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the new IC-756PROII

May 2002 £2.75

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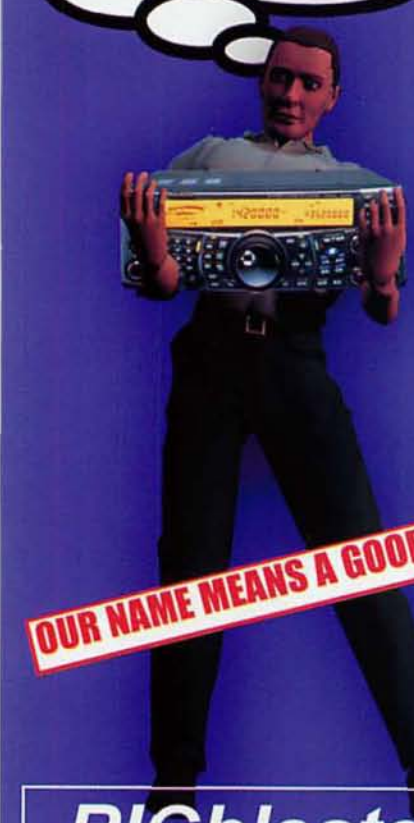

OUR NAME MEANS A GOOD DEAL

RIGblaster
a marriage of radio and computer

OVER 10,000 ON THE AIR

PSK31, MFSK, MT63, SSTV, RTTY,AMTOR, CW, PACKET-APRS, HELLSCHREIBER, REMOTE BASE, METEOR SCATTER, CLUB QST'S REPEATER CONTROLLER, VOICE KEYER.

TRY THAT WITH A TNC!

All programmes and every lead included. Just change jumper lead to suit rig's mic socket pin-out

RIGblaster Plus	Auto mic switch 8-pin round (software and cables)	£139.95 B
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YAESU

FT-1000MP Mk-V 200W HF ALL MODE
3 YEARS FREE WARRANTY

FREE HEIL GOLD LINE MICROPHONE

When you buy the amazing FT-1000 MK V from us, we will offer you FREE the equally amazing Heil Gold Line microphone with dual inserts and matching lead (base stand optional extra).

£2899 Plus £9.00 Carr.

FT-847 160m - 70cm ALL MODE
3 YEARS FREE WARRANTY

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

£1149 Plus £9.00 Carr.

FT-100 D 160m - 70cm ALL MODE
SAVE

Yaesu's latest version is now available and includes 500Hz CW filter, high stab. oscillator and CTCSS decoder.

£899 Plus £9.00 Carr.

FT- 920AF HF 160m-6m-100W

100 Watts from 1.8 to 54MHZ with dual VFO controls. Supplied with FREE FM unit.

£1099 Plus £9.00 Carr.

W-25SM 25AMP SWITCH-MODE POWER SUPPLY

Switched 230 / 115V AC input and fixed 13.8V output at 22 Amps continuous and 25 Amps peak. Over voltage and over current protected and fan cooled. Measures 180mm (W). 75mm (H) and 190mm (D)

£69.95 Plus £6.00 Carr.

KENWOOD

TS-2000 160m - 70cms+23cms OPTION
3 YEARS FREE WARRANTY

+FREE HEIL HM-10 MIC

The amazing TS-2000 offers coverage from HF to UHF. And you can go right up to 23cms with the optional module. Monitor the DX cluster whilst working other DX, optimise your satellite contacts, enjoy the benefit of built-in ATU. It's all there in one very compact box. Colour brochures available on request.

£1695 Plus £9.00 Carr.

TS-570DG 160m - 10m All Mode
3 YEARS FREE WARRANTY

TS-570 Accessories

• VS-3	Voice synth	£45	A
• DRU-3A	Recording	£99	B
• HS-5	H'phones	£52	B
• MC-90	Desk mic	£187	B
• MC-80	Desk mic	£72	B
• PS-33	Power supply	£199	C
• SP-23	Speaker	£68	B
• CW	Filters each	£61	B
• SSB	1.8kHz	£61.95	B

INTEREST FREE	
DEPOSIT	£85
6x MONTHLY	£29.97
OPTION	£580.18

£849 Plus £9.00 Carr.

TS-870 160m - 10m 100W Advanced DSP

It has IF-stage digital signal processing on transmit and receive. This raises the performance to a level that is impossible for analogue circuitry to achieve. Also features automatic ATU, interactive menu system, built-in electronic keyer and 100 memories.

INTEREST FREE	
DEPOSIT	£135
6x MONTHLY	£47.63
OPTION	£928.22

£1349 Plus £9.00 Carr.

SGC SG-2020 £599 Plus £7.50 Carr.

Ideal for QRP, but with VOGAD and RF speech processing it can sound like 100 Watts! Very low current (4A max) makes it ideal for portable work. Variable selectivity down to 100Hz means no extra filters to purchase.

NEW SG-2020 ADSP now available £799 carriage £9.00

SG-237 mini auto coupler ideal for SG-2020 £369

ICOM

IC-756 PRO II £2495 Plus £9.00 Carr.

This is Icom's new Flagship.

IC-7400 160m - 2m ALL-MODE

£1499 Plus £9.00 Carr.

IC-756PRO 1.8 - 52MHz 100W
3 YEARS FREE WARRANTY

INTEREST FREE	
DEPOSIT	£190
6x MONTHLY	£66.89
OPTION	£1303.66

£1895 Plus £9.00 Carr.

IC-706IIG 160m - 70cm ALL MODE
3 YEARS FREE WARRANTY

The IC-706MkIIG is the latest enhanced version of this popular HF/VHF/UHF mobile rig. It has more features but in the same physical size.

IC-706IIG ACCESSORIES

• AT-180	Auto ATU	£379	B
• FL-100	500Hz CW	£59	B
• FL-232	350Hz CW	£59	B
• FL-103	SSB 2.8KHz	£59	B
• FL-223	SSB 1.8kHz	£59	B
• DC Lead	(spare)	£16	A
• 3.5m	sep. cable	£33	A
• 5m	sep. cable	£49	A

£849 Plus £9.00 Carr.

IC-718 100W HF £549 Plus £5.00 Carr.
SAVE £150

LIMITED SPECIAL OFFER!

If you are looking for a radio with pedigree, but without a high price tag, then this may the one for you. Covers all HF bands including wide-band receive. Plus auto notch, dual vfo, swr meter etc. Plus options including DSP & filters.

YAESU

Built-in ATU and requires approx 80W drive.

QUADRA 1KW HF AMPLIFIER!

Main VL-1000 amplifier module (413W x 151H x 451D mm) has 2 RF inputs and 4 switched antenna outputs. Large display offers VSWR, peak power, voltage, current and functional information. With most Yaesu transceivers you enjoy automatic band-switching. The separate VP-1000 230V AC power supply with long interconnecting leads coasts along and measures 413W x 151H x 381D.

EXCLUSIVE 3-YEAR WARRANTY!!

£3899 C

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QUIRIES: 01592 756962 FAX: 01592 610451-CLOSED MONDAYS

e catalogue: www.wsplc.com ★ Freephone orders: 08000 73 73 88

CARRIAGE CHARGE CODES: A=£2.75, B=£6, C=£9, D: £12

SECOND HAND LIST
.....SEE TRADERS TABLE

RT-11 REMOTE AUTOTUNER

NEW

NEW FROM LDG

ASK FOR DETAILS.
ALSO AVAILABLE IN KIT FORM.

£239 Plus £6.00 Carr.

GZV-4000 40A 5-15V Switch Mode

- Output voltage 5 - 15V DC
- Output current 40A continuous
- Built-in cooling fan
- Supply 230V AC 50Hz
- Size 210 x 110 x 300mm
- Weight 3.5kg

£159 Plus £9.00 Carr.

W-CRI PADDLE KEY

£44.95 Plus £6.00 Carr.

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

W-GMP Morse Key

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

£29 Plus £2.75 Carr.

KENT TWIN-PADDLE

- Metal parts brass
- Heavy metal base
- Two ball races
- Size 100 x 100 x 40mm
- Weight 1.1kg

£76.50 Plus £6.00 Carr.

Kent Morse Practice Oscillator

- Size 160 x 55 x 97mm
- Weight 260g

£19.50 Plus £2.00 Carr.

ICOM

IC-207H • 2m + 70cm FM £279 Plus £9.00 Carr.

A great budget class radio for VHF & UHF use.

IC-2800H • 2m + 70cm FM £419 Plus £9.00 Carr.

Large colour display with video input, and airband rx. 50W/35W and remote head unit.

IC-910 • 2m + 70cm ALL MODE £1299 Plus £9.00 Carr.

Icom's new dual band all-mode base station radio with 23cms option.

IC-2100H • 2m FM MOBILE £229 Plus £9.00 Carr.

Rugged design with switched receive filters 12.5/25kHz

YAESU

FT-7100 • 2m/70cm MOBILE £399 Plus £9.00 Carr.

NEW

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

FT-1500M • 2m FM MOBILE £159 Plus £9.00 Carr.

SPECIAL OFFER 'SAVE £70'

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

KENWOOD

TM-D700E • 2m + 70cm FM £449 Plus £9.00 Carr.

Large detached screen and APRS, make this a firm favourite. 50W on 2m and 35W on 70cms. Features 200 memos, CTCSS, Band Scope, built-in TNC, DX cluster monitor, alphanumeric etc.

TM-G707E • 2m + 70cm FM £289 Plus £9.00 Carr.

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

TM-V7E • 2m + 70cm FM £359 Plus £9.00 Carr.

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

KENWOOD

TH-D7E • 2m + 70cm £299 Plus £9.00 Carr.

DATA COMMUNICATOR

- 144-146MHz
- 430-440MHz

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

TH-F7E • 2m + 70cm £249 Plus £9.00 Carr.

NEW

WITH EXTRA WIDE RX COVERAGE

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

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

TH-G71E £199 Plus £6.00 Carr.

- 144 - 146MHz FM
- 430 - 440MHz FM
- 3 power levels
- 6W (13.8V) 5.5W (UHF) HI
- 0.5W LO • 50mW EL
- 200 multi-function memories
- Freq. deviation: ±5kHz
- CTCSS tone encoder/decoder
- Illuminated keypad, memory name function
- Auto power off • Auto batt. saver
- Time-out timer
- 5.5 - 16V DC (13.8V)

HORA

HORA C-408 • 70cm £49 Plus £6.00 Carr.

HOCKLEY ONLY

- 230mW
- CTCSS
- Digital Display

Very much underrated handy. Covers the full 70cm band. Wideband receive possible. Very compact fits into top pocket. Ideal for use at rallies. Only uses 2x AA batteries (not included).

SPECIAL OFFER

FT-817 'SPECIAL OFFER'

YAESU

SAVE

INCLUDES AC CHARGER *AND 1 AMP Ni-cad PACK*

The amazing *FT-817* offers all-modes from 1.8MHz - 440MHz with up to 5 watts out. Buy one of our *"WALKABOUTS"* antennas at the same time and *SAVE EVEN MORE!* We will give you an extra *10% DISCOUNT* on the antenna!

NEW MINI SM PSU PS-817 £19.95 Carr £8.00

£595 carr.£9

ADI

ADI AT-600 • 2m / 70cms £179 Plus £6.00 Carr.

HOCKLEY WAREHOUSE EXCLUSIVE

- Dual Band 2m/70cms
- Up to 5 Watts out
- Airband Receive
- Nicad Pack • CTCSS
- Hod Charger

You won't find better value than this. Limited stocks

ADI AT-201 £99 Plus £6.00 Carr.

- 2m Handy
- 2.5W, 5W (13.5V)
- 1750Hz & CTCSS
- Wideband receive
- Drycell case
- Batteries not included
- Full keypad

Higher power than most palm sized models. Fully (illuminated) keypad for ease of frequency entry. Channel or frequency readout.

ADI AR-147 • 2m 50W £199 Plus £9.00 Carr.

AIRBAND RECEIVE

2m FM mobile transceiver. Three power levels 50,10,5W. Displays frequency or channel numbers, and offers Airband AM receive

YAESU VX5R •BLACK OR SILVER £239 Plus £6.00 Carr.

Tiny but incredibly rugged, the VX-5R provides transceiver capability on three amateur bands (50/144/430MHz) and almost continuous reception from 500kHz up to 999MHz.

YAESU VX1R • 2m/70cm £145 Plus £6.00 Carr.

- 76-999MHz Rx
- 144-146, 430-450MHz Tx

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

'Amazing' FT-817 Screwdriver Antenna

Manually slide it to set band and fine tune with 110cm telescopic whip. Supplied with universal table clamp and SO-239 socket, plus 3m radial kit. Can also be mounted on any 3/8" mount. Packed down length just 30cm. *THIS IS NO MIRACLE, IT'S THE REAL THING!* (80m kit and other accessories available).

£149.95 carr.£9

WATERS & STANTON

E-mail: sales@wsplc.com * On-line catalogue: www.wsplc.com * Freephone orders: 08000 73 73 88

CARRIAGE CHARGE CODES: A=£2.75, B=£6, C=£9, D: £12

Get in Front with HUSTLER

5BTV

£199.95
Carr. £9.00

4BTV

£159.95
Carr. £9.00

HUSTLER®

BASE STATION ANTENNAS

Spec	5BTV	4-BTV
Bands	5	4
Coverage	80m-10m	40m-10m
Bandwidth 10-40m	Full	Full
Bandwidth 80m	100kHz	N/A
Resonance	1.15:1	1.15:1
Power	1kW CW	1kW CW
Traps	1" forms	1" forms
Tubing	1.25"	1.25"
Bracket size	1.75"	1.75"
Height	25ft 1" (7.64m)	21ft 5" (6.52m)
Weight	17lbs. (7.7kg)	15lbs (6.8kg)
Wind (112kph)	13kg	-

"I worked my first ZL while actually on the move using a Hustler whip" - Peter Waters G3OJV. Customers are also telling us how pleased they are with the base verticals. Check the prices!

HUSTLER Mobile Antennas

Model	Band	Bandwidth	Price
RM-10	10m	150-250kHz	£19.95 B
RM-11	11m	150-250kHz	£19.95 B
RM-12	12m	90-120kHz	£19.95 B
RM-15	15m	100-150kHz	£19.95 B
RM-17	17m	120-150kHz	£22.95 B
RM-20	20m	80-100kHz	£22.95 B
RM-30	30m	50-60kHz	£25.95 B
RM-40	40m	40-50kHz	£25.95 B
RM-80	80m	25-30kHz	£29.95 B

Model	Band	Bandwidth	Price
RM-10-S	10m	250-400kHz	£24.95 C
RM-15-S	15m	150-200kHz	£25.95 C
RM-20-S	20m	100-150kHz	£29.95 C
RM-40-S	40m	50-80kHz	£35.95 C
RM-80-S	80m	50-60kHz	£49.95 C

Lower mast sections

MO-1	54" (FOLD @ 22°)	£31.95 C
MO-2	54" (FOLD @ 27°)	£31.95 C
MO-3	54" (NON FOLD)	£25.95 C
MO-4	27" (NON FOLD)	£21.95 C

GARMIN®

STREET PILOT III £875 Plus £6.00 Carr.

IT TALKS TO YOU

It talks to you and is supplied with street level mapping, 32Mb storage card and card reader for quick PC programming. Examples of voice info are: "turn left 2 miles," "take 2nd left at next roundabout", "house number 17 is on your left," "turn right in 300ft." These are in stock now.

NEW NEW NEW

CUSHCRAFT COMMUNICATIONS ANTENNAS

HF HORIZONTAL BEAMS + DIPOLES

When you buy an HF Yagi, you want quality and realistic performance. You also want to know you can get spares. We offer a wide choice with guaranteed spares availability. COUNT ON US!

MA5B	10-20m (5 band) 3 el 2.7m radius 1.2kW	£299.95 C
X-7	10-20m 7 el. 12.5 - 13dBi 2kW 6.09m radius	£669.95 D
X-740	40m add on kit for X-7	£269.95 C
A4-S	10-20m 4 el. 8.9dBi 2kW 5.49m radius	£529.95 D
A-744	Gives 40m or 30m operation from A-4S	£149.95 C
A3-S	10-20m 3 el. 8dBi 2kW 4.72m radius	£459.95 D
A-743	Gives 40m or 30m operation from A3-S	£149.95 C
A3-WS	12 & 17m 3 el. 8dBi 2kW 4.4m radius	£349.95 D
A-103	Gives 30m operation from A3-WS	£149.95 C
D-3	10-20m dipole element 7.86m 2kW	£219.95 C
D-3W	12, 17, 30m 17m dipole element10.37m 2kW	£219.95 C
D-4	10-40m dipole element 10.92m 2kW	£299.95 C
D-40	40m dipole element 12.88m 2kW	£259.95 C
Ten-3	10m 3 el 8dBi 3m radius 2kW	£189.95 C
ASL-2010	13.5-32MHz 8 el. log periodic6.4dBd 5.86m radius	£749.95 D

THE MINI-BEAM FOR SMALL GARDENS

Cushcraft MA5B

The best 3 element mini beam you will ever find. 2 element gain on 10, 15 & 20m, and dipole performance on 12m and 17m. Up to 25dB F/B ratio, it accepts 1.2kW yet has a boom length of only 2.2m and element length of just 5.2m Turning radius is 2.7m. Uses a single feeder, this really works the DX. Get one up before winter!£299.95 C

CUSHCRAFT VERTICALS

R8 (Illustrated), covers 8 bands from 6m - 40m, stands 8.7m high and requires no radials. You can feed it with 1.5kW and typical VSWR is around 1.2:1 £469.95 C

R8-GK Optional guy kit for R8 £49.95 B

R-6000 6 band 6m-20m that requires no radials and handles 1.5kW. Stands just 5.8m high and was chosen for the RSGB GB4FUN vehicle antenna. It works!! £329.95 C

NEW MA5V VERTICAL 20-10m **£229.95 C**

WATSON

WEP-300B • EARPIECES £2.95 Plus £2.75 Carr.

Over-the-ear earpiece, popular for security and emergency use. Its low cost and firm mounting even in arduous conditions make this a popular item. fitted with 3.5mm jack plug.

WSA-1 PSK-31 Adaptor £39.95 Plus £6.00 Carr.

All you need to connect up to your sound card and run PSK-31. Includes CD software.

YS-130 £79.95 Plus £9.00 Carr.

Ideal for medium sized VHF antenna systems, the YS-150 is a good quality Japanese manufactured product. It is supplied with control box with rotary direction setting, plus upper and lower in-line mast clamps.

FREQUENCY COUNTERS

Each counter is supplied with internal Ni-Cad pack, AC charger and whip antenna.

Hunter	10MHz - 3GHz	£59.95 B
FC-130	1MHz - 3GHz	£79.95 B
S. Hunter	10Hz - 3GHz	£149.95 B
S. Searcher	10MHz - 3GHz	£99.95 B

MASPRO VHF/UHF YAGIS

These high quality Yagis are made in Japan and superbly engineered. Features folded dipole, balun transformer, waterproof box and SO-239. You won't find anything better on the market.
Take a look at our prices!

144-WH5	2m 5 el. 6.8dBd 0.93m	£26.95 B
144-WH8	2m 8 el. 8.8dBd 1.79m	£37.95 B
144-WH10	2m 10 el 9.7dBd 2.3m	£41.95 B
435-WH8	70cms 8 el. 8.6dBd 0.8m	£29.95 B
435-WH12	70cms 12 el. 12.8dBd 1.51m	£35.95 B
435-WH15	70cms 15 el. 14.2dBd 2.19m	£41.95 B

To compare with dBi figures, add 2.4dB

WATSON

QS-112 • SPEAKER MIC £16.95 Plus £2.75 Carr.

Combined speaker-mic. with PTT switch. Models for Yaesu, Kenwood, Icom, Alinco and Motorola.

SPM-102 • SPEAKER MIC £9.95 Plus £2.75 Carr.

Incredible value!
Has 4-way 3.5mm plug for VX-1, VX-5, FT-50 and IC-G7E Handies

Limited stocks.

WM-308 • BASE MIC £59.95 Plus £6.00 Carr.

The perfect answer for a high quality base microphone. Built-in pre-amp powered from rig or 2 x AA, electronic PTT and FM/SSB response switch. Includes lead with 8-pin plug. The plug needs to be wired for your radio. We can do this but phone for quote.

WCT-321 • LAPEL TALKER £19.95 Plus £2.75 Carr.

The elegant way of personal communications.
Earpiece with combined lapel hanging mic and PTT. Models to suit most radios. State: Kenwood, Yaesu or Icom when ordering

AVAIR VSWR • POWER METERS

Great value and great performance. There's one just right for you.

AV-200 1.8 - 200MHz 5/20/200/400W £49.95 B
AV-400 140 - 525MHz 5/20/200/400W £49.95 B
All fitted with SO-239, PEP/RMS readings, 3W for FSD approx.
Also available AV20 & AV40 compact meters

WATSON

ATX WALKABOUTS

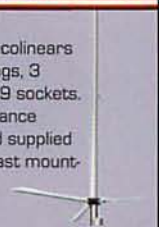
WALKABOUT PORTABLES

Multi & single telescopic whips. Covers 80m to 6m BNC. Ideal for FT-817 and similar QRP radios.

ATX Walkabout 80 - 6m	£69.95B
AT-80 Single band	£24.95B
AT-40 Single band	£24.95B
AT-20 Single band	£19.95A
AT-17 Single band	£19.95A
AT-15 Single band	£19.95A
AT-12 Single band	£19.95A
AT-10 Single band	£19.95A

BASE VHF/UHF VERTICALS

2m / 70cm fibre glass colinears with stainless steel fittings, 3 short radials and SO-239 sockets. These are high performance antennas, pre-tuned and supplied with all hardware for mast mounting.



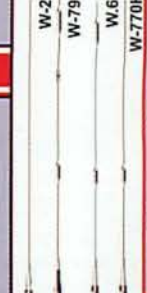
Dual Band 2m/70cms

W-30	3/6dB 1.15m long	£39.95 C
W-50	4.5/7.2dB 1.8m long	£49.95 C
W-300	6.5/9dB 3.1m long	£59.95 C

Triple band 6m/2m/70cms

W-2000	0/6/9dB 2.5m long	£69.95 C

GREAT VALUE MOBILE WHIPS



W-285	2m 5/8th whip with PL-259 base £14.95 B
W-7900	2m/70cm 5 & 7.5dB length 1.58m £32.95 B
W-627	6m / 2m / 70cm 2 / 4.5 7.2dB length 1.6m £34.95 B
W-770HB	2m/70cm whip 3dB / 5.5dB length 1.1m £24.95 B

ALL WITH TILTOVER BASES

CUSHCRAFT

COMMUNICATIONS ANTENNAS

"World Leaders in HF + VHF Antennas"

"Cushcraft - the contesters 1st choice"

CARRIAGE CHARGE CODES: A=£2.75, B=£6, C=£9, D=£12.

MA5B HF 5-BAND 3 EL. 'MINI BEAM'

- Bands: 10, 12, 15, 17, 20m
- Max gain: 5.3, 0, 4.8, 0, 3.6dBi
- Front to back ratio: 10, 0, 12, 0, 22dB
- Power rating: 1.2kW
- VSWR: 2:1
- Bandwidth: 665, >110, 255, >100, 90kHz
- Boom length: 2.2m
- Turning radius: 2.7m
- Weight: 12kg

£349.95 C

MA5V HF 5-BAND COMPACT VERTICAL

- Bands: 10, 12, 15, 17, 20m
- Gain: 2dBi
- Power rating: 500W
- VSWR: 1.3:1 (typical)
- Height: 3.7m
- Wind survival: 160 kph
- Weight: 3.2kg

£229.95 C

AR-270 BROAD BAND VERTICAL ANTENNA

- Frequency Band: 2m/70cm
- Bandwidth (MHz): 4/15
- Gain (dBv): 3.7/5.5
- Power (kW) FM:250W
- Height (m):1.13
- Mast Size (mm): 32-51
- Radials (mm): 171
- Wind Load (m): 0.03
- Weight (kg): 0.9

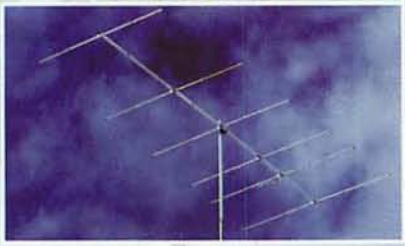
£89.95 C

R8 HF 7BAND VERTICAL ANTENNA

- Bands: 6, 10, 12, 15, 17, 20, 30, 40m
- Gain: 3dBi
- Power rating: 1.5kW
- VSWR: 1.2:1 (typical)
- Height: 8.7m
- Weight: 10.5kg

£499.95 C

A50-6S 6M 6 ELEMENT BEAM ANTENNA



- Frequency Band: 6m
- Elements: 6
- Power (kW) : 1
- Forward gain (dBi): 11.6
- Front to back (dB): 26
- SWR typical : 1.2:1
- Bandwidth (MHz): >1
- Boom length (m): 6.1
- Longest element (cm): 302
- Turning radius (m): 3.5
- Mast Size (mm): 38-51
- Wind Load (m2): 0.41
- Weight (kg) : 8.2

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A50-5S	6m 5 element beam 10.5db gain 3.7m long	£159.95 C
A50-6S	6m 6 element beam 11.6db gain 6.1m long	£299.95 C
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WORLD LEADERS

PW

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Cover Subject
Use the IC-756PROII transceiver and you really will have a window to the world of wireless communication. **Rob G3XFD** was so impressed with the PROII's capabilities and features that he's going to buy one for his shack! We think you'll agree that **Bob Kemp** *PW*'s Layout & Design artist has come up trumps with this striking cover design - enjoy!

Main Photograph:
Tex Swann G1TEX/M3NGS
Design by: **Bob Kemp**

May features

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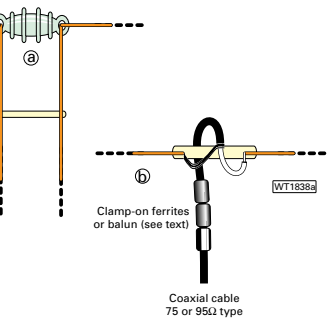

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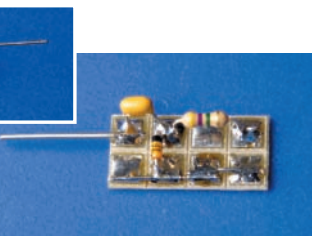

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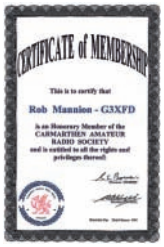
May regulars



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rob mannion's keylines

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

There's always a new adventure or 'first time' event just round the corner and on my way to catch the Irish Ferries afternoon sailing from Pembroke Dock to Rosslare on Friday 22 February, I met one head on! The event? - It was a special meeting between myself and **Islwyn (Wyn) Hughes GW4ZXL** of the **Carmarthen Amateur Radio Society** (CARS) at the large Safeway Supermarket, just off the A48/A40 junction on the outskirts of Carmarthen.

I'd been dealing with the - delightfully friendly and helpful - club members recently because of a request to help the daughter and widow of a recent Silent Key in that part of Wales. Carmarthen - with the help of their friends (including **Trevor Perry GW3XQK**) at the **Cleddau Club**, based in Neyland, Pembrokshire alongside the beautiful Milford Haven - had acted in the best tradition of our hobby.

However, I was due for a surprise (see **Fig. 1**), when I arrived in Carmarthen (much delayed by the horrendous gales on Friday 22 February - instead of just a cup of tea and a chat - Wyn presented me with a certificate of membership!

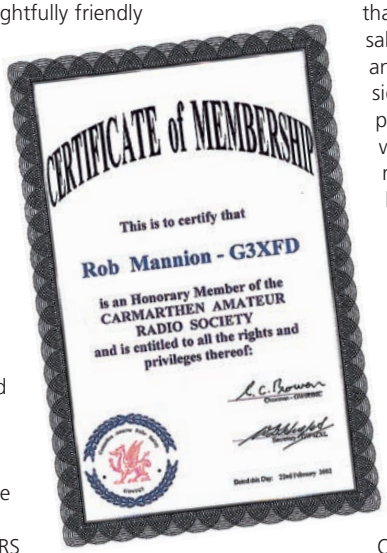

Fig. 1:

Unfortunately, I missed the CARS Chairman **Granville Bowen GW0UMC**, so the presentation - in the supermarket's tea bar! - was done by Wyn himself. I was extremely touched by the gesture. **Thank you Carmarthen, I'll be very proud indeed to be an Honorary Member**. What a great privilege to have such good friends. Amateur Radio is that sort of hobby, with many good and generous souls taking part.

Silent Key Sales

The original letter I received from the bereaved family was one of the many we receive here in the *PW* offices every year. And despite what I said at the end of the last paragraph about generous people, I'm saddened to say that over the years I've heard of a number of bereaved families being 'ripped off' by avaricious collectors (almost like vultures in their determination to get bargains) - hence my own equal determination to help the families by putting them in contact with the nearest local Amateur Radio Club or Society.

In the past several *PW* staff have volunteered their help to organise Silent Key (SK) sales. In particular **Tex Swann G1TEX** joined by my family and I, along with **Darren Howe** (then working in our Accounts Dept), gave up several weekends organising a huge SK sale some years ago. Despite all our efforts, it turned out to be a bad experience for our organising team although it made a great deal of money for the family!

Tex, my wife Carol and I said that we'd never willingly become personally involved in organising such a sale in future. We were all very saddened at the behaviour of the specialist collectors and the family of the SK - it was really that unpleasant!

Shared Experience

During our various telephone conversations Wyn and I had shared our own experiences of organising disposals sales while we tried to assist the family of the SK. We were doing our best so that they could make the sale as painless, trouble free, and as profitable (for both sides of the transactions) as possible and thought it would be a good idea for me to prepare an article to be published in *PW* reflecting as many opinions and personal experiences as possible.

To this end the *PW* Editorial team would like to hear from anyone with a story to tell, advice to give, or anything to share on the topic of selling the radio effects on behalf of bereaved families. Obviously, with such a sensitive subject (especially if you had, or were involved in an unpleasant experience) we will be prepared to publish the comments without making your own name public, providing you establish who you are to myself before we publish.

Hopefully, we'll then be able to publish an article which will at the same time help SK sales organisers and assist the bereaved families. It will also help deter the 'sharks' who always seem to be lurking in the background ready to strike. Strong words perhaps, but unfortunately true in some cases.

Our hobby is an honourable one - and the sharks **are very much a minority**. With the article I hope we can 'beach' their unethical behaviour for good! So, I look forward to reading your comments...and all correspondence will be dealt with in a strictly confidential manner.

Tom Withers & Communicators

Although I had the information too late to mention it last month I'm delighted to say I've made direct contact with **Tom Withers G3HGE** the former manufacturer of the TW Communicator equipment. Tom is now preparing an article for publication later in the year and expresses his own delight at the interest shown.

I was inundated with letters on the subject and thanks to your enthusiastic support we've all got something to look forward to!

Rob G3XFD

practical wireless services

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

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In general all components used in constructing *PW* projects are available from a variety of component suppliers. Where special, or difficult to obtain, components are specified, a supplier will be quoted in the article. The printed circuit boards for *PW* projects are available from the *PW* PCB Service, **Kanga Products, Sandford Works, Cobden Street, Long Eaton, Nottingham NG10 1BL. Tel: 0115 - 967 0918. Fax: 0870 - 056 8608.**

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amateur radio waves

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All other letters will receive a £5 voucher.

STAR LETTER

RAE Success

● **Dear Sir**

My name is Sean Ward and I've recently passed my Radio Amateur's Examination (B). During the course of study I had some difficult times trying to understand the work involved. Through *PW* I like to express my thanks to the **Foyle & District Amateur Radio Society** for their tremendous help.

I would like (especially) to thank five individuals **Martin Gillesie** (s.w.l.) **Ronnie Kilgore GI0WYO**, **Ray Blythe MI0VFO** and his wife **Anne**, and **Adain MacIntyre EI2FPB** for their encouragement during the last 18 months. Without their help I would not have been successful. Now I hope to obtain a Class A Licence in the very near future. Thanks for a great magazine, and I look forward to seeing you during your planned visit to the F&DARS in February.

Sean Ward
Londonderry
Northern Ireland

Editor's comment: I had the very great pleasure in meeting Sean during the club visit on Monday 25 February. Sean is a delightful young man who is pictured looking at the 1933 vintage *Practical Wireless* tool kit which now forms parts of the travelling archives for club visits. More details of the *PW* 'Club visit' to the F&DARS appear on page 50 in this issue. I'm also delighted to say that Sean is now the proud holder of the callsign MI1PSU! Well done Sean - you'll never be short of energy with that callsign! Who says Amateur Radio is lacking in new young blood!

Pere Sottise

● **Dear Sir**

I write with reference to Pere Sottise. A brilliant spoof - thank you, this should cause some confusion amongst the natives! Regards to all

Roy Woollard G0TUL /G8RCK
Lincoln
Lincolnshire

Spoof Articles - No Thanks!

● **Dear Sir**

I have just got the April 2002 *PW*, and very welcome it was. I like the magazine, the staff are very friendly and helpful, the reviews are interesting and well written and the technical articles are instructive. I really do think that it is the best, most balanced Radio periodical on the market.

