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SPECIAL OFFERS

WISP-150 £16.95 ~~£22.95~~

AC Inverter DC - 230V 150 Watts! Now you can run all your AC mains adaptors, laptop, and other small supplies from your car! Just plug into cigar connect to 13 Amp socket on WISP-150. Much cheaper than dedicated 12V adaptors for every item you own!!

WHX-7000 £9.95 ~~£14.95~~

2m/70cm Handy Antenna. Get the power and efficiency of this antenna - replaces standard antenna. BNC fit 18cm long 10W handling.

WEP-501 £16.95 ~~£24.95~~

Earpiece with boom mic. Yaesu Kenwood or Icom versions. Swivel boom, Earbud and Clip, In-line PTT, Very lightweight. Fittings for all modern rigs - same price!

W-50 £39.95 ~~£49.95~~

Dual-Band Colinear 2m/70cms Take advantage of this special price on this fibre-glass base antenna. 4.5/7.2dB gain 1.8m long, 200W capacity - SO-239 plus mounting bracket

W-770HB £16.95 ~~£24.95~~

Dual Band 100W Mobile Antenna This is a highly efficient mobile antenna 2m/70cms 3/5.5dB 1.1m long. PL-259 base.

WCT-421

£14.95 ~~£19.95~~

Lapel Talker Beige coloured earpiece with in-line microphone and PTT. Clips on lapel or pocket. Fittings for all modern handhelds

WSMA-7000 £9.95 ~~£14.95~~

2m/70cm Handy Antenna Get the power and efficiency of this antenna - replaces standard antenna. SMA fit 18cm long 10W handling.

W-627 £24.95 ~~£34.95~~

6m/2m/70cms 2 - 7dB gain! A magnificent triple band antenna 1.6m long 120W power handling. PL-259 base

These offers end 31st July 2005

All subject to stock availability

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www.wsplc.com

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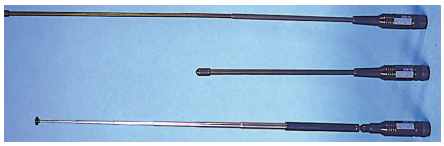
Hear the difference!

These antennas make your scanner really perform!



W-801	BNC 25-1900MHz 21cm Long	**£12.95**
WSMA-801	As above but SMA connectror	**£12.95**
W-881	Super Gainer 25-1900MHz 42cm L.	**£19.95**
WSMA-881	As above but with SMA fitting	**£19.95**
W-901	VHF/UHF Airbander BNC 10cm L.	**£19.95**
W-889 BNC	Telescopic Gainer 25-1900MHz 40cm	**£14.95**
WSMA-889	As above but with SMA 13 - 40cm L.	**£14.95**

Icom HF Transceivers

ICOM IC-756 PRO III

Top of its range of HF transceivers. HF & 50MHz, features large colour LCD with spectrum scope, auto ATU and 32-bit floating point DSP unit. **£2099 C**

IC-7800 £6400 C
Icom' Flagship HF 200W transceiver. 200W max. The ultimate receiver - the ultimate design! AC psu built in.

IC-7800-PACK £6995 C
The superb transceiver as above plus 17" flat screen, keyboard and SM-20 base microphone.

IC-7400 £1299 C
HF/VHF 160m - 2m transceiver 5 - 100W. SSB CW FM AM. 12V DC. Nice big display. Lovely price.

IC-706 MkIIGDSP £769 C
It's unbeatable. 160m - 70cm (up to 100W HF) yet so small with detachable head. The ultimate mobile..

IC-718 £449 C
This is a budget class radio HF 160 - 10m at a price that belies its performance. Beautiful display.

IC-703 *FREE IC-703 Logbook* £539 C
Take an IC-706, reduce power to 10W max and get rid of VHF/UHF. 160 - 6m of pure QRP joy!!

Going HF Mobile?

Then check out the great 80m - 6m SIDEKICK magnetic mount whip from USA. No hassel and great performance. £249.95 C

Kenwood HF Transceivers

KENWOOD TS-2000

Top-of-the-range Kenwood transceiver. The Station in a box. 160m-70cm with every feature imaginable inc. DX Cluster. Kenwood fans dream rig. HF/VHF/UHF or up to 23cm with the optional module. Built-in auto ATU, DSP and its unique TNC. **£1389 C**

TS-2000X £1799 C
Take the TS-2000 and add a superb 23cm module. The best 23cm we know of plus all other bands!

