating conditions or times of day.

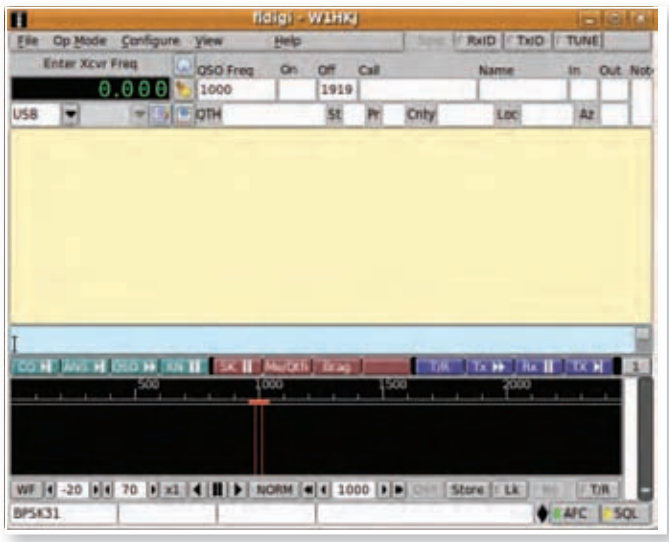
Other factors can effect our operating such as local noise levels, signal strengths, equipment limitations, available power, available band space (try listening on 7MHz during a contest), operating speeds or even the type of antenna used can all have an effect our choice of mode.

Several of the factors can all be used at the same time and it's this choice that makes our hobby so interesting and adds to our operating pleasure! However, it's always difficult to advise which mode is the best to use for each particular occasion and this is where experience comes in. Only by operating regularly at different times of day or night will you get an idea of just how well a particular mode will work for you on each band at your location.

With conditions still being rather poor at the moment, it is no wonder that many of you will have noticed a growing interest amongst our reporters in digital communication – especially PSK and more recently RTTY. These modes are allowing communication where s.s.b. or even Morse code are unable to provide a QSO.

One 'free' programme that may be of interest to you covers several modes and may allow you to operate when conditions get tough. It's called ***Fldigi*** (Fast Light Digital Modem Application) by **David Freeze Jr. W1HKJ** and associates and is a digital modem programme for *Linux*, *Free-BSD*, *OS X*, and *Windows*, etc.

The programme itself, operates in conjunction with a conventional h.f. transceiver which is connected to the input and output sockets of the PC's sound card while a serial port connection is used for rig control. The program is also multi-mode, which means that it's able to operate with many popular digital modes without you having to change programmes and it includes c.w., DominoEX, MFSK16, MT63, PSK31 and RTTY.



The* Fldigi *screen ready to go on PSK31. The lower (black) screen will show the 'waterfall'. The top section will show received and transmitted text.

Take a look at the excellent *Beginners' Guide to FLDIGI* at **www.w1hkj.com/beginners.html** and download the latest programme V3.20 at **www.w1hkj.com/Fldigi.html** The program is very easy to install and set up and has a good professional feel to it. Although *Fldigi* does not supply all the rig control files with the downloaded program, there are links for most transceivers on the home page. It certainly handles more modes than I will ever need. If you do decide to try it please let us know how you get on.

***Editorial note: Tex Swann G1TEX** told me about this program Carl – it's truly superb and I now use it for my own PSK31 operations. It's highly recommended. **G3XFD**.*

The DX News

On to this months DX news now and I begin with three Japanese amateurs JA2NQG, JH2BNL and JI2UAY. They will be active from Wallis OC-054, an island in the Pacific Ocean which is a French Territoire d'Outre-Mer, or overseas territory, from July 14th to 24th and the requested callsigns are **FW5M**, **TO2BNL** and **FW5FM** respectively. They will try to operate from Futuna OC-118 during their stay and activity can be expected on most h.f. bands with a QSL via their home calls.

The Puerto Rico Amateur Radio League **www.prarl.org** will operate a special event station **K4C** on all h.f. bands until the August 1st, to celebrate the 21st Central American and Caribbean Games that will take place in Mayaguez and the QSL is via KP4ES.

Mahé AF-024 is the largest of the Seychelle Islands and lies in the north east of the country. The population of Mahé is 80,000 and 90% of its people live in the Island's capital city of Victoria. It is from here that Manuel Marques CT1BWW will be active as **S79BWW** between July 17th – 31st July and he plans to operate c.w., s.s.b. and possibly include some RTTY on 3.5-28MHz bands. The QSL route is via the bureau or direct to his home call and further information can be found at **www.ct1bww.com/s79bww/**

On to Western Africa next, and to Senegal where Silvia Delgado EA1AP, Juanjo Fortuny EA1CJ, Alberto Cruz EA1SA and Raul Blasko Blasko EA5KA will be active using the call **6V7EA** from July 25th to the 31st. The group will operate c.w., s.s.b. and RTTY from 1.8 to 28MHz and plan to have three stations running with a QSL via the operator's instructions.

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In Turkey the Sile lighthouse (TUR046) is celebrating its 150th anniversary. This lighthouse is situated on the Anatolian side of the Bosporus where Cape ile is the first 'prominent' cape east of Istanbul on the Black Sea coast. The lighthouse is located on the point and is the second highest in the world at 60m (197ft) above the sea level. Its tower was built in thick stone that rises to a height of 19m (62ft) and was constructed by a French Administration in 1859, as a result of privileges given to them by the Ottoman Empire.

The stone part of the lighthouse was built by Turkish architects while all the metal parts and the lens system were made in the Barbir factory in Paris. The TC Special Wireless Activity Team **www.tcswat.org** will operate from here using c.w., s.s.b., PSK and RTTY as **TC150SLH** on July 24th-25th and August 21st-22nd. An award is available and details on this can be found at www.**qrz.com** under the event call. The QSL is via TA1HZ.

Finally, operating as **MM3T** from the Isle of Bute EU-123 on July 24th-25th – for the IOTA Contest – will be Doug Maxwell GM0ELP who will operate c.w. and Simon Nash M0GBK will concentrate on s.s.b. There are no paper QSL cards but contacts will be confirmed via eQSL while IOTA chasers will be able to claim credit online once the contest logs are uploaded to **www.rsgbiota.org** in 2011.