I do however, (yearly, in the April edition), object to spoof articles taking up **two VALUABLE** pages of the publication, and masquerading as a feature. If I wanted a Funny magazine I would buy one, heavens knows there are enough of those about.

So, please *PW* resist the urge in future, bung in another review, give the regular columnists an extra column-inch or two, Give the Editor two pages to sound off on radio topics dear to his heart, but please don't waste your time and our money on this type of frippery. (Empty display in literary style).

Roy Walker G0TAK
Thornton Cleveleys
Lancashire

Storage Of Components

● **Dear Sir**

I've just been reading your Radio Basics article on the storage of components, particularly aimed at beginners. As someone who - for professional reasons has accumulated many thousands of components, I'd like to tell of one fairly inexpensive way to store things.

When it comes to resistors and similar long leaded items, I use the following method: I take an old but good strong shoe box and then get some equally strong cardboard to make the central divider. The sides of the box are then wrapped around with the wider type of parcel tape, to prevent the box from coming undone.

The divider is cut to size so it can also form a handle. The box has two slots cut into on either side end to allow the divider handle to locate, and to prevent it just pulling out. (Some glue or suitable adhesive can be used to hold it to the bottom of the box).

In use the components are put into individual self-seal polythene bags and arranged in value order. The lower values to the front left, and front from the front to the right.

Transistors, small capacitors and any other small items go into plastic containers that have 18 locations. These can be order from Maplin as part number AN833 at £1.99 including VAT. A more versatile unit is the SF05F at £3.99 including VAT. Pages 206 to 207 in their latest catalogue. I think they just about cover all needs.

I first started out using the modular system from RS Components and have built up a large number of drawers . (Only problem is that they're not easily transported!).

Ian Johnson
Kidderminster
Worcestershire

Editor's comment: Ian's letter had some interesting points (he's a very experienced service engineer/constructor) and I've written to him asking for an in-depth article on storage ideas for radio enthusiast. It's a very long time since we concentrated on this (often frustrating aspect of the radio hobby). All being well, we hope to publish the article later this year.

Nothing New Under The Sun!

● **Dear Sir**

I read with interest the review of the Copper Islands in the January issue of *PW*. I write because it just goes to show that there's is nothing new under the sun. I say this because in the 1970s and 1980s I was in technical charge of a sound recording studio and we found that small additions or alterations to circuitry in chassis or modules was sometimes necessary.

Single-sided pieces of ready-made printed circuit board with components soldered, but with no through connections were stuck in spare spaces in chassis, etc., with small dabs of tube-applied adhesive or the putty-like adhesives.

We then discovered that the 3M Corps from the USA produces small boards with various DIL patterns (for use with integrated circuits) with power bus and input/output lines in the form of copper tracks. They were backed with standard 3M 'sticky', protected by a pull-off film.

They were neat, 'dead easy' to use and looked nice in their glass-fibre materials. They could be mounted by pressing onto a surface, but could also be removed with a table knife - no mess.

As the pieces were often mounted in difficult-to-reach-places, and might themselves need attention later on this was ideal (Their actual name escapes me now. I would never for one moment agree to the use of the Cyanocrylate adhesives for this sort of job. The very idea makes me shudder! Best wishes to everyone on *PW*.

Jim Brown G0KZV
Bridgwater
Somerset

Editor's response: I too recall the 3M boards Jim used so successfully. I seem to remember they were called

'3M Place 'n Fix'. Very useful indeed! However, regarding the Cyanocrylate adhesives, although for many years I wasn't happy using the stuff, in practice I've not had any problems and remember I'm digitally compromised nowadays and can't afford to risk getting my five (only) fingers stuck together!

Reception Interference & Radar Memories

● **Dear Sir**

As a regular short wave listener (s.w.l.) since 1936, I venture to write on two items : The first is regards to the relentless rise in interference - particularly on 1.8 and 3.5MHz - from television receivers and other appliances. I'm sure that an article on antennas designed to minimise this nuisance would be appreciated by many readers.

Secondly, the article by **Charles Miller** (Valve & Vintage April 2002) is most interesting. However, it would be nice to hear of the experiences of RAF radar technicians stationed at the Chain Home and other radar systems during the critical days of the second World War.

Yours faithfully.

W. G. P Lamb
Westcliff-on-Sea
Essex

Editor's reply: What a difficult question to answer! W. G. P. Lamb (I don't have a given name I'm afraid) has raised a very topical point although the equipment and antennas used at them moment aren't mentioned. Many of us try to overcome the problems with digital signal processing (DSP- very effective) - but this approach is not available for all due to the costs. No one approach will suit everyone's EMC problems. Readers with ideas (especially their own successful ideas) are asked to send them into Tex's Tips & Topics page. I feel sure that we're bound to read some really good ideas. Hopefully W. G. P. Lamb will write in with full details of the equipment/antennas used. Radar memories: Anyone interested in reading about the experience of CH and other radar technicians/operators from the Second World War is thoroughly recommend to obtain a copy of *Radar A* *Wartime Miracle* compiled by Colin Latham and Anne Stobbs. Published by Allan Sutton Publishing Ltd, Phoenix Mill, Far Thrupp, Stroud, Gloucestershire. The ISBN number is 0-7509-1114-X and it costs £17.99 (This reference will help a local book shop obtain it for you). A superb read with enough technical information to keep radio enthusiasts satisfied.

Comments On Euro Zone Operating

● **Dear Sir**

What a tremendous 'spoof' article Euro Zone Operating was (It's 0830 and I've just received my subscription copy of April 2002 . Congratulations to who ever thought the idea up - it was almost too believable but, too much emphasis on the rank, etc., of the inspecting officer gave the game away to me, keep up the good work. How many spotted it I wonder. I was impressed!

C. H. Lucas G7TDL
Crowborough
West Sussex

...another...

● **Dear Sir**

When I first saw the title Euro Zone Operating in the April issue of *PW* I thought "How useful"! the information would be. However, as I read further I became convinced that it was a cover for yet another set of rules from our would be master in Brussels. To quote a famous tennis player "You cannot be serious Man"! What a load of Euro twaddle. Our G licence not valid because we don't belong to the Euro currency!

We may have to pay a different fee according to the rank/status of the official with whom we are dealing? As I quoted "You cannot be serious Man"! Unfortunately though, this form of daftness has a nasty habit of being true and I am sure our Government would do its utmost to enforce such silly twaddle.

There again this was the April edition of *PW*...so do I smell a hoax? Thanks for a great magazine and I hope to see you at the rallies.

John Randall G3OAZ
Basingstoke
Hampshire

Euro Zone...Nice One!

● **Dear Sir**

I write regarding the Euro Zone article in the April *PW*...Nice One! May I mention however, that our French friends may not appreciate the Anglais 'taking of the water' - and I suggest that the author holiday elsewhere this summer! Best wishes to all.

Derek Bundey
Bath
Somerset

Eurocracy Documentation

● **Dear Sir**

The article Euro Zone Operating (*PW* April 2002) made excellent reading as it showed how Eurocracy has got totally out of control. However, the author neglected to mention that any documentation must be validated on (and only on) March 32nd of any year otherwise it will be unacceptable.

Further details may or may not) be obtainable from **Avril Poisson** (00/GOTYA) who unfortunately is not listed in any of the callsign directories. Best wishes to everyone on *PW*!

Mike Turnbull G7PWL
Monkseaton
Whitley Bay

Dismaying Euro-bureacracy

● **Dear Sir**

As one who enjoys occasional spells of operating in other countries, I was dismayed to read in *PW* (April) of the Eurobureaucracy spawned by the adoption of the Euro. What on earth led me to think that EEC and CEPT spelt 'harmonisation'?

The article refers to 'surcharges' payable to officials, the amount depending on the rank of the official, to help lubricate the passage through the bureaucracy. This sounds very much like a Eurobribe.

Ray Burgess G3RXG
Shipham
Somerset

Editor's comment: Ray squirmed (and then laughed) when he realised he'd been well and truly had! Thank you everyone for the (literally hundreds) of letters, E-mails, and comments over the air (especially to those readers now living in France/Belgium who helped perpetuate the joke). Fortunately, all French reading *PW* fans were immediately alerted by the name (Père means 'Father' and Sottise means...Nonsense! The author is now in hiding somewhere in Dorset!

Against Foundation Licence

● **Dear Sir**

I disagree with the Foundation Licence. I was licensed in May 1948 when the requirements for working on any band with any mode were: pass the RAE, which was a two-part written examination or have any alternative or better qualification (mine was a B.Sc in Physics plus 5 years at the Signals Research & Development Establishment) and a 12w.p.m. send and receive Morse code test conducted by a Telegraphist of the GPO (General Post Office).

For the first operating year I was permitted to send only in Morse. After that year I could not automatically start using a microphone: I had to apply for a telephony licence, and that was given only if the c.w. experience was considered satisfactory by the local GPO Inspector. In fact I knew a licensee in Bournemouth whose first year was largely spent in hospital, so that he had only about half a page to show in his log. He had to do a further year's Probation before he got his full licence.

In those days (do I hear cries of "living in the past"?) the new licensee felt that he had earned the privilege. Nowadays people want things without having to make an effort, and that is an unworthy ambition.

Here's a suggestion: **Send a questionnaire to all Amateur Radio licence holders on whether to have a Foundation licence or not. A** majority over 50% of those who reply should decide the issue.

Walter Farrar G3ESP
Ackworth
Yorkshire

Morse Bashing

● **Dear Sir**

Regarding **John Dove's** typical Morse bashing letter (Feb 2002), and his moan of having to learn something he "will never use". Maybe, just maybe, after he had learnt the Morse code he could actually give it a go before he decided he'll "never use it". He claims to be a QRP enthusiast. The use of c.w. is one of the best ways of QRP operating. World-wide contacts can be made with single transistor transmitters without the need for any cumbersome modulation circuits. **It's simply another whine about having to actually do something to get a licence**.

If learning Morse is a bind and something never used again then the majority of the RAE should be scrapped, many never construct so why learn Ohm's Law?, Why the need to know the length of a dipole? (etc., etc.). This hobby is about, or should be, experimenting and learning but if it's too much trouble to learn a few dits and dahs then maybe some should stick with their mobile telephones.

Ben Nock G4BXD
Kidderminster
Worcestershire

Treasure That Junk & Safety

● **Dear Sir**

After reading the 'Treasure That Junk' article by **Brian Kendal G3GDU**, (March *PW*), I was surprised to see that *PW* seemed to be encouraging highly dangerous practices when dismantling equipment! The article read: "*Always play safe and never work on equipment which is isolated from the mains when dismantling*". Although I feel sure it's a sub-editing mistake let's hope readers don't electrocute themselves!

R. C. King
Settle
North Yorkshire

Editor's reply: My apologies to those who read the article and thought we were going mad! It was my fault I'm afraid and R. C. King's suggestion that it was an error is correct, my apologies to all. My sub-editing mistake, made a nonsense of the fact that the author had included - knowing just how important they were - a few paragraphs on safety. A slip of the keyboard I'm afraid.

Treasure That Junk - My Concerns

● **Dear Sir**

I have to write to convey my concern about the Editor's (in Radio Basics) **careless revelation in the March issue, in no less than three separate places**, of the joys and advantages of recovering useful components from 'junk'. Until his 'blowing of the trumpet' there were a small and diminishing group of enthusiasts pursuing this approach to our hobby, and with a few irresponsible words, he tells the whole world, and no doubt pushed the price of recycled goods up! art, 'recycled' components are a valuable resource and the process is fun in itself.

However, **I must take serious issue with the Editor** over a statement made in your own Radio Basics column about 'Goody Bags' - quote" "The only disadvantage(s) of buying bulk mixed components... is that you've got to spend time sorting the capacitors and resistors out". When I started building little radios. etc., as a lad, my Dad was a keen stamp collector, forever poring over little rectangles of coloured paper, pausing only occasionally to feverishly leaf through a catalogue or to demand my mother's opinion on the precise shade of mauve of a small square.

I never did understand what he got out of it, until the last time, at the age of 40, that I spent several peaceful hours sorting through a bag of 200 mixed transistors. It was so therapeutic and relaxing, and, let's face it, when will I ever use all those transistors?

But the little bags, magnifier, data book gave away the fact that, while still pursuing electronics, I've become my Dad. If any readers haven't tried sorting a goody bag **just for the fun of sorting a goody bag**, I recommend they spend a tenner and start now! Okay, the implied criticisms were just a joke, the March issue was one of the best.

Dr Philip Miller-Tate
Walton-on-Thames
Surrey

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

Letters Received Via E-mail

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

Editor

amateur radio rallies

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

April 14
Cambridgeshire Repeater Group Annual Rally
Contact: Paul Dyke G0LUC
Tel: (01462) 683574
E-mail: g0luc@btinternet.com
Website: www.gb3pi.org.uk
The Cambridgeshire Repeater Group Annual Rally is taking place at the Bottisham Village College, Bottisham, which is six miles east of Cambridge. Access is via A14 and A1303. Features include a large hall, car boot sale, Bring & Buy and the group's renowned auction of radio and electronic equipment. Doors open at 1030 and admission is £1.50. Refreshments will be available and there will also be a Talk-in on S22.

April 21
The 18th Yeovil QRP Convention
Contact: Derek M1WOB
Tel: (01935) 414452
E-mail: m1wob@tiscali.co.uk
The 18th Yeovil QRP convention takes place at the Digby Hall, Hound Street, Sherborne, Dorset . Doors open at 1000. Talk-in on S22 GB2LOW. There will be three lectures by notable speakers, superb in-hall catering, trade stands, Bring & Buy, Construction Challenge and lots more.

April 28
Aldridge & Barr Beacon ARC Rally
Contact: Charles
Tel: (01922) 636162
The Aldridge & Barr Amateur Radio Club (West Midlands) will be holding their 3rd Surplus Radio & Electronical Sale at the Aldridge Community Centre, Anchor Meadow, Middlemore Lane, Aldridge, from 1030 until 1430. Admission is just 50p.

April 28
Andover Radio Amateur Club
Contact: Terry G8ALR/Jim G4NWJ
Tel: (01980) 629346/(01980) 610594
The Andover club are again holding their Spring Boot Sale at the Village hall in Wildhern, Andover, Hampshire Full details are available from Terry G8ALR or Jim G4NWJ.

May 6
The 9th West Wales Amateur Radio & Computer Rally
Contact: Ray GW7AGG
Tel: (01686) 628778
E-mail: mwmg01@aber.ac.uk
The West Wales Amateur Radio & Computer Rally will be held at Penparcau School, Aberystwyth. Doors open 1000-1530. Admission is £1. There will be good parking facilities, with easy access for disabled visitors and traders for all stalls. There will be demonstrations of h.f., v.h.f., on the air, amateur Radio and computer traders, Bring & Buy, clubs and Special Interest Groups. Talk-on S22.

May 6
Dartmoor Radio Rally
Contact: Ron G7LLG
Tel: (01822) 852586
Taking place at Pannier Market, Tavistock, Devon, the Dartmoor Radio Rally will offertrade stands, Bring & Buy and refreshments . There will be access for disabled visitors and plenty of public car parking within five minutes walking distance. Doors open at 1030 (1015 for disabled visitors). Talk-in on S22.

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- Kevin Nice takes a tour around 'The Other Man's Shack'.
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- Graham Tanner brings back radio memories from his trip to Goa.

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(Boom 45") (Gain 8dBd) **£49.95**
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MSS-2 Freq RX 25-2000 Mhz, TX 2 mtr 4.0 dBd Gain, TX 70cms 6.0 dBd Gain, Length 62" **£49.95**
IVX-2000 Freq RX 25-2000 Mhz, TX 6 mtr 2.0 dBd Gain, 2 mtr 4dBd Gain, 70cms 6dBd Gain, Length 100" **£89.95**
Above antennas are suitable for transceivers only

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6 metre (size 30" approx) **£24.95**

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All fittings Stainless Steel

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PVC Coated Flex Weave	£37.95	£32.95
Deluxe 450 ohm PVC Flexweave	£49.95	£44.95

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Complete with 25 mts of enamelled wire, insulator and choke Balun Matches any long wire to 50 Ohms. All mode no A.T.U. required. 2 "S" points greater than other Baluns.
MWA-H.F. (Receives 0-30Mhz)..... £29.95
Adjustable to any length up to 60 metres. Comes complete with 50 mts of enamelled wire, guy rope, dog bones & connecting box.

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9" Stand off bracket *(complete with U Bolts)*..... £9.00
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18" T & K Bracket *(complete with U Bolts)*..... £17.95
24" T & K Bracket *(complete with U Bolts)*..... £19.95
36" T & K Bracket *(complete with U Bolts)*..... £29.95
3-Way Pole Spider for Guy Rope/ wire £3.95
4-Way Pole Spider for Guy Rope/ wire £4.95
11/2" Mast Sleeve/Joiner..... £8.95
2" Mast Sleeve/Joiner..... £9.95
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SINGLE 11/2"..... £10.00
SET OF FOUR 11/2" £34.95
SINGLE 2"..... £15.00
SET OF FOUR 2" £49.95

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MGR-3 3mm (maximum load 15 kgs)..... £6.95
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Mini 8 best quality military spec best quality per mt..... 70p
RG213 best quality military spec per mt 85p
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PHONE FOR 100 METRE DISCOUNT PRICE.

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YC-2m For 2 x 144MHz Yagi..... £24.95
YC-7m For 2 x 70cm Yagi £19.95

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PL259/9 ..... £0.75 each
PL259/6 ..... £0.75 each
PL259/7 for mini 8..... £1.00 each
BNC (Screw Type) ..... £1.00 each
BNC (Solder Type)..... £1.00 each
N TYPE for RG58..... £2.50 each
N TYPE for RG213..... £2.50 each
SO239 to BNC..... £1.50 each
PL259 to BNC..... £2.00 each
N TYPE to SO239..... £3.00 each

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G.A.P.12 1/2 wave alumimum (length 18' approx)..... £19.95
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BALUNS

MB-1 1:1 Balun..... £23.95
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MB-6 6:1 Balun..... £23.95
MB-Y2 Yagi Balun 1.5 TO 50MHz..... £24.95

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300Ω Ribbon (20 Metres)..... £13.00
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MD-24 (2 Way Internal Duplexer) (1.3-35 Mhz 500w) (50-225 Mhz 300w) (350-540 Mhz 300w) insert loss 0.2dBd SO239 fittings £22.95
MD-24N same spec as MD-24 "N-type" fitting..... £24.95
MD-25 (2 Way external/Internal Duplexer) (1.3-35 Mhz 500w) (50-225 Mhz 300w) (350-540 Mhz 300w) insert loss 0.2dBd £24.95
Tri-plexer 1.6-60Mhz (800w) 110-170Mhz (800w) 300-950Mhz (500w) SO239 fitting £49.95
CS201 Two way antenna switch, frequency range 0-1Ghz, 2.5 Kw Power Handling SO239 fittings..... £18.95
CS201-N same spec as CS201 "N-type" fitting £28.95
CS401 4-way antenna switch..... £29.95

ANTENNA ROTATORS

AR-31050 Very light duty TV/UHF £24.95
AR-300XL Light duty UHF\VHF..... £49.95
YS-130 Medium duty VHF..... £79.95
RC5-1 Heavy duty HF..... £349.95
RG5-3 Heavy Duty HF inc Pre Set Control Box £449.95
AR26 Alignment Bearing for the AR300XL..... £18.95
RC26 Alignment Bearing for RC5-1/3 ..... £49.95

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PS-30 30amp with 35amp surge Dual Meter & Adjustable Voltage 5-15v £119.95

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20 metre trap 400W £23.95
40 metre trap 400W £23.95
80 metre trap 400W £23.95

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BAHF-4 FREQ:10-15-20-40 Mtrs LENGTH: 1.70m HEIGHT: 1.20m POWER: 300 Watts £129.95

HF YAGI

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

ADEX-3300 3 BAND 3 ELEMENT TRAPPED BEAM FREQ:10-15-20 Mtrs GAIN:8 dBd BOOM:4.42m LONGEST ELE:8.46m POWER:2000 Watts £269.95

ADEX-6400 6 BAND 4 ELEMENT TRAPPED BEAM FREQ:10-12-15-17-20-30 Mtrs GAIN:7.5 dBd BOOM:4.27m LONGEST ELE:10.00m POWER:2000 Watts..... £499.95
40 Mtr RADIAL KIT FOR ABOVE..... £99.00

HF VERTICALS

VR3000 3 BAND VERTICAL FREQ: 10-15-20 Mtrs GAIN: 3.8 dBd HEIGHT:3.80m POWER:2000 Watts (without radials) POWER: 500 Watts (with optional radials)..... £89.95
OPTIONAL 10-15-20mtr radial kit..... £34.95

VR5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN:3.5 dBd HEIGHT:4.00m RADIAL LENGTH:2.30m (included). POWER: 500 Watts..... £169.95

EVX4000 4 BAND VERTICAL FREQ:10-15-20-40 Mtrs GAIN:3.5 dBd HEIGHT:6.50m POWER:2000 Watts (without radials) POWER:500 Watts (with optional radials)..... £99.95
OPTIONAL 10-15-20mtr radial kit..... £34.95
OPTIONAL 40mtr radial kit £12.95

EVX5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN:3.5 dBd HEIGHT:7.30m POWER:2000 Watts (without radials) POWER:500 Watts (with optional radials)..... £139.95
OPTIONAL 10-15-20mtr radial kit..... £34.95
OPTIONAL 40mtr radial kit..... £12.95
OPTIONAL 80mtr radial kit..... £14.95

EVX6000 6 BAND VERTICAL FREQ:10-15-20-30-40-80 Mtrs HEIGHT:5.00m RADIAL LENGTH:1.70m(included) POWER:800 Watts..... £249.95

EVX8000 8 BAND VERTICAL FREQ:10-12-15-17-20-30-40 Mtrs (80m optional) HEIGHT: 4.90m RADIAL LENGTH: 1.80m (included) POWER: 2000 Watts..... £269.95
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MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts..... £79.95
MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts..... £44.95
MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts..... £69.95

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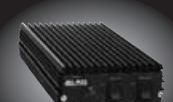

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amateur radio **news**

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

New Store Opens!

Maplin Makes it Mark

Maplin Electronics opens its 64th high street store in Bournemouth, Dorset.

Local radio station the Fire helps Maplin, Bournemouth get off to a roaring start.

On Saturday 2 March, Maplin Electronics opened the doors of its new store at Commercial Road, Bournemouth, Dorset. The promise of fantastic opening offers had customers queuing from as early as 8am!

The newest store in the Maplin chain boasts over 5,000 of their 15,500 strong product portfolio and features a wide range of components, cables, computer hardware and much more. Local radio station Fire 107.6 FM helped to promote the launch of the new store and Zius the robot man entertained passers by and visitors on the day.

For more information about Maplin Electronics, their range of products or where to find your nearest store check out their website at: **www.maplin.co.uk**

There's a diverse range of products on offer.

Zius the robot man helps put a smile on the face of customers.

Maplin staff are keen to ensure their customers receive the best service.

Bring & Buy

Moorlands First!

If you are free on the 16 June 2002 why not go along to the Moorlands & District ARS Bring & Buy event?

The Moorlands And District Amateur Radio Society (MADARS) are holding a Bring & Buy and table- top sale on 16 June 2002. The event will take place at the Creda Social Club on the Creda Factory Site, Blythe Bridge, Stoke on Trent, Staffordshire.

Doors open at 1230 and admission is **free** and the venue boasts a large free car park. There are still some tables left for anyone wishing to sell their wares - but hurry as they are going fast!

This is the first event that the Moorlands club have organised and they hope it will be the start of things to come and help to promote the hobby in their local area. So go on - go along and support them - who knows you may even pick-up a bargain!

To book a table or find out more contact **Paul Stevenson M5DAD**, Secretary for the Moorlands Club direct.

Paul Stevenson M5DAD
Tel:(01782) 542944
E-mail: m5dad@qsl.net

It could be YOU!

Club Spotlight 2002

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

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

It's very simple to enter the Club Spotlight magazine competition and all you need to do is to send us the **three most recent copies** of your magazine along with a covering letter. The covering letter should make it clear **which category of club you would like to enter your magazines into**. For example, the **Remote Imaging Group**, winner of the 2001 national award - can only enter in the national club section, whereas the **Cockenzie & Port Seton Club** - last year's winners, have to specify that they are a local club.

National Or Local?

For either category (national or local) your covering letter should provide the following details: How many people there are on the Editorial team and the type of job they do/or did (if retired); how long the magazine has been established; how it's produced (on your computer or text supplied to 'outside' printer for professional printing, etc.) and whether or not the publication is 'sponsored', the number of copies printed and membership size of your club. It would also help the judging panel if you could provide some historical details on your club.

The judging panel comprises of **Jim Bacon G3YLA**, **David Barlow G3PLE**, **David Wilkins G5HY** and **Rob Mannion G3XFD**. Entry to the competition is open now and all entries should be at the *PW* offices in Broadstone no later than **Monday 1 July 2002**. This is so the presentations can be made at the Leicester Show in September and members of the judging panel live in places as far apart as Cornwall, East Anglia and Greater London, so it will not be possible to consider late entries! So, make sure your club's entry reaches us in good time!

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

Donna Vincent G7TZB,
Club Spotlight Magazine Competition,
Arrowsmith Court,
Station Approach,
Broadstone,
Dorset
BH18 8PW

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Stop Press!

Free RAE Course!

Thinking of taking your Radio Amateurs Examination? You must read this!

Readers may be interested to know that our sister magazine *Radio Active* are busy working on an eight part home study RAE course. This will start with the October 2002 issue (on sale 20 September 2002) and will be an extra 20-page pull-out section in the magazine each month. Collect all eight parts for a complete, comprehensive guide to passing the RAE.

Radio Active is published on the third Friday of every month, priced £2.50 and contains articles on CB, Scanners, Satellite, PMR, Foundation Licence, s.w. listening and much more - in fact it covers the 'world of communication'. If you haven't seen a copy of *Radio Active* just send a £2 coin with your name and address to the address below to receive a recent back issue.

Donna Vincent, Dept. RA/PW05, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW

Contesting on 144MHz

QRP Contest Goes Platinum!

To celebrate the 70th anniversary year of PW our 144MHz QRP Contest this year has a surprise in store for everyone who enters!

This year everyone who takes part in the PW QRP Contest will receive a specially printed platinum style certificate. Contest Organiser (he also originated the event) and Adjudicator, **Dr. Neill Taylor G4HLX** explains:

"This year, thanks to the generous support and further sponsorship of **Chris Rees G3TUX** of the **QRP Component Company**, we're able to offer **every entrant** the chance of receiving on the especially printed and prepared Platinum style certificates. Every entrant, whether they enter from Ireland, the UK, France, Belgium or Holland can claim their free certificate. All they'll need to do is to include the special corner flash which is to be published together with the full rules in the June issue of *PW*. **This must be detached and sent with the log entry to obtain the certificate**.

"Although readers who joined in with previous years' contests - and we've got a very loyal band of regulars - missed out last year due to the tragedy of the 2001 Foot & Mouth Disease outbreak - many will remember the difficulties involved with the special commemorative 2000 'Millennium' Silver Certificate! The problems were because of the high quality card not accepting the Calligrapher's inks.

"Cyril Hutchings who acted as *PW*'s voluntary Calligrapher for many years, producing excellent work, really tried his best (thanks Cyril!) but had to give up after trying many different inks. In the end, after much searching and consultation with **Rob G3XFD** we decided to use a dedicated laser printer with special software to produce a suitable script on the certificates. And if you entered the Millenium Contest...that's how your certificate was produced and it's the way your Platinum Certificate will be done too"!

Don't forget the date for the contest is **Sunday 16 June 2002**. The contest runs from 0900-1600UTC. Good luck to you all! For the latest up-to-date details look at the contest website at **www.contest.org.uk**

Everyone on the *PW* Editorial team encourages as many readers to join in and we wish you all well. Rob G3XFD/P plans to be joining in the fun (it is a **fun** contest) and let's hope we have little wind, a good site, a bit of sun and a good picnic to back up Neill Taylor G4HLX's efforts as organiser. See you on the band!

IOTA News

Minkieboys On Air Again

Belgian contest team, the Minkieboys, are off to Ile de Sein to take part in this year's Islands On The Air (IOTA) Contest.

For the third year the Minkieboys will be operating from Ile de Sein EU-068 for the annual IOTA Contest. The team will be lead by their founder **Harvey ON5SY** and will also consist of **Hans ON4ASG, Wil ON4AVA, Dan ON4ON, DriesON6CX, Pat ON7PQ, Bill ON9CGB** and **Ronny** (the cook) **ONL10451 .**

The team plans to land on the island on Wednesday 24 July and will be leaving again on Tuesday 30 July. The on-air activity is expected to commence on the 24th and run until Monday 29th.

The Minkieboys will operate using the call **TM2ON** for contest calls and outside of the contest individual operators will use F/own call/p.Other references to listen out for during the DXpedition are: DIFM: AT-007; ARLHS : FRA066 and FRA067.

The QSL manager for the event will be **Danny Commeyne ON4ON** and all requests should be made via the bureux or direct to **Rozenlaan, 38, B-8890 Dadizele, Belgium.** Watch this space for details of website to be announced later.

Edgeware And District Radio Society

All Keyed Up

Dust off that Morse key and join in with the Edgware And District Radio Society's Straight Key evening - go on it could be fun!

The Edgware And District Radio Society would like to welcome you to join in with their 21st Straight Key evening on Friday 10 May. The club will be activating **GB3SKE** and **GX3ASR** and will be operating on the 80m band around 3.54MHz and above.

Anyone wishing to join in should call 'CQ SKE' from 1900BST**.** Remember this is **not** a contest, so join in, young or old, newcomer or veteran and enjoy the chat!

For more details on how to get involved contact **John Bluff G3SJE**.

John Bluff G3SJE
52 Winchester Road
Kenton, Harrow
Middx HA3 9PE
Tel: 0208-204 1034

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Website Revamp

Win an IC-T3H!

Fancy winning an Icom IC-T3H? Then check out the expanded Icom UK website to be in with a chance.

Icom (UK) Ltd have recently expanded their website to included four new sections, which they believe add value for 'surfing' customers. The site now features:

- Diary page, highlighting all the radio trade and consumer shows that Icom will be attending.
- A download section where customers can obtain electronic copies of leaflets and instruction manuals.
- An accessory section categorising Icom's complete range.
- Competition section - customers will have the chance to win Icom equipment and merchandise every month!

The first competition gives you the chance to win an IC-T3H 144MHz hand-held by answering a simple question. Further developments are planned for the site over the next few months so watch this space!

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

Contesting

What's Your Postcode?

If you enjoy contesting, especially the more unusual ones then why not take part in the International Listeners Association event in May?

The International Listeners Association are holding their United Kingdom Post Code Contest from 0000 on 18 May to 2359 on 19th May. The aim of this contest is to log Amateur Radio stations from as many UK postcode areas as possible.

Only the first part of the postcodes are needed, eg NE25, BH24, etc and only one station in each area will count.

Scores will be 1 point per QSO with the final score being the total points multiplied by the total number of Districts logged, eg NE, MK, BH, etc. NE25 is an area, NE is the District. Logs must show

Callsign	MHz	UTC	Date	Area	District
M1DZT	21.335	1234	18/05	NE25	NE

Entries must be sent to the Contest manager by 31 May 2002. So, go on, join in the fun!

Ken Burnell,
ISWL Contest Manager,
27 Manners Gardens,
Seaton Delaval,
Whitley Bay,
Tyne & Wear NE25 0DW

Repeater News

New Website Address

The Wessex Repeater Group have a new website - take a look...

The Wessex Repeater Group website is starting to take shape, see for yourself at **www.twxrg.info** If you want to contact a member of the group you can do so by putting the position at the start of the address line: i.e. secretary@twxrg.info or chairman@twxrg.info and to contact a repeater keeper, just put the callsign at the start i.e. gb3ys@twxrg.info

If you have a links to the Wessex Group site, from your own website, please remember to change the link!. The old site at: www.twxrg.org.uk currently has a holding page with a link to the new site, but this will be removed at the end of April. Please do not send any E-mails to the old addresses from now.

Help Out Your Fellow Amateurs

Can You Help?

Are you looking for help? If so, maybe other PW readers can help you out...

Barry Twigg is looking for an S-meter for his Racal RA17 receiver or alternatively a similar moving-coil meter (FSD 200µA) about 2in diameter (screw fixture). If you can help him please contact Barry on **0121-453 3290**.

F. Blain G3JLN needs some information on the interconnections between the rotator unit and indicator for the a couple of antenna rotators, these are: Kenrotor Model 400RC, Kenpro Industries, Japan and an Emotator Model 103SAX, Emotor Antenna Mfg, Japan. All expenses paid. Contact **G3JLN, High Ridge, Howgate Lane, Bembridge, Isle of Wight PO35 5QW. Tel: (01983) 872220**.