TS-B2000 £1299 C
Designed for the 21st century. You get HF - 70cm with PC software for direct PC control. It works great.

TS-570DG £839 C
The best budget radio at the price. Superb 100W from 160m to 10m. As used by Peter Waters, G3OJV

TS-480HX £1049 C
Take the TS-480SAT, remove the auto ATU and offer a beefy 200W output. That's a really potent package!

TS-480SAT £899 C
HF 160m - 6m with remote front panel. Large enough for base use, small enough for mobile. Big display

Buy a TS-480SAT & get Free Of Charge a Heil Microphone Package. To claim send a copy of invoice to Kenwood

Yaesu HF Transceivers

YAESU FT-1000 MKV

200W HF transceiver, EDSP, Collins filter, auto ATU, 220V AC PSU. Acknowledged as one of the finest DX rigs on the market. Superb tailored audio and the ability to select Class A bias for dramatic signal purity. **£2099 C**

FT-1000 FIELD £1699 C
The HF choice for DXers. With this rigs reputation on DXpeditions what more persuasion do you need?

FTV-1000 £729 C
6m 200W module for the FT-1000 range. Probably the ultimate for 6m DXing.

FT-897D £649 C
160m - 70cm self-contained portable. 100W and up to 20W from optional internal batts.

FT-857D *SPECIAL LOW PRICE* £579 C
160m - 70cm mobile with up to 100W output. Lovely tuning control from remote head unit - and great price!

FT-847 £999 C
Complete station in a box! 160m - 70cm - up to 100W (50W 2m/70cm). Great for satellite work.

FT-840 £399 C
Is there any other radio that comes close to this price? One of our all-time best sellers. 100W 160m - 10m

FT-817ND *SPECIAL OFFER* £489 C
The ultimate QRP self-contained radio. Up to 5W output 160m - 70cm. New low price. UK warranty.

FT-817DSP *SPECIAL OFFER* £589 C
FREE CSC-83 CARRYCASE WITH FT-817ND/DSP

Warning - as a regular advertiser you can be sure all our stock is genuine UK warranted. Check serial numbers!!

Carriage Charges: A=£2.75, B=£6, C=£10

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Icom
VHF/UHF Mobile/Base

ICOM IC-E208

VHF/UHF FM Dual Band Mobile Transceiver
**Freq range 144-146MHz, 430-440MHz Tx*
**55/50W (3 pwr steps each band)*
**Wideband Rx 118-173, 230-549 & 810-999MHz*
£239 C

IC-910H **£1099 C**
2m / 70cm 100W Base station all - modes with option for 23cm module (**UX-910 £359)**

IC-910HX **£1249 C**
As above but with 23cm module ready fitted and a big saving as well.

IC-2725E **£269 C**
Icom's new dual band 2m / 70cm radio. Very easy to operate and install and a lovely detachable head.

Kenwood
VHF/UHF Mobile/Base

KENWOOD TMD-700E

2m/70cm dual band mobile transceiver with APRS. Does not need extra high cost boards to function. Only extra if required is a compatible GPS receiver. **£439 C**

TM-G707E **£269 C**
Dual Band 2m & 70cm with detachable front

TM-V7E **£359 C**
Dual Band 2m & 70cm with 50/35W output

TM-271E **£189 C**
Single Band 2m FM 60W mobile transceiver

Yaesu
VHF/UHF Mobile/Base

YAESU FT-7800E *SPECIAL OFFER*

**2m/70cms Dual Band Mobile *High power 50W 2m /40W 70cms *Wide receive inc. civil & military airband *CTCSS & DCS with direct keypad mic. *Detachable front panel *1000 memories plus five one-touch*

FREE YSK-7800 SEPERATION KIT **£229 C**

FT-2800M *FREE MLS-100 SPEAKER* **£159 C**
*2m FM Mobile transceiver * High power 65W * Capable of VHF wideband receiver

FT-8800E *LOW PRICE* **£269 C**
*2m/70cmDualband FM Mobile transceiver * 50W 2m, 35W 70cm * Wideband receiver

FT-8900R **£339 C**
*2m, 70cm, 6m & 10m Quadband FM Mobile transceiver * Independent dial for each band

Watson
On-Glass Antenna

WGM-270

Dual Band 2m/70cm mobile whip. 2.5dB gain and 1.5:1 VSWR. 0.8m long. Complete system including 3.5m cable. No drilling involved. Antenna sticks on glass and interface assembly sticks on inside. Simple and very effective.
£29.95 B