Your Reports

On to this last month's reports and the first is from **George Davis G3ICO** in Mudford, Yeovil who runs an Elecraft K2 at 10W to a doublet, some 40m long for his activities. He logged 7MHz c.w. stations N7RO (USA) in Bellingham, Washington at 0714, TM68X (France) 0719. This was a special call for World Amateur Radio Day and Ham Radio exhibition organised by REF68 in Wittenheim (QSL via F8BUO). Next was HG2010P (Hungary) at 2023, a Special Event Station from Pecs the European Capital of Culture. Then came PA100ROVER (Netherlands) 2125 one of the seven special calls for the 100 Years of Scouting in the Netherlands Award see **http://award.jota-joti.nl**

In Little Milton, Oxford **David Bambrook 2E0DAB** also managed a few contacts on the band working s.s.b. stations UT5MB (Ukraine) 1410, IZ8OFO (Italy) 1915 and EA2CTQ (Spain) 1930 using a Yaesu FT-747GX and 50W to a loft installed dipole for the band.

On to 10MHz and **Eric Masters G0KRT** in Worcester Park, Surrey who logged SP9HTY/P (Poland) 1538 and OK1HA (Czech republic) at 1444UTC using a Kenwood TS-570 at 100W and home brew modified W3EDP antenna 26.9m (84ft) long with counterpoises tuned with an SGC SG-230 auto tuner.

Back in Yeovil George G3ICO also worked this band finding JR4GPA (Japan) AS-007 at 1837, OL80OK (Czech Republic) 1855 and a special callsign to remember the 80th anniversary of the first Amateur Radio licences being issued in Czechoslovakia to OK1AA, OK1AB, OK1AC, OK1AF and OK1AH by The Ministry of Post and Telegraphs on May 15th 1930. Then followed RP65DPR (European Russia) 1911 QSL via RN3DG, OY2J (Faroe Islands) EU-018 at 2023 and W1EBM (USA) in Brookline, Hew Hampshire at 2058UTC.

The 14MHz Band

As usual the 14MHz band was the most productive for our reporters and amongst these was David 2E0DAB who added 9H1NE (Malta) EU-023 at 2025 and K8CW (USA) in Mansfield, Ohio at 2325UTC to his s.s.b. log.

Also on the band in Athens, Greece was **Panos Dadis SV1GRN** who logged LX1EA (Luxembourg) 0857, DL2HSK (Germany) 1232, RA3FO (European Russia) 1503, F4AGQ (France) 1522, YO3YX (Romania) 1654 and EK5KE (Armenia) at 1804 using PSK31 and 10W. Then his 100W s.s.b. found 3A2ND (Monaco) 1621, CQ0ODX/P (Portugal) at 1628, a call used by the Oeste DX Gang Association operating with the only 'CQ0' prefix authorised by Portugal for use on the h.f. bands. This was followed by contacts with EH7FDS (Spain) 1633, TS8P (Tunisia) on Djerba island AF-083 at 1640 QSL via IK7JWX and 4Z5LA (Israel) 1800UTC using an Icom IC-756PRO in conjunction with a three-band trapped wire dipole for 14, 21 and 28MHz.

Using a Yaesu FT-450AT and 30W to a Cobra vertical antenna was **Tom Hutton G0HUT** in Farnborough, Hampshire. He used PSK31 to work SP80UXB (Poland) 1046, a call marking the 80th anniversary of establishment of PZK the Polish Radio Amateur Association (QSL via SP9UXB). Next came U1BB (European Russia) 1432, EG0URS (Spain) 1303 a call by the Union

Radio aficionados Sevilla (QSL via EA7URS), 1B1AB (Northern Cyprus) AS-004 at 1527 (QSL via N7RO). Then came Nand Kishore VU2NKS (India) at 1543UTC – an Amateur known personally to Tom when he operated in New Delhi as VU2CSO in 1990.

In Chelmsford, Essex **Martyn Medcalf M3VAM** uses a Yaesu FT-897 and Comet CHA-250BX for his s.s.b. operating and sent in a large log including S52WW (Slovenea) 1332, NG4F (USA) in Jacksonville, Florida at 1336. Then came OH1JO (Finland) 1432, and VE2MAB (Canada) 1437. This is a call for the Montreal Association for the Blind and was set up to provide access to all those in the Montreal area who are blind, visually impaired, deaf and otherwise physically disabled and give them the opportunity to experience Amateur Radio.

Finally, Martyn worked LZ1BJ (Bulgaria) 1714, EB8AH (Canary Islands) AF-004 at 1732, TA7KA (Turkey) 1855, YO5OHY (Romania) 1905, RN3ZC (European Russia) 1926 and 4O3O (Montenegro) 1942UTC.

Welcome to new reporter **Colin Goodwin 2E0BSW** in Malvern, Worcestershire! Colin found s.s.b. stations UA1AFZ (European Russia) 0915, IW0HLZ (Italy) 0920, ES4A (Estonia) 0929, YP9W (Romania) 0934 (QSL via YO9WF). Next came YT4W (Serbia) at 0940UTC (QSL via YU1DW) while UP2L (Kazakhstan) was heard but could not be worked shortly after. All contacts were made using an Icom IC-703, running 10W to a half-sized inverted-V G5RV.

There was more PSK31 activity for **Bill Ward 2E0BWX** in Edwinstowe, Nottinghamshire this month as he worked YO6EX (Romania) 0811, EA8TL (Canary Islands) 0817 and US8UA (Ukraine) at 10 18UTC. Bill was using an Icom IC-7400 at 25W to a Diamond CP-6 vertical

In Cambridge, New Zealand **Peter Leng ZL4TE** has also been using PSK with his Yaesu FT-1000MP Mk V and interface from G3LIV and Cushcraft AV-3 vertical antenna. His log included I0CHA (Italy) 0624, RK9UAQ (Asiatic Russia) 1044, DL3APM (Germany) 1038 and SM7NBO (Sweden) 1134UTC using 100W.