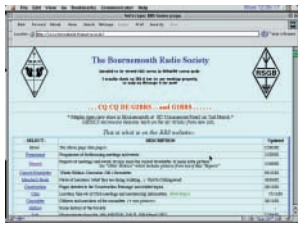
amateur radio clubs

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

DORSET

Bournemouth Radio Society
Contact: Chris Ellis M5AGG
Tel: (01202) 893126
Website: brswebsite.freeserve.co.uk

The Bournemouth Radio Society meets on the 1st & 3rd Friday of every month at the Kinson Community Centre, Millhams Road, Kinson, Bournemouth at 1930hours for an 2000 start. Meetings scheduled for the forthcoming weeks include: **May 3:** WAB - Is that something to do with the Locator? a talk by David G4BKE and **17th**: PicaTune Project night. by **Paul Berkley M0CJX**. Go along, you'll be very welcome!



LOTHIAN REGION

Livingston ARS
Contact: Alec MM0CJT
E-mail: mm0cjt@blueyonder.co.uk

The Livingston Amateur Radio Society hold meetings every Tuesday evening between 1830 and 2145 at the Crofthead Community Centre, Dedridge (West), Livingston. The club run RAE courses, 5w.p.m. Morse tests, and the Novice tests.

Cockenzie & Port Seton ARC
Contact: Bob Glasgow GM4UYZ
E-mail: gm4uyz@cpsarc.com/bob.gm4uyz@btinternet.com

The Cockenzie club meet at the Thorntree Inn (Lounge Bar), High Street, Cockenzie, (halfway between Old and New Harbours) from 1900hours until closing time! Meetings and club events planned for the coming weeks include: **27 April:** 10 pin Bowling Night at Megabowl, Kinnaird Park, Edinburgh at 2000; 3 May: Normal Club Night and **10th May**: 144MHz DF Hunt - Meet in The Old Ship Inn Car Park (East) 1830 for 1900.

KENT

Dover Amateur Radio Club
Contact: Jim Cairns M1BK1/Ian Keyser G3ROO
Tel: (01304) 852773/(01304) 821588

The Dover Amateur Radio Club meets every Wednesday at 1930 in term time at the Dover Boy's Grammar School. The club are a centre for the Foundation licence, the Intermediate licence and Morse assessments. They are also an RAE exam centre for the area.

MIDDLESEX

Edgware & District Radio Society
Contact: David G5HY
Tel: (01923) 655284 days/0208-954 9180 eves

Meetings of the Edgware & District Radio Society commence at 2000hrs and are held at The Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware,Middlesex. Visitors and new members are always welcomed. Look out for the following meetings: **11 April**: Talk by **Keith G3MCD** on the RSGB RLO system; **25th**: Talk - tba; **9 May**: Patents and Intellectual Property Right - a talk by **John G3SJE** and **23rd** NFD Briefing and Constructor's Cup competition.

Keep those details coming in!

HAYDON Communications

Mail order: 01708 862524 — **For main product lines see over**

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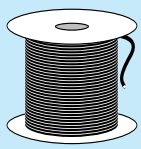

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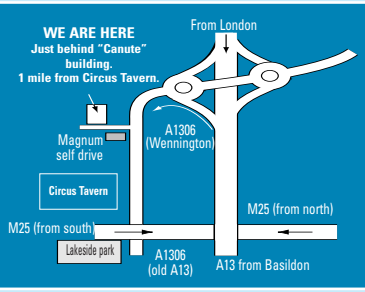

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THE VOLTAGE REGULATOR Part 1

This time in his bi-monthly series Gordon King G4VFV begins his look at the voltage regulator, which as you will discover, has two basic types.

When it's necessary for the voltage of a supply to be held essentially constant despite large fluctuations in load current, a voltage regulating circuit is used between the output of the power supply and the load. Circuits of this kind come in various guises. The simplest, which I looked at in the March issue, involves little more than a zener diode, while regulators of greater sophistication are based on transistors and integrated circuits.

Linear & Switching

Regulators come in two basic types - linear and switching. The linear version, which is the main feature of this instalment, can be arranged in either series or shunt mode. The basic principle of the frequently adopted series-mode linear regulator can be seen in the circuit shown in **Fig.1**.

As long as the *npn* transistor is biased for conduction, current from the smoothed rectifier supply flows into the load (e.g. into the equipment under power) via Tr1. The voltage appearing across the zener diode, which is taken into zener current by the series resistor R1, sets the base bias of the transistor to a constant reference value.

When the load demands increasing current, the voltage at the emitter of the transistor will tend to fall, which is tantamount to the base becoming more positive with respect to the emitter. This means that, because the transistor is an *npn* device, it will be turned on 'harder' and therefore provide the extra current demanded by the load. In this way the output voltage will be regulated, which is all there is to it really!

Practical Regulator

For enhanced regulation sensitivity, the control loop may include a transistor or two in addition to the zener diode. The diagram **Fig. 2** shows a practical circuit of this kind, where Tr3 is effectively the series regulator transistor, corresponding to Tr1 in Fig. 1.

The zener diode, fed from the supply through R1, produces a constant reference voltage across divider P1/R2 and a small amount of this potential, as selected by the potentiometer P1, appears at the base of the control transistor Tr1. Owing to the diminutive voltage drop across the base/emitter junctions of Tr2/Tr3, the potential at the emitter of Tr1 is essentially the same as that at the load.

The control transistor, which can be regarded as an error/amplifier, compares the ratio of the output voltage at its emitter with the reference voltage at its base. If there is any change in the difference between these two voltages, owing to the output voltage decreasing with increasing load or decreasing with increasing load, an error voltage will occur across R3 This will be communicated to the base of Tr2. The transistor Tr3 acts like a variable resistor in series with the supply, whose effective resistance automatically decreases or increases with a greater or lesser demand for load current, and in this way the output voltage is held constant despite changes in load current.

Darlington Pair

Because the base current for Tr3 is obtained directly from the emitter current of Tr2, this two-transistor arrangement, known as the 'super alpha' or Darlington Pair, yields a high current gain. The output voltage of the regulator is set by adjustment to the zener reference voltage at Tr1 base by potentiometer P1.

Many power supply units which partner today's rigs incorporate a version of this sort of voltage regulator to provide 20A or more of power at 13.8V. Large power dissipation in the series regulator is handled by the use of several parallel-connected transistors mounted on substantial heat-sinks. Power units of this kind are quite sophisticated nowadays and generally incorporate refinements,

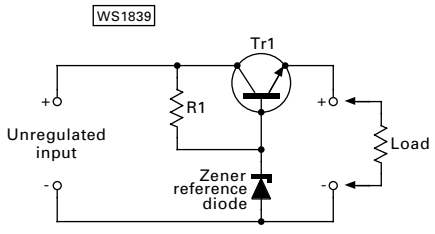

Fig. 1: Basic linear mode series regulator.

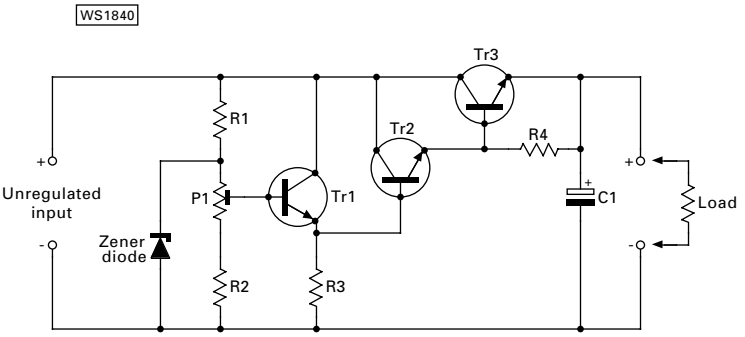

Fig. 2: A practical linear mode series regulator, which may incorporate overload and over-voltage protection.

such as overload and over-voltage protection.

Voltage Multiplication

To conclude this month I'm taking a brief look at voltage multiplication, whose basic features can be seen in **Fig. 3**. The voltage-doubler circuit at (a) comprises two half-wave rectifying diodes, D1 conducting on negative-going half-cycles and D2 conducting on positive-going half-cycles.

Capacitor C1 charges to the peak value of the a.c. input when D1 conducts, while C2 charges likewise when D2 conducts. As the charges of the two capacitors are effectively in series, they add together so that the net d.c.output is twice the a.c. input to each diode, and the ripple twice the value of the a.c. frequency.

By adding further diode/capacitor stages a d.c. output voltage many times that of the a.c. input voltage can be obtained. The three-stage circuit at (b), for instance, provides a d.c. output three times that of the a.c. input.

Voltage multiplier circuits, though, are mainly suitable for relatively low current applications. They are commonly used to provide the extra high tension (e.h.t.) supply for cathode ray display tubes.

Well, that's about it for this month. Next time I will be looking at parallel and switched regulators.

PW

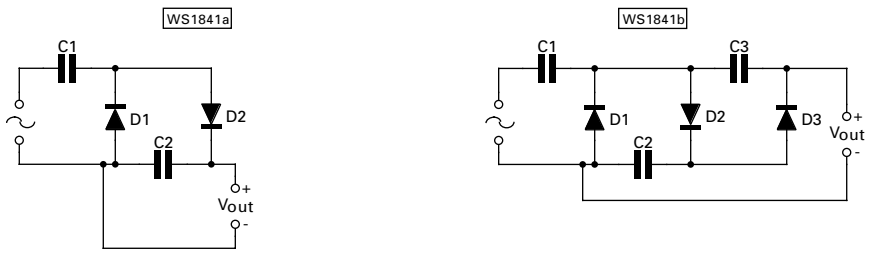

Fig. 3: Basic features of voltage multiplication, (a) for voltage doubling and (b) for voltage trebling.

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Radio Basics

● Once you're 'in the know' with this month's Radio Basics - identifying capacitors like these by using their colour codes won't be a mystery!

This month Rob Mannion G3XFD follows on from identifying resistors to the equally important task of recognising and using the many different types of capacitors.

Over the years I've been involved with hobby radio, both as a beginner, keen constructor and later on as an informal instructor at a school radio club, capacitors have caused confusion. It seems that identifying capacitors, the value and the type, is the biggest source of confusion for both beginners and even **moderately experienced constructors**. So, this article is aimed at helping you out as much as possible!

However, before we go any further - I've got a confession to make! Well over 30 years ago I built a valved 144 to 6MHz converter kit (in those days we still used an h.f. receiver as a tuneable intermediate frequency). The kit came with all the basics except resistors and capacitors (these, the constructor had to supply).

Unfortunately I mis-identified a medium value capacitor as a resistor - confusingly it looked like a resistor - complete with colour code. It took many (very many) hours to find the simple fault. I felt rather stupid that it was simply discovered (by a friend) using a testmeter, I should have known better - and I'll try my best to make sure you don't get caught out like 'Bozo Bob' (me!) as my friends called me at the time.

Important note: This article avoids surface mount device capacitors. They're out of the scope of this beginners series and I hope you won't be tempted to use them yet, at least not until you're familiar with standard wire-ended capacitor types.

Marked Values

Most of the confusion regarding capacitors involves the marked values...especially if the components are from a surplus source. If they are, you may well end up with some marked in the traditional system using microfarads (Millionths of a Farad, usually marked with the µF symbols - µ means 'micro' or one millionth) or the more modern system based on the nanofarad (a nanofarad is 0.001µF).

The chart, **Fig. 1** provides listings and comparisons in µF, nF and picofarads. Using the chart it's easy to make a quick cross check. To be honest again, I keep a chart handy myself because I too get confused...having been brought up on a good radio 'diet' of µF and pF (pF is usually referred to as 'puffs' by my radio generation!).

The second chart, **Fig. 2**, explains the numbers involved - and you'll realise that in fact we are dealing with minute 'fractions of a Farad' in radio. The chart explains the relationship between the systems and the equivalent in mathematical notation. (Useful, but not necessary for using them...so don't be frightened by the merest whisper of 'Maths'!

In the diagram, **Fig. 3**, the colour code used is shown. However, other important information is shown also (see **Fig. 4**). The extra information can be very important - particularly with voltage sensitive capacitors.

Caution: Never use a capacitor on a supply higher than it's rated for. Older types of electrolytics can literally boil and explode - spraying you with a (admittedly very small) layer of paper, foil and electrolytic compound. Again, I've got specific memories myself, having ended up with spectacles coated with fragmented capacitors, and in one case a real 'near miss' when a capacitor's metallic can shot by my left ear, embedding itself in the (wooden) shack wall. **Play safe - wire in correctly and never subject capacitors to over voltage**!

Capacitors & Choices

When you're building a circuit/project, the type of capacitor is usually specified by what the circuit does. For example, you're far more likely to see larger high value electrolytic - particularly low

Capacitance value conversion

0.000001µF	=	0.001nF	=	1pF
0.00001µF	=	0.01nF	=	10pF
0.0001µF	=	0.1nF	=	100pF
0.001µF	=	1nF	=	1000pF
0.01µF	=	10nF	=	10 000pF
0.1µF	=	100nF	=	100 000pF
1µF	=	1000nF	=	1000 000pF
10µF	=	10 000nF	=	10000 000pF
100µF	=	100 000nF	=	100 000 000pF

● Fig. 1: This chart provides direct comparisons between the three most likely capacitor value markings to be found - especially on older types of surplus capacitors (see text).

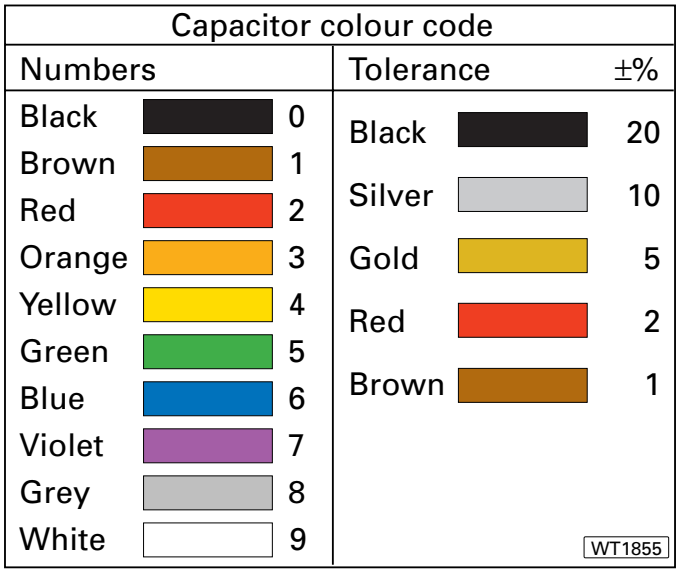
Expressed in:	Farad	µF	nF	pF
Picofarads (pF)	10^{12}pF	10^{6}pF	10^{3}pF	1
Nanofarads (nF)	10^{9}nF	10^{3}nF	1	10^{-3}nF
Microfarads (µF)	10^{6}µF	1	10^{-3}µF	10^{-6}µF
Farads	1	10^{-6}F	10^{-9}F	10^{-12}F

Where

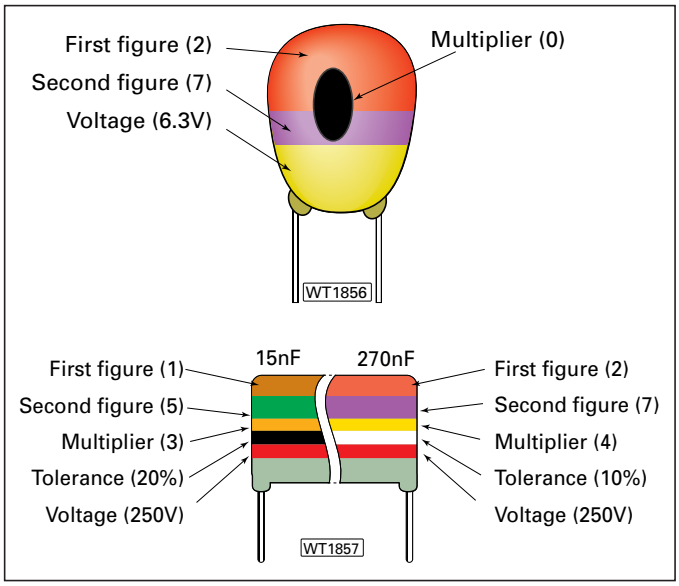
10^{-12}	=	one million-millionth
10^{-9}	=	one thousand-millionth
10^{-6}	=	one millionth
10^{-3}	=	one thousandth
10^{3}	=	one thousand
10^{6}	=	one million
10^{9}	=	one thousand million
10^{12}	=	one million million

WT1858

● Fig. 2: The chart explains how the picofarad, nanofarad, microfarads and Farads numbering notation works. Note that, for all practical purposes the Farad (named after Michael Faraday the pioneering physicist) is much too large for radio use.



● Fig. 3: Chart showing the colour code used for capacitor value marking. Please note that although it's the same as that used for resistors, important extra information is provided - please see Fig.4 for explanations.



● Fig. 4: Showing how colour coding is provided to show both the value, tolerance (see text) and voltage of capacitors. Note that some capacitors with colour coding can be polarised (i.e. marked + or -) and must be connected in circuit correctly (see text).

voltage types - in audio frequency amplifiers. To see what I mean just take a look at the little integrated circuit amplifier used with the Radio Basics (RB) capacitance/resistance bridge.

Incidentally, I hope you built the RB C/R bridge! You'll certainly find it useful to check values of uncertainly marked/suspect capacitors. (Take the hint and build one yourself, you won't regret it!).

The large value (sometimes anything up to 1000µF) are usually sensitive to voltage. Again, to play safe, I would always recommend that when used in a 12V powered circuit...a voltage rating of 16V or more should always be used.

Polarity of the electrolytic capacitor is of prime importance. This is because electrolytic action - in other words chemical etching - is used in the manufacturing process to allow a greater surface area of capacitive plate to be produced. In simpler terms this means that the surface of the metal electrode (the plate) has been microscopically pitted with many tiny depressions on the metal to increase the surface area, and thus the resultant charge 'capacity' of the components.

Unfortunately, once made the electrolytic capacitor is not at all happy if a voltage of the wrong polarity is connected. It will then pass a high current and in some cases the component will in effect try to reverse the effect of the original electrolytic action and short-circuit, and boil (they're always damp inside). And if they're completely sealed they can build up enough pressure to explode. However, with care, the modern electrolytic capacitor can give very many years of trouble free service.

Resin Dipped

The majority of the capacitors shown in the illustrations this month are dipped, or coated, in very high quality resins. Gripped **(very gently...don't damage them!)** between your front teeth you can really feel just how hard and protective the resin coating is. By the way, the 'teeth test' is only suggested for small value capacitors to gently test the hardness. It's very difficult indeed to judge this in any other way. **But please don't end up swallowing the component!** (If you've any doubt on your ability to hold the component safely - temporarily solder a wire to one lead. Not much chance of swallowing wire and capacitor then!

Resin dipped types can be of the little 'bug' types in the heading photograph, or the miniature 'Liquorice Allsort' type, also in the heading photographs.

The bug types can be either the spirally wound high quality foil and paper dielectric types (the dielectric is the insulating medium between the capacitors plates. It can be air, paper, ceramic, glass, or plastic) or the Tantalum Bead types (These are electrolytic capacitors and will be marked with their connections + and - those shown in the photograph are Tantalum beads.

On the other hand, the Liquorice Allsort types tend to be high quality ceramic plate capacitors. With this reliable method the capacitor is usually formed by electro-plating the required metallic plates (it's very often silver*), on either side of the ceramic plate itself, with the lead out wires bonded to one plate at one end, with the other lead being bonded to the other plate at the opposite end.

Ceramic plate types are ideal for radio frequency applications, decoupling known radio frequency (r.f.) - or possible r.f. signals to 'ground', this reduces instability in amplifiers (both a.f. and r.f. amplifiers). You can see an ideal application for this type of capacitor in the RB audio amplifier circuit which has been used many times for different projects in this series.

In the de-coupling application the capacitor is connected with one end as close to the input of the integrated circuit (i.c.) a.f. amplifier as possible. The other end is connected at the nearest convenient grounding point -thus providing the lowest impedance pathway for any spurious signal to be dissipated to earth.

The precautions are necessary because many i.c. amplifiers provide an enormous amount of signal gain in an extremely small area. Again, I've had experience in this area, which I'd like you to avoid!

I once built an audio amplifier (using an LM380 I think) which seemed to be drawing 150mA of current rather than the expected 50mA or so. It made some strange noises (but still amplified to a certain extent) and got very warm. It was only when I happened to carry the amplifier (it was for use in an outside broadcast caravan) past a u.h.f. TV receiver and noticed the r.f. patterning on the screen - that I realised the amplifier was oscillating a very high frequencies.

A quick look on a spectrum analyser showed me it was oscillating at around 800MHz! However, the application of one 0.1µF (100nF) cured the problem immediately. All because I'd forgotten to fit a by-pass (decoupling) capacitor on the i.c. input. Was my face red!

Hopefully, you'll now feel more familiar with capacitors and find it easier to identify the various markings. This will help you with some of the v.h.f. projects I've got underway for you soon.

Cheerio for now, and get busy sorting those goodie bag capacitors out now!

PW

***Note:** Many older capacitors were made by using the natural mineral mica - which can be split into very thin sheets - so thin that they can be translucent. Originally, silver was plated on either side of this almost ideal dielectric - hence the term 'Silver Mica' capacitors. They're still very useful indeed!).

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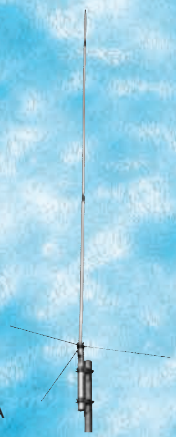

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25 Watts SSB
★ Freq Seps : 1, 10, 100kHz

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Icom's Window on

Rob Mannion G3XFD had much to say about the original IC-756PRO and now he's had the opportunity to try the new Mk II over a month's loan...he's impressed. In fact Rob's so impressed he's intending to buy one!

● The Icom IC-756PROII. Rob G3XFD/EI5IW was so impressed that he was reluctant to let it go back to Icom!

● Fig. 1: Oliver Norris (together with his wife Briege) were Rob EI5IW's hosts during his holiday in County Mayo. Oliver provided a selection of antennas and intends to put the experience to good use when he takes the RAE (when the exam is available in Ireland again that is!). Rob's *PW* IBP Beacon 'Clock' timer is next to the transceiver - and it proved a great help in evaluating which band to use.

When I reviewed the original IC-756PRO in the May 2000 issue of *PW*, I was impressed with the transceiver. I also said in the summary that: "*I feel sure the IC-756PRO is a model we'll be seeing many facility up-dates provide for in the future. In fact, like the Kenwood TS-870 became a few years ago - I feel that the '756PRO will become another 'classic' and I look forward to having one in my shack to up-date*".

Well, that opportunity arrived just in time for me to take the new rig with me to Ireland on a short combined holiday and *PW* 'club visit' trip, finishing up with the **Irish Radio Transmitter's Society's** Annual General meeting, rally and dinner in County Mayo.

The version loaned to me was made for the Japanese market...although apart from different band edges on 7MHz there didn't seem to be any major differences on the rig. I was delighted to get the chance to take it with me!

During the 10 days I was in Ireland - with a day in and out of Northern Ireland too - visiting the **Foyle and District Amateur Radio Society** in Londonderry, the weather was indescribably foul...except for one truly beautiful day. Because of the weather I didn't feel guilty about not seeing as much new countryside, enjoying the industrial archaeology (railways!) or looking up family and relations as I usually do.

So, apart from the enjoying the

F & 50MHz Transceiver - the World

radio - there were other 'distractions' - but as it's the newly-improved version transceiver you want to read about I'll waste no more time and get on with it! **However, I will not be writing this up as a review of a completely new transceiver**. Instead, I'll be concentrating on the improvements Icom have made and just how effective and useful I think they are (when I've been able to use them that is, as some are for specialised use only).

If you wish to see my full review of the original IC-756PRO I strongly recommend that you either refer to your own back number of the May 2000 *PW*, or if you don't have a copy contact **Clive Hardy G4SLU *on* (01202) 659930)** for help.

Design Changes

The information on the design changes and up-grading to the MkII version of the IC-756PRO (provided by Icom) make interesting reading and they start with the receiver. This has been up-graded from the band pass filter stage to the mixer stage. Additionally, the automatic gain control (a.g.c.) has been improved. Icom claim that these two improvements have led to a wider dynamic range, and a reduction of 3rd order distortion.

Digital i.f. filter: The digital i.f. filter shape is now selectable from either soft or sharp, and can be changed during reception. Icom state that the changes enable the digital filter sound to be changed to appear like an analogue filter.

One Touch Record/Playback button: This feature has been added and one of the four receive digital voice memories can be recorded/played back from any screen at the push of a button. Going to the digital voice memory screen is not necessary, and recording/playback can be done instantly, even when the spectrum display screen (bandscope) is in use.

External control function: By connecting a control device to the microphone connector, it's now possible to externally control the four voice memories (transmit) and all four of the memory keys. **Going to each function screen is not necessary**, so it's possible to operate the unit from many screens (an advantage during contest operation).

Increased performance of s.s.b. data mode: Even in the s.s.b. mode, when the i.f. filter bandwidth has been set to less than 500Hz, the band pass filter (b.p.f.) function switches on and filtering equivalent to c.w. filtering is possible. Additionally, the quarter turn dial tuning function permits precise tuning (Very effective for PSK31 mode operation).

Upper sideband now standard in c.w. mode: On the original IC-756PRO c.w. reception was fixed in the lower sideband (l.s.b.) mode. However, in the MkII, reception using the upper sideband (u.s.b.) is now possible.

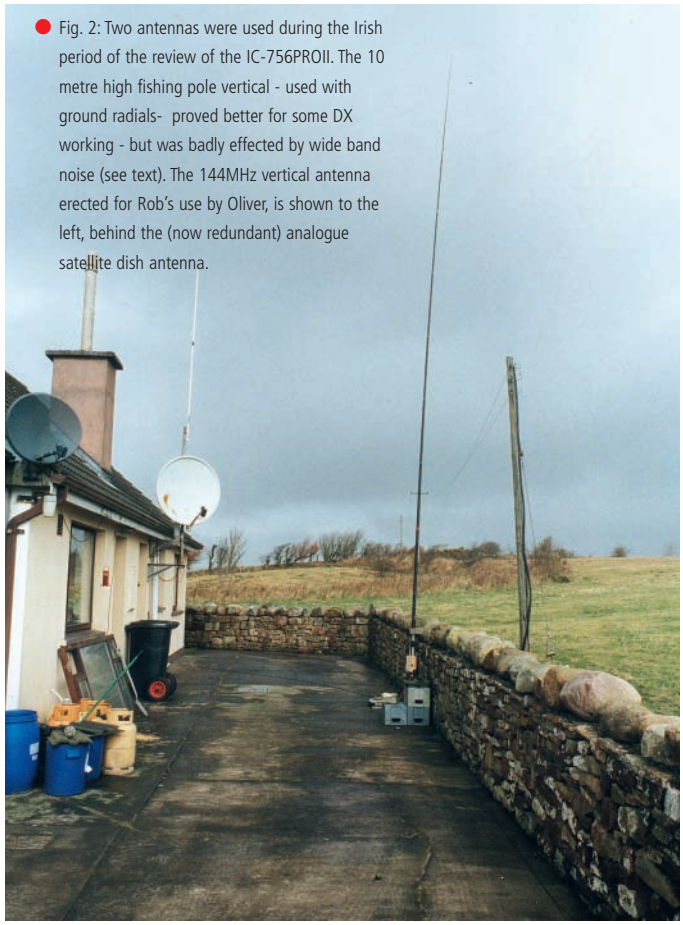

Fig. 2: Two antennas were used during the Irish period of the review of the IC-756PROII. The 10 metre high fishing pole vertical - used with ground radials- proved better for some DX working - but was badly effected by wide band noise (see text). The 144MHz vertical antenna erected for Rob's use by Oliver, is shown to the left, behind the (now redundant) analogue satellite dish antenna.

Other modifications/ improvements include: changed keyboard lettering and colour, the S-meter background is now white for improved readability. The noise blanker performance has been increased (0 to 100 level adjustment range has been added), and there are now eight new screen lay-outs with seven font styles. Additionally, the transceiver now has s.s.b./c.w. synchronous shift function added.

Features retained from the original IC-756PRO include: 32-bit floating point DSP, 4.9 inch colour TFT display, Twin Pass Band Tuning, Manual/Auto notch and reduction functions, Real time spectrum scope, RTTY 'on screen' demodulator and encoder. Full 100W output with 100% duty cycle, microphone equaliser, plus CI-V capability for PC control. The transceiver can be fitted with the optional voice synthesiser (UT-102).

Marked Improvement

There's no doubt about it in my mind...**there's a marked improvement and Icom have 'cracked it'** regarding the on air performance of the '756PROII, because in use performance was superb. Additionally...the transceiver's superb selectivity and operating ease-of-use had a very difficult testing time during the last weekend of my trip because it coincided with one of the major h.f. bands weekend s.s.b. contests. And in my opinion the rig came out with flying colours.

My hosts in County Mayo where I had five days of concentrated operating - were my good friend s.w.l. **Oliver Norris** and his wife **Briege**. It was the second time they'd put up with me

and my accompanying disruption! Oliver - shown in **Fig. 1**, spent many years in the Irish Army....can't you tell that's at least a General's moustache? As usual they were great - and looked after me well (I was a truly spoiled guest) and Oliver soon rigged up two good antennas which he'll soon be using when he passes his RAE!

The first antenna was my usual 10m glass fibre telescopic fishing pole system which I've now used for several years with great success. The photograph, **Fig. 2**, shows how Oliver quickly adapted his own home-brewed version of the *PW* 'Tenna Tourer' drive-on mast base so that it could be mounted upright with the help of some of the plentiful local stone.

Also seen in the photograph, Fig. 2, is the 144MHz vertical collinear which Oliver rigged so that I could chat to the locals with one of my hand-helds. (I was also able to use the antenna to listen on 50MHz). The h.f. vertical was used in conjunction with an extensive wire radial systems which he - with Briege's permission! - has left ready for my next visit to Mayo.

Not seen (because it's very difficult to photograph) is Oliver's full size G5RV which although very much in the clear is only 8m (24ft approximately) above the ground. Despite this - it was the antenna Oliver and I used most frequently due to bursts of broad band noise emanating from nearby unscreened telephone systems (this is becoming problem in the United Kingdom too) which could make 7MHz (in particular) unusable for minutes at a time.

Once we had set the station up in the room I use at Oliver's - it was straight down to business. I'd taken my prototype *PW* International Beacon Project monitoring 'Clock' timer with me and once correctly time set this proved to be very useful.

● Fig. 3: When power is switched on the IC-756PROII calibrates itself - a process which takes ten seconds...and G1TEX our photographer just caught it in time! Rob had already 'personalised' the screen by making sure 'Irish Whiskey' was entered!

Once again I found that the monitor scope l.c.d. viewing screen - first encountered on the '756PRO - to be extremely useful...providing what I call Icom's Window on the World'. (see **Figs. 3, 4, 5, 6, 7 8** and **9**). However, this time the full colour display seemed more reactive, providing a much more 'real time' display as to what was going on the h.f. bands.

Although I go into much more detail when I discuss working the bands later - I must at this point stress just how useful the spectrum display (combined with the superb adjustable DSP) turned out to be on 28MHz during my last weekend in Ireland. This was because 'Ten' was wide open and there were 'wall to wall' DX stations all calling 'CQ' and not apparently listening very much!

Either side of whatever frequency I was listening on I could see the many different stations pop up on the scope. The higher the trace on the screen the higher the signal level. If however a lower level signal appeared -let's say 50kHz up - I could immediately tune up to it and invariably be there quickly enough to work the station before the contesting hounds arrived!

Unfortunately, h.f. s.s.b. contests seem to attract a large number of high power stations using too much compression, badly adjusted linear amplifiers (perhaps non linear would be a better term!) in their attempts to score the highest points. However, all they seem to do is to upset other users, but when you have a transceiver such as the IC-756PROII equipped with both DSP and a spectrum monitor...you're well equipped to reduce the problems.

In fact, whilst trying (and succeeding) to work a DX station on Vancouver Island in Canada, while waiting my turn, a very strong continental station came up on air a few kilohertz below my frequency. Splattering like mad.. he was a problem until I adjusted the filtering (the settings are displayed on the screen) as I watched him try various frequency adjustments. Just as I was satisfied...he suddenly leap-frogged up in frequency to where it was clear...just above my listening frequency. It was obviously him because his 'footprint' was so obvious. Nothing else for it...I quickly adjusted the filters to minimise his presence. No more trouble...but I was able to see the offending station in action all over 28MHz that day!

Icom seem to have spent much effort in making the main display clearer, more responsive and better in brighter ambient light. In fact it shows great improvement...and even on the (all too rare I'm afraid) times bright sunshine shone into the room I could see everything on the display very clearly - except the Radio Teletype (RTTY) indicator (more of that later).

Incidentally, whilst talking about the extremely effective main display I would like all Amateur Radio manufacturers to take note of one shortcoming in modern equipment! It's the lack of a really decent 'bale bar' or decent length retractable stands to lift a rig up to provide a good viewing angle. How about it folks? Surely it should be possible to provide something built-into the rig to provide what's needed? I ended up using a plastic pill bottle with a fairly broad bottom and top and to support the '756PROII and then got the full advantage of the marvellous viewing screen.