Icom
VHF/UHF Handhelds

ICOM IC-E90

The new E-90 offers triple band coverage of 6m, 2m and 70cms. Up to 5W output and rx coverage from 495kHz - 999MHz makes this a very attractive rig. **£269 B**

IC-T3H **£129 C**
2m FM handheld 5.5W c/w BC-01 & BC-146

IC-T22A **£149 C**
2m FM 5W handheld transceiver

Kenwood
VHF/UHF Handhelds

KENWOOD TH-F7E

- 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. **£239 B**

TH-D7E **£299 C**
2m/70cm dualband FM handheld transceiver with data communications

TH-G71E **£179 C**
2m/70cm dualband FM handheld transceiver

TH-K2E **£139 C**
2m FM 5W portable transceiver c/w Ni-MH battery/charger

TH-K2ET **£145 C**
2m FM 5W portable transceiver c/w Ni-MH battery/charger

TH-K4E **£139 C**
70cm FM 5W portable transceiver c/w Ni-MH battery/charger

Yaesu
VHF/UHF Handhelds

YAESU VX-7R
SPECIAL OFFER

Totally waterproof, wide frequency coverage 500kHz-900MHz AM/FM. 132x64 dot matrix display providing easy-to-read frequencies and information plus pictorial graphics.
£249 C

VX-2E **£119 C**
2m/70cm miniature handheld transceiver with LiON battery/charger

VX-110 **£94 C**
2m handheld transceiver with 8-key keypad Ni-Cd & charger

VX-150 **£99 C**
2m handheld transceiver with 16-key keypad Ni-Cd & charger

Alinco
VHF/UHF Handhelds

DJ-V5E **£159 C**
2m/70cm FM 5W dualband handheld transceiver

DJ-193E **£91 C**
2m FM transceiver no keypad, Ni-Cds & charger

DJ-195E **£99 C**
2m FM transceiver with keypad Ni-Cds & charger

DJ-C7E **£124 C**
2m/70cm credit size FM handheld

Linear Amp UK
HF Linear Amplifiers

RANGER 811H

**1.8 - 29.7MHz*
**800W CW or SSB, 400W RTTY*
**Uses 4 x811A vertically mounted*
**Drive 10 - 100W*
**Toroidial AC Power Transformer*
**6:1 Reduction Drive on Tuning Controls *"Near Silent" Papst Cooling fan *Front-panel ALC Adjust Control *Built-in AC 230V @ 8A Supply*
£945 B

CHALLENGER III **£1795 C**
HF linear amplifier 10-160m WARC 100W in 1.5kW out

Ameritron
HF Linear Amplifiers

AL-811XCE **£699.95 C**
HF linear amp 10-160m 600W

AL-1200XCE **£2499.95 C**
HF linear amp 10-160m 1.5kW

AL-1500XCE **£2799.95 C**
HF linear amp 10-160m 1.5kW

AL-82XCE **£2399.95 C**
HF linear amp 10-160m 1.5kW

AL-80BXCE **£1399.95 C**
HF linear amp 10-160m 1.5kW

AL-811HXCE **£849.95 C**
HF linear amp 10-160m 500W (3x811A)

ALS-500MXCE **£769.95 C**
HF linear amp 10-160m 500W solid state

ALS-600X **£1299.95 C**
HF linear amp 10-160m 600W (export only)

SGC
HF Linear Amplifiers

SG-500 **£1399.95 C**
"Power Cube" 1.6-30MHz 500W solid state

Yaesu
HF Linear Amplifiers

VL-1000 QUADRA **£3795 C**
HF + 6m linear amp. 1kW comes with PSU

Tokyo Hy-Power
HF Linear Amplifiers

HL-1KFX **£1399.95 C**
HF linear amp. 1.8-29.7MHz 500W PEP max, solid state

HL-2KFX **£2695.95 C**
HF + 6m linear amp 1.8-29.7MHz + 50MHz 1kW PEP max, solid state

HL-100BDX **£429.95 C**
HF+ 6m linear amp 3.5-29.7 & 50MHz 1-10W in 100W PEP solid state