The 14MHz Special Event station log of GB1ST, Saltram Telegraph in Plympton, Devon – run by John Wakefield M0XIG – included all areas of the United States, Europe and V51GB (Namibia) 0755, HZ1GW (Saudi Arabia) 0848, 4Z5PQ (Israel) 0903, KP4BJD (Puerto Rico) 1018, VP8LP (Falkland Islands). Then came SA-002 at 1837 and 5X1DF (Uganda) 1956UTC. John was running a Yaesu FT-1000MP MkV and up to 300W to an inverted Comet H-422 antenna.

The 18, 21 & 24MHz Bands

On to 18MHz now where **Robin Trebilcock GW3ZCF** in Bishopston, Swansea used an IC-756PRO and 40W of PSK31 to a 40m horizontal loop logging CO8LY (Cuba) NA015 at 1846, A61EK (United Arab Emirates) 1855, WA3ERQ (USA) in Philadelphia, Pennsylvania at 1859, PY3WC (Brazil) 1912 and SV8PKH (Greece) at 1956 while George G3ICO had c.w. contacts with 9Q/DK3MO (Democratic Rep of the Congo) 1441, KH7XS (Hawaii) OC-019 at 1813, ZS6BQI (South Africa) 1822, 9M2MT (West Malaysia) 1830, K4LTA (USA) in Oak Ridge, Tennessee at 1842, PY2WC (Brazil) 1936, T77C (San Marino) 1941, CO6RD (Cuba) 1956UTC.

Using a home-brew rig – based on G2DXK design from 1985 *RadCom* – for the WARC bands is **Steve Hartley G0FUW** in Bath who wrote, "Whilst I have retained the overall system design, I have made many major changes to most of the circuit boards with the final board is taken from an old Cirkit QRP PA kit bought for me by my father at a Rochdale convention in about 1993. This delivers around 3W output on the 10, 18 and 24MHz bands. So far on 18MHz s.s.b. I've worked LZ65P (Bulgaria), IK2AGN (Italy), SV2MAP (Greece), WD8CCC in Ripley, Wyoming and OH3JJ (Finland) and my intention is to get a QRP DXCC using the rig. The antenna used is a 'genuine' CobWeb from Steve Webb, purchased after reading the review in (where else?) *PW*!"

A change to 21MHz found more PSK activity for Robin GW3ZCF as PU3LYB (Brazil) 1932, 1B1AB (Northern Cyprus) 1646, SV9BMG (Crete) EU-015 at 1844 and 4Z4TL (Israel) 1903UTC all made his log.

On 24MHz Eric Masters managed one voice contact with OZ5EV (Denmark) at 1547 using a Kenwood TS-570 at 100W and W3EDP antenna tuned with a SGC-230 auto tuner.

The 28MHz Band

There were a few openings reported on 28MHz but these were very brief. From his QTH in Athens, Panos SV1GRN worked EA9IB (Ceuta & Melilla) at 1638 using s.s.b., while **Jeremy Smith M0XVF** in County Durham made his first African contact on the band by working CN3A (Morocco) at 1840 (QSL via I2WIJ) using a Yaesu FT-957 and 20W to a half size G5RV.

For his 10m operations Eric G0KRT listed voice contacts with IS0R (Italy) Isola Rossa Sardinia Island EU-024 at 1004 (QSL via F5CWU). Then came DJ9FC (Germany) 1537 and TK4LS (Corsica) EU-014 at 1623 and Robin GW3ZCF managed PY2WC using PSK31 again at 1841UTC.

Signing Off

Well that's about it for another month and even though most reporters complained again of the 'poor' h.f. conditions with sporadic openings and high noise levels. Despite this there was still plenty to work and even some activity on the higher bands – which is always nice to see!

As usual 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 recalls meeting an old customer and remembers investigating a problem on an FT-757.

Welcome to this month's *In The Shop* (*ITS*) where I look back to my time in the Amateur Radio trade. However, first, I suggest we 'Don't Panic' – unlike Corporal Jones in 'Dad's Army' who would always shout as he started to panic!

It was good to meet one of my ex-customers, who I hadn't seen since I closed the shop over ten years ago – but **'Jim'** had a problem. He'd seen a modification on the Internet for his FT-757 which appeared 'like it might be quite useful'! The 'mod' seemed very simple and so he snipped a lead as recommended – but oh dear his rig then no longer functioned on receive or transmit!

Jim then re-soldered the connection he'd snipped – but there was still no joy. So, he ended up on my doorstep feeling rather down. With a plaintive look on his face he asked, "What have I done Harry, will it be expensive?

A couple of days later (when I found the time – retirement can take all the hours of the day! – I put the rig on, but surprise surprise, it worked perfectly! I tried it again a few times over the next few days, but couldn't find anything wrong at all.

I then looked at the modification details – which seemed quite logical – so I disconnected the lead again and the modification did exactly what the designer had said. Somewhat puzzled I 'phoned Jim, who was delighted that a large bill was not awaiting him, collected the rig, and all was well.