Spectrum Display

One or two people - commenting on my original review of the IC-756PRO - have recently said that "Isn't the monitor scope display feature rather a gimmick". My reply that "Once you've used it...you'll feel you're tuning blindly when I used another rig' was really brought home to me when I used my mobile/portable h.f.. rig in the car on several occasions. It really did feel as though I was 'tuning blindly' when using my little Alinco DX-70 which is kept for use in my car!

On 7MHz I was able to look at the whole band with the display set to its maximum span. When I first encountered the appalling interference from the telephone wires - I could see just what we were facing on that band - when the spiky digital format signal burst was seen to spread over the whole band! Everything was lost during

● Fig. 4: Close up view of the transceiver's main screen, showing the main frequency displays, and sub-display. Note the filter selections and positions (top of display). The lower section has the multi function meter display selected.

● Fig. 5: The main Spectrum Scope display in action. Note how noisy '80' is! Note also the very strong signal some 50kHz below the tuning marker (hatched red line at the centre of display).

● Fig. 6: A busy (but not so noisy) 14MHz band. Note that the spectrum display is set to show ±12.5kHz either side of the central frequency marker. (The maximum frequency span provided for is 100kHz).

the time it appeared...and on many occasion the G5RV had to be used because it was much further away from the telephone wires than the vertical.

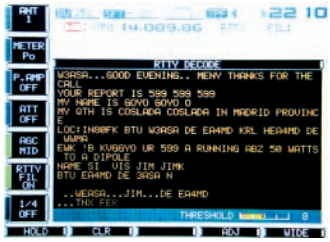

Fig. 7: Screen shot of a 14MHz RTTY QSO between W3ASA in the USA and EA4MD in Spain. Note the RTTY filter is shown selected (top left) and the RTTY tuning indicator (to left of clock display) at the top of the screen. (See text reference RTTY tuning).

Fig. 8: Main screen display close up view showing filter setting and adjustment display selected. The IC-756PROII enables the operator to select an excellent variety of filter settings, and other operating parameters, to suit their needs.

Fig. 9: Main display with a.g.c. setting selected, ready for adjustment if necessary. Adjustments can be carried out when the transceiver is in use.

The real time improvement on the spectrum display has now improved so much that it's new possible to track the ionospheric sweepers and other frequency agile transmissions which inhabit the bands alongside (and often on top of!) of Amateur Radio transmissions. It's truly fascinating to see these transmission travel up the bands and through your working frequency!

Many Contacts

Oliver and I made very many contacts during the five days I was 'on holiday. Best DX for me using EI5IW was Vancouver Island, Hawaii, ZL and VK with some very complimentary remarks on the audio quality too.

At one point **Brendan Minish EI6IZ**, from nearby Castlebar, came to join us. Brendan (who has an IC-756PRO) was most impressed with the new '756PROII and although he said he'd love one I know he's got a problem because his wife is expecting twins very soon! However, Brendan scored one over me...the station I was working when he arrived said Aidna's voice was better' radio quality' than mine! (I was piqued...but of course we know the remark is true...why else would we hear so many Irish voices on broadcasting stations?).

Much of my inter-Europe working was done on 7MHz and I particularly enjoyed working **Rob M3LJE/M** for over an hour, under very difficult conditions. Rob was driving his service van from Cockermouth in Cumbria to Lockerbie in Scotland - his 10W low power s.s.b. struggled - but the superb new noise blanker really helped us during the (many) periods of noise from the telephone lines. Incidentally, Rob was the first ever M3/M I've worked! (Great fun Rob, hope to see you on the bands again soon).

As band conditions (and the noise - together with deliberate interference on occasions) were not at all good during the day...the IC-756PROII's DSP and improved receiver stages were really put to the test. Previously, with the original model I'd been left thinking there was room for improvement - and now I had it in front of me! **I was most impressed.**

Teletype Reception

With the improved display, I enjoyed Amateur teletype (RTTY) reception - especially on 14MHz. It's very easy to set up and on many occasions I just left the rig running on the frequency I'd first tuned into and watched what was going on.

Reception of RTTY is very good - however, the filter which is used in this mode is of such good quality (It's extremely 'tight' indeed) that I found it easier to tune into the signal while switched onto the c.w. mode and when tuned in, the RTTY mode could be selected together with the display. Final adjustment (if it was needed) could then be carried out with the receiver incremental (RIT) control whilst watching the RTTY tuning indicator. **Tex Swann G1TEX (*PW* Technical Projects Sub-editor)** commented on this, as did **Kevin Nice G7TZB** (Editor of *Short Wave Magazine*) when they tried the receiver out.

Incidentally, Kevin G7TZB was **so impressed** with the IC-756PROII that he's intending to feature it in ***Short Wave Magazine***, concentrating on the specialist receiving side. So watch the *SWM* space!

Broadcast Bands

During my work at home I do a great deal of listening on the broadcast bands and to be honest....most Amateur transceivers lose out badly here because of fixed, narrow filtering. Not so the '756PROII - you can tailor the filtering to suit the station (and the quality of audio required) to just how you want it.

Enjoying listening to Radio Canada International's 49 metre band transmission one evening - I had the '756PROII on a wide bandwidth when suddenly a strange Arabic station appeared just h.f. (and not on the International frequency spacing either) - but the strange wailing music and chants (standard on these stations) wasn't a problem for the transceiver It was a moment's work to adjust the pass band to eliminate the annoyance, whilst keeping the maximum bandwidth for the Canadian programme. A very enjoyable process indeed!

In fact, at the very end of the review period I was attacked by one of those unpleasant '24 hour' viruses and it left me feeling very ill over a weekend and well into the next week. I was indeed fortunate to have the '756PROII at my bedside...where it worked for 24 hours at a time as I rested in bed listening to everything from Radio Netherlands to Shanwick (Aeronautical) Radio and the Amateur bands. It was a pleasant medicine to have...and it helped!

PW

Product

The Icom IC-756PROII

Accessories

Supplied accessories include power supply leads, microphone and manual

Pros & Cons

Pros: Much improved main display, spectrum monitor scope display now provide much more realistic 'real time' presentation of selected bandwidth on and either side of receiving/transmitting frequency. Display now much better with brighter ambient light. The DSP facilities seem markedly superior to previous model. Superb audio quality - tailorable by operator from very narrow band working for c.w. right up to wide band for best audio reproduction on broadcast stations. Superb audio on receive and transmit.

Cons: Extremely tight (non user adjustable) RTTY filter. Difficult to adjust RTTY tuning with filter in. Slightly 'fiddley' series of rotary controls on the lower left side of main control panel - particularly noticeable when headphones, key and microphone all connected.

Price

£2749.91

Summary

Generally speaking I was immensely impressed with the MarkII version of the IC-756PRO. It's a delight to use and I was genuinely sorry to send it back to Icom! No rig will ever be perfect for every operator and the few shortcoming I've mentioned I know I can live with! And even bearing in mind that there are bound to be further modifications and improvements to this transceiver (It's going to be with us for a long while) I have decided to buy one as soon as possible. It's that pleasing to use!

Thanks

My thanks go to
Icom (UK) Ltd.,
Sea Street,
Herne Bay, Kent CT6 8LD,
Tel: (01227) 741741,
FAX: (01227) 741742 for the loan of the review model.

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- 100W output on HF & 6mtrs
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- 100 memories
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- All modes, FM, LSB, USB, CW & AM
- 100 memory channels
- Built in speech compressor
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- Optional keyer

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Auto Tuner

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

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

£289.00

HFM-1

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

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

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ALINCO DR-605E Dual Band Mobile

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

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

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DJS 193E

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- Wide RX possible (typical 135-173MHz)
- CTCSS + DCS enc/dec fitted
- 40 memory channels + 1 call channel
- Alphanumeric display
- DCS, Tone burst and DTMF
- 13.8V DC direct input facility with battery charge feature
- THEFT ALARM!
  Emits a tone when disconnected from power
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  Activate the special tone and decide for yourself!

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A feature packed dual bander - yet simple to use, with the capability of Digital Voice operation (where permitted - using optional digital voice board).
A nickel metal-hydride (NiMH) battery is supplied as standard, for added power and convenience.
VHF/UHF TX/RX including cross-band split operation

- 100 memory channels, any mix of VHF/UHF
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- Large backlit display and keypad
- CTCSS, DCS encode+decode
- DTMF tones and autodial memories
- Tone bursts
- Three scan modes
- Theft Alarm feature
- Wide and narrow FM TX/RX
- 12VDC direct input (5w output)
- High-power NiMH battery (4.5w output VHF/4w UHF)
- Busy Channel Lock Out
- Mosquito Repelling feature (experimental)
- External Terminal Control
- Wire cloning capability
- Optional digital mode *(where permitted)*

£199.95

DJS 195E

2 mtr Handheld with Keypad

Alinco has created a new 2 meter HT that sets new standards in features, convenience and easy operation. The DJ-195 sports an alphanumeric display for easy memory management. It has an ergonomic design that's "user friendly" and the 5 watt output battery is standard. You'll be ready to travel the world with CTCSS encode+decode, DCS and European tone bursts, all included at no extra cost.

- New 2 metre (144-146MHz) handheld
- Easy to use, direct entry keypad
- Wide RX possible (typical 135-173MHz)
- Up to 5 watts output (0.8W low power)
- 40 memory channels + 1 call channel
- Large range of accessories available

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A brilliant twin band handheld that does everything including spectrum display of 4 adjacent channels. The receiver has a superb front end that does not suffer with breakthrough like other handhelds and has CTCSS/DTMF built in as standard.

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- RX expandable 108-173.995AM/FM 420-479.995 + 800-920MHz
- Built in CTCSS tone encoder & decoder
- DSQ encoder/decoder as standard
- Optional receive to include Airband
- Full VHF/UHF Duplex
- 100 memories
- Over air cloning
- Cross band repeater function
- Up to 5W RF output
- NiCad battery
- Charger, Rubber Duck antenna and Belt clip

Advanced Channel Scope

- Monitor 5 freq activities in VFO/Memory modes
- Simultaneous monitor of VHF/UHF bands
- Real time monitor of 11 channels during mono band operation
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- Memory mode
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DJ-S40 CQ

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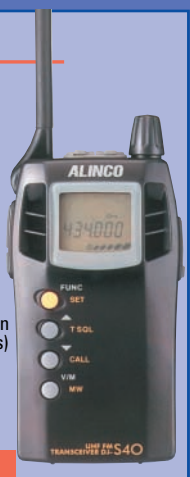

Alinco has created a new UHF FM Hand held Transceiver that sets new standards in features, convenience and easy operation packed in a compact pager-size package. The DJ-S40T has an ergonomic design that's "user friendly" and capable of 1 watt output with optional Ni-MH battery pack. You'll be ready to travel the world with CTCSS encode/decode and European tone bursts, all included at no extra cost.

- Up to 1 W output (with 13.8V supply)
- Large illuminated display
- Loud clear speaker horn system
- 100 memories+1 call channel
- Multi Scan functions
- 38 CTCSS tones for selective calling
- S-meter
- Cable Cloning
- External device control feature (outputs 3Vdc 5mA signal from an accessory port when squelch opens)
- Additional features, including anti-theft alarm and experimental mosquito repelling tone!
- Huge selection of accessories available

£99.95

DJV5E

Compact Dual Bander

Alinco introduces an exciting new VHF/UHF handheld-transceiver that will change the way you think about communications. The new Alinco DJ-V5 can fill a variety of roles and it does them all well. Loaded with technical features, 5 watts of output power and a wide array of operator conveniences, the DJ-V5 is an attractive radio in a compact package.

- New dual band handy transceiver
- 5W/1W/0.5W output power
- Super wide receive (76-999MHz)
- Includes wide FM mode
- CTCSS Encode+decode, DTMF squelch and 4 different European Tone Bursts
- 200 memory channels +2 call channels
- Alphanumeric Display, up to 6 characters
- Autodial memories
- Up to 6 character alpha-tagging
- 4 scan modes, 5 programmable scan banks
- Input voltage display with over voltage warning
- Automatic high temperature protection feature

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CHAIN HOME RADAR...

A Vital Part Of Britain's Defences 1939-1945

Brian Kendal G3GDU continues the story of the early Radar protection which provided early warning of enemy aircraft during the Second World War. In operation before September 1939 - it was to prove vitally important.

Bawdsey Manor - where it all started

After the success of the Daventry experiment, which I described in the April 1998 issue of *PW*, progress towards a practical Radar was rapid thanks to the research at Bawdsey Manor (shown in heading photograph). Even by 1936 the Air Ministry felt confident to place an order for a chain of five stations, **Fig. 1**, to protect the Thames Estuary.

When the five stations were in operation, they proved so successful that the order was extended by a further 19 stations to cover the coast of Britain from the Isle of Wight to the River Tay in Scotland. All of them were operational before the outbreak of war in September 1939.

Arnold Wilkins, **Robert Watson Watt's** (later Sir Robert Watson Watt) deputy was given the responsibility for station location. Accordingly, in late 1936, a specification for site selection was prepared. This included preferred height above sea level, distance from the coast, the availability of power supplies, etc.

The proposals were forwarded to the Air Ministry for approval who returned them unchanged....except for one amendment: "that the choice of the site should not gravely interfere with grouse shooting"! (Some of the stations would be built on the Yorkshire moors and in Scotland and someone was obviously making certain that, in planning the Air Defence of Great Britain, the right priorities should be observed).

The Metropolitan Vickers Company were given responsibility for producing the 'Chain Home' transmitters, A. C. Cossor for the receivers and the Marconi Company for the antennas. The total costs of the contracts amounted to about £10,000,000, which was a measure of the importance invested in the endeavour by the British Government.

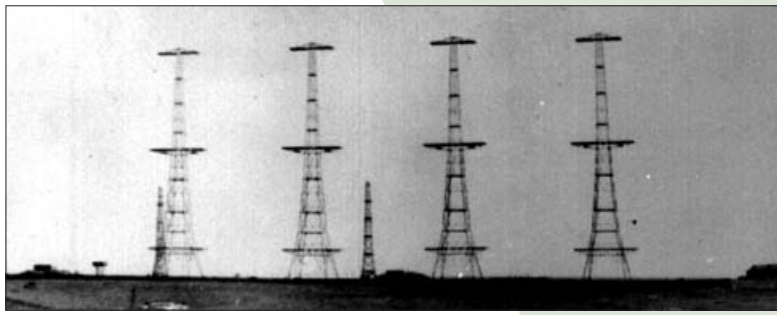
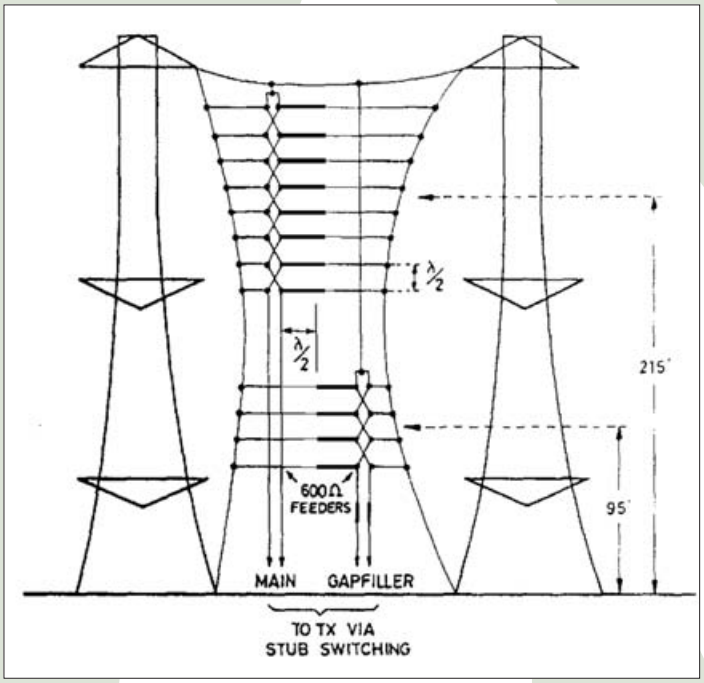


Fig. 1: Historical photograph (hence quality!) showing the antenna systems of a typical East Coast Chain Home (CH) station. The four towers in the foreground carry the transmitting antennas and those in the background, the receiving antennas (see text).

Chain Home Principle

The basic principle of the CH system was quite simple. The volume of sky under surveillance was floodlit with pulsed r.f. energy and the echoes from all aircraft within the floodlit area were received and displayed on a simple range display.

Return signals were received on two sets of crossed dipoles at different heights on the receiver masts. By comparing the signal received on a pair of crossed dipoles, the bearing of the incoming echo could be



● Fig. 2: Historical diagram illustrating the lay-out of the transmitting antennas at a Chain Home transmitter (see text).

measured and by comparing the signal strengths received on dipoles at differing heights, the height of the target could be determined.

Four Transmitters

Initially, it was intended to provide each station with four transmitters, operating on four allocated spot frequencies in the 20 to 55MHz band. The antenna system used four 110m (360ft) steel towers for the transmitting antennas, **Fig. 2** and four 73m (240ft wooden towers, **Fig. 3**, for the receivers, each pair of towers being dedicated to one spot frequency.

It was later decided to abandon the four frequency plan. Instead, it was decided to simply have main and standby equipment on a frequency in the 20 to 30MHz band at each station

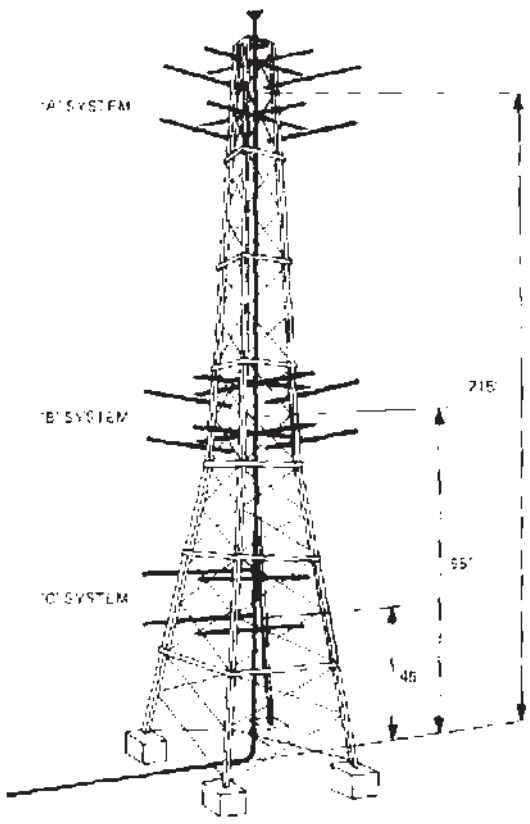
There were a number of variations in station layout, but the best known are the East Coast Stations. These employed two Type T3026 transmitters, each giving 350kW (later 750kW) output.

In operation the pulse length was 20 microseconds (20μs) and the pulse repetition frequency (p.r.f.) was either 25 or 12.5Hz. The design was derived from transmitters previously provided for the short wave station at Rugby.

Originally intended for continuous wave (c.w.) operation, the requirements for a low duty cycle with a peak output of 350kW was completely outside the circuit designer's experience. Furthermore, power radiated during the interpulse period had not to exceed a few microwatts so as not to interfere with reception of echoes.

Many ideas were tried to meet the very stringent requirements and the final circuit used a modified Hartley oscillator tuned to half station frequency. This was gated by a fast positive going pulse applied simultaneously to both control and screen grids.

The oscillator was coupled to a balanced doubler/driver to a pair of Type 43, water cooled demountable tetrodes. The output was fed via Pyrex d.c. blocking capacitors to balanced 600Ω lines to the antenna system.



● Fig. 3: Illustrative sketch (re-drawn from Second World War illustration) showing the positioning of the receiving antennas on the wooden towers used for the purpose (see text).

The power requirements for the T43 valves make interesting reading! The filament required **18V at 140A** and the anode voltage was 35kV to provide an output power of 750kW.

There were two antennas available to each transmitter and they were mounted between adjacent 110m (360ft) steel towers, each having cantilever platforms at 106m (350ft), 61m (200ft) and 15m (50ft). The main array was located between the upper and centre platforms, providing a mean array height of 66m (215ft) and comprised a stack of eight, end fed, half-wave dipoles with reflector elements placed 0.18 wavelengths to the rear. This produced a broadside radiation with approximately 100° beam width.

In the vertical plane, the main lobe had an elevation of 2.6° with the first gap at 5.2°. The gap in vertical coverage was filled with an array of four end fed dipoles located between the lower two platforms, which had a mean height of 29m (95ft) giving a main lobe at about 6°. These were known as the gap filler antennas (The selection of antennas could be made remotely by the operator).

The Receivers

Three sets of receiving antennas at heights of 66, 29 and 14m (215, 95 and 45ft) were located on each of four 73m (240ft) wooden masts. The upper two systems on each mast were identical and consisted of centre fed, horizontal crossed dipoles. The dipoles were aligned to look N-S and E -W and behind each dipole was a centre switched reflector.

The upper set of antennas were at the same effective height as, and used in conjunction with, the main transmitting antenna array. Due to their height, they suffered the same gap in coverage at 5.2° as the transmitting antennas. The aerials at 29m (95ft) matched the height of, and were used in conjunction with gap filler transmitting antennas.

The lowest set of antennas consisted only of dipoles and unswitched reflectors, these being used only for height finding when the system was operating in the gap filler mode. The antennas were coupled by high quality coaxial feeders to the receiver via a Goniometer.

The Goniometer is a device which contains two sets of fixed coils, mounted at right angles. Inside these coils is a rotatable (known as the search) coil. The output from the N-S dipole is fed to one fixed coil and from the E-W dipole to the other . From these, a signal is induced into the search coil, the amount

from each being dependent on the position of the search coil. The search coil is rotated for minimum signal, the position of this being a measure of the position of the received echo relative to the antenna system.

With such a simple crossed dipole array, it's not possible to determine whether the signal is originating from behind or in front of the antenna array. Having determined the bearing, therefore, the operator would then turn the Goniometer a few degrees off bearing and energise the switch in the centre of the reflector elements. Then, if the signal was originating from in front of the array, its strength would increase and if behind, would decrease. (This is known as sensing).

Fig. 4: A typical CH receiver room. The WAAF to the left is adjusting the Goniometer while observing the cathode ray tube (c.r.t.) display. Brian Kendal G3GDU says "Why the WAAF Corporal in the foreground is operating a Morse key, I cannot guess"? (Perhaps readers can help here?).

The receiver, which was designed and constructed by A. C. Cossor, comprised three push-pull r.f. stages feeding a push-pull mixer. This was followed by a single-ended five stage intermediate frequency (i.f.) amplifier giving a choice of: 500, 200 and 50kHz bandwidths.

After full wave detection and video amplification, the signal was applied to the Y-plates to give a downward deflection on the display cathode ray tube (c.r.t.). An additional signal was applied to the Y-plates from the calibrator unit which produced a series of upward marks at 16km (10 mile) intervals. The X-plate waveform was, of course, synchronised to the transmitter pulse.

Height Finding

Earlier in this article, I have several times mentioned that the vertical radiation pattern had a low lobe at 2.6° with a gap at about 5.2° which was filled by the lower antenna array. This characteristic was also used for height finding, using a technique which was originally developed by Arnold Wilkins for determining the angle of incidence for transatlantic radio signals.

By comparing the signal strength received by two antennas at differing heights with known lobe patterns, the angle of incidence can be calculated. From the angle of incidence, the range and allowing for the curvature of the earth, the height of the target can therefore be determined.

The comparison of signal strength between the two arrays was made using the Goniometer which was switched between the appropriate antennas. If the gap filler antenna was in use, the signal comparison was made between the lower pair of antennas.

The calculation was far to complex to be performed by the operator. So use was made of an electro-mechanical computer, known as the 'fruit machine', which had been designed and constructed by the General Post Office (GPO) staff at the Dollis Hill research Laboratory in London. The reading of the Goniometer was input to the machine which had already accepted the range, and this then performed the required calculation. Corrections could also be applied for locally induced errors, such as terrain, etc., which had been determined on the initial calibration of the station.

Initial Calibration

There were obviously many variables due to manufacturing tolerances and local terrain at every site and these had to be compensated for during the initial calibration of the equipment. Most of the variables could be compensated by a slight variation of length in the receiving antenna feeders. This was achieved by fitting a phasing box between feeders and Goniometer.

The phasing contained lengths of television-type twin feeder. These were folded up in the box and trimmed to length during the initial calibration of the station.

Calibration was performed in a number of ways. Prior to the war, balloons were frequently used, but after the outbreak of hostilities calibration aircraft were flown on predetermined courses or, more frequently, an autogyro with a half-wave element suspended below was found more convenient.

Performance Remarkable

For such a relatively simple equipment the performance was remarkable. From the earliest days, an aircraft at 4600m (15000ft) could be detected up to 225km (140 miles) range and targets at 3050m (10,000ft) could be detected at 160km (100 miles.)

When within the radar's coverage, the height could be determined to reasonable degree of accuracy. The characteristics of the returns from single aircraft, small and large formations were distinctive, and the (mainly) Women's Auxiliary Air Force (WAAF) radar operators, **Fig. 4**, became adept at estimating the composition of incoming raids, **Fig. 5**.

The main weakness of the system was that, due to the frequencies used, the low level cover was poor and it was possible for hostile aircraft to approach unseen under the radar cover. Fortunately, the Luftwaffe thought that RAF radar systems would have similar low coverage characteristics to their own v.h.f. systems and very little advantage was taken of this weakness.

By the time that the weakness was realised, the RAF had installed a additional system using 200MHz equipment (Chain Home Low, or CHL) which had improved low cover and after the invention of the cavity magnetron, even lower cover was possible using 10 centimetre equipment (Chain Home Extra Low, or CHEL).

Key To Success

The real key to the success of CH radar, however, was not so much the efficiency of the radar equipment, but the manner in which it was used. It was well known that the bearing of individual returns could be several degrees in error, although the ranges were quite accurate.

Plots from a number of installations were therefore passed to a filter room where reports from adjacent stations could be compared and a mean position of the hostile aircraft determined. This position was then relayed to the sector Fighter Controllers for appropriate action. This system was used to great effect throughout the Battle of Britain and, doubtless, without it the outcome may well have been different.

The greatest advantage of an integrated radar system was that it eliminated the pre-radar need for standing patrols. In this, flights of fighter aircraft had to patrol the approaches to the country to give warning of any approaching hostile aircraft.

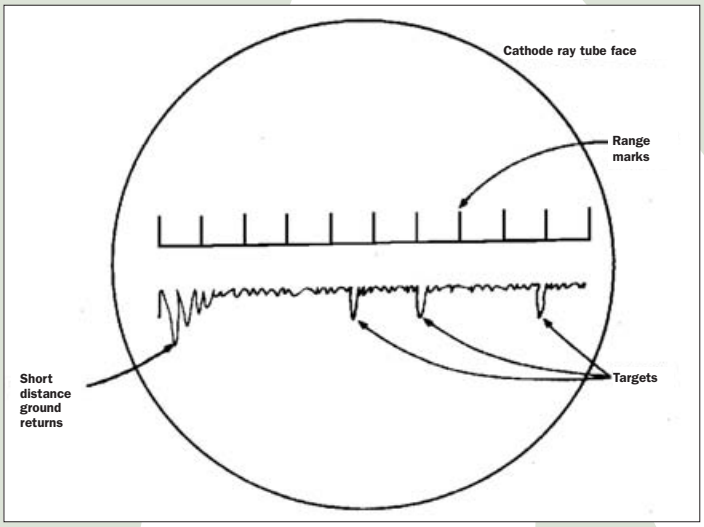


Fig. 5: A re-drawn wartime illustration showing the display presented to the operators at a CH station. The cathode ray tube (c.r.t.) was approximately 305mm (12 inches) in diameter.

On making a sighting, the standing patrol would contact their Sector Controller giving details of the incoming raid, but would not intercept as, in all probability, they would have insufficient fuel for combat. The sector controller would then detail a suitably located squadron to take off and perform the interception whilst the standing patrol resumed its 'beat'.

The standing patrol system was extremely wasteful in terms of flying hours and was also very fatiguing for the pilots concerned. Radar effectively replaced the standing patrols and made all squadrons available for combat, in effect, more than doubling the effective strength of Fighter Command.

Battle Of Barking

There were, however, some failures which had sad consequences. The first failure later became known as 'The Battle of Barking Creek'. Every description of this episode varies to some degree, but as far as I can ascertain the sequence was as follows.

Three days after war was declared on the 6 September 1939, two Blenheim aircraft were returning after a patrol, but failed to switch on, or did not have Identification Friend or Foe (IFF) equipment fitted. The radar chain identified these as 'hostiles' and the sector controller scrambled 12 Hurricanes of 56 Squadron from North Weald to investigate.

As the Hurricanes climbed to gain height, they were inland from the coast but appeared on the Canewdon, Essex (**Fig. 6**) CH radar screen. At this point there was either a system failure or the operator failed to check the sense of the return and reported a number of aircraft at a reciprocal bearing, which gave the impression of another squadron of hostile aircraft approaching over the North Sea. To meet this imagined threat, the sector controller then scrambled the Spitfires of 74 Squadron from Hornchurch to intercept.

Fig. 6: The last remaining CH tower. This was removed from Canewdon (Between Burnham-on-Crouch and Hockley in Essex) and re-erected at Marconi's factory at Great Baddow, also in Essex.

Meanwhile, the 56 Squadron Hurricanes sighted the Blenheims and wrongly identified them as Junkers JU88s and immediately attacked causing severe damage to the returning bombers. Almost simultaneously, the 74 Squadron Spitfires, who had climbed more quickly than the Hurricanes, sighted the melee below and wrongly identified the Hurricanes as Messerschmit Me 109s and dived out of the sun to attack, shooting down two.

Had either IFF been available and operating on all aircraft or the sensing on the Canewdon receiver system been working correctly, the tragedy would not have happened. But, regrettably, such things happen in wartime, particularly in the early days when radar operators and pilots are still relatively inexperienced.

Black Day

Another black day for the CH radar chain was on 12th August 1940. This was when the Luftwaffe used Messerschmit Bf 110 and Junkers JU88 aircraft in a dive bombing role to attack five CH stations: Dunkirk (Kent), Dover, Rye, Pevensey and Ventnor (IoW) on the South Coast.

During the attacks, the WAAF radar operators remained at their posts and many were killed. Severe damage caused and all except Dunkirk to go off the air, leaving a huge gap in the radar screen.

Fortunately, none of the masts were demolished. Additionally, as the Germans believed that the operations rooms were deep underground, they did not realise the extent of the damage which they had caused.

Very quickly, mobile transmitters were brought to the sites and transmissions were resumed within a few hours, giving the impression to any monitoring stations that the chain was still fully operational. This fooled the Germans into thinking that the chain could not be broken and the stations were never again attacked.

Although CH radar remained operational throughout the war and for several years afterwards, the shorter range plotting and fighter control later became the responsibility of the Ground Control Interception (GCI) stations which were equipped with v.h.f. and centimetric radars feeding Plan Position Indicator (PPI) displays. However, the CH stations came into their own again during the very last stages of the War.

Rocket Attacks

When the Germans started their attacks with their V2 rockets, we had the problem of detecting them soon after launch, assessing their probable trajectory, estimating their possible impact point and giving suitable warning. Furthermore, if the launching sites could be pinpointed, these could be attacked by Allied aircraft.

A system was rapidly devised where a system of simultaneous range measurements from Bawdsey, Great Bromley, High Street, Dunkirk and Swingate stations being made as the rocket passed through their vertical lobes. This was further assisted by the fact that the length of the V2 rocket was very close to a half wavelength at the CH operational frequencies and therefore made an excellent radar target.

Crude But Remarkable

Crude as it may be by modern standards, CH was a remarkable achievement for the time, and there is no doubt that, without it we would not have survived. We should be eternally grateful to men of the calibre of **Sir Henry Tizard**, Robert (later Sir Robert) Watson Watt, Arnold Wilkins, **E. G. Bowen** and many more, who had the vision, ability **and, above all,** courage to forge a system of the complexity of Chain Home within the brief time available.

PW

Rotary Dipoles

Patrick Allely GW3KJW reports on simple rotary dipoles that can improve your signals as well as save on support poles!

One evening, at my local radio club, I was waxing lyrical about working DX and turning my dipole, when I was interrupted by the simple question, "How do you turn a dipole"? This simple question made me realise that the concept of a dipole antenna in the minds of most radio enthusiasts, is a resonant length of wire, fed in the middle, and supported at each end with something strong and preferably high.

At my QTH I only use the one mast to support all my various antennas, so I've used beams, verticals and inverted V systems. I've a G5RV multi-band antenna which works fine on 3.5, 7 and 14MHz, but is not as efficient on 21 and 28MHz as I would wish.

A world-wide contest was coming up, propagation conditions were good, and I wanted to operate on 21MHz with some degree of success. The answer was blindingly obvious (eventually), forget about wire antennas and think about alloy tubing and start thinking about length.

By using the general formula (to be found in many books) the overall dipole length should be half of {285/*f*(MHz)} metres long, I decided that the antenna should be resonant around 21.2MHz. I calculated that the overall length should be 6.73m.

It's not that the dimensions I'd arrived at were really critical, as I intended to operate over the whole band and would be using a matching unit to tune out any odd reactance. This meant two lengths of alloy each just over 3.35m long and something to support them, and some method of affixing everything to my mast above the rotator.