ANTENNAS

W-2LE	1/4 wave 2m 0.48m 200W	£9.95	B
W-285	5/8th 2m 1.33m long 200W	£14.95	B
W-77LS	2m/70cm 0.42m 50W	£14.95	B
W-770HB	2m/70cm 1.1m 200W	£24.95	B
W-7900	2m/70cm 2m/70cm 1.58m	£32.95	B
WSM-270	Dual band mini magnetic	£19.95	B

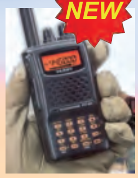
BASES

WM-08	8cm diam magnetic	£9.95	A
WM-14B	14cm diam magnetic	£12.95	A
W-3HM	Hatch mount	£14.95	A
ECH	Cable kit	£10.95	B

NOTE: All antennas have PL-259 ends. Mag mounts have cable attached. Hatch mount needs ECH cable.

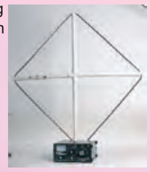
NEW STOCK & OFFERS

YAESU FT-60E *NEW*



**Wide band Reception 108-520MHz & 700-999.990MHz (Cellular blocked)*
**New Emergency Automatic ID System*
**High 5W Power Output*
**Ni-MH Long-Life Battery FNB-83 (7.2V,1400mAh)*
**Programmable Keys for user convenience*
**Split CTCSS/DCS and DCS Encode-Only Capability.*
£179 B

MFJ-936B "Magic Circle" Loop Tuner *NEW*



This is the most amazing antenna we have seen in years. For optimum results take a wire around 1/5th wave long, bend into square loop (14ft on 20m = 3.5ft square) and attach to MFJ-936B. Result: Ultra low indoor noise and VK, ZL & W all on SSB! That's what we achieved in one day's operation! 20m loop works on 15m as well. Now In Stock. Great for QRP and portable as well. **£229.95 B**

bhi
DSP Equipment

bhi NES10-2 MkII

NES10-2 Combined speaker and programmable DSP unit. Offers dramatic noise reduction, even reduces annoying hetrodynes. Power On/Off switch with audio bypass, 8 Ohms, 8 filter settings, 3.5mm plug, 12-24V DC. **£99.95 B**

NES-5 **£79.95 B**
DSP Speaker Basic Plug & Go model

NEIM-1031 **£129.95 B**
Noise Eliminating In-Line Module with DSP

1042 **£19.95 A**
Switch box allowing up to 6 items to connect to one bhi speaker/module.

NEDSP-1061 **£89.95 B**
Small DSP PCB module for retrofitting into rigs

NEDSP-1062-PCB **£89.95 B**
Amplified DSP module to insert in speaker path

NEDSP-1062-KBD **£99.95 B**
As NEDSP-1062 but with small keyboard

NCH **£34.95 B**
ANR Noise Cancelling headphones

Watson
Mobile Antennas

Carriage Charges: A=£2.75, B=£6, C=£10

UK'S LOWEST PRICES!

NEW STOCK & OFFERS

MANSON SDC-2010

£9.95 A

- Cigar Plug-in DC adaptor
- 1.5 - 12V DC 1.5 Amps
- Stabalised and protected.
- 7 - way DC adaptor set.
- Matches most Yaesu / Alinco sockets.
- Works from 12 V or 24 V vehicle systems.

POCKET MORSE READER

MFJ-461
Reads CW
Just hold near receiver speaker

£79.95 B

That's right - just hold this self-contained decoder near your speaker and see the text scroll across the screen. Absolutely amazing

SG-2020ADSP QRP 20W HF Radio

160m - 10m
0.1 - 20W
Full DSP
Diecast Chassis

Perfect for QRP. SSB / CW and DSP processing. Passband down to 100Hz. Built-in SWR meter and electronic keyer. Max Tx drain 4A. Size 15 x 6.5 x 18cm. 680g.

£589.95 B

Antenna Accessories

Dipole Bits

Kevlar	Strong 400lb strain line 200ft	£22.95	A
FW-PVC-50	50m clear PVC 2mm wire	£39.95	A
Flexweave	50m multi-strand 2mm wire	£29.95	A
HDCW	50m hard drawn 16g copper	£14.95	A
Insul-8	Black ribbed insulator	£0.99	A
WDC-50	SO-239 dipole centre insulator	£6.49	A
Egg-l	Large ceramic egg insulator	£4.99	A
Egg-s	Small ceramic egg insulator	£1.75	A
WS-2580	25pcs 3" ladder line spacers	£9.95	A