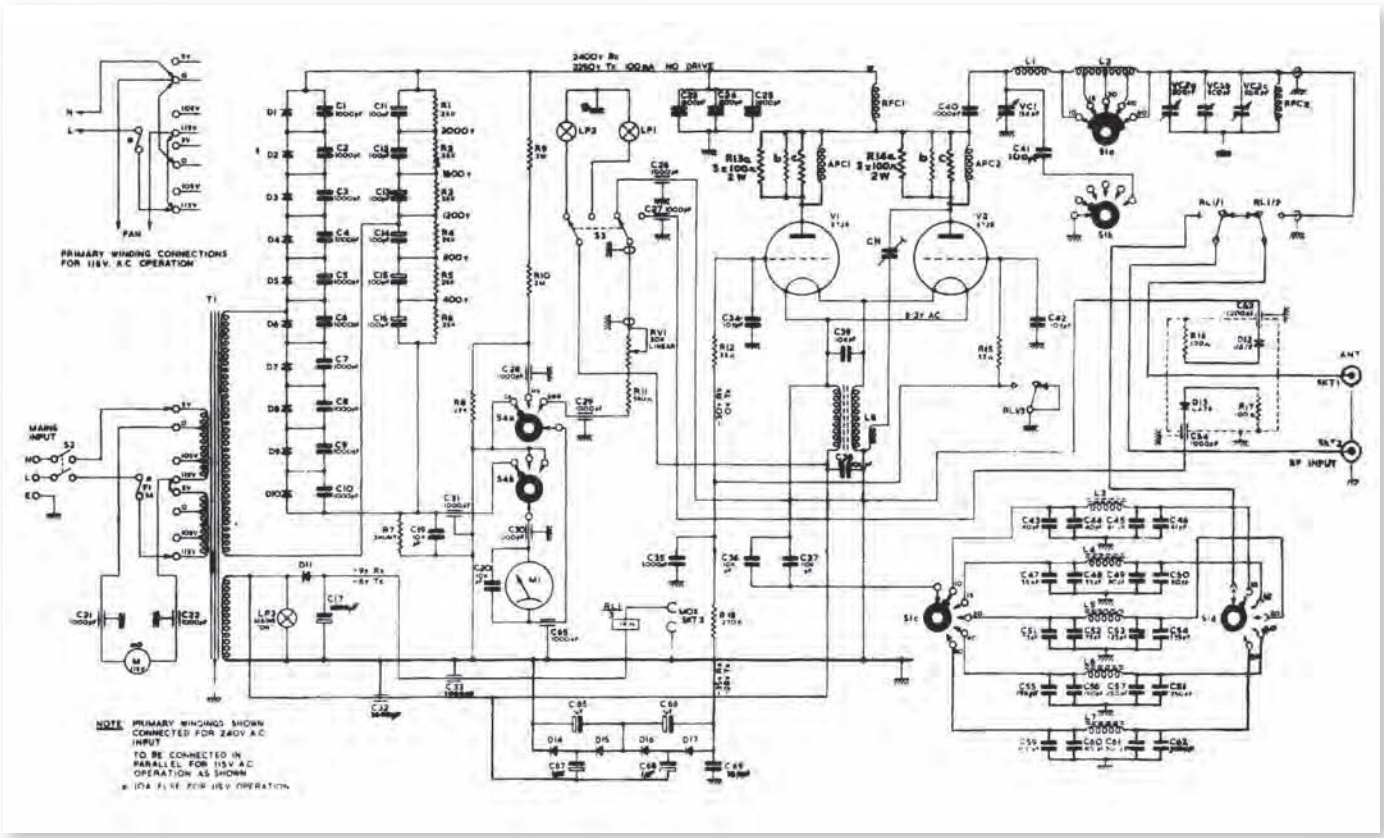
The Problem?

So, what was the problem? In answering, I should mention that I've had this kind of trouble many times. This is because inexperienced Amateurs tend to be rather taken aback when they remove the lid of a complex piece of equipment and they then presume that anything that then stops functioning must be due to some damage that they've done.

Common troubles are switches that have been inadvertently depressed or turned and left in the wrong position. Then there are leads that have been plugged in the wrong socket, or as it turned out in Jim's case, a dickey patch lead!

So, if your rig starts to play up when you have done some work on it – such as fitting a c.w. filter, or carrying out a small mod' – do check the obvious before jumping to wrong, and possibly expensive, conclusions!

The mod' that Jim had found on the Internet is credited to **Uwe Sievers DJ9XG** and enables the power to be turned down in the s.s.b. mode for QRP operation. You can, of course, reduce the power of the FT-757, as with any other rig in the s.s.b. mode, by simply turning the microphone gain down. But this can create problems, although if the hum and noise on your transmission is a typical 40dB below the peak level – this is quite acceptable and your transmission will sound clean.



KW 1000 circuit diagram.

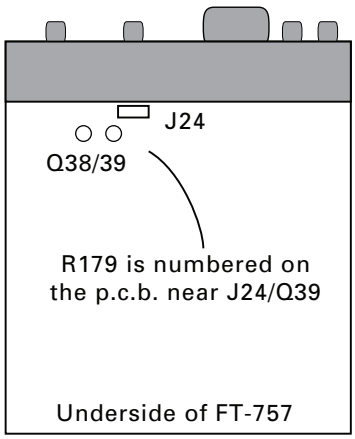


Fig. 1: Positions of the two transistors Q38 and Q39 and, adjacent to J24 is R179 all to be found on the underside of an FT-757.

If however, you back off your microphone gain by 20dB, the noise and hum are likely to remain at the same level as they were previously – and will then be only 20dB below peak. So, to retain the quality of transmission, power should either be reduced via the automatic level control (ALC) system, or, as in DJ9XG's mod, by reducing the rig's transmit gain.

As originally wired, the FT-757 drive control is deliberately made ineffective in the s.s.b. mode, by applying a positive voltage to Q38 via R179. The DJ9XG mod' consists of disconnecting this resistor. Once this has been done, the drive control then adjusts the transmit i.f. gain in all modes and not just on c.w. and tune. The adjustment is a little coarse, and most of the action occurs over the last third of rotation – but otherwise it works well.

To carry out the mod' you should first remove the bottom cover from the FT-757. Then, with the rig inverted (and looking from its rear) go to the front corner on **your** left, near to the **TX In** socket and plug, there you will find two plastic transistors Q38 and Q39. Next to these, adjacent to J24 is R179, simply cut the longer of its two leads, being careful not to damage the resistor so that you can reconnect it (if you ever want to), see **Fig. 1**.

Charging Batteries

I'm frequently (even years after 'retirement') asked if I have a charger for some particular piece of equipment, left over from the shop stock. Usually the answer is 'No' – but in most cases the correct item isn't needed, as charging a re-chargeable battery cell is easy.

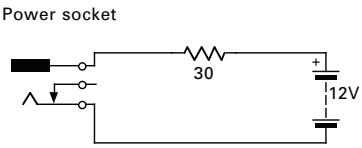


Fig. 2: A simple charging circuit that's suitable for most re-chargeable cells.