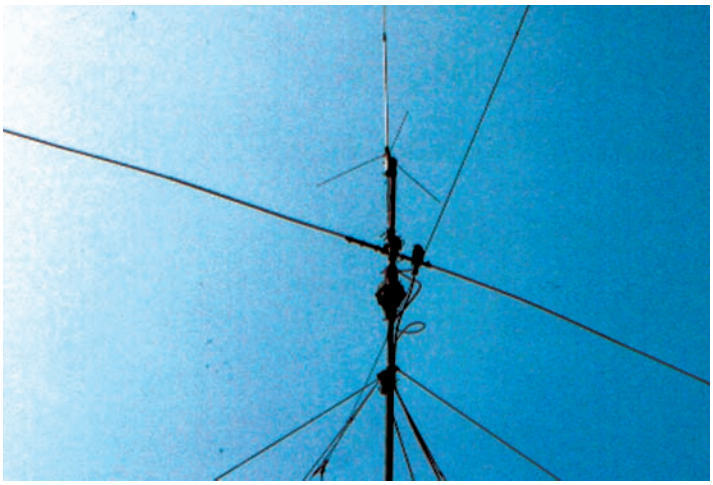


Fig. 1: Bits and pieces from the scrap-box are all that Patrick needed to create an effective dipole in the form shown here. The overall lengths will need to be calculated as described in text.

Compromise Antenna

In any case, being a compromise antenna it is not as efficient as a dedicated dipole for any one of the bands it tunes, and there is no way that I could easily turn it.

Over the years I have made various v.h.f. beams from 50MHz up and had accumulated a quantity of alloy tubing of various lengths and diameters. This heap of metal was gathering cobwebs at the back of my garage and could be put to good use. A root through the heap, produced enough metal to make up the required lengths although in more than just two sections.

I realised that I would have to make up each 3.37m length with three pieces of tubing. This turned out to be better than using a single diameter length which will droop alarmingly under its own weight. It's far better to use small lengths of decreasing diameter and insert them into each other. In any case, the metal I had was not of uniform length.

Cobbled Together

Eventually I cobbled together two element lengths each consisting of three pieces of alloy. I allowed an insertion length of about 150mm for each length to slot into the bigger diameter piece and fastened the pieces together by crimping them with gentle clouts with a big hammer. On a subsequent dipole I made I used 25mm diameter jubilee clips, which is a much better idea.

When the two sides of the dipole were finished, I again checked the lengths and thought of how these two section, each a little over three metres long, were to be held rigidly in a straight line. The two parts of the dipole had to be insulated from each other and insulated from the metal mast on which it would be supported.

Wood is a good insulator and I had a length of 25mm round wood, in fact a broom stave which was already varnished. I cut it to a 900mm length and bound it with insulation tape. I now had my centre-supporting piece and it was time to think of how to secure the two lengths of the dipole to the centre piece.

I had to spend some money purchasing six 50mm Jubilee clips, three for each side. Each of the two dipole pieces were placed up against the centre support leaving a gap of approximately 150mm between them. This is where the mast clamp would be placed.

Three jubilee clips were fastened on each side holding the two parts of the dipole to the wooden centre piece and before finally tightening everything was

adjusted to ensure that the whole dipole was in a straight line. It was very light and only drooped a few inches at either end.

Feeding The Dipole

Now to feeding the dipole! I already had a length of low loss 50Ω coaxial cable, terminated with an N type plug, running up the mast from the 144MHz array that had been removed for the winter months. This was the cable I intended to use for the 21MHz dipole. the coaxial cable was fastened with a cable tie to the mast just below the termination point, this was to stop the coaxial cable from pulling away from the dipole as the mast turned.

To connect to the dipole, I drilled two small holes through the inner ends of the dipole into which I placed stainless steel bolts, held in place with nuts and washers. Then, in my junk box, I found an N type socket and soldered two long, strong wires to the inner and outer connections. I then weatherproofed these joints as best I could. The two short wires were terminated with solder tags were then fastened to the bolts on the dipole.

I'd previously tried the antenna on a short mast in the middle of a back garden, when the s.w.r. had be good. With the matching unit, unity s.w.r. reading was obtained and the antenna was pulling in signals. Mounted 150mm above the rotator and at 10.5m the antenna was everything I could have wished for.

The signals coming in were much stronger than through the G5RV and the matching was excellent. The contest I had wanted to operate in had started and soon I was exchanging reports and having a great time.

The Great Thing

Now the great thing about horizontal dipoles is, that when considered from above, they have two main lobes broadside on to the run of the antenna. So, if the ends of the dipole are pointing North and South, maximum radiation is east and west, and by turning the dipole just 90°, maximum radiation is now North and South.

There's also quite a null in signals at 90° to the maximum. In practice this produces some interesting results, in that with the antenna running NE-SW, I've worked China and then Brazil as successive contacts without turning the antenna. Similarly Reunion Island and the United States can be heard and worked at the same time.

Pleased with the results of this first rotary dipole, I decided to make another one, this time for 28MHz. The metal store was again raided but this time I used jubilee clips to clamp the lengths of metal together. I used a separate feed line of 50Ω coaxial cable and mounted this dipole about a metre above the 21MHz antenna on the stub mast from the rotator.

The new antenna works well and there seems not to be any interaction between the two. I could have used a single feed line, feeding both antennas from it to save another length of cable.

Wind Resistance

I consider that a dipole made with alloy and clamped to a mast has less wind resistance than a wire antenna with a weighty centre feed point and dangling coaxial feed and of course I am spared the bother of finding a second high point on which to hang one end of an antenna.

The 28MHz antenna, when taken apart as two lengths is small enough to be transported in a car and I've used it at a Scout Jamboree on the Air station (JOTA). As expected it performed well on the designed band, but the operator, being an adventurous chap decided to load it up both on 24 and 21MHz. To his delight and my surprise, with the matching unit, the antenna worked on all three bands and provided a number of contacts with good reports.

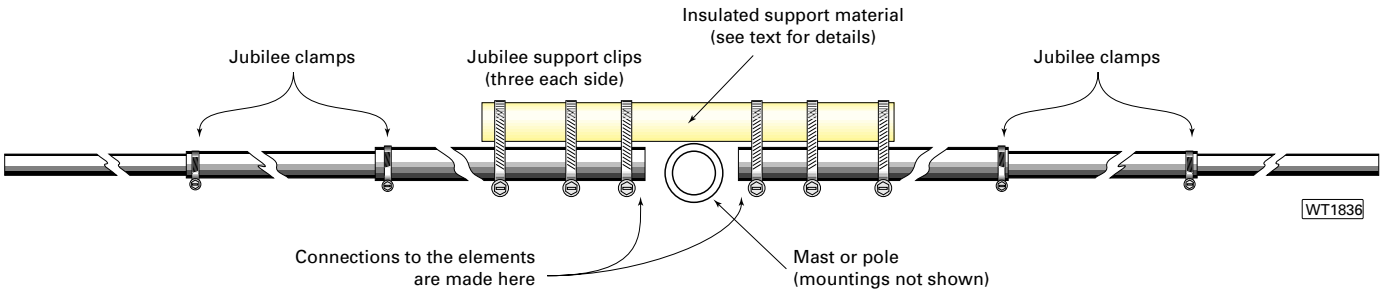
Scaling the whole thing up to work on the lower h.f. bands has been considered but not yet attempted. The 14MHz band is very tempting but 5m of alloy in a straight line would entail heavier and bigger diameter alloy and my metal store is now starting to run low.

As always, antenna systems have to be a compromise of what you can get into the air and what is considered acceptable with your neighbours and local planning authority. Whilst designing something for 7MHz is reasonably simple, though there could be problems in having some 20m of metal in the air and possibly overhanging some one else's property. There are few urban gardens this wide!

Should you wish to build a similar antenna, I feel that you will be delighted with the results and the costs involved can be quite minimal. In my case my only expense was the purchase of a few more jubilee clips. It also helps having a store of aluminium alloy tubing of various diameters, but even new alloy from a metal dealer is relatively inexpensive.

Go on have a go, you'll be pleasantly surprised. Good DX!

PW



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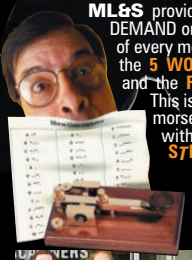

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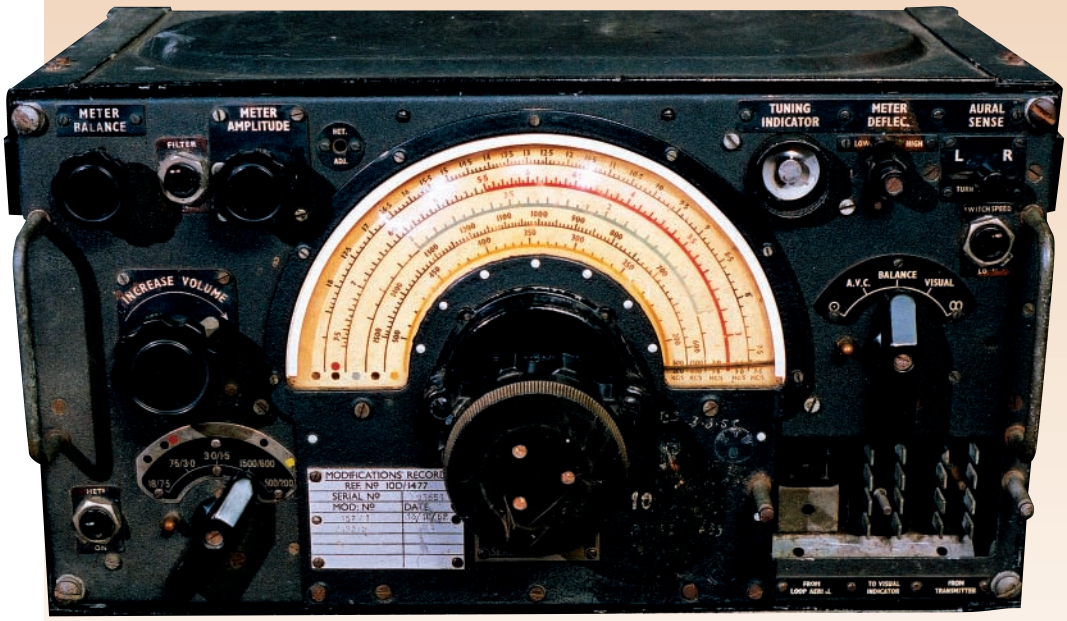
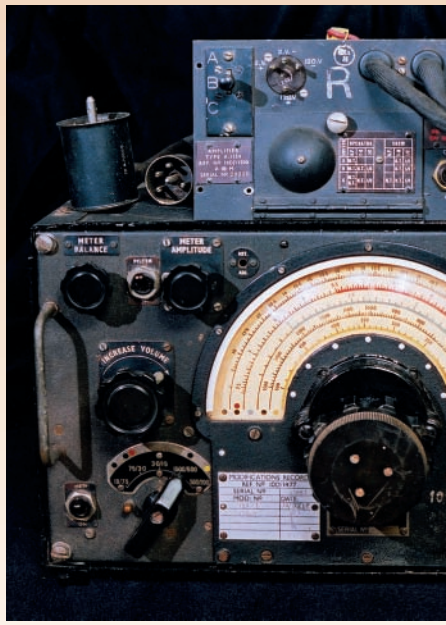




● It's a vintage classic! A huge number of the RAF's R1155 receivers ended up in the hands of radio enthusiasts. This version, covering 1.5 to 3MHz, was much rarer than the types fitted with the l.f. ranges.
Photograph courtesy of Ben Nock G4BXD.

Feature

It's a Vintage Classic

The R1155

Ray Fautley G3ASG writes about the famous R1155 receiver in what's likely to be a unique perspective for a Radio Amateur - he worked in one of the factories that made them! Ray's story starts in the dark days of war and ends with advice for modern collectors.

Many old timers will remember the Royal Air Force's R1155 communications receiver – in fact many who were licensed before, or just after the Second World War, will have owned or operated one. And I've got very personal memories of the 1155 because during the war years I worked at one of Marconi Wireless Telegraphy Company's (MWTC) factories in Hackbridge, Surrey.

Marconi WTC was one of several companies who manufactured the receiver and my job was to diagnose faults in new production and repaired units. A team of ladies did the necessary repair work to correct the defects and most of the faults were due to incorrect wiring, especially the complicated wiring loom to the Master, or main operational, switch.

The switch was generally referred to as the 'OP switch' in the factory. Based on the civilian type AS87/AD882 transmitter-receiver made by MWTC, operational in 1939; the R1155 radio receiver together with its companion transmitter type T1154 was used by the RAF from 1941 onwards.

Thirteen Varieties

In all there were 13 varieties of the 1155 set, ranging from types R1155A to the R1155M, see heading photograph plus **Figs. 1**, **2** and **3**. Production of the first R1155 sets started in 1940. By the end of the war some 80,000 sets had been produced.

After the war, type R1155N appeared which had the lowest frequency range (75 to 200kHz) removed and replaced by an extra radio frequency (r.f.) range for 1.5 to 3MHz. This version of the set was mainly for use by marine craft such as Air-Sea rescue. (The set was of course marked with old terms like Mc/s and kc/s whereas we now use kHz and MHz).

Primarily, the receiver (together with the T1154 transmitter) was used for providing air-to-ground as well as air-to-air communication, using both c.w. and phone modes. It also had circuitry for navigation use, i.e. for direction finding (d.f.) and homing, on the lower frequency bands.

A block diagram, **Fig. 4**, shows the design lay-out of the receiver. Ten valves were used, of which three were solely for the d.f. and homing circuits. The receiver is a superhet with a tuned r.f. amplifying stage, mixer and local oscillator, two intermediate frequency (i.f.) stages, beat frequency oscillator (b.f.o.) which was labelled **HET** on the front panel, automatic volume control (a.v.c.) a detector, signal detector, a.f. amplifier and a 'magic eye' tuning indicator. (The old term a.v.c. is nowadays referred to as automatic gain control (a.g.c.).

Two Movement Meter

A meter having two movements, called the **Visual Indicator**, **Fig. 5**, was used for both direction finding and homing. The wireless operator (WO) and the pilot each had a visual indicator at their respective positions.

Direction finding facilities were provided as a navigational aid. For this, two ground transmitting stations were provided, with one being at the Alexandra Palace, the pioneering British television transmitter. The other station was at a

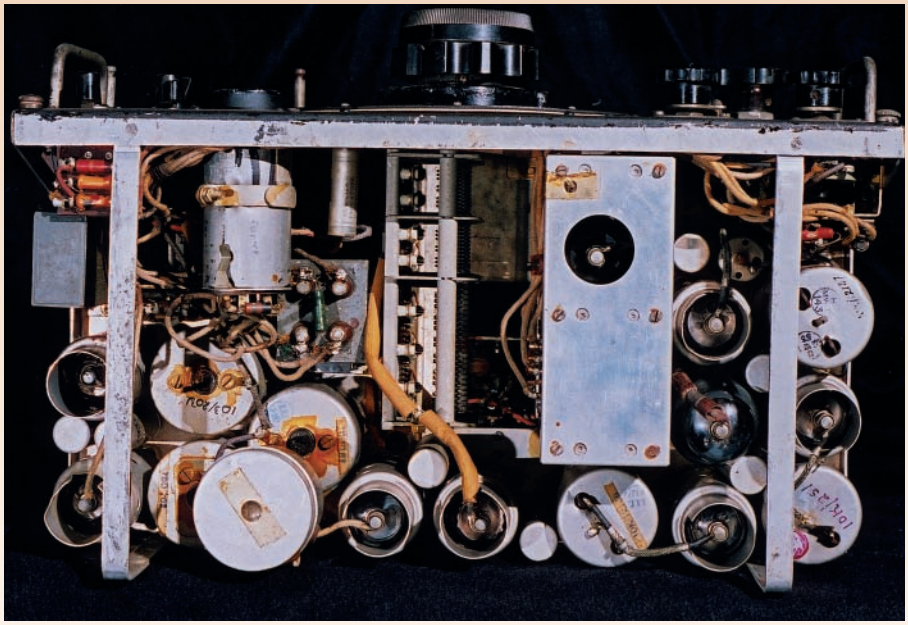


Fig. 2: The R1155 removed from its cabinet and with photograph taken from above. The 'magic eye' tuning indicator is mounted within the tubular housing on the left (wiring for the valve base can be seen), the main variable capacitor for tuning can be seen directly in line with the main tuning dial. The b.f.o. valve (valve top cap visible) in its own screened compartment to the right of the tuning capacitor. (see text).

Fig. 1: The R1155, from Ben Nock G4BXD's collection, accompanied by the direction finding indicator (crossed needle meter on the right) and the Amplifier A1134 which was commonly used in conjunction with the receiver on board aircraft.

location for which instructions were given either at briefing or depended on the aircraft's position.

The aim was to get a suitably divergent angle between the two stations. To achieve this, the WO would use the d.f. loop antenna and take bearings on the two stations. Then the intersection of these bearings would give the position of the aircraft.

With the loop antenna fixed athwartships (parallel to the wings) the aircraft would maintain its course so that the two needles on the visual indicator would intersect on the central vertical line. In bomber aircraft the WO would also use the receiver to obtain weather reports during the flight and also to listen for any signals to recall them from their mission.

Design & Development

Design and development of the R1155 was started prior to the Second World War with the apparent intention of fitting a push-button unit just underneath the tuning dial. This was to enable several pre-selected frequencies to be available without going through the tuning process.

Unfortunately it appears that the start of the war put an end to development and so the unit was never fitted. That's why there is a big hole inside the receivers, just under the main variable ganged tuning capacitor with components jammed all around it!

Some of the later versions of the receiver were fitted with a quite different slow-motion tuning mechanism, which unlike the early models had about a two-to-one reduction on the main control instead of a direct drive. Many versions had extra filters fitted to prevent medium wave signals at, or very close to, the i.f. of 560kHz causing possible interference by direct i.f. breakthrough. These filters also provided attenuation to reduce the gain at 560kHz in the r.f. amplifier stage and so reduce the possibility of instability.

Increase Volume Control

The **Increase Volume** control (R8) was used as an r.f. and i.f. gain control when in the **O** position of the Master Switch. It was used as an a.f gain control in **AVC** position of the **Master Switch**

Meter Balance

The **Meter Balance** control (R51) adjusts the meter circuitry for **balance** of the two meter needles on the visual indicator when the loop antenna is disconnected. That is, it compensates for any asymmetry in the d.f. circuitry.

Meter Amplitude

The **Meter Amplitude** control (R23) controls the amplitude of both meter needles on the visual indicator simultaneously.

Meter Deflection

The **Meter Deflection** switch (S2) when in the **Low** position reduces the amplitude of the fixed antenna signal and consequently also reduces the level of the two meter indications.

Front Panel Controls

The names of the controls listed below are the names given to the controls on the front panel of the receiver. Those references given in brackets after the control names are those used on the original circuit diagram.

Master Switch (MS): The master switch is at the right-hand side of the front panel has five positions.

Position 1 marked **Operation**: **O** a.v.c. off, manual r.f. and i.f. gain control.

Position 2: AVC - a.v.c. on, manual a.f. gain control only.

Position 3: Balance - used to balance the d.f. circuitry.

Position 4: Visual - part of d.f. system.

Position 5: Part of d.f. system (called 'figure-of-eight')

The first position, marked **O**, referred to omni-directional reception (normal communications use) as distinct from d.f. operation. The 5th position, marked •, indicated 'figure-of-eight' reception using the loop antenna for taking bearings.

Frequency Range Switch

The **Frequency Range** switch, **Control 2**, is at the left-hand side of the front panel and also has five positions. Please note that the old style of frequency terms are used here, as marked on the receiver. (For kc/s read kHz, and Mc/s read MHz).

Position	Frequency Range		
		3	1,500 kc/s – 600 kc/s
1	18.5 Mc/s – 7.5 Mc/s	4	500 kc/s – 200 kc/s
2	7.5 Mc/s – 3.0 Mc/s	5	200 kc/s – 75 kc/s

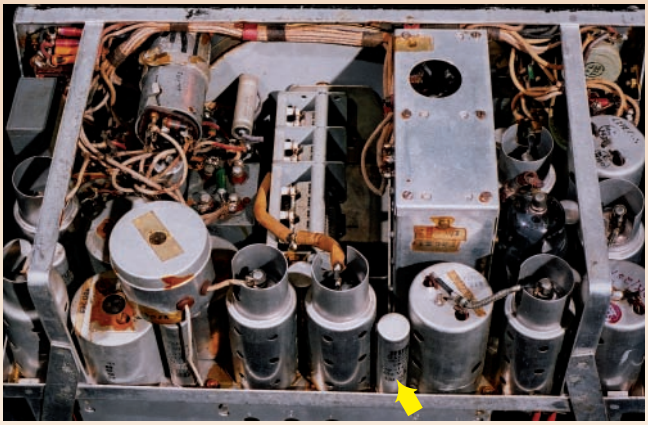


Fig. 3: Rear view of the R1155. Just to the right of the central valve (with valve top cap lead running from main tuning capacitor) is one of the multiple-capacitor-in-a-can decoupling capacitors (arrowed) which feature in G3ASG's article. These capacitors are notorious for becoming very 'leaky' in old age and advice is given regarding their replacement (see text).

Aural Sense

The **Aural Sense** switch (S3) has three positions. It's spring-loaded so as to be normally in the centre position. When held to the **L** (left) or **R** (right) it adds the fixed antenna signal to the loop antenna signal to indicate which of the two bearings, which are 180° apart, provided by the loop is the correct one. (This is indicated by the signal being louder in the correct direction). In the normal centre position the switch is inoperative.

Switch Speed

The **Switch Speed** control (S1) is a two position switch. The **Up** position sets the d.f. switching speed at 80c/s (cycles per second) and the **Down** position to 30 c/s.

Filter Switch

The **Filter Switch** (S5) when set to the **In** position introduces a high pass filter into the a.f. circuit with a cut-off frequency of 300c/s (300Hz). By reducing the amplitude of low frequency signals below 300Hz it minimised the 'rumble' due to aircraft engine noise

Heterodyne Switch

The **Het** (Heterodyne) control (S4) switched the beat frequency oscillator (b.f.o. or **Het'** for heterodyne as it was called then) on or off.

Het Adjust

The **Het Adjust** (C13) is to adjust the frequency of the b.f.o. There's a small hole in the front panel to allow a screwdriver to be inserted to alter the position of a trimmer capacitor.

Circuit Description

Now let's take a look at the circuit - starting of course at the antenna input. There are two inputs, one for the short fixed antenna mounted on the aircraft, and the other for a long trailing wire which is let out from the aircraft only when it's airborne.

Both antenna inputs are connected by the frequency range switch to taps on the r.f. amplifier (V3) input coils. The anode circuit of V3 has a link winding inductively coupled to the grid tuned circuit of the mixer valve V4.

A local oscillator uses the triode part of V4 (which is a triode-hexode) to mix with the received signal to provide the i.f. signal at a frequency of 560kHz. Tuning of the output of the mixer at the anode of V4 is provided by the 1st i.f. transformer (1st i.f. unit) followed by two i.f. amplifying stages V5 and V6.

The two i.f. stages produce most of the high gain of the receiver. As three i.f. transformers are used, the selectivity is very good for equipment of Second World War vintage. The coupling used in the i.f. tuned circuits is 'top capacity coupling', i.e., the inductive coupling between primary and secondary windings is minimised by mounting the two coils at right angles to each other.

A small 2pF capacitor connected between the 'hot' end of each coil provided the required coupling. (The ratio of coupling capacitance to tuning capacitance determines the degree of coupling between the two tuned circuits of the transformer).

The actual tuning for the two windings is adjustable by setting iron-dust cores inside the coil formers. Holes in the sides of the transformer screening cans provide access to the cores. Later, I will detail the changes I made at the time (1942) to increase the selectivity. This was to make c.w. reception (or rather for me at least c.w. interception!) as you will see eventually....easier!

Direction Finding Circuits

The d.f. section valves, V1 and V2, are both triode-hexode valves. The triode sections of both V1 and V2 are connected as a low frequency push-pull oscillator which is used to switch the hexode sections of the two valves on and off alternately.

As the fixed antenna is connected in parallel to both the control grids of the hexodes, the low frequency oscillator effectively switches the fixed antenna alternately via V1 and V2 to the input of the receiver's r.f. stage via a centre-tapped coil.

Also connected to the ends of the same centre-tapped coil is the loop antenna which has the loop signal in one sense (or phase) from one end of the coil to the centre-tap and the other end of the coil to the centre-tap provides the loop signal out of phase. Thus the fixed antenna signal is switched alternately to add or subtract from the loop signal.

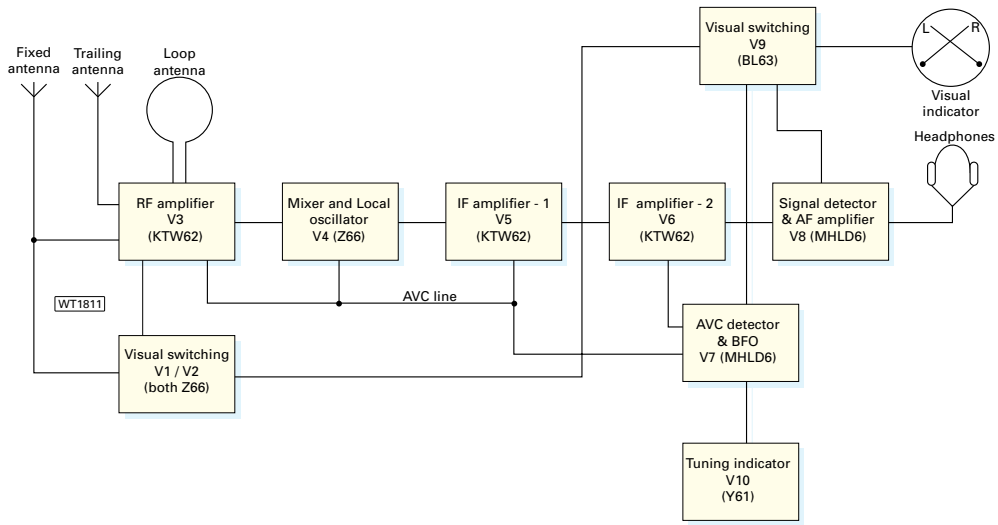
At the same time as all this r.f. switching is going on, the l.f. switching signal is also applied to the two triodes of V9 which makes each of them conduct (switch on) in turn. Output from one triode is fed to one of the movements in the **Visual Indicator** meter and the output from the other triode is fed to the other meter movement.

The outcome of all this activity is that the fixed antenna signal in phase with the loop signal operates one meter movement and the fixed antenna signal out of phase with the loop signal operates the other movement. That was quite a mouth-full to swallow....but it worked!

Valve Types

Valves used in the R1155 are, are VR99 Z66 triode-hexode for d.f.

Fig. 4: Block diagram of the R1155 receiver. (See text for further details).



use (**V1**), VR99 Z66 triode-hexode -for d.f. use (**V2**), VR100 KTW62 r.f. pentode r.f. amplifier (**V3**), VR99 Z66 triode-hexode mixer and local oscillator (**V4**) , VR100 KTW62 r.f. pentode 1st i.f. amplifier (**V5**), VR100 KTW62 r.f. pentode 2nd i.f. amplifier (**V6**).

Next, there's is a VR101 MHLD6 double diode triode signal detector and b.f.o. (**V7**), VR101 MHLD6 double diode triode a.g.c. detector and audio frequency amplifier (**V8**), then a VR102 BL63 double triode for d.f. use (**V9**). Finally, there's **V10** - which is a VI103 Y61 'Magic Eye' tuning indicator

Tuning Capacitor

A three-gang tuning capacitor, see Fig. 2 and 3, is used to tune the input and output circuits of the r.f. amplifier as well as the local oscillator. Two i.f. amplifying stages are followed by the usual signal and a.g.c. detectors, a.f. amplifier and b.f.o.

Unusually, the b.f.o. operates at 280kHz, which is half the i.f. frequency. The intention was to provide a more stable frequency control for the b.f.o., and although the second harmonic was selected and tuned, there were also other harmonics present which appeared at the r.f. input causing some interference when using the medium wave-band.

Not To Chassis

One feature, which catches out some renovators of the R1155 set, is that the h.t. negative lead from the external power supply is not connected to the chassis of the receiver. If the negative lead **is accidentally connected to the chassis**, it will result in real problems with the biasing circuitry.

Decoupling Capacitors

Another problem with receivers which have not been in use for a long time is that the many 0.1µF decoupling capacitors which have some 100V or more across them, will almost inevitably be internally short-circuit. Their failure is a common cause of 1155 breakdowns.

Unfortunately, the capacitors were manufactured in blocks, each containing three capacitors (see Fig. 3, where one of the capacitors can be seen almost touching the chassis back plate). so it's best to remove the whole lot and use separate components for each one. Better safe than sorry!

Wartime Memories

Now it's time to share some of my wartime memories...something I've been looking forward to doing! And one that comes to mind is "My shadow's stuck"! - was a comment I had from one of the test assistants who was supposed to be aligning the i.f. transformers.

What did that mean? When I looked at the set I found that the magic eye's green fluorescent shadow was fully closed all the time, regardless of signal level. The segment which should normally be open, with very low or no signal present, was permanently fully closed.

The bias to the magic eye valve in this particular set was fixed, not allowing it to change when different signal levels provided a changing voltage on the a.g.c. line. That's all it was!

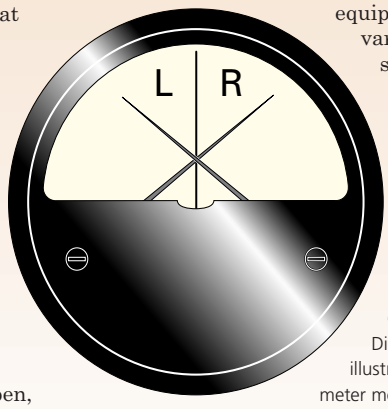
Repaired sets always had to be completely re-aligned and since all the cores in the coils had been varnished to prevent movement due to vibration in the aircraft, these had first to be completely removed and replaced by new ones. Getting the old cores out without damage to the coil formers was not easy!

A special tool, made of steel rod and small enough to go inside the coil formers, had the face at one end serrated. This was to provide a suitably abrasive surface for grinding away at the core until it broke up into powder and small pieces. The coil former could then be completely cleared by screwing in and out a metal tap with, of course, the same thread.

New cores had to be fitted to all coil formers before commencing any re-testing and re-alignment. This took quite a time! After re-aligning the r.f. and i.f. circuits, all the cores were varnished once again.

To save tying up valuable r.f. signal generators for routine alignment and also to save time in changing frequencies, each testing station in the factory had a piece of specialised test equipment. It had r.f. and i.f. signal frequencies which could be changed simply by setting a switch, and a stepped attenuator for adjusting output level.

A master generator containing crystal controlled oscillators for each of the alignment frequencies provided about 1V output for each signal. From this generator, lead covered cables carried all the signals around the factory in a bunch to the test equipment at the various testing stations. The idea was to have any frequency available at the turn of a switch with output levels down to 1µV available via a calibrated attenuator.



● Fig. 5: Diagram illustrating the dual meter movement used for direction finding. In use it's driven from the visual switching valve V9 (see text).

Well, what really happened was that the higher frequency signals were practically uncontrollable in output level and some of them appeared at lower levels mixed with other signals. A bit of a mix-up! This meant that the sets were aligned at the correct frequencies but with very little idea of the signal levels being used. Sensitivity could only be checked, after alignment, by the use of a normal calibrated r.f. signal generator.

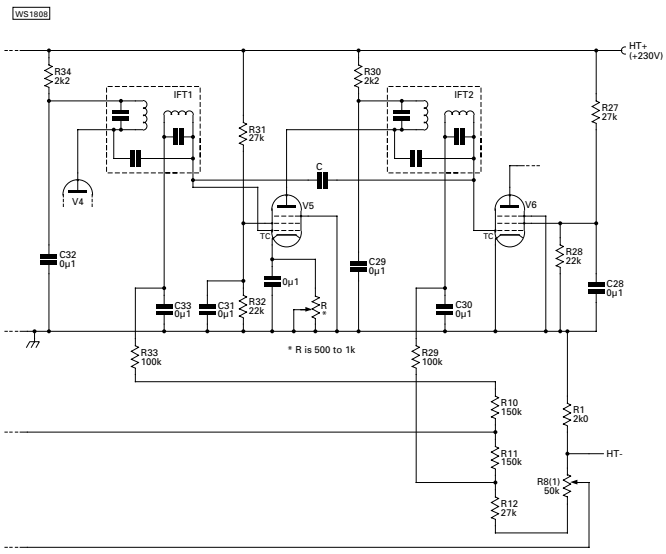
To check the operation of the d.f. circuits, during routine testing, a small box was connected to the receiver. It contained components wired to simulate the phase variation of signals being received from different directions, which would happen when bearings were taken using the loop aerial during an operation.