Diamond 50 Ohm Balunas

BU-50	1:1 1.7MHz 40MHz 1.2kW	£26.95	A
BU-55	1:1 3.5MHz - 75MHz 500W	£34.95	A

Antenna Traps (pairs)

TR-200-14	200W bands 10m - 20m	£44.95	B
TR-200-10	200W 10MHz	£47.95	B
TR-200-7	200W 7MHz	£49.95	B
TR-200-3.6	200W 3.6MHz	£53.95	B
TR-1000-14	1kW bands 10m - 20m	£59.95	B
TR-1000-10	1kW 30m	£61.95	B
TR-1000-7	1kW 40m	£64.95	B
TR-1000-3.6	1kW 80m	£73.95	B

German Made High Quality Baluns

HB-1-200	1:1 3.5 - 30MHz 200W	£25.95	B
HB-4-200	4:1 3.5-30MHz 200W	£25.95	B
HB-6-200	6:1 3.5 - 30MHz 200W	£25.95	B
HB-1-1	1:1 3.5 - 30MHz 1kW	£34.95	B
HB-4-1	4:1 3.5 - 30MHz 1kW	£41.95	B
HB-6-1	6:1 3.5 - 30MHz 1kW	£41.95	B

Remote 4:11.5kW Balun

REM-BAL	For coax to ladder line match	£45.95	B

Patch Leads

WPL-70	V low loss 75cm PL-259	£6.95	A
WPL-50	Standard 50cm PL-259	£2.99	A
WPL-50BNC	BNC version of above	£2.99	A
HQ-66	66cm RG-213 PL-259	£4.99	A
HQ-10m	10m long PL-259	£14.99	A

SGC External Auto ATU's

SGC SG-231

1 60MHz. 3 100W pep (50W CW). Min wire length, 7m. 50 Ohm feed. Needs 12V at approx 900mA.

£349.95 C

SG-239 £189.95 C
Mini auto ATU 1.8 - 30MHz 1.5 - 200W PEP primarily for long wires - non waterproof. 12V DC

SG-231 £349.95 C
1.8 - 60MHz 100W PEP. A great random wire tuner that you can use outdoors. 12V DC

SG-237 £299.95 C
1.8 - 60MHz 100W PEP. Great for mounting outdoors and feeding long wire. Waterproof. 12V DC

SG-230 £339.95 C
1.8 - 30MHz 200W PEP. The original design that handles end fed or coax unbalanced. Waterproof. 12V

Icom External Auto ATU's

AH-3 £479.99 C
1.8 - 28MHz. A hunky 120W PEP tuner that handles whips or wire longer than 2.5m. Waterproof.

SG-235 £749.95 C
3.5 - 54MHz. A hunky 120W PEP tuner that handles long wires. Great outdoor design. Waterproof.

Alinco External Auto ATU's

EDX-2 £289.95 C
1.8 - 30MHz 150W long wire tuner designed for use with DX-70 transceiver. Waterproof.

MFJ Internal Auto ATU's

MFJ-993

*Auto ATU with digital data display *1.8-30MHz *Long wire, coax & balanced line *300W SSB, 150W CW *Cross needle metering

£209.95 C

MFJ-991 £179.95 C
1.8 - 30MHz auto ATU. Similar to MFJ-993 but no digital display. Works with any HF transceiver. 150W PEP

MFJ-994 £299.95 C
1.8 - 30MHz high power auto ATU. 600W PEP / 300W CW. Tunes wire, coax and balanced feed.

SGC Internal Auto ATU's

MAC-200 £259.95 C
1.8 - 60MHz 200W PEP. Wire, coax and balanced feeder. Features auto antenna switching.

SG-237PCB £279.95 C
1.8 - 60MHz 100W PEP. Same as SG-237 but without housing for building into your own housing.

SG-211 £189.95 C
1.8 - 60MHz works off internal dry cells. Zero drain wait state. 60W PEP. Ideal for portable (Min 1W).

Yaesu Internal Auto ATU's

FC-20 £249.95 C
1.8 - 60MHz 100W matched for FT-100/Ft-847. Desk top unit to match transceivers. Coax systems only.

FC-30 £249.95 C
1.8 - 60MHz 100W. Designed for use with FT-857/FT897. Coaxial input / output.

FC-40 £239.00 C
1.8 - 60MHz 100W. New waterproof ATU designed for use with FT-897 / FT-857 and mobile operation.