The re-chargeable cells used in most hand-held and other portable Amateur Radio equipment have a nominal voltage of 1.2V per cell. A battery is made up of a series of single sells wired in series with each other and this can consist of a battery pack. Alternatively, as in the case of the FT-290 (for example) several separate cells fitted into a battery holder. **Note:** It's important in the later case that all the cells are of the same capacity, otherwise if one runs out before the others, this cell will tend to be charged in reverse by the remaining charged cells, will be damaged and soon fail.

Depending on the type of cell used there are different designs of 'quick chargers' available. These are supposed to enable the cells to be fully charged in a few hours without doing them any harm – but often their use does appreciably shorten battery life.

The easiest way to make your batteries last, is to charge them at around a tenth of their capacity for about 15 hours. Charging at this rate has the advantage that it doesn't seem to do too much harm if one occasionally forgets and leaves them on charge a little too long.

Making up a circuit to do the charging is simplicity itself, as **Fig. 2** shows. First check the voltage rating of the battery pack, or calculate this yourself by multiplying the number of single cells by 1.2. As an example, the FT-290 uses eight 1.2V cells, hence the total battery voltage is 9.6V. Next find a supply voltage that is at least 2 or 3V higher than the battery, so as to give a reasonably constant charging current over the 15 hour period.

Subtract the voltage of the battery from the voltage of the supply and use this to calculate the value of the required resistor. If for example, a rig's battery pack is rated at 12V and has a capacity of 1000mAh hour (i.e. 1 amp hour), a 15V supply would be okay, and the **voltage difference would be 3V**.

So, we'll need to charge at a rate of 100mA (0.1A) for 15 hours and so – from Ohm's law R=E/I = 3/0.1= 30Ω. Providing that there's a little charge in the battery, the voltage will not fall much below 1.2V per cell. This means that a resistor of 25 to 35Ω, would ensure that it was charged at about the correct rate over most of the charge cycle.

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Replacing 572B Linear Valves

The shop door was pushed wide open and a few seconds later **'Tom'** staggered in with a KW 1000 linear amplifier that he he'd recently obtained. He told me that he had fitted a new pair of 572B output valves and now the unit blew fuses.

Tom had obtained a circuit diagram – but it was hardly necessary to consult this as it soon became obvious that the mains transformer was faulty. And, as KW had long been out of business, I thought that this would be the end of the story.

However, I hadn't allowed for Tom's resourcefulness! Within a few weeks he'd tracked down the address of one of KW's retired directors, had found out where they had had their mains transformers manufactured and turned up with a brand new replacement! Fitting this was straightforward and while I couldn't find any shorts, or any other fault that may have damaged the transformer, caution was very much the watchword with a unit running over 2000V.

I initially applied 24V to the mains input and checked that all the voltages seemed sensible at around 10% of their expected value when using 240V. Then I gradually increased the mains voltage, until the amplifier was operating normally in the receive mode.

I then connected it to a large dummy load and a transmitter and gave it a try. The output was in the region of 600W as expected – but I soon noticed that the anodes of the output tube were running red, even when no drive was applied. The whole amplifier was getting far too hot – it was pretty clear as to why the original

transformer had bitten the dust, it had been overloaded.

Unfortunately, I had no details regarding the correct standing current for the pair of 572Bs in the KW 1000 linear while running s.s.b. However, Yaesu suggests that in the FL-2100Z, they are set at 90mA, and as Tom's were running at over twice this, something was wrong. The original 'bias' circuit is shown in the lower part of **Fig. 3**, and a glance at this showed that when switched to transmit, there was **no negative bias on the valves at all**. That was strange, so I made a few enquiries, and was given the following information.

The original 572B was classified as a 'zero bias triode' and so didn't need any negative bias on its control grid, so I could only presume that the KW1000 linear was designed to be used with these. As time went on different manufacturers produced their own version of the 572B, and altered the bias requirements. Around the time Yaesu were making their FL-2100Z linear, about -2V was needed on the control grid of the 572Bs.

Some later versions of the valve, such as those made in Russia, however need -4V to keep the standing current for a pair down to 90mA and Tom had purchased a pair of these. The only provision in the KW1000 amplifier for bias consists of a high impedance voltage multiplier, fed from the 6.3V heater winding, which supplies about -35V when the linear is in the receive mode. This voltage is used to turn the valves completely off – to stop noise being generated and to allow things to cool down between transmissions.

It became obvious that the new power amplifier (p.a.) valves were totally incompatible with the bias circuit in the KW 1000 and that the only economical solution was to modify this. Whilst the very high impedance circuit was satisfactory, on receive when the 572B valves were inactive, a much lower source impedance was called for if it was to be used on transmit. After a bit of trial and error I altered the circuit as shown in the upper part of Fig. 3.

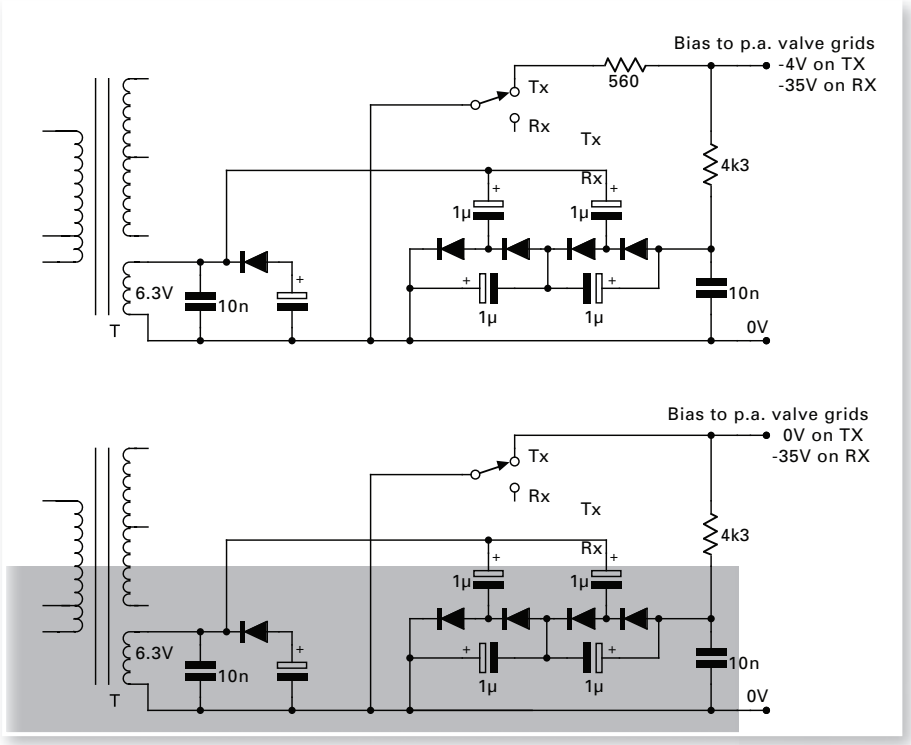

Fig. 3a: The original bias circuitry for the KW1000 amplifier is shown in the lower part of the diagram. The upper part is the circuit after Harry had modified to to operate with other versions of the output valves.