Fautley On Frequency

During the war, from 1941 onwards whilst still working at Marconi's, I was also operating my own home-built receiver at home during the evenings. This was not just aimless short-wave listening, but intercepting coded Morse signals in the band 7 to 7.5MHz. This was because I had been enrolled as a Voluntary Interceptor (or VI) in the Radio Security Service (RSS) and my job (called General Search) was to listen and log any new or 'suspicious' stations that appeared on my 'patch'.

The stations which experience proved to be the 'interesting' ones usually had three letter call-signs, and used some Q-code signals. For example QRJ was often used following the call-signs, which appeared to mean – "I have not heard a reply from you".

Anyway, the purpose of giving this background is that I found later, after I had (legally) borrowed one of the R1155 sets from work for my VI work, the selectivity was not really good enough. The signals that I was attempting to read were very weak and often had strong



● Fig. 6: Partial circuit diagram, showing the area and modifications needed to add the G3ASG 'Q-multiplier modification (see text).

interfering stations very close in frequency. So....could I increase the receiver's selectivity without too much modification?

Earlier Receivers

Memories of even earlier pre-war tuned radio frequency t.r.f. receivers for listening to broadcast and Amateur Radio stations (all using double-sideband amplitude modulation) prompted the R1155 modifications to be described here. My idea came about when I tried to obtain maximum sensitivity from those simple (often using just a single valve) receivers, the degree of regeneration (using the 'reaction' control) had to be adjusted to be **only just** below the threshold of oscillation.

In those pre-War days, although I couldn't read Morse signals, I found that they also could be made audible when the detector was just into oscillation. As well as increasing the t.r.f. receiver's sensitivity, I also noticed that the selectivity was also considerably improved at the same time, when the receiver was just below oscillation.

Back to the wartime modifications! Could this phenomenon be used to provide the extra selectivity required for the R1155? If one of the i.f. stages could be made to **very nearly oscillate**, wouldn't it also reduce the bandwidth of that stage and so also improve the selectivity of the whole receiver?

The answer was – very probably! Next, just how could I find out to make the i.f. stage oscillate. Positive feedback is necessary for oscillation, so where could I find such a possible equivalent to the reaction control used on the old simple receivers?

After a little thought, I realised that any feedback from the control grid of the 2nd i.f. valve V6 back to the control grid of the 1st i.f. stage V5 would, because of the phasing of the i.f. transformer windings, provide the positive feedback necessary. I was half way there!

If a control could be fitted to vary the gain of the 1st i.f. amplifier V5, then as the gain was increased, so also would be the amount of signal fed back from the input of the 2nd i.f. stage V6 to the input of V5. As the signal being fed back would be in-phase with that at the grid of V5, that is positive feedback, eventually it would be great enough for the stage to oscillate.

It's when the valves reaches the 'threshold' just before oscillation which would produce the required increase in selectivity. In other words it would provide what's now often called a *Q*-multiplier. Just what the doctor ordered! To help, **Fig. 6** shows the circuit diagram of the i.f. stages with the modifications highlighted. For those who own an R1155 and would like to try the modification, here's how to do it!).

Modification Work

To start disconnect the receiver from its power supply before starting the actual modifications.

1: Remove the set from its case.

2: Unsolder or cut the wires to the Meter Balance control and remove the potentiometer.

3: Insulate each lead and then tape them together as they are not now required.

4: Fit a variable resistor (a potentiometer, using only the slider and one end) of between 500Ω and 1kΩ in place of the one removed. (Preferably fit one of the wire-wound variety).

5: Wire one end of the new control to the chassis.

6: Turn chassis upside-down.

7: Locate V5 valve-holder.

8: Remove lead from V5 cathode pin to chassis.

9: Wire a 0.1µF capacitor from V5 cathode pin to chassis.

10: Connect a lead from V5 cathode pin, through the chassis, to the slider of the newly fitted variable resistor.

11: Locate the 1st i.f. transformer (IFT1).

12: Cut a 65mm length of 16 or 18s.w.g. bare copper wire.

13: Solder one end of the piece of wire to the tag on IFT1 which is connected to the grid cap of the 1st i.f. valve V5.

14: Locate the 2nd i.f. transformer IFT2.

15: Cut a second 65mm length of 16 or 18s.w.g. bare copper wire.

16: Solder one end of the piece of wire to the tag on IFT2 which is connected to the grid cap of the 2nd i.f. valve (V6).

17: Slide a length of insulating sleeving over both wires.

18: Bend the two wires towards each other to make what's effectively a small capacitance between the wire ends.

19: Label the newly fitted control **Selectivity** (if you want to be posh!).

Realignment Necessary

An r.f. signal generator is necessary to re-align the i.f. transformers IFT1 and IFT2.

1: Start with receiver power supply switched off .

2: Ensure that the antenna is disconnected from the receiver.

3: Set the new **Selectivity** control to minimum position (maximum resistance).

4: Set the manual **Gain** control to minimum position.

5: Set the b.f.o. switch to the **on** position.

6: Set the **Main Operation** switch to the **O** position.

7: Set the **Frequency Range** switch to position 3 (1500kHz to 600kHz).

8: Switch signal generator on.

9: Set signal generator controls to provide a 30% amplitude modulated signal with a modulation frequency of 400Hz to 1kHz.

10: Set signal generator output level to minimum.

11: Set signal generator frequency to 560kHz.

12: Connect signal generator r.f. output lead, via a 500pF capacitor, to the grid (top cap) of the mixer (or frequency-changer) V4. **Do not remove the existing lead to the valve top cap**.

13: Switch the receiver power supply on.

14: Increase the **Gain** control until noise can be heard in headphones or loudspeaker.

15: If the noise is a 'howl', indicating that the i.f. stage is oscillating, switch power supply off and carefully increase the separation between the two insulated wires.

16: Switch power supply on, if the howl persists, switch power off and separate the wires still further, repeating until the howling stops. If necessary cut off a few millimetres from the wire ends to further reduce the feedback capacitance.

17: Rotate the **Selectivity** control until oscillation occurs.

18: Again reduce coupling between the two wires.

19: Again adjust the **Selectivity** control until oscillation occurs.

20: Repeat steps 18 and 19 until the i.f. stage is on the threshold of oscillation when the **Selectivity** control is at maximum.

21: Switch the b.f.o. off.

22: Switch the power supply off.

23: Connect an a.c. voltmeter across the a.f. output of the receiver. (An easy way would be to connect it across the headphones output).

24: Set the a.c. voltmeter to an appropriate range (high enough to ensure that the meter is not damaged at switch-on).

25: Switch the power supply on.

26: Reduce the **Selectivity** control to well below maximum.

27: Increase the signal generator r.f. output until the a.f. modulation is audible in the headphones.

28: Set the a.c. voltmeter to provide a low scale indication.

29: Increase the **Selectivity** control slowly, keeping an eye on the a.c. voltmeter reading, reducing the signal generator output to keep the voltmeter reading on scale.

30: Set the **Selectivity** control to very close to oscillation (near maximum).

31: Switch the signal generator to c.w. output. (That is – unmodulated.)

32: Switch the receiver b.f.o. on.

33: Adjust all six separate cores in the three i.f. transformers for maximum indication on the a.c. voltmeter, reducing the signal generator output as necessary to prevent overloading. If oscillation occurs, switch the power supply off and repeat from Step 15 (if necessary several times) until:

a) all cores have been adjusted for maximum a.c. voltmeter reading.
b) the SELECTIVITY control is at maximum.
c) the i.f. stage is on the verge of oscillation.

34: Switch power supply off, disconnect test equipment and refit the receiver into its cabinet.

Try It Out

Now, switch the power supply on and try using the new control. As the **Selectivity** is increased to very near maximum, the i.f. response should be a very sharp, even if it is a somewhat asymmetrical spike – just right for uncovering c.w. signals previously hidden under strong adjacent channel interference.

For receiving s.s.b. signals the **Selectivity** control should be adjusted to below maximum until the bandwidth is wide enough (about 3kHz). This adjustment can easily be made (after a few attempts) by trial and error.

If anyone has the courage to try the above modification, I would be very interested in their results! I'm QTHR in the callbook...and I look forward to hearing from you.

So, that's my story of the old classic R1155. It's not very easy to find them anymore, although some are still in use. Even if they can be found, they are collector's items so getting to be quite expensive but I have fond memories of the old '1155.

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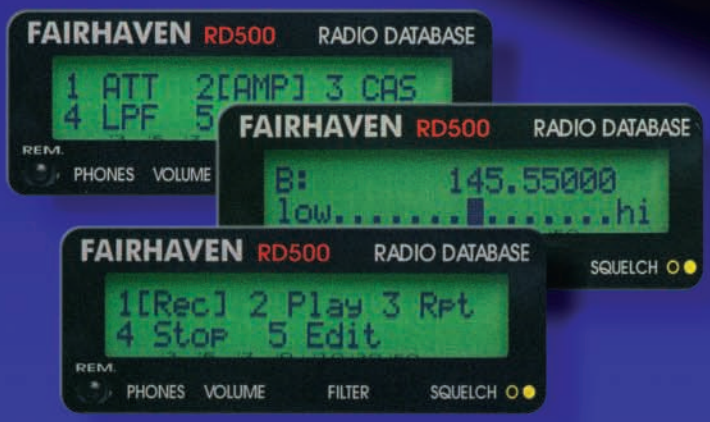

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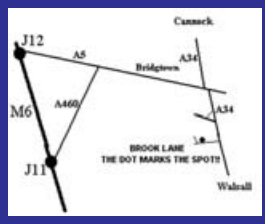

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A Truly Irish Welcome For Practical Wireless

Rob Mannion G3XFD/EI5IW recounts the story of his latest trip to the Emerald Isle...where he was entertained royally, provided a club visit and attended the IRTS national rally and AGM.

The crossing from Pembroke Dock, Wales to Rosslare, Ireland on Friday 22 February was rough indeed. But despite the motion of the vessel I enjoyed a superb meal!

From Rosslare on Saturday 23rd I drove north, skirting round Dublin and north via Monaghan, over the border through Omagh to Londonderry/Derry and then back into the Republic to stay with my great friend **John Doherty EI9GB** in Buncrana.

● The busy Mayo Rally, during the IRTS AGM weekend on Sunday 3 March. Willy Long's (Long Communications, Dunkineely, Donegal) stall was very busy!

Enjoying John and his extended family's hospitality on Saturday and Sunday I also managed to get on the air on 7, 14, and 18MHz from Malin Head. The wind was so strong I could hardly open the car door!

Foyle & District Visit

On Monday 25 March John EI9GB and I drove across the border near Londonderry/Derry, to the **Foyle & District Amateur Radio Society**. We arrived okay - only a year late! (2001 visit cancelled due to the Foot & Mouth disease outbreak).

The F&DARS meets at a Horticultural Nursery (owned by Ray Blithe MIOVFO) overlooking Lough Foyle. A relatively young club, it operates in an area with a troubled history. Despite this it's incredibly active and draws members from all communities, and also from the Irish Republic.

John EI9GB and I were given a truly fantastic welcome - led by **Trevor Campbell MI5TCC**. We even had a contingent from the **Bangor & District ARS** who had driven nearly 100 miles for the occasion! (delighted to see you folks!). Providing the *PW* 'Club Talk' to such an appreciative group was an exceptional pleasure for me.

An excellent buffet table was provided and we didn't leave until after midnight!

John and I left loaded with some wonderful souvenirs - see photographs - for me to take home! What a wonderful spirit there is in Amateur Radio in Ireland!

● Rob GI3XFD surrounded by the wonderful gifts, presented by members of the Foyle & District Amateur Radio Society in Londonderry. L-R, Aidan McIntyre EI2FPB (RAE Instructor), Jack McDermott GI4NMZ (Chairman), GI3XFD, and Trevor Campbell MI5TCC (Secretary). John EI9GB was the cameraman! Gifts included two plaques from Strabane District Council presented by GI4NMZ and Derry City Council, presented on their behalf by MI5TCC. There was also a Donegal tie and pin, from Donegal County Council, presented by EI2FBP, a set of engraved crystal whiskey glasses from the club itself, some traditional 'hooch' (Poteen) to fill them (much appreciated by PW Publishing staff!), and books illustrated with paintings and stories of Donegal and Inishowen. "Staggering Generosity" says Rob!

Heading South

On Tuesday 26 February after bidding a temporary farewell to John EI9GB, I headed south. Despite the continuing bad weather, I enjoyed the drive, arriving at my friend **Oliver Norris's** home near Westport in County Mayo by mid afternoon.

I then had five days of glorious holiday and relaxation, also enjoying using the Icom IC-756PROII (see pgs 298-31) and being extremely well looked after by **Briege**, Oliver's wife (thanks for the wonderful hospitality Norris Family!).

Annual Dinner & Rally

Saturday 2 March saw Oliver, Briege and I attending the Irish Radio Transmitter's Society's Annual Dinner, hosted (**and extremely well organised**) by the **Mayo Radio Experimenters' Network (MREN)**, at the Belmont Hotel in the village of Knock, site of the internationally famous religious shrine. I was honoured by being asked by the MREN to join IRTS President **Dave Moore EI4BZ** and other guests at the 'Top Table', and to provide the opening prayers of Grace before the meal. Altogether it was another extremely enjoyable Saturday evening and Sunday morning!

It seemed as though we'd hardly got to bed before we were driving back to Knock for the rally at the same Hotel! It was the MREN's first rally **and it was superbly well organised, at a great location**. I met many readers and made new *PW* friends. However, I was disappointed not being able to stay for the entire IRTS AGM in the afternoon, but on starting my five hour 200 miles plus drive to Rosslare on the way home, I said I'd be back for the next event! Thanks everyone, what a wonderful trip - EI5IW will be back soon!

PW

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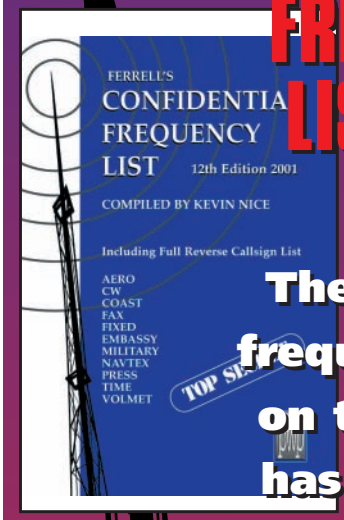

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Antenna Workshop

LOW-DOWN ON LOOPS

Full-wave loop antennas offer several advantages over other types of antennas, says John Heys G3BDQ, as he tells you all you need to know about them.

The 1930s saw a dramatic rise in short wave broadcasting and new stations were appearing every few weeks. Not to be left out, Ecuador built a powerful transmitting station near Quito, its capital city. Situated on the Equator at an altitude of about 3600m, the rarified atmosphere and the station's high power resulted in coronal discharges from the ends of the antenna wires. The station's engineers solved the problem by developing a full-wave loop antenna, and so, the quad antenna was born.

Radio Amateurs were rather slow to pick up on this new antenna design and it was not until the 1940s that **Clarence C. Moore W9LZX** experimented with, then described the full-wave quad (square) antenna. It was soon realised that the full-wave loop could be arranged not only as a square or a diamond so, other shapes of full-wave loops appeared in antenna books.

Characteristics & Parameters

Firstly, let's have a look at some loop characteristics and parameters. The full-wave loop antenna 'family' have twice the conductor length of a half-wave dipole so some gain should be expected. Because the conductor is bent around the actual gain is not the equivalent of a pair of discrete in-phase half-wave dipoles. For a circular loop the gain will be about 2dBd (referenced to a dipole). This represents a power gain of around 1.6 times which would give an e.r.p. of 160W when a 100W output transmitter was used.

The gain (in dBd) when using a full-wave loop antenna is directly related to the area enclosed by the loop. A circular loop encloses a greater area than any other configuration which by the way, is why primitive people build their houses with circular walls. They then have the greatest floor area for the least expenditure and effort.

Four different full-wave loop arrangements are shown in **Fig. 1**. A square (or when tilted a diamond) loop has slightly less enclosed area than a circular loop. A Delta (triangular) loop has less again. The least enclosed area is when the loop is an oblong (letterbox shape). If the flattening continues we end up with a folded dipole, an antenna with the radiation characteristics of a conventional dipole, showing no gain at all.

All the full-wave loops radiate in two directions and the quad loop's gain is about 1.8dBd. A delta loop's gain will be only 1dB or less, giving its best gain figure when formed into an equilateral triangle. The feed-points marked 'F' in Fig. 1 are positioned for horizontal polarisation for the radiation from the two vertical legs of the quad and the sloping sides of the delta have anti-phase antenna currents which largely cancel out.

Vertical polarisation

If vertical polarisation is required, the feed-points should be moved from the base of the loop antenna, to halfway up one of the vertical sides of the antenna. With a Delta antenna, the feed-point should be moved to one of the lower corners. The impedances at the points 'F' are also related to the enclosed areas of the loops. A circular loop has a feed impedance under 100Ω, rising, in the squared form, to lie between 100-120Ω.

With the equilateral delta, the feed-point impedance lies between 75-100Ω. When in a narrow or flattened form loop antennas' feed impedances rises rapidly as the flattening increases until the antenna becomes a folded dipole having a feed impedance of almost 300Ω.

The loop's maximum radiation is in two directions at right angles to the plane of the loop (looking through it). The side, or end-on radiation is minimal. It is the 'end affect' of insulators, etc., which determines a wire's resonant length which will be less than a true half or other multiple of a wavelength.

Closed loops, like all coiled wires must, however, be lengthened to maintain resonance. So, full-wave loops should be cut to a length of 306/F(MHz) rather than the more usual values used for straight dipoles.

The points marked 'V' in Fig. 1 are the high voltage and high

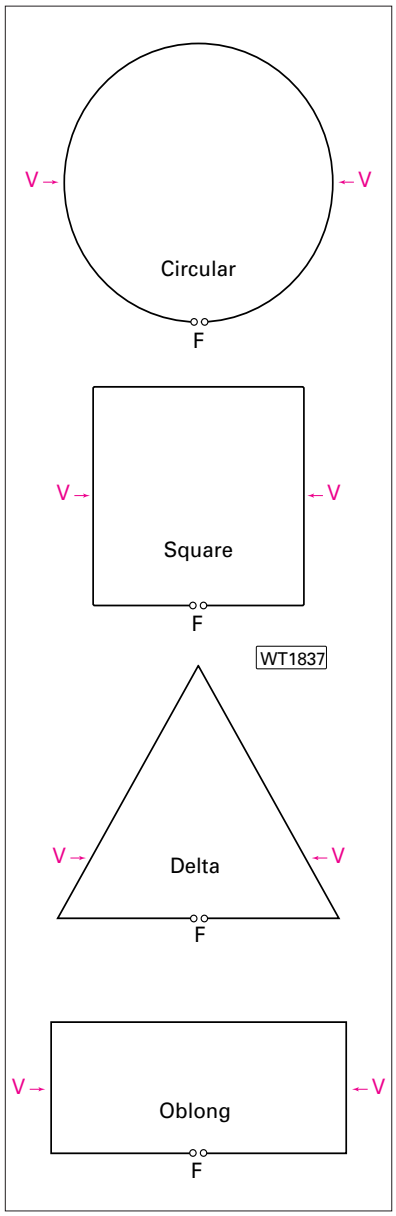


Fig. 1: Four figures having equal perimeters shown in descending order of the enclosed area. Points 'F' are the feed-points for horizontal loop polarisation and Points 'V' are the points of highest voltage and impedance.

impedance positions along the loops. Being closed loops these values are considerably lower than those found at the ends of resonant single wires. This is the factor that proved so useful in Quito. Full-wave loops must be positioned vertically, for when used parallel to the ground, the ground reflection makes almost all the radiation go skywards.

A Disaster

High angle radiation can sometimes be fine for short haul work on the 3.5 and 7MHz bands, but would be a disaster if long distance communication is your aim. Large multi-wavelength loops can however be used in the horizontal plane and they can be effective for long distance working.

Full-wave loops are little influenced by nearby trees or buildings and their lower points can be a λ/4 or less above ground. They can even give good results when made from insulated wire and are actually positioned within trees.

The turning radius of a quad loop antenna is half of that of a half-wave dipole and so, it can be erected in quite small gardens. A loop antenna installed indoors in a roof space will be less affected by the metal tanks, pipes and wires than a conventional open ended wire antenna.

First Consideration

The first consideration when thinking about using a quad or delta loop is the question "will it fit into my available space"? Fortunately, a full-wave loop will still be effective even when it is close to the ground. When its lower wire is half-wave above ground the horizontal radiation pattern of the loop will be about four degrees lower than that of a dipole at the same height.

At just λ/8 in height, which is only 2.5m (8ft), when the antenna is cut for the 28MHz band, its horizontal radiation angle will be as much as 10° lower than that of a dipole at the same height. When height is a problem, an horizontally polarised loop may be slanted at up to 45° from the vertical with little ill effect.

A quad loop antenna needs two upper tie points and its corners will all be fairly low impedance points where the insulation is not critical and where just nylon cord without insulators may be used. A delta loop can be positioned with its apex help up by a single nylon cord. The apex impedance is quite low. If the delta is inverted two upper supports are needed and again the impedance at the end points is not high.

Feeding the loop correctly may be done in one of several ways, as shown in **Fig. 2**. A tuned 'ladder' feedline made with open wires or lengths of 300 or 450Ω ribbon feeder is the most versatile feed method. However, this means that a balanced a.t.u. such as a 'Z Match' is needed.

Sometimes the eminently suitable (but now rather elderly) KW Eezimatch balanced tuners may be found at rallies and junk sales. Loop antennas may be fed directly with coaxial cable, preferably by using RG-62AU, with its 95Ω impedance (stocked by **W. H. Westlake** of Holsworthy, Devon).

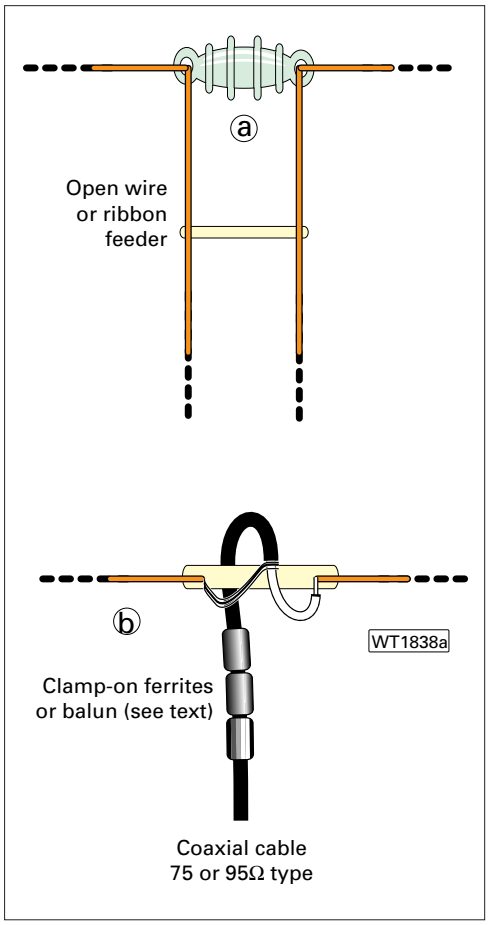


Fig. 2: Three ways to feed a full-wave loop antenna. Open wire feeder or ladder line is the most versatile and will allow operation on the higher harmonic frequencies. See text for details.

A good quality 75Ω coaxial cable may also be used, though it will have to be matched to the transceiver. Many modern rigs incorporate an auto-tuner for this purpose. If a coaxial feeder is used to connect to a balanced antenna, a current balun is required to prevent r.f. currents running along the outside braid of the coaxial cable.

An easy and very effective way to make a current balun is to use clamp-on ferrites which are now available. If the cost is more important, then some of the coaxial cable itself may be wound into a four or five turn coil (about 250mm diameter) close to the antenna feed-point.

Traditional Match

The traditional way to match a 50Ω impedance feeder to higher antenna feed-point impedance, is to use a quarter wave matching section **Fig. 3**. This critical length of 75Ω coaxial cable can be determined by multiplying the free space quarter wavelength by the velocity factor of the coaxial cable used. The velocity factor for most cables is around 0.66, but some cables have different factors. The 50Ω coaxial cable need not have any special length.

Full-wave loops fire in two directions so a pair of loops positioned at right angles to each other could give world-wide coverage. The inherent and rather low *Q* of full-wave loops results in a wider bandwidth than that of half-wave dipoles.

When fed from tuned line, a full-wave loop can also be induced to work on its harmonic frequencies, though it will not have the same radiation characteristics of its full-wave use, nevertheless it's still a useful antenna. You cannot use loops on their harmonic frequencies when they are fed with coax, as was discovered by my local club on one Field Day.

Full-wave loop antennas for the v.h.f. bands can be fabricated from tubing or thick copper wire and may be self supporting. Under these circumstances, circular loops may be used to get the full 2dB gain and a 95Ω feed impedance. Additional parasitic elements (loops), to make a beam can bring the feed impedance of the driven loop down to 50Ω. One full-wave loop for 144MHz was made from strips of aluminium kitchen foil, glued to a sheet of rigid plastic material.

Full-wave loops are indeed versatile! They make useful antennas for the amateur bands.

PW.

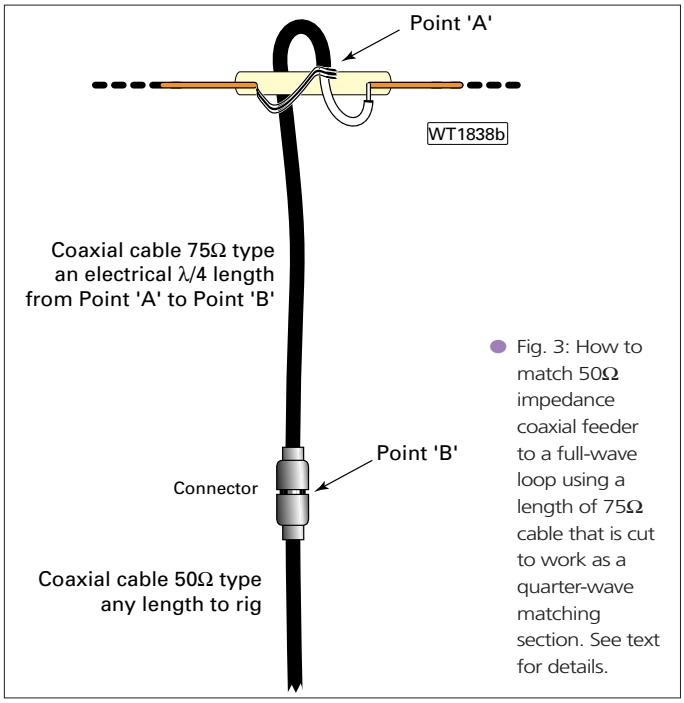
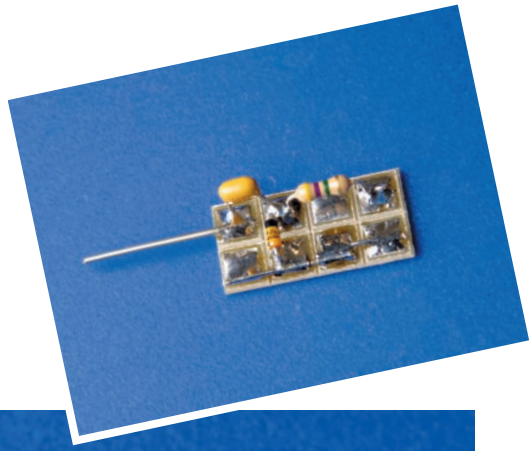


Fig. 3: How to match 50Ω impedance coaxial feeder to a full-wave loop using a length of 75Ω cable that is cut to work as a quarter-wave matching section. See text for details.

Carrying On The Practical Way



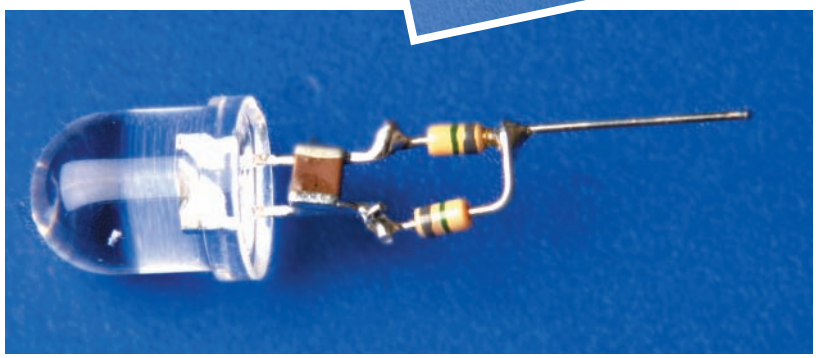
"Detection is, or ought to be, an exact science".

Sir Arthur Conan Doyle
from The Sign of Four

This month the Rev. George Dobbs look at detecting radio frequencies and says he's got a "A few ideas" for his readers. So, read the appropriate quote and join in the fun!

A few weeks ago I began setting-up an alternative address radio station for a holiday lodge. For this I've got an old, but pristine Yaesu FT-707, which I modified so it could only run QRP power output on a suitable power supply.

What I really needed to add to the station was a wide-ranging antenna tuning unit (a.t.u.) with a capability for matching balanced or single feed lines. To achieve this I experimented with some single coil Z-Match circuits and found one that would cover all the h.f. bands over a relatively high range of antenna impedances. (Perhaps I will talk about that one in a later edition of this column).



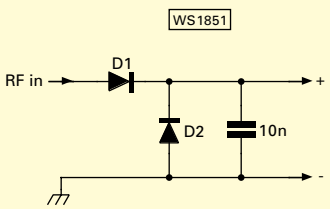
● You can check for 'smoke up the stack' with this month's projects because G3RJV's discussing r.f. probes and measurements.

Smoking Stack

However, I did build a s.w.r. meter into the a.t.u. but, like the old timers of radio, I like to have a 'smoke up the stack' radio frequency (r.f.) indicator. For those who don't know, that phrase, it means some kind of indication that the r.f. signal is getting out!

I began my early radio days by putting light bulbs in series with the antenna feeders and tuning for maximum brightnes and old habits die hard! Nowadays most of my station set-ups have had some kind of r.f. probe near the antenna feeders, which flickers a light or a meter needle. It might not be much of an objective measuring device but it is reassuring to know that 'it's getting out'.

The diagram, **Fig. 1**, shows the circuit that I've often used. It is a basic r.f. detector circuit using a voltage-doubler based on the diodes, D1 and 2.



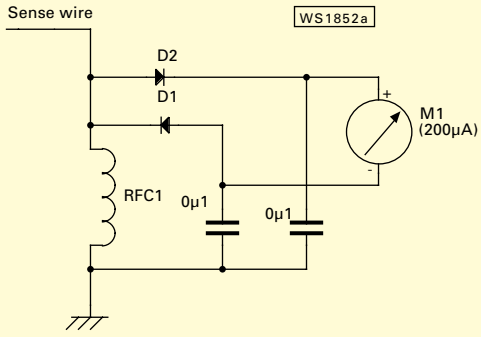
● Fig. 1: This detector circuit has been used by G3RJV and uses a voltage-doubler based on the diodes, D1 and 2 (see text).

The resultant d.c. signal is decoupled with a capacitor; 10n – 0.01µF or 100n – µF are suitable. The add some kind of resistive load to the output and connect to a measuring device.

In practice D1 and D2 are usually any common type of germanium diode. Most germanium diodes have a forward voltage (barrier potential) of less than 0.3V.

The more common silicon diodes, handle r.f. signals well but their higher barrier voltage make them unsuitable for low r.f. voltages. I advise that you get some germanium diodes in your junk box (1N34A, OA90, OA91 etc.) as they're useful devices.

Although the circuit shown in Fig. 1 is a useful, multi-purpose, r.f. detector, the little circuit that's most often been used in my station is shown in **Fig. 2**. In this arrangement the r.f. signal is put across



● Fig. 2: The circuit shown here is G3RJV's favourite design (see text).

an r.f. choke (r.f.c.) and two diodes give a positive and negative d.c. signal to drive a meter. A suitable r.f.c. for most Amateurs station use is in the range between 100µH and 1mH. (One of those little axial chokes is ideal).

The diodes are the same as I've already recommended and a meter with a full-scale deflection of 1mA, or less, completes the circuit. My current example uses a surplus meter with a full-scale deflection (f.s.d.) of some 200µA and many of the cheap tape recorder meters, available on the surplus market, have an f.s.d. in that order.

My version has a crocodile clip to connect the ground end to a convenient 'earth' point and a short length of wire to pick up the signal. This wire will vary in length according to how much r.f. signal is present and how far the wire is away from the signal.

The sophisticated constructor may even wish to add a little telescopic antenna to act as the probe. This is really a 'wave it about' circuit. Just move the pick-up wire and/or the circuit around until enough signal is picked up for a good indication.

You probably won't even have to connect it to a ground point. Just connect the wire probe and try to get a meter reading - it's that easy to use.

Burt's Bright Idea

The diagram, **Fig. 3**, shows a nice little departure from this circuit. I first met the idea as a submission from **George Burt GM3OXX**, to *Sprat*, the journal of the **G-QRP Club**.

George's circuit used a couple of Schottky diodes, a de-coupling capacitor and a Hyperbright l.e.d. Super bright and Hyperbright l.e.d.s will illuminate at low micro-amp levels. The GM3OXX version used BAT86 diodes and a Hyperbright l.e.d. from Maplins [red at 1.6cd (candela) **see note**]. The capacitor is a miniature disc type but a surface mount capacitor could be used to make a miniature unit.