As you'll see from the diagram, the capacitors are increased in value and the bias supply feed resistor value has been very much reduced. The voltage remained the same in the receive mode, but instead of being shorted out by the relay, a 560Ω resistor is incorporated to set the bias at about 4V on transmit. This had the desired result, the s.s.b. standing current came down to about 85mA and the valves no longer glowed with that worrying cherry red!

Even though the modification details I've mentioned only apply to the KW 1000 linear – the principles apply to other units using the 572B. Incidentally, I've never had the opportunity to try Russian valves in Yaesu linears – to be honest I no longer want to repair large linears, as the last time I tried to lift one, I ended up with a very non linear back! – but the necessary alterations should be quite simple.

The Yaesu FL-2100, FL-2000, and FL-2100ZD, all have a 10W 30Ω adjustable resistor, which is used to adjust the bias and set the p.a. current to about 90mA. Note: If by adjusting this resistor it's not possible to get the current down to 90mA, then try connecting a 15 or 20Ω 5W wire wound resistor in series and this should bring the adjustment within range.

Please don't forget that the 2000V high tension (h.t.) supplies in large valve linear amplifiers are absolutely lethal. So, make sure that you pull the mains plug out, you wait a few (I suppose you would dance if you touched it!) minutes before removing any covers, and that you then short the top caps of the p.a. valves to chassis (just to be really sure) before touching anything else!

I once had a Yaesu FL-2100 linear brought to me for inspection, that the owner had just purchased from a well known (but long since extinct) emporium. They had replaced the 572B valves and had 'fully tested it', but it would only give about 300W out. I eventually spotted that when he'd replacing the valves the engineer had somehow managed to insert one into its socket rotated 180° from its correct position. Correcting this increased the power to 600W.

Yes getting them in the wrong way is difficult! But if you really try and push hard they will go, so watch out, even the professionals make mistakes! See you next month. ●

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 while it is plugged into the mains. Switching off at the wall socket does not necessarily make equipment safe!

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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

Repairs

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

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.
www.proantennas.co.uk

QSL cards

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.
E-mail: qslers@aol.com
P.O. Box 184 Northampton NN3 9JH.

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.

Valves

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

Please ensure that and cheques or postal orders are made out to PW Publishing Ltd.

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PLEASE WRITE IN BLOCK CAPITALS

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: .....

Address:.....

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Telephone No.:.....

Box Number @ 70p: Tick if appropriate

Category heading:.....

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

4-BTV HUSTLER 40-10m Vertical 1kW. Spec as per ads in *PW*/*Radcom*. Erected and used for 3 months, but is still good as new, £125 o.n.o. P&P (DHL) £11 or collect. Tel: G1VZT 07910439848 or 01473 687224 evenings (Ipswich).

ICOM IC-7000 x 2. One mint, boxed, £600, one in very good condition, boxed, £550. May swap HF/Rx 1772, 1792, 1650/9, WHY.
Tel: 01279 815020 (Essex).

SHACK SALE all must go. Radios, oscilloscope, frequency counter, power supplies, SWR meters, speakers, mics, EQ plus equipment antenna. Hustler 3.5-30 + mobile antennas. More things to go. Telephone for details, all at good price or o.n.o. Tel: Steve 01484 545831 (W. Yorks).

TELEQUIPMENT D-61A scope, £30. Marconi TF-2700 universal bridge, £25. Both with handbooks and in working order. Tel: B Tibbert GW3RKZ 01248 722041 (Anglesey).

THREE VALVE TESTERS Offers.
Tel: 0113 240 3496 (Leeds).

VERSA TUNER II £50 plus postage. Antenna Multi-Ranger 9, £10 plus postage. Antenna AM Pro 160, 7ft, £10 plus postage. Antenna 2m 1/2 wave, £10 plus postage.
Tel: Tom M3EHA 01606 597342 (Cheshire).

YAESU FT-200 PSU dummy load SWR GDO ATU plus spares. Complete station, ideal first station or collector. Change of hobby and downsizing, £200 o.n.o. Tel: Vernon 07785 266704 (Oxon). E-mail: vbc@fireflyuk.net

YAESU FT-817ND HF/VHF/UHF all-mode transceiver. Transfer/mic antenna, battery charger, manual, battery case and cable. PS-122 2.2A 13.8V PSU. Prefer buyer collects, £375.
Tel: Joe 0121 742 2920 (West Midlands).

WANTED

ANYONE HEARING CONTINUOUS weak wide-band HF pulse signals slow 5 per second around 8MHz and 21MHz. Technology unknown, not OTH radar. Good antenna with low noise location essential. Tel: Des Walsh, EI5CD QTHR 00353 87 9360052 (Co. Cork).

KW EZE MATCH or KW107. Tel: B Tibbert GW3RKZ 01248 722041 (Anglesey).

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).

PART KENWOOD TS-440 R-820 for project.
Tel: 01279 815020 (Essex).