Editorial note**: The Chambers Science & Technology Dictionary states that "The candela is a fundamental SI unit of luminous intensity". However, the explanation goes much farther than that and G3RJV and I recommend that aspiring eletcro-optical engineers research further themselves! **Editor.

The G3RJV Version

My version of the circuit shown in the heading photograph, has a Superbright l.e.d., which I bought as a surplus item. The project comprises of two surplus diodes and a surface mount capacitor soldered between the leads of the l.e.d. It works surprisingly well.

When, just by using the surplus wire on the l.e.d. as a probe, it produced a clear glow when placed close to the output circuit of a 1W transmitter. In fact I mounted one of these detectors on the front panel of my wide-range Z-Match a.t.u. with a probe wire placed near the balanced output wires.

The circuit can also be used very successfully as a hand-held r.f. probe. By holding the unit with the finger and thumb around the l.e.d. and using a short stiff wire probe, r.f. can be detected by placing the probe close to a circuit component or feed wire.

If the sniffer is to be connected directly to an r.f. circuit a small series capacitor in line with the probe, is required. (A low value in the order of 5pF or less will be enough for most applications).

Test Probe

To complete this little round up of r.f. detector circuits, the r.f. test probe ought to be included. I've mentioned them before in *PW*, but usually in the type that reads peak-to-peak r.f. voltages.

The diagram, **Fig. 4,** shows the circuit of a root mean square (r.m.s.) r.f. probe for connecting to a digital voltmeter. This is a common circuit that does the round of all the Amateur Radio literature and is a useful addition to any workshop.

It's worth adding a few notes about the circuit, starting with D1, usually a germanium diode, which is placed in parallel with the input. In the common series circuit (half-wave – peak rectifier) shown in Fig. 4.(a) any positive d.c. voltage present at the input gets added to the output. The circuit in Fig. 4.(b) just gives the peak voltage of the r.f. signal at the output.

Although many Amateur Radio circuits quote r.f. signals in peak-to-peak voltages, it's more usual to use r.m.s. values. In a peak reading r.f. probe the resultant voltage can be divided by 1.414 to get the r.m.s. value. An easier way to do this is to include a resistive potential divider in the output to do the calculation before the meter reading. The circuit in Fig. 4. shows a common method to do this with one resistor.

The 4.7MΩ resistor forms the top of the potential divider and the input resistance of the voltmeter is the other resistor. If the input is in the order of 10 to 11MΩ ohms (a common value for a digital multi-meter) the division is near enough to give the divide by 1.414 reading. It is rather a rule of thumb method...but it seems to work out about right for most digital meters.

Useful Test Equipment

The physical requirements are a short stiff wire probe and a ground wire with a crocodile clip. Ideally the circuit elements should be mounted in a screened case and screened leads between the detector circuit and the multi-meter. This is a useful piece of test equipment and I hope you'll get that soldering iron out and build one for yourself!

PW

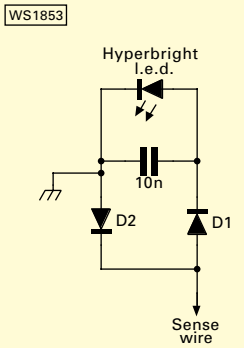
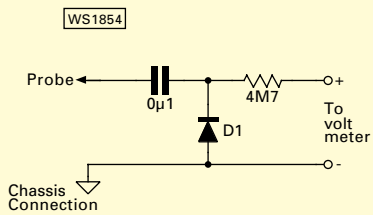
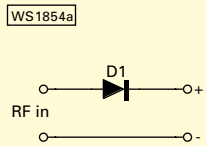


Fig. 3: If the sniffer is to be connected directly to an r.f. circuit a small series capacitor is required (see text).





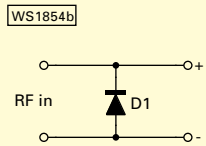


Fig. 4: The circuit of a root mean square (r.m.s.) r.f. probe for connecting to a digital voltmeter. See text for further comments on the inset for Fig 4a and b.

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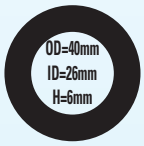

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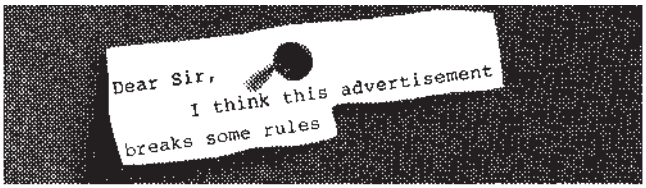

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Valve&Vintage

This month it's Ben Nock G4BXD's turn to look after the vintage 'wireless shop'. On the counter this time you'll see some interesting items, including one from sunny Australia and another from snowy Finland!

Hello once again! This time in the 'Quartermasters Stores' I have several new acquisitions to tell you about, including one from Australia and one from Finland. On my recent trip to Australia I was able to acquire at least one item of militaria amongst the usual souvenirs of boomerangs and Kangaroos. The set in question sat basking in the sunshine on the patio of **Ian O'Toole VK2ZIO's** home when I visited.

Ian knew of my interest in locating the matching transmitter to my Australian AR8 receiver (May 2000 V&V). Being a serious collector himself, Ian was able to provide a nice example from his spare stock.

Amalgamated Wireless Australia

The AT5 transmitter, **Fig. 1**, was built by AWA (Amalgamated Wireless Asia Ltd., Radio Electric Works, Sydney) and used by the Royal Australian Air Force (RAAF) in a role similar to our T1154. The transmitter covers 140 to 500kHz, and 2 to 20MHz. The set offers both v.f.o. and crystal control (six crystals sockets being easily reached via a front panel door).

Although it's smaller than the T1154, the AT5 is just as heavy! I managed to find a decent box and packing for it, and due to the above normal grade of travel, it was possible to bring the set back as luggage, even getting the box carried by hand to and from the aircraft for me!

Once home, the task of getting it going was underway. After an initial clean and a good check the set was cleaned and made ready for power. Application of the heater supply was tried first and things lit up and all seemed well. Next, I applied high tension (h.t.) to the oscillator and a 'jumpy signal' was obtained, much like that from a T1154.

Applying h.t. to the power amplifier (p.a.) stage produced some funny readings on the centre meter. It was accompanied by a little (**an understatement!**) bit of smoke emanating from the louvres in the sides of the case.

Removing the side, top and rear panels and applying power again, I saw that one of the two 807 p.a. valves was producing a blue sparkling display! It was soon replaced and the set retried and this time a good radio frequency (r.f.) output was obtained although it was still quite 'jumpy'.

The valve line-up in the AT5 is a 6V6 as the h.f. oscillator, an 807 as h.f. buffer (or doubler) which switches in as the master oscillator on the low frequency (l.f.) ranges and twin 807s in the p.a., grid modulated by another 6V6. Supplies are either 12 or 24V for the heaters and a 300 and 550V h.t. supply.

● Fig. 2: The LV-661 Finnish made set, not much bigger than a car radio. The built-in key is on the side, out of view. (see text).

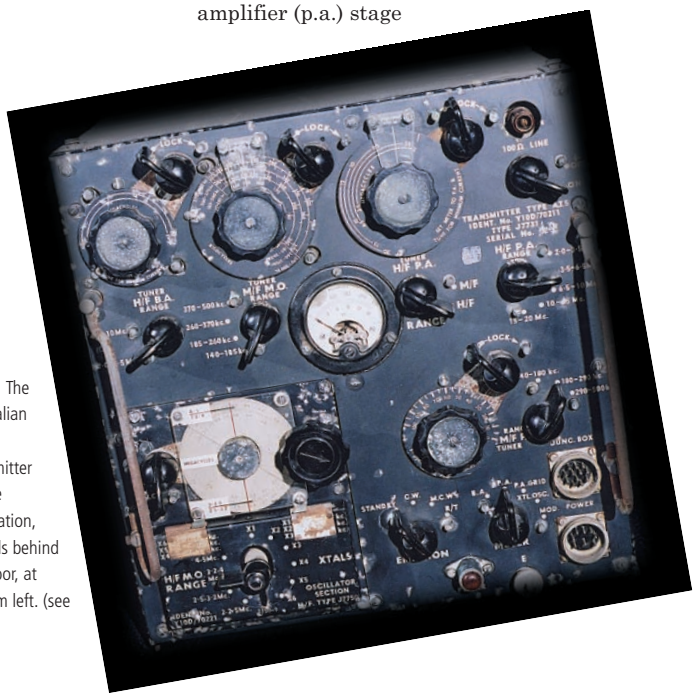
After further cleaning and numerous switch manipulations the signal from the transmitter settled down. I then made some good 3.5MHz c.w. contacts with **PA0HTT, G3YPS, G4GEN, F5XM** and **F2PI** and several QSOs using amplitude modulation (a.m.) with **G4GEN** and **G3YNT**.

Incidentally, looking back on my Australian trip, it was interesting that during a stroll around Sydney I spied a tall mast on top of a building which turned out to be the old AWA property! I now have several radios in the collection which were made by AWA, so it was nice to see the historical connection.

Finnish Military Set

A good friend of mine from Finland, **Timo OH1SM**, sent an interesting little Finnish military set, **Fig. 2**. He mentioned that it's a SIPI model LV 661, made by Televa near Helsinki Finland, for h.f. field and guerrilla portable radio operations. Weighing 2.8kg with batteries, it's transistorised. Covering 3-5MHz, with tunable receiver, the transmitter uses three switchable crystal frequencies. Quoted range is 1-500km. Output is 1W, c.w. only, receiever modes are c.w. and 'phone. The power supply is from four lantern dry cells, 4.5V each, wired in series.

The main unit is 165 x 55 x 240mm, accessories include antenna wire, 42m, 'throw weight', mini earphones, attached test bulb and a built-in Morse key. There's also a frequency calibration card.



● Fig. 1: The Australian AT5 transmitter before restoration, crystals behind the door, at bottom left. (see text).

● Fig. 3: The restored BC-620 'Jeep' set. A similar sized box housed the batteries underneath (see text).

'as new' inside which prompted the restoration of the case.

Dennis W7QHO, of Glendale in California told me that the BC-620 covered 20 - 27.9MHz, the old US Army Armour frequency range. It's frequency modulated with a deviation ±40kHz, has two crystal controlled channels, switch selected from the front panel, and approximately 1.3W output. The BC-620 i.f. is 2.88MHz and uses crystals in the 5 - 8MHz range tripling the output before mixing with the incoming r.f. Thanks for the information Dennis!

New Receivers

Let's now look at some new items and of course when I say 'new' I do of course mean new to this location! (it's very rare to see an actual new set in my collection. The two sets in question are a 1939 RME-70 set, **Fig. 4**, and an American Second World War unit, the R-45/ARR-7, **Fig. 5**.

The RME-70 is a later version of the RME-69 and was made around 1939. It's a single conversion superhet, with a 465kHz intermediate frequency (i.f.), six band receiver tuning 550kHz to 32MHz with 11 valves, including rectifier.

My example is in a grey case with nice green dial which glows with a soothing light when switched on. A nearby contact, **John Buckley G8TFO/M0CYW**, has another example but his is in a black case with pale coloured dials. I need to find a 6A6 valve to complete my set but it does light up, makes hissing noises and the meter moves, so it might well prove to be a working set in the near future!

● Fig. 4: The RME-70 receiver, with glowing green dials which G4BXD finds very soothing! (see text).

Produced By Hallicrafter

Produced by the Hallicrafter Company, the R-45 was used in American aircraft as a search receiver looking for enemy transmissions tuning 550kHz to 42MHz in six bands. An interesting feature on the set is that it will mechanically scan, via a motor driven tuning system, between any two given frequencies on a particular band.

In the photograph, Fig. 4, the large round cover in the centre of the R-45 hides a disc. This disc is connected to the tuning shaft which has two 'dogs' or lugs which can be locked in position around the disc and will flick a toggle switch to reverse the motor.

The set arrived in a damaged condition, with the front stoved in and looking a real mess. However, two weeks of dismantling, hard work and metal re-shaping have restored the set to near perfect condition.

● Fig. 5: The R-45/ARR-7 receiver, which Ben G4BXD states "with its motorised tuning makes it one of the first scanners". (see text).

The controls are labeled EI, K1, K2, K3, Ei=battery off, K1=crystal 1, K2=XTAL, K3=XTAL3 -KAL, A3, LDH, A1. KAL=calibrate the receiver. Calibration is achieved with a 200kHz oscillator.

On the rear of the set there is an inspection label, 'Tarkastettu'= (inspected) Date 19 December 1972, and 'Viesti keskus korjaamo' = (Signal Corps Central Service). So the Sipi is older than 1972...and is called the LV 661.

My thanks go to Timo for the translation of the small booklet that came with the set. It's an easy set to use although the internal construction is very basic, looking as it does like some Amateur produced rig rather than a military set!

On the air the results are what you would expect. My first CQ produced a call from an OH station but he never came back to my call. That would have been quite poignant...working a Finnish station! My first QSO was with a DJ station in Germany and I had several other good contacts while testing the set.

Rust To Radio

When the next set, a BC-620, arrived, **Fig. 3**, it was just a rust covered box. However, when opened it was

Rally Season Arrives

Finally, I look forward to the coming rally season, hoping to meet a few old friends once again and even make some new ones. Have a good summer!

As always I can be contacted at **62 Cobden Street, Kidderminster, Worcestershire DY11 6RP**. You can also contact me via E-mail at **G4BXD@qsl.net** or have a look at my web pages at **www.qsl.net/g4bxd**

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REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

THIS MONTH DAVID BUTLER G4ASR HAS DETAILS OF PROPAGATION CHANGES OCCURRING ON THE 50MHz BAND.

If you have 50MHz capability then there wasn't much for you to complain about regarding activity on this band during February. If, on the other hand, you were only active on the 144MHz band or higher frequencies then there was very little to report! The reason for this is that DX contacts on the 50MHz band are determined by the state of the ionosphere. whereas propagation on higher frequencies are largely dependant (at this time of the year) by the prevailing weather conditions in the troposphere. So, at this time around the peak of the Sun Spot cycle with the UK being battered by gale force winds and rain the 50MHz band wins hands down every time!

February marked a transitional period for propagation on the 50MHz band. During January the predominant propagation mode was via the F2-layer with UK stations making regular afternoon contacts into central and North America. There were also early morning openings to the Middle East and central Asia but no openings to Australia and the far east.

With only one or two brief exceptions there were also no openings during January into Africa. February was different though.

The openings to central and North America which most of the UK had enjoyed with regular monotony gradually faded out by February 15. It was obvious that propagation was on the move as these openings were now restricted to stations located in north-west England, Ireland and Scotland.

Contacts on c.w. and s.s.b. were made in the afternoon period between 1200-1800UTC with the stations of FP5BU (St.Pierre & Miquelon), HC2FG (Ecuador), KP4EIT (Puerto Rico), VP5/G4RCG (Turks & Caicos), XE1KK (Mexico), YV4DDK and YV4DIG (Venezuela) and ZF1DC (Cayman Islands). Stations in Canada (VE) and all USA call areas except W6 and W7 were also contacted.

Openings between 0830-1000UTC to the Middle East and central Asia were reported during February with operators throughout the UK contacting the stations of A45XR (Oman), A71MA (Qatar), HZ1MD and 7Z1SJ (Saudi Arabia), JY9NX (Jordan), OD5/OK1MU (Lebanon), YI9OM (Iraq), 5B4AGM (Cyprus) and numerous stations in Israel (4X). Some of the ex-Russian republics provided many stations with new DXCC countries. These included EX8MLE and EX8MLT (Kyrghyzstan), EY7AF (Tajikistan), UK9AA (Uzbekistan), UN5PR, UN6P, UN7GM and UN7QX (Kazakhstan) and 4L7IG (Georgia).

PREVIOUS FORECASTS

Previously I made the forecast that contacts would be made during February with stations in Australia, Japan, Hong Kong and the Far East. Fortunately my credibility is intact, as this turned out to be completely correct!

The first of the real DX contacts occurred on February 4 with the station of VR2LC (Hong Kong) being worked around 0930UTC in south-east England. Another brief opening, this time to DU1/GM4COK (Philippines), occurred on February 14 around 1030UTC. It wasn't until February 17 that the 50MHz band really got going with daily contacts to the Far East. Apart from two mornings this state of affairs continued through to the end of the month. Openings to Australia were reported on ten days during the period.

Some of the best openings took place on February 18, 19, 21, 24, 25 and 28. The opening on February 18 was unusually late for this path as it occurred between 1145-1315UTC. Contacts on c.w. were made from England, Scotland and Wales with the stations of VK4ABW, VK4CXQ, VK4JH and VK4FNQ.

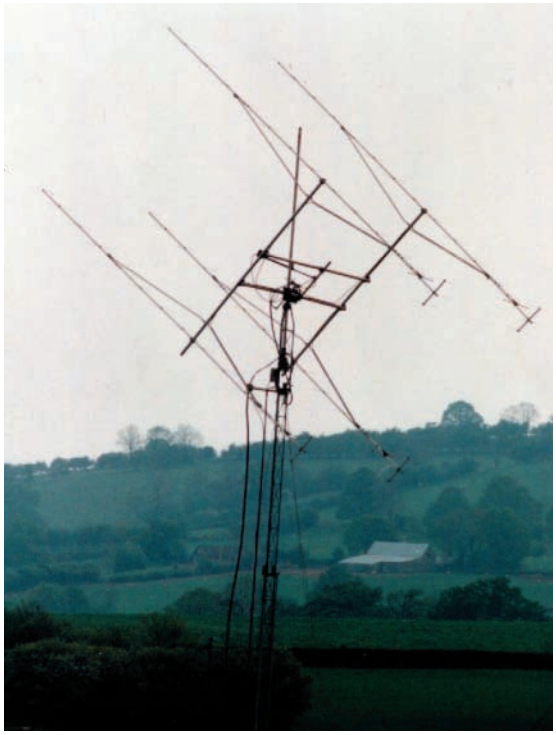
On the following morning the 50MHz band was open to Australia at the more usual time from 0900-1145UTC. Stations in central England and Wales mainly, mentioned making c.w. contacts with VK6HK, VK6JJ, VK6JQ and XV3AA (Laos). The low power beacon VK6RSX operating on 50.304MHz was copied throughout the morning.

The path from the UK to Japan (JA) is quite difficult as it passes over the polar regions. Signals are usually very weak and it's necessary to use c.w. to make reliable contact. Indeed c.w. is probably the major mode of operation on the 50MHz band due to the weak nature of many real DX openings.

Although signals were not strong some good openings to Japan occurred on February 21, 24 and 25. Stations in the JA1, 2, 3, 5, 6 call areas were contacted as were stations on Okinawa (JR6). Other DX worked in this period included the stations of DU1EV (Philippines), KH2JU (Guam) and YB5QZ (Indonesia).

The openings to Australia continued to the end of the month with a good event taking place on February 28. Unusually more than one call area was worked from the UK with the stations of VK4ABW, VK4CXQ, VK4JH, VK6JQ and VK8MS being reported between 0930-1215UTC.

During February there were also a number of openings to southern Africa made via trans-equatorial propagation. The best period for



David G4ASR's 144MHz antenna array.

these t.e.p. contacts was between February 23-28 around 1200-1400UTC. Stations contacted from England and Wales included V51E and V51/SP6IXF (Namibia), ZS6AXT, ZS6NK, ZS6WB and ZS6XJ (South Africa). Although not strictly t.e.p. (as the stations are located north of the Equator) contacts were also made with the stations of TR8CA (Gabon), TT8DX (Chad), 5U6W (Niger) and 9U5D (Burundi).

On February 12 between 1030-1045UTC there was a selective t.e.p. opening to South America with stations in western England and Wales managing to contact the station of PY8EA (Brazil). The beacon station PY0FF (50.006MHz) was also heard later in the morning at 1140UTC. It's located on the Fernando de Noronha Archipelago in the South Atlantic Ocean.

Trindade Island is also located in the South Atlantic Ocean and is a really rare DXCC entity. The station of PW0T was active from there during February and managed to make some contacts into the UK. The DXpedition station was first heard on February 24 at 2300UTC by stations in Cornwall (IO70) and Devon (IO80).

On February 27 and 28 between 2100-2130UTC a number of lucky stations including G1KTZ, G6ION and G8BCG/P managed to make an s.s.b. contact. What a way to end off the month!

Edward Murphy GM3SBC (Edinburgh IO85) mentions that at the beginning of the year he was loaned an Icom IC-575H 50MHz transceiver. He reports having made some great contacts on the band via tropo, backscatter, aurora and F2 propagation.

At the time of writing **Edward GM3SBC** had worked nearly 100 stations including Australia (VK), Aruba (P49), Canada (VE), Cape Verde (D44), Cyprus (5B), Israel (4X), Jordan (JY), Lebanon (OD), Puerto Rico (KP4), Trinidad & Tobago (9Y4), Turkey (TA), USA (W) and Venezuela (YV). That's all continents with 100W to a 2-element Quad antenna at only 6m above ground!

Ed mentions that he is interested in making 50MHz skeds with stations located in the north of Scotland. He regularly monitors 50.150MHz (the UK s.s.b. calling frequency) during the evenings.

GALE FORCE CONDITIONS

Because of gale force winds during much of February I kept my towers luffed-over with the antennas at ground level. As a consequence I worked little on the v.h.f. bands from my QTH (Herefordshire IO81) during the first few weeks of the month.

I did however, keep an ear on the 50MHz band by using a small vertical antenna. Using this antenna a few UK stations were heard calling for DX contacts during the morning of February 12. Tentatively cranking the tower up into a vertical position I quickly made s.s.b. contact with the stations of 5U6W (Niger) and PY8EA (Brazil) before deciding that the wind was getting the better of the antennas!

During the last week or so of February the weather conditions and F-layer propagation had greatly improved. On February 19 from 1000UTC the stations of XV3AA (Vietnam) and JH5FIS (Japan) were heard but signals were very weak. By 1045UTC the propagation had improved and a c.w. contact was made with the station of JA5FFJ (PM63).

Other contacts made during the month included VK6JQ (Australia) on February 21, 9U5D (Burundi) on February 22, DU1EV and DU1/GM4COK (Philippines), TR8CA (Gabon) and XW0X (Laos) on February 24. Propagation to the far east was even better on February 25 with c.w. contacts being made with the stations of JA0RNN, JA6QGG, JH6TOR, JH6VXP, JR6EXN (Okinawa) and VK6WD.

At 1100UTC I heard the Perth beacon VK6RPH (50.065MHz) with signals peaking 529. Conditions must have been good as it only runs 10W into a dipole antenna.

Many stations in the middle east were heard at my QTH on February 27 and s.s.b. contacts were made with JY4NE (Jordan), 4Z4KX, 4Z4TL and 4X6ON (Israel). At the end of the month, February 28, more DX contacts were made with the stations of A71MA (Qatar) and VK8MS (Australia). It's probably worth noting that all of these QSOs were made between 1000-1200UTC.

Jamie Ashford GW7SMV (Monmouthshire IO81) reports working many DX stations on the 50MHz band during February. Star turn of the month was a c.w QSO with VK6JQ on February 22. He had been looking for an Australian contact for eight years. Well done! Other DX contacts made during the month included the stations of EX8MLE, JA6IDJ, PY8EA, TR8CA, UK9AA, UN7QX, ZS6NK and 5U6W. Jamie also mentions hearing DU1/GM4COK, KH2JU, VK4ABW, XW0X and ZS6WB.

PROPAGATION FORECAST

The period from mid-April to mid-May should produce many t.e.p. openings deep into Africa on the 50MHz band. These will often be intermingled with days when auroral back-scatter is more prevalent on all the v.h.f. bands.

During April the t.e.p. paths should give c.w. and s.s.b. contacts with stations located in Malawi (7Q), Namibia (V5), South Africa (ZS) and Zambia (9J). From the UK you will need to beam at 160°.

By May the t.e.p. path could shift toward South America with contacts being made in Argentina (LU) and Uruguay (CX) on a beam-heading of 225°. Although these type of openings favour stations located in southern England the skip distance often extends enabling stations in northern UK to participate.

Auroral activity should be high, favouring stations in northern England, Ireland and Scotland. The period often produces one or two large scale events enabling long distance contacts to be made on the 50, 70, 144 and 430MHz bands. Beam in a northerly direction and move your antenna further eastwards to find the real DX stations. From central UK, stations in Scotland will be strongest when beaming at 000° whereas Eastern European stations (Hungary, Poland) may be found around 050°.

By the end of April openings via Sporadic-E (Sp-E) will become more prevalent with contacts being made on the 50MHz band with stations in southern Europe (Italy, Yugoslavia). During May there could well be Sp-E openings on a daily basis and this will extend up to the 70MHz band enabling DX contacts to be made with stations in Slovenia (S5).

The summer period is an excellent time to be active on the 50MHz band with low power and a small antenna. Signals can be rock-crushingly strong and it is very easy to make dozens of contacts with QRP powers.

There are two major meteor showers during the period. The Lyrids meteor shower occurs between April 19-24 peaking around April 22. The shower rises at 2000 and sets at 1200UTC. Don't bother trying to make contacts during the afternoon and early evening! The best path is to the south-east at 0600UTC and due south at 0800UTC although you'll find you can make contacts in most directions when the shower is above the horizon.

The Eta Aquarids meteor shower occurs between May 1-8 peaking around May 5. It's more sharply defined than the Lyrids shower, rising at 0300 and setting by 12000UTC. The best paths are to the north-east, east and south-east and occur between 0500-1000UTC. Activity will be found on high speed c.w. around 144.100MHz, on s.s.b. around 144.200MHz and on FSK441 (WSJT) around 144.370MHz.

Meteor scatter activity on the 50MHz band is far less structured and you can expect to find many examples of poor operating on 50.110MHz! Don't use this frequency, move up the band to 50.140MHz and above.

DEADLINES

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

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

73, David G4ASR

The DX contacts mentioned in this column are made using either Morse (c.w.) or s.s.b. telephony in the appropriate sub-bands for each mode. On v.h.f. and u.h.f. this equates to contacts being made in the bottom 200kHz or so of each band.

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

I was able to attend the **Swansea Radio and Computer Rally** this month on what became a very wet and windy Sunday morning here in South Wales. The weather did not appear to put too many people off though and the main hall at Swansea Leisure Centre was jam-packed with visitors when I arrived. At times it was difficult to move around and all the traders appeared to be very busy.

Tucked away in one corner was **Robin Trebilcock GW3ZCF** who was busy demonstrating PSK31 to a wide audience, having just repaired the feeder to his roof mounted dipole which had been cut by vandals the night before. Band conditions were good and many contacts were made throughout the day. Amongst the groups represented were the RNARS, RAFARS and RSIGS who between them had many a tail to tell. All-in-all it was a very successful event!

SPECIAL EVENT STATION – ZS100ABW

The Midlands Amateur Radio Group (South Africa) will be operating another in a series of special event stations from 3 to 5th May to commemorate the roles played by the British, Boers and brave Zulu's during the Anglo Boer War of 1899-1902. Two separate stations will operate from Lancaster Hill, Vryheid in KwaZulu Natal, South Africa from 1600 on Friday, closing down early Sunday morning when a remembrance service will be held in recognition of those who lost their lives in the Battle of Holkrans.

The preferred bands will be 7 and 14MHz during the day and 3.5MHz in the evenings depending on conditions and the operation will be mainly s.s.b. All contacts made will be acknowledged with an attractive card and QSLs should go via the bureau or direct to **Midlands ARC, PO Box 100220, Scottsville, 3209, South Africa**.

On the 31 May a station will operate from Spioenkop, scene of one of the bloodiest battles fought to relieve the town of Ladysmith. For further details contact **Willie Axford ZS5WI** at **zs5wi@iafrica.com** If you would like information of a more historical nature contact **Sean Friend** at **seanfriend@dorea.co.za**

THE HF BANDS HAVE BEEN BUZZING AGAIN THIS MONTH WITH YET MORE NEW REPORTERS JOINING IN!

DX NEWS

Massimo Cosentino IZ0BXZ who is the ARI Roma h.f. manager reports that the station HV2CO (QSL via I0XXR) **is most likely to be a pirate**. Giancarlo I0XXR the stated manager does not know anything at all about the station.

Many of you have requested the new QSL information for 5A1A. Abubaker has been in Germany since December and those of you who need cards should send requests direct to **A. Assid, Max Strasse 58, Bonn 53111, Germany**.

FIVE STAR DXERS ASSOCIATION

News now from **Don Field G3XTT**, the D68C Publicity Officer, who say's that **Phil G3SWH** reports that around 85% of the direct requests for D68C QSLs have now been processed and that 42,500 of these have been confirmed to date. The team is now starting to think about the perennial question 'Where do we go next'?

The Five Star DXers Association now has considerable experience in mounting large-scale operations following on from DXexpeditons to 9M0C and D68C and has the ability to cover all bands and modes to fill those missing slots. They are now looking to mount their next operation in late 2003 or early 2004.

Don G3XTT says they are not planning to head for Peter 1 or Bouvet, but want the sort of DX entity where you may have a 14MHz QSO, but are finding those low bands, WARC or data slots hard to fill. They would be interested in your 9-band, 3-mode 'wanted' lists so they can gain some idea of what the entities might be. Being mainly a European group the preference would be for an African location for reasons of cost, propagation and travel time.

Don says the group has already reviewed the various 'most-wanted' surveys, so if there is enough response they will make the analysis public for the benefit of other would-be DXpeditioners. Don can be contacted at **g3xtt@lineone.net**

YOUR REPORTS

First this month is **Sean Gilbert G4UCJ**, Milton Keynes who say's "The bands have been chock-a-block with stations, in fact too many! That sounds an odd thing to say but we've had too many DXpeditions operating at the same time and in the same part of a band.

"Several of these have been operating using a wide split receive. Other DXpeditions then operate calling in the middle of their receive frequencies. Before you know where you are the whole band is full of stations calling over the top of each other.

"Many stations are not even sure who they are calling! On several occasions I have had to change frequency during a QSO to escape the pile-ups of DX hunters as they spread up the band. Having said that, I have managed to work a few of these myself including VP8GEO (Falkland Islands) which is a new country for

● Carl recently attended the Swansea Rally - pictured here are RNARS, RAFARS & RSIGS members (back row l-r) Bryn GW0DPM, Les GW0JTE, Syd GW0PPG and (front row) Bill GW0SGG and Arthur GW3LNR.

me and 5U1A (Niger) snagged first call on 7MHz".

I'm sure we have all had experiences similar to Sean's especially when conditions are as good as they have been this month. Sean's log lists 7MHz contacts with JW8AJA (Svalbard), FP/JA9KRO/P (St. Pierre & Miquelon) VP5/KI7VR (Turks & Caicos), HI3/OK2ZU (Dominican Republic), KP4UD (Puerto Rico), 9K2HN (Kuwait), V31YN (Belize), VP2E (Anguilla), YV5BNR (Venezuela) and JT1CO (Mongolia). All contacts were made using an IC-746 and up to 100W c.w. between 2218 and 0138UTC.

All c.w. man **Ted Trowell G2HKU** on the Isle of Sheppy, Kent worked OY3QN (Faroe islands), DS5USH (South Korea) at 2000 followed by ZF2NT (Cayman Islands) at 2200UTC using a Ten-Tec Omni V and G5RV or Butternut HF6 vertical.

THE 14 & 18MHz BANDS

Welcome now to new reporter **Colin Topping MM3ACL** who has been very busy using his new callsign from Gauldry in Fife. Colin's rig is an IC-706Mk2 with a HB Pi-Match and the antenna, a G5RV which has just been repaired after suffering damage during the winter gales.

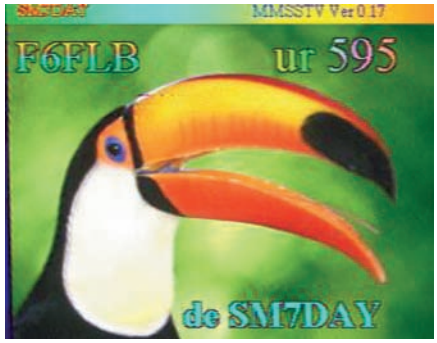
On 14MHz Colin worked VP5/VK4BRC (Turks & Caicos) 1135 followed by W6LMJ in Palm Beach (USA) at 1140UTC. I had the pleasure of meeting Colin last year onboard *HMS Belfast* where we managed to down a pint or two while operating GB2RN!

One of Colin's other hobbies is magic which he enjoys performing at various venues around the UK. Check out the **Master of Magical Mirth's** website at **www.colinsmagic.com** (The site also has several useful Amateur Radio links).

Another new reporter is Short Wave Listener **Mark Borthwick GM-20877**, who has lived in Hawick in the Scottish Borders for the past 10 years. Mark rejoined the ISWL in February last year and has spent the past few months monitoring SSTV on 14, 21 and 28MHz. He uses an Icom IC-R71E with Datong FL3 filter, connected to a vertical 12m (40ft) up. The station PC is 800MHz, 64Mb of ram running the SSTV program DL4SAW (GSPC 2.3) with a soundcard interface supplied by Pervisel Ltd.

Martyn Medcalf M3VAM, Chelmsford, Essex had 10W s.s.b. contacts with UR4PWC (Ukraine), LA7YX/M (Norway), HA5KDX (Hungary), OH3OJ (Finland), OE8CIQ (Austria), 9A3NY (Croatia), 8S4Z (Sweden), 4X4MU (Israel), RW1ZW/MM onboard a fishing vessel off the coast of Iceland and OD5NH (Lebanon) between 1120 and 1900UTC. The equipment was an IC-746, SGC237 tuner with 8.2m (27ft) wire.

The large QRP logbook of **Roy Walker G0TAK** near Kendal, Cumbria lists 5W c.w. contacts on 18MHz with OH6MM (Finland) 0929, OM7AX (Slovak Republic) 0948, HB9DNB (Switzerland) 1027, EA6BB/QRP Majorca (Balearic Islands) 1151, ZC4VG (UK Sovereign Bases on Cyprus) 1426, VO1VK (Canada) 1440 and SM7RYR/QRP (Sweden) at 1507UTC using a QRP Plus, Alinco EDX tuner and 3.5MHz long wire loop.



● A selection of SSTV images received by Mark GM-20877

THE 21 & 24MHz BANDS

The 21MHz band has had its fair share of activity this month and **Mike Baker G3SUK**, Stowmarket, Suffolk spent some time working 9A4KF (Croatia) 0842, EA1CYK/QRP (Spain) 1529 and LU1DZ (Argentina) at 2044 using an IC-746, 80W s s.s.b. and a Carolina Windom.

Heard by MM3ACL but not worked was BY4BZB (China) 1204. A little later contact was made with fellow RNARS member Bill WA1HMW in Boston, (USA) who gave Colin a 56 report.

Don McLean G3NOF, Yeovil, Somerset noticed that 21/24MHz has been staying open for longer this month with South American stations still being heard at 2345UTC. Using a TS-950 and trapped dipole Don's s.s.b. reached H40T (Temotu Island), 3V2SM (Tunisia), 5U4R (Niger) and 5X1BK (Uganda) between 1000 and 1430UTC.

On 24MHz Don found conditions 'very good' working V51/DJ4SO (Namibia) 1314, S9LA (Sao Tome & Principe) 1324, P49MR (Aruba) 1826 and KG4ZO (Guantanomo Bay) at 1949UTC.

THE 28MHz BAND

On to 28MHz now where **Peter Lowrie MI5JYK**, Newtonabbey, Northern Ireland worked several new countries including A61AS (United Arab Emirates), V51/SP6IXF (Namibia) and IS0GQX (Sardinia) using 10W and s.s.b. around 1230UTC. At 1410 A41LD (Oman) was heard calling CQ using a.m. but no contact could be made. However, f.m. proved more successful with EA7BVD (Spain), S51AP (Slovenia), SQ7CNM (Poland), YO5AMF (Romania), CT2HTM (Portugal), OK2IPW (Czech Republic) and another new country EA6ST (Balearic Islands) making the log between 1220 and 1310UTC. Peter's rig is an Albrecht AS545E and the antenna a dipole which is being replaced with a G5RV shortly.

SIGNING OFF

Well that's about it for this month. All our reporters have worked some good DX especially those with low power or simple antennas. My thanks to you all and to **Tedd Mirglotta** (*OPDX Bulletin*) for the DX information. See you again next month.

73, Carl GW0VSW

PW LISTENING & OPERATING WATCH LIST. (ALL TIMES UTC)

Sean Gilbert G4UJC operates around 0700-1100 and 2100-0000 7 days a week on all bands using an FT-307 and Alinco DX-70 tranceivers at 3/30 watts into a loft mounted G5RV dipole antenna.

Rob Mannion G3XFD's station at his new home is not yet fully operational, but he is working most days on 7, 18 and 28MHz from his car using an Alinco DX-70, running c.w. and s.s.b. at 50W to Pro-AM mobile whips. He's on 7MHz around 1700 (clock time) most weekdays on the way home from the office (c.w. and s.s.b.) when he parks up for 30 minutes or so.

Carl Mason GW0VSW listens and operates on 14.060MHz most mornings at 0800 with a Ten-Tec Argonaut and inverted Carolina Windom.

Don McLean G3NOF operates 1030 Saturdays on 3.685MHz on the ISWL Net or 1030 Sundays on the Yeovil ARC Net on 3.665MHz using a Kenwood TS-950 and trapped dipole antenna.

George Woods G3LPT operates an open net on 29.630 n.b.f.m. 0830 Tuesday to Friday.

Jon Wheeler G0IUE monitors 28.600 n.b.f.m. every evening between 1730 and 2230 regardless of conditions using a Yaesu FT-920 transceiver running 100W and 2-element tri-band beam.

Brian Parsons GW0KZK listens and operates on 14.250MHZ 1000-12000 and 1400-1600 most days using an Yeasu FT-1000MP and 100W into a Carolina Windom or five band vertical.

Trader's Table

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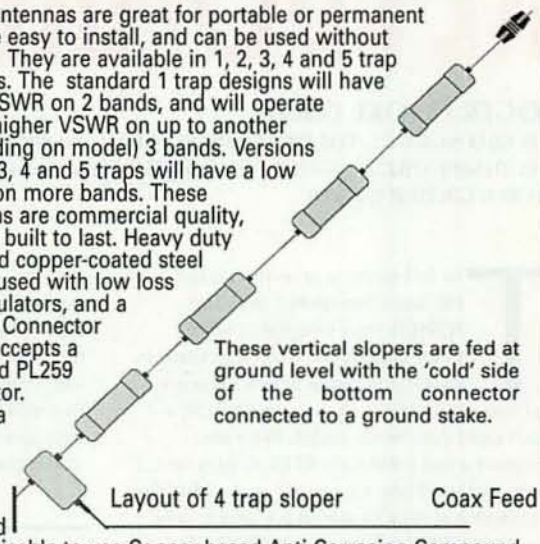

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ROGER COOKE G3LDI TAKES A SLIGHTLY DIFFERENT APPROACH THIS MONTH AS HE FOLLOWS A DEBATE ON NATURAL BAND PLANNING.

The following is an extract taken from the latest Newsletter from **Jim N2HOS** regarding data comms. **Peter G3PLX** has been interested in digital communications for years and was instrumental in making AMTOR a much used data mode on h.f. Peter also designed a first solid state RTTY display unit. I made and used one for several years. His latest pet offering is now in use on h.f. and is very popular, and I'm talking about PSK31 of course.

Firstly a note from Jim N2HOS: "A few weeks back I commented in Newsletter 115, 5 Feb 2002, that I'd received an unwelcome E-mail from a DL Ham who derided PSK, calling it the kindergarten mode. He went on to brag about Pactor II and hinted at a new Pactor III, a new digital mode for the true digital fan. I thought no more about this communication until I received a note from Fred OH/DK4ZC. He added a few comments and then, in a subsequent note, opened up a subject that forms the backbone on this epistle".

Jim continues: "The background includes a recording by **Les VK2DSG** of some new, strange signals on 14MHz. He sent the .wav file to Peter G3PLX, who, after spending some time with these new signals responded to Les, a copy of which was received by Fred, who forwarded it to me.

Peter's logic impressed me from the beginning of this exchange of notes and the impression lasts and lasts. It's a simple idea, so simple it has been overlooked as the most elegant solution to the never-ending discussions about the allocation of our frequencies. It is, indeed, the **natural** approach to the problem. But, read on and learn more about Peter's latest and most interesting contribution to our hobby".

FIRST MEMO

This first memo is from Peter to Les VK2DSG. "Hello Les, Yes the signals you sent me are the same as I have been hearing on 3.584MHz here. One of the stations in the 3.5MHz set-up was **Peter Helfert DL6MAA**, the inventor of Pactor. He did send a CW-ID at the end of the QSO.

My guess is that he is running some tests on both 3.5 and 14MHz. When I first heard this noise I thought it was a Pactor signal suffering from instability, which they tend to do when r.f. gets back into the PTC hardware and gets rectified by non-linearity in the audio circuitry. But closer examination revealed the spectral structure. The smallest number of tones I have seen is 14, but looking carefully at the start of the 14-tone burst, I saw two extra tones for a brief period at the start of the transmission, as if the system was probing the adjacent channels to see if it was worth starting up two more tones. Sure enough, it later switched to 16 tones and a further two blips of tone appeared, and last night I saw it swap to 18 tones, at which point there were no more, so I guess that 18 is it's maximum - 18 tones at 133.333Hz spacing is 2.4 kHz wide.

Each tone has 100 baud PSK data, and I have seen both BPSK and QPSK. That puts the raw throughput at 18 x 100 x 2 = 3600 baud but there will be some loss due to the ARQ switchover and other overheads. The easiest way to recognise this signal is by the short acknowledgement bursts. Like Pactor, there are two of these short ack tones.

In Pactor they are of course 200Hz apart but this new mode has them 1066Hz apart. I could see this clearly on your recordings, although I couldn't make out much other detail because the recording level was very low. I could see both sides of the QSO on your recordings.

The debate I want to promote is to establish what support there would be for the idea that modes of similar bandwidth should occupy the same part of the band, **regardless** of whether they are voice or data. It would be easy to get support for this idea from the narrow-band digital fans (the 'Not in My Back Yard' effect), but I think if the debate was widened to include the s.s.b. people, although there would be some objection initially, I think that this principle could be accepted generally.

In effect I am suggesting that you get the minimum of conflict if **both** types of mode cause each other **the same** level of interference. The really bad conflicts occur where mode A causes more QRM to mode B than the other way round. In this situation, of which the PSK31/Pactor conflict is the best example, there is no co-operation between the parties involved in the conflict.

If you heard these signals around 14.106, then that's exactly where I would hope such signals would go. It's above the narrow-band part and indeed above the medium-bandwidth (300 baud packet) area. The same reasoning applies to your choice of this part of the band for MT63 operation.

If one accepts the principle that modes of similar bandwidth should share, and accept that there are modes of widely different bandwidths, then it makes sense to put the

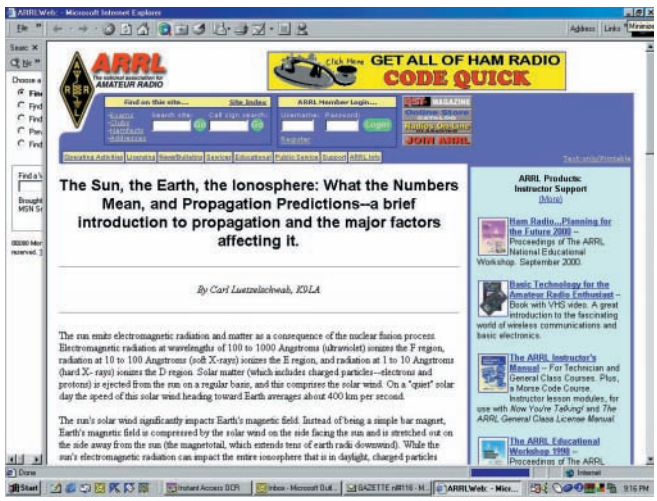

Fig.1. Check out this site for all you ever wanted to know about propagation.

widest modes at one end of the band and the narrowest at the other, and whenever a new mode appears on the scene, it should find a spot in the band where it's bandwidth matches that of the existing users. This way there are never any places in the band where widely different bandwidths are adjacent to each other".

Jim comments "After receiving and reacting to the memo to Les, I dropped a note to Peter. I complimented him on the quality of his thinking process and because of it, requested permission to reprint the message. He agreed and added further thoughts for discussion. Note: I added the underlined emphasis"!

Peter then replied with the following: "Jim, by all means quote me on the band-plan idea. I want to get this idea aired as soon as possible. With luck we can have the whole area being hotly debated just as SCS are about to launch Pactor3 (or whatever they might call it - that's only my name for the signal I have observed).

This idea is not at all new. The principle of separating modes of different bandwidths has been around for a long time. It's perhaps just not been obvious that this is what people have chosen to do instinctively. It's easier to state the argument inside out: The principle is that of having similar-bandwidth modes sharing the same part of the band. SSTV, which is about the same bandwidth as s.s.b., operates quite happily in the middle of the s.s.b. sections of 3.5 and 14MHz.

My analysis of why this works is that if you have a situation in which the operators of mode A cause the same amount of QRM to the operators of mode B as that caused by mode B to mode A, then there will be a stable, happy medium in which both sets of operators keep away from each other and neither cause nor suffer QRM. The most significant factor, which determines the extent to which one mode can cause more or less QRM than it suffers from another mode, is the difference in bandwidth between them.

To be precise, the broader bandwidth mode causes more QRM than it suffers, and this is the conflict-causing mechanism. The point I wanted to make on the reflector was that the present bandplans are based on separation by 'mode-name'. By which I mean that the top end of the band is allocated to the mode called s.s.b. and the bottom to the mode named 'c.w.' and the bits inbetween to the modes collectively called 'digital'.

In practice, if you look at the bandwidths of these modes, you can see that the widest mode is at the top-end and the narrowest modes are at the bottom (well almost), and modes (like packet) of intermediate bandwidth are somewhere between the two. This situation has established **itself** by evolutionary forces, and I suggest that this is precisely **because** of the principle I have described.

It makes for harmony if the operators on either side of you are roughly the same bandwidth as you are, so since c.w. (which is narrow) has historically always been at the bottom and 'phone (which is wide) has always been at the top, the tendency for modes of intermediate bandwidth to dispose themselves in bandwidth-order across the bands, is a natural evolutionary trend. Darwin would understand what I mean! You can see now why I chose to place PSK31 activity (which is narrower than RTTY or Pactor), just **below** the existing RTTY/Pactor activity!

My point, therefore, is that the stated bandplans would place **any** new mode called 'digital in the presently-named digital part of the band, and if a new digital mode was as wide as s.s.b., it would be forced by convention to occupy the digital sub-band **and this would violate the natural law.** There is therefore a good case for debating the issue before a conflict develops".

So there it is, I make no apology for quoting these memos as read, as they make very interesting reading. This is a novel approach to band-planning and I can see the logic in Peter's thinking. It will cause quite a lot of discussion, to put it mildly! I fear it will also open the proverbial can of worms, but something has to be done.

We do have a limited amount of space on our bands. With all the intruders that we have to suffer too, especially on 28MHz, our bands need a spring-clean!

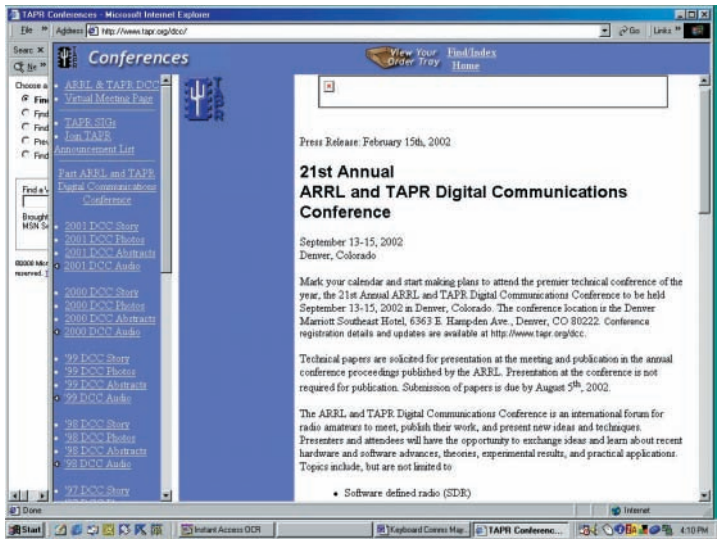

Fig.2.

Feedback on this is needed and also constructive criticism/suggestions. You can send comments to me, or direct to Jim N2HOS. I will report on any that I receive. Give it some thought, it makes a lot of sense, and then get your fingers walking over your keyboard, don't leave it to the others to do!

As a matter of interest, the Pactor II unit from SCS is still currently being used on h.f. but this has now been superceeded by a newer unit, somewhat more expensive too!

ODDS AND ENDS

Find out all you ever wanted to know about propogation at **www.arrl.org/tis/info/k9la-prop.html (Fig. 1).** The site is maintained by **K9LA** who does the ARRL propagation bulletin.

The 21st Annual ARRL/TAPR Digital Communications Conference takes place will be 13-15 September in Denver. Papers must be submitted by 5 August. Details can be found at: **www.tapr.org/dcc (Fig. 2).**

SECURE E-MAIL

If you've been less than impressed with the security and leaks in *Outlook Express* you might want to try *HushMail*. It claims to be the world's premier secure web-based E-mail system offering total end-to-end security.

Hushmail uses Blowfish, a 128-bit symmetric block cipher to encrypt your password before it even reaches the web. Combine that with 1024-bit security and there is a system no super computer will be able to hack - well not yet anyway!

It even encrypts attachments. Despite this unsurpassed level of security, sending and receiving encrypted E-mail messages and attachments is as simple as clicking a mouse. Unfortunately if doesn't work on Macs but is available free from **www.hushmail.com** **(Fig. 3**).

That's all I've got room for this month so, until next time keep those keyboard communications coming! See you next time.

Roger G3LDI

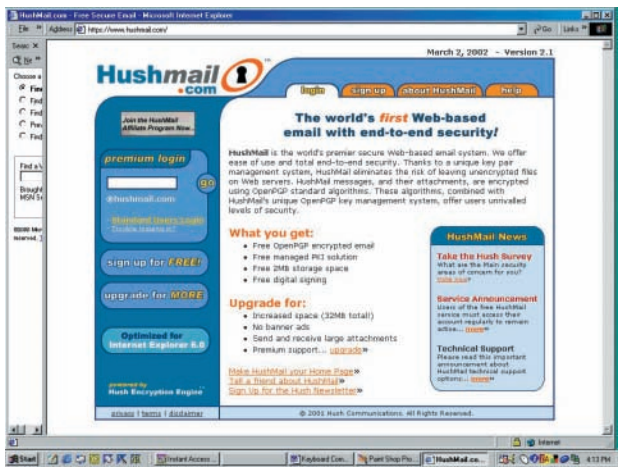

Fig.3.

TUNE-IN

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● Vatican Radio has been the centre of discussion over possible health hazards caused by electromagnetic emissions from its transmitters.

TOM WALTERS HAS THE LATEST NEWS FROM THE WORLD-WIDE BROADCASTING BANDS.

While it seems that international radio broadcasting is secure for the foreseeable future, in spite of competition from other media, the same can not be said of radio programmes about international broadcasting. The following message appears on the Internet, on the home page of the **Voice of America** (VOA) media programme *Communications World*

"To My Friends in the Radio Community: With sadness, I must inform you that I will leave *Communications World* after the February 23 program. I will return to audience research at VOA, which was my profession before I became host of *Communications World* in September 1995. I will miss most of all the support of my listeners, whose participation was the main reason the program succeeded. The VOA does not plan to continue *Communications World* under a new host, at least for the time being. I will remain active in the shortwave and DXing communities, and I hope to keep in touch with my listeners via post and E-mail. All the best, Kim Elliott". So, that would appear to be that.

It's not long since **Radio Netherlands** dropped their on-air *Media Network* programme, although that lives on as a very active Internet site. *Communications World* was, like *Media Network*, a fount of information from all over the world about international radio. But like its Dutch counterpart, it depended very much on the efforts and personality of just one individual. We shall miss it - not only for the programme itself, but also because this column was much indebted to it as a source of news!

TRANSMITTING BEASTS

Transmitters used for international broadcasting are powerful beasts, and they have to be sited in just the right spot to give maximum effect. These two aspects have put the transmitting sites of two major international radio broadcasters firmly in the spotlight.

First, the site of **HCJB** in Ecuador turns out to be on the flight path for a new airport that's needed for the country's capital, Quito. The present site at Pifo has to be levelled by 2006. So HCJB has to move its transmitters but they will have to go to a really inconvenient place called Santa Elena, that can only be reached after an 11 hour car journey from Quito, or after 4 hours by plane and car.

Transmission from Santa Elena is scheduled to begin in 2003, with a complete switch-over by 2005. The transmitters at Pifo include four at 100kW and one at 500kW.

Meanwhile, the dispute over the possible health risks - such as leukaemia - to Italian citizens from the transmitters of **Vatican Radio** has taken a new turn. It seems that under a treaty of 1929, the Italian state can't "interfere with the central institutions of the Catholic Church".

Vatican Radio notes that no reliable study on health hazards has been done, that it has always respected the international recommendations on electromagnetic emissions, and has anyway limited the emissions to within Italian limits. The power of the medium wave transmitter at Santa Maria de Galeria has been reduced from 300 to 100kW, and its time on air has also been reduced. Some broadcasts have been transferred to a transmitter owned by Monte Carlo Rediffusion.

ISRAELI BROADCASTING

At the time of writing, there was anxiety about the suggestion that the **Israel Broadcasting Authority** should stop all foreign language broadcasts, in a cost-cutting move. The country's Deputy Foreign Minister weighed in with the comment: "Ending the broadcasts during this difficult conflict would be an irresponsible move that would harm the interests of the Israeli public".

The main languages broadcast from Israel are **Russian, French** and **English**, but there are also short transmissions in **Yiddish, Ladino, Spanish, Romanian, Hungarian, Georgian, Bukharian** and **Moghrabi.** The **Kol Israel** schedule for English has been at: 0400-0415 on 9.35, 15.640, 17.545; 1030-1035 on 15.640, 17.545; 1600-1630 on 15.615, 17.545; 1900-1925 11.605, 15.615, 15.640 and 17.545MHz. Try it and see if they're still there.

● The Association for International Broadcasting is looking to fill the gap in cross-border broadcasting.

RENEWED CONTRACT

Radio Telefis Eireann (RTE), Ireland's national public service broadcasting organisation, has renewed its contract with Merlin Communications to broadcast RTE programming on Merlin's short wave network for another year. Merlin will transmit daily programming from its UK sites, as well as Singapore, Ascension and Sackville, offering comprehensive coverage of RTE's key target areas.

The RTE schedule is: 0130-0200 on 6.155 Central America; 1000-1030 on 9.895 Middle East; 1830-1900 on 13.640 Central and Eastern USA; 1800-1830 on 15.540 South East Asia and Australasia and at 1830-1900 on 21.630MHz Africa. Merlin will also broadcast the All Ireland Hurling & Football Finals' in September on behalf of RTE.

INTERNATIONAL UNIONS

There are many organisations that cover selected areas of international broadcasting. The **International Telecommunication Union** deals with matters such as frequency allocation. Regional groupings such as the **Asia-Pacific Broadcasting Union** cover international broadcasting in their part of the world.

Until recently, there has been no organisation to look at the whole range of cross-border broadcasting - programming, technology, distribution and all the many facets of creating programmes and sending them to other countries. But now **The Association for International Broadcasting** (AIB) is filling that gap.

The **AIB** is holding its first conference in Manchester on 30 April, with top-level speakers and delegates from around the world. I'll be reporting on this soon. Meanwhile, you can find out all about the AIB's activities on their web site **www.aib.org.uk** where you can also find details of their world-wide radio and television listing *The Global Broadcasting Guide* (currently available from the PW Book Store for £2.25 plus P&P.

Bye for now, Tom

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ECC81	3.00	PL81	2.00	6BR8	4.00	12BY7A	7.00
ECC82	6.00	PL504	5.00	6BW6	4.00	12DW7	15.00
ECC83	5.00	PL508	4.00	6BW7	3.00	12E1	10.00
ECC85	5.00	PL509/519	10.00	6BX7GT	7.50	13E1	85.00
ECC88	6.00	PL802	4.00	6BZ6	3.00	572B	30.00
ECC808	15.00	PY500A	3.00	6C4	2.00	805	45.00
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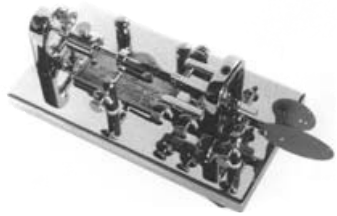

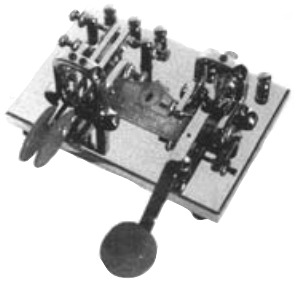

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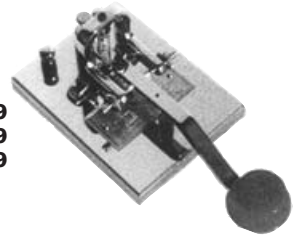

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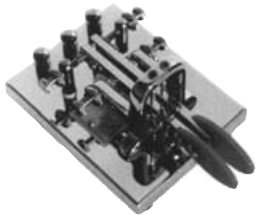

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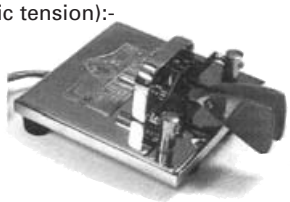

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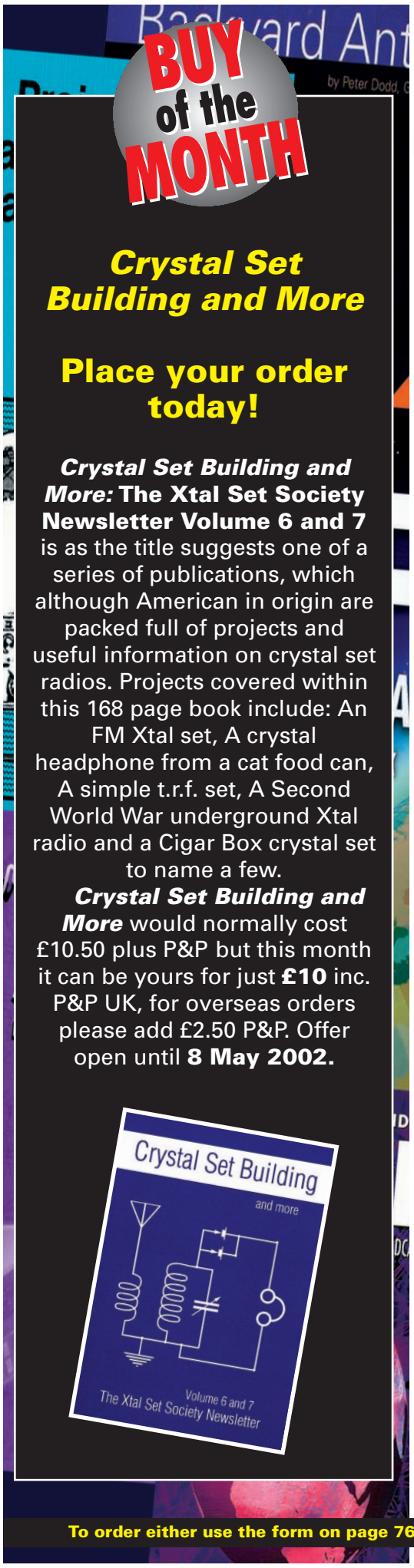

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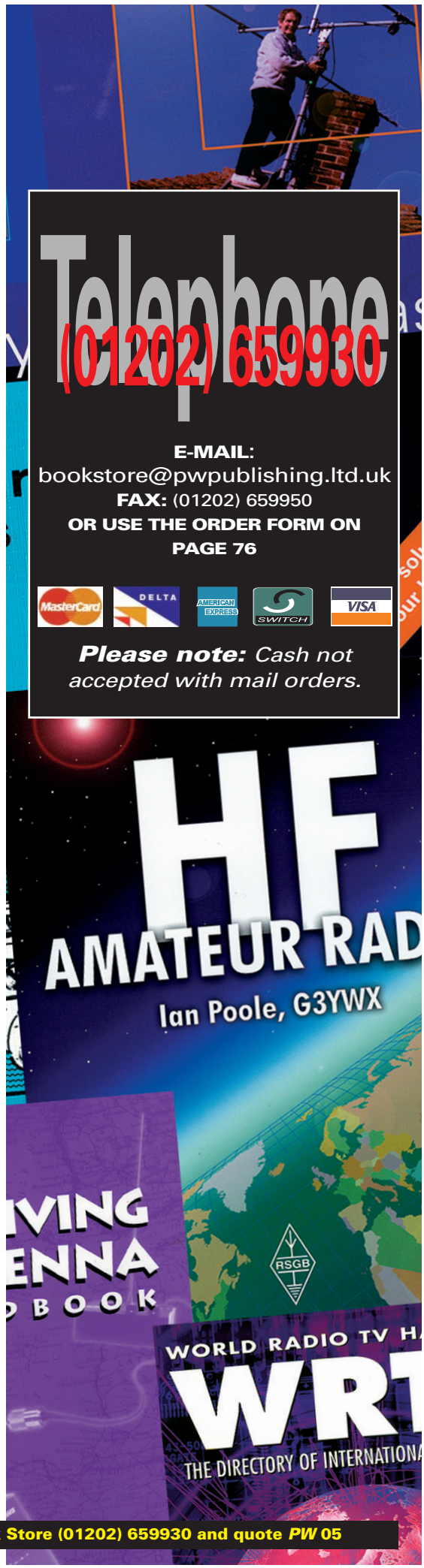

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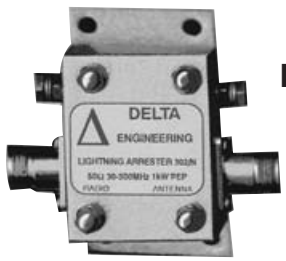

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topical talk

Although this month's topical chat centres around the recent passing of one of the greatest Amateur Radio personalities - the PW team still regard it as highly appropriate. It's real Boy's Own stuff!

It's not often that the passing of a Radio Amateur is marked by an almost half-page obituary in *The Daily Telegraph* (Tuesday 19th of March) - but **Evan Nepean G5YN** had a long (92 years) life packed with adventure, radio and much more! And - by strange coincidence - in this issue of *PW* Evan's great long time friend, the late **Bert Newman G2FIX** is also mentioned in the news pages where his 'Bert's Bell' Trophy is once again up for the best National Club Magazine. Another coincidence (life is full of them) is that both Bert and Evan were keen bell-ringers!

Bell Ringing Baronet

Evan Nepean G5YN - or to give him his full title **Lieutenant-Colonel Sir Evan York Nepean Bt. (Baronet)** was at the same time a wonderful gentleman, a very keen Radio Amateur and a great adventurer - having once lugged heavy radio equipment over the mountains into the even more mountainous Tibet! In fact, the he was renowned for wearing a woolly Tibetan coat wherever he went! (Our Editor remembers standing talking to Evan G5YN and Bert G2FIX at the Longleat Rally - with Evan looking very comfortable in his treasured souvenir).

● Lieutenant-Colonel Sir Evan York Nepean, Baronet, G5YN. Evan seen wearing his favourite Tibetan coat of which he was very proud. A Gentleman and great friend to Amateur Radio and it's adherents, he'll be missed - but remembered with great affection. *Photo courtesy Roger Croston*

● Evan G5YN on the air in October 2002. Although frail he still enjoyed his life-long radio hobby. *Photo courtesy Roger Croston*

Active on air right up until his death, Evan - although very frail - enjoyed the hobby and tremendous respect from everyone he came in contact with. Well known for dashing off (with G2FIX) when new-bells-to-ring were spotted...Bert (a TV and Radio Engineer) and the Baronet were perhaps unlikely friends, but of course that is what our hobby is all about isn't it? (Our Editor remembers hearing Bert G2FIX - with his delightful Wiltshire burr - working Evan G5YN on 'Top Band' at weekends. If you've been fortunate enough to hear Tony Hancock's The Radio Ham - the cultured tones of the Tea Planter's voice, crackling over the radio from Ceylon (he who asks Tony for bread pudding) provide a good impression of Evan on the air. A true gentleman and friend to all.

Full Feature

The Editorial team are indebted to **Roger Croston** for the photographs used on this page. Roger researched and wrote the obituary in the *Telegraph* and as G5YN's lifetime's experiences deserve, we are planning - with Roger's kind assistance - to provide a full and fitting feature marking Evan's life. In the meantime, the Editorial team remember this great man with fond respect. No wonder his family are so proud! *PW*

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FAULT FINDING

* **David Clark** offers some fault finding tips and 'do's and don'ts' on using Stripboard for project construction.

FEATURE

* **Rob Mannion G3XFD** looks behind the scenes at the Radiocommunications Agency's Monitoring Station at Baldock.

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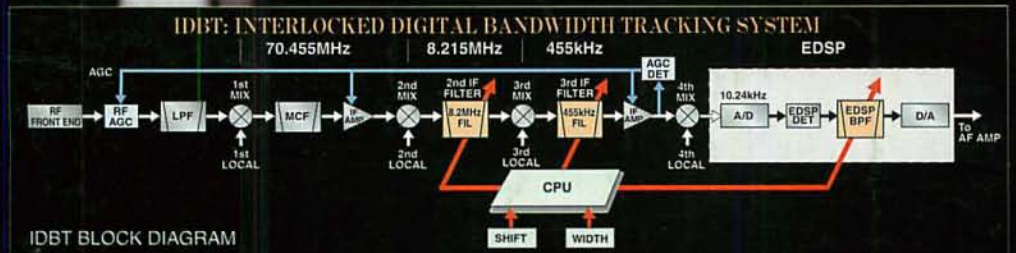

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