WITH RE-NEWED INTEREST now I am retired, I am looking for cheap wireless sets numbers 12 or 19, or 33 or accessories or power supply, and other wartime sets. I am looking pairs of Weyrad coils circa 1955 types CT2W2 and CS3W3 any reasonable price paid. I am trying to reconstruct a set I made as a schoolboy, so only these coils will do. Tel: Anthony, 01908 373114 evenings best. E-mail howard.anthony@tesco.net

WWII US COMMAND SERIES equipment, receivers BC-454, etc. transmitters, control boxes, leads and mounting racks. Also, BC-455 receiver, top cover (black). Xtal 1000Kcs CJL-40023B metal octal base for LM-14 frequency meter.
Tel: Dave 07866 706206 (Co. Durham). E-mail: dave.stables@sky.com

Please make any cheques for Bargain Basement advertisments 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 .....

.....

..... Post code.....

Telephone Number .....

PLEASE WRITE IN BLOCK CAPITALS

CARD NUMBER

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) .....

		(30)	

CONTACT DETAILS FOR ADVERT. Please only write in the contact details you wish to be published with your advert, ie. do you want your name & address, or just your telephone number? Your advert, you decide! **PLEASE - No FAXed Ads!** (12)

B.B. Aug '10

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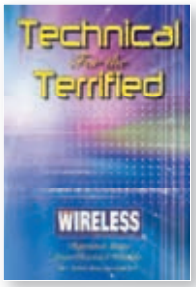
RADIO BOOKSTORE

mail order...huge range in sto.....fast delivery



TECHNICAL FOR THE TERRIFIED

NEW!

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

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.

£11.50

NEW IN STOCK NOW

NEW!! CALLSIGN 2010

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

£11.50

NEW CIVIL AIRCRAFT MARKINGS 2010
£10.99

NEW MILITARY AIRCRAFT MARKINGS 2010
£10.99

SCANNERS 6

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.

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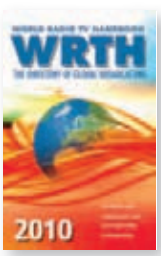

WORLD RADIO TV HANDBOOK 2010 EDITION

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)	163	£12.95
● NEW **THE RADARBOX COMPANION** (Seldec)	163	£12.95
● NEW **CIVIL AIRCRAFT MARKINGS 2010** Alan S Wright. (abc)	432	£10.99
● NEW **MILITARY AIRCRAFT MARKINGS 2010** Howard Curtis. (abc)	224	£10.99
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You can see full descriptions of all these books & order securely on-line at www.mysubcare.com see the magazine's related products section. Also, see www.pwpublishing.ltd.uk/bookstore/books.html for full descriptions of all these books.

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The 14th Edition of this popular "POCKET FREQUENCY GUIDE" is now available, the contents represent the most comprehensive and up to date frequency listing currently available.
128 pages A6 (10.5 x 15 cm) Spiral Bound with Colour Cover.

£5.75

NEW EDITION! The Pocket UK & Ireland VHF Marine Frequency

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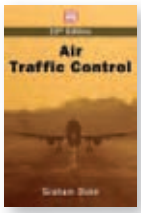
£5.75

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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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. Air traffic has continued to increase rapidly resulting in more complex air traffic control systems which have to meet demand, as well as fulfilling safety and environment regulations. Covering current issues facing the air traffic control industry, the author looks at the establishment of the new London Control Centre at Swanwick in the beginning of 2008, and the problematic congestion plaguing the UK skies, particularly in the busy Southeast.
Graham Duke is an authority in the study of Air Traffic Control and in this latest volume he provides coverage of recent developments within the industry, and a glimpse into military air traffic control systems. This is the essential handbook for anyone interested in civil aviation and the operation of modern air traffic control practice.

THE UK & IRELAND AIRBAND FREQUENCY GUIDE 13th Edition

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.
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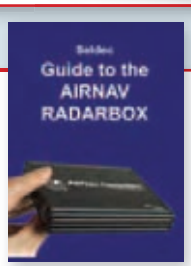

GUIDE TO THE AIRNAV RADAR BOX

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A5 with wire 'lay flat' binding.

£12.95

NEW!

THE RADARBOX COMPANION

The RadarBox Companion includes thousands of 4 letter identifiers (e.g. EGLL London Heathrow) decodes, three letter airline codes (e.g. RYR RyanAir).
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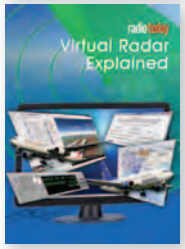
£12.95



VIRTUAL RADAR EXPLAINED

This book shows you how to get the most from all the mainstream Virtual Radar hardware and software offerings including: AirNav RadarBox, Kinetic SBS-1, PlaneGadget and PlanePlotter. Virtual Radar Explained will be of great interest to all aviation enthusiasts, especially those using Virtual Radar.

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NEW IN STOCK NOW

INTERNATIONAL QRP COLLECTION

A Compendium of QRP articles from around the world.

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QRP (or low power) operating is practiced by many radio amateurs across the globe. Much is published by these QRP enthusiasts detailing great designs, best practice and much more. The authors of the International QRP Collection have scoured the world for the best of these and compiled them for you, into this great scrapbook.

£11.00

HF AIRBAND FREQUENCY GUIDE

The book is intended to enhance the enjoyment in listening to civil, military and government aircraft on short wave throughout the world. In addition to an extensive frequency list, covering from 2MHz to 30MHz, plus ACARS frequencies, the book includes sections on Antennas, Receivers, including DX Tuners (www.dxtuners.com) with information and guidance on decoding ACARS, HFDL, SELCALS, FAX, RTTY and CW. Listings of Major World Air Route Areas (MWARA), Regional and Domestic Air Route Areas (RDARA), and Long Distance Operational Control frequencies (LDOC) are included. A section is devoted to suppliers of Radio equipment, with their addresses and telephone numbers.

225 pages, wire spiral "lay-flat" bound with colour cover.

£14.75

HF MARINE BAND FREQUENCY LIST

The new HF Marine Band Frequency List is our latest publication for listeners with a general interest or a particular interest in Marine Radio. Listed are frequencies of Civil, Military & Government shipping on the HF bands throughout the world. In addition to an extensive frequency list covering from 1.5 - 30MHz (with MF shipping, yes the 500kHz band is still in use!) the book includes sections on antennas, receivers, including DX tuners, with chapters on decoding RTTY, SITOR, CW, FAX and other modes.

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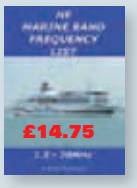

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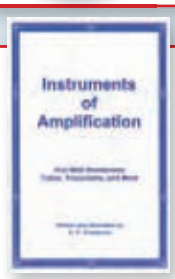

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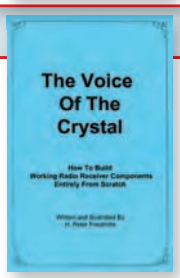

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Rob Mannion's

topical talk

The Editor discusses feedback from a reader in this month's Letters pages regarding the imposition of DAB radio on Band II.

Tony Simpson's letter (*Letters* this month) was extremely interesting and I also enjoyed talking to him on the telephone. Since *PW* launched the 'Save Analogue Radio' (SAR) campaign we've received a great deal of feedback. However, the biggest response – from the general public – came after I was invited by the BBC to appear on their *PM* programme. Here, I entered into a three way debate with the presenter **Eddie Mair** and a marketing man from the Digital UK.

Although I felt uneasy to be 'put up against' a professional marketing man, by listening to the programme again via the BBC's 'Listen again service', I think I held out well! Unfortunately, however, with Digital UK's large advertising budget and with the present coalition government's apparent intention to carry on with the 'digital bill' that was signed and sealed – literally on the last day of their existence by the previous government – I think the practical problems continue to be ignored.

Shortly after the SAR received the brief burst of publicity, the BBC started broadcasting an advertisement – usually just before the 6pm news on Radio 4 – promoting the advantages of digital radio. The 'voiceover' artist was an actor who I have always respected greatly – **Stephen Fry**. Indeed, my actress daughter **Alexanadra** worked with him on the ITV **Kingdom** series.

Stephen Fry is a remarkable man who has risen above adversity and has overcome serious mental illness in a most successful way. For those of us who have suffered depression on top of physical health difficulties – his extremely successful career is an excellent example of what can be achieved against otherwise 'hidden' problems.

So, bearing in mind my admiration for Stephen Fry, I'm sure readers who also have their doubts about the suitability of DAB radio on Band II, will be as disappointed as I was to hear the advert. However, several friends sent me a details of a website where we can hear what is most likely to be Stephen Fry's **real opinion** of DAB radio! Visit **www.bbc.co.uk/comedy/extra/video/p004dk37** and yes, **it is a BBC website!**

In his letter Tony Simpson also mentioned that he's concerned about the huge number of (perfectly usable previously) radio receivers and what will become of them? He also mentioned 'alternative' programmes and resurrecting 'unofficial' broadcasters!

Chatting to Tony on the telephone I mentioned that there's provision for very low powered analogue stations to remain on Band II. The government envisages that these stations will carry programmes for 'local use'. So why not use them for providing a reliable service for listeners who don't have reliable reception of digital radio services?

As I understand it, the very low power f.m. broadcasters will be self financed. I don't think it will be difficult for keen types to set up their own stations – similar operation to the 'self-help' television relay stations that brought u.h.f. TV to remote parts of the UK.

There would be no need for listeners to invest in DAB radio. Instead, their local 'self-help' repeater could be at a location where reception of DAB radio could be carefully set up to reduce (and with luck eliminate them) the 'burbles' that so annoy the BBC's own Radio 4 *Today* presenters!

The audio feed from the incoming digital services could then modulate the new low power analogue f.m. services. The listeners in the local transmitter's area can still enjoy reliable v.h.f. radio, utilise their existing receivers and save electricity (much 'greener').

Of course, the new local area f.m. transmitters will require power – but relatively low power. Nowadays, we're encouraged to think 'green' and reduce our electricity consumption and the local stations will certainly help because by using traditional analogue receivers, the power consumption will be drastically reduced.

However, the many car radio users will have to be looked after another way. Here I envisage a large number of low power Band II f.m. transmitters set up along motorways and main road. Perhaps supported by motoring organisations and service area operators?

All this may be a little 'tongue in cheek' perhaps – but I hope it demonstrates we can overcome impractical decisions by governments!

Rob Mannion G3XFD/EI5IW

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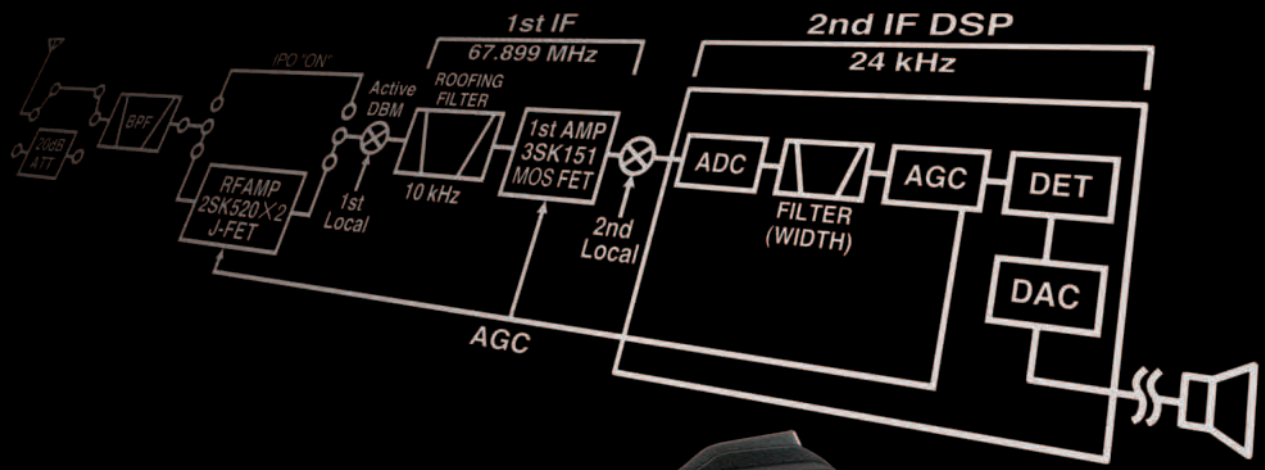

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