Icom Internal Auto ATU's

AT-180 £349.95 C
1.8 - 54 MHZ ATU designed for IC-706. Plugs directly into transceiver for seamless operation. Coax only.

Kenwood Internal Auto ATU's

AT-50 £319.95 C
1.8 - 30 MHZ 100W ATU specifically designed for use with TS-50 transceiver. Coaxial only.

Cushcraft HF Antennas

MA5V £239.95 C
Vertical 5-band 20m - 10m. No separate radials needed. 250W. Self-supporting. 4.48m tall.

A3-S £469.95 D
The classic 20, 15, 10m 3-el beam. 2kW 8dB gain. 8.45 el. Turn radius 4.72m. F/B ratio 25dB.

A3-WS £379.95 D
Dual Band 3 el. beam for 17m & 12m. 2kW. El length 7.66m. Turn radius 4.4m. Gain 8dB. F/B ratio 25dB.

A4-S £569.95 D
Tri-band 4 element Yagi. for 20m - 10m. DXers delight. 2kW . 8.9dB gain F/B 25dB. Turn radius 5.49m

R-8 £469.95 C
8-band vertical 40m - 6m. No separate radials needed. 1.5kW. Height 8.7m

R-6000 £329.95 C
6-band vertical 20m - 6m. No separate radials needed. 1.5kW. Height 5.8m. Great small garden ant.

MA5B
£369.95 C

5-band 2 El mini beam. 20m - 10m 2kW. Elements 5.2m Turn radius 2.7m. (Dipole on 17/12m) 5dB gain

Diamond HF Antennas

DIAMOND CP6

Covers five popular HF bands and the 6m band. Low angle radiation makes it ideal for DX work. Outperforms dipoles for long distance contacts and compares favourably with beams located 10m+ above ground.
*Bands: 3.5 -50MHz *Power: 200W *VSWR: Better than 1.5:1
*Socket: SO-239 *Height: 4.6m
*Radials: 1.8m rigid adjustable £239.95 C

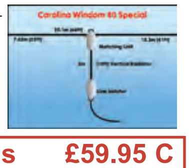
Radio Works HF Antennas

CW-160 £129.95 C
8-band 160m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 265ft long.

CWS-160 £119.95 C
Compact 8-band 160m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 133ft long.

CW-80 £89.95 C
7-band 80m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 133ft long.

CWS-80 £109.95 C
Compact 7-band 80m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 133ft long.



G5RV Plus £59.95 C
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80 - 10m 5-band vert. 7.64m tall 1kW. Can be used at ground level with earth stake. Ideal small gardens

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40 - 10m 4-band vert. 6.52m tall 1kW. Can be used at ground level with earth stake. Ideal small gardens

Butternut Antennas

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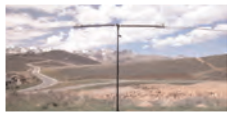
HF-6V £299.95 C
6 band vertical 80-40-30-20-15-10m. 2kW. 7.9m tall. Use own radials or ground mount.

HF-9V £349.95 C
9-band 80 40 30 20 17 15 12 10 6m vertical 1kW 7.9m tall. Use radials or ground mount

Buddipole Products



HF Portable at its Best

W3-BP £199.95 B
40m - 2m adjustable dipole. 250W and max length of 4.65m. Packs down to 65cm approx.

W3-MBP £199.95 B
Sames as W3-BP but packs even smaller.

W3-BS £134.95 B
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Peter Waters says: *I think these products are great. Superbly engineered and very efficient.* Options include adaptor for dipole to decorators pole £6.95, Field tripod £89.95, 2.45m telescopic mast £49.95, mini tripod for Buddistick.

Super Antennas

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MP2-SA £199.95 B
Electrically tuned version of the above. Requires around 9V - switch control box not included.

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SIDEKICK £249.95 C
As used by Peter Waters G3OJV/M

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High-end radio technology doesn't mean a high-end budget anymore — Kenwood delivers it today with the TS-570DG. With 16-bit DSP technology, untouchable digital filtering, heavy-duty transmitter design, a Central Frequency Control System for near-perfect stability, and a large LCD display section coupled with an ergonomically-optimized human interface, the TS-570DG provides a clean and powerful operating experience. All of this wrapped up in a compact and efficient package makes the TS-570DG the perfect choice for home or mobile operating.

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100W Model

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e-mail comms@kenwood-electronics.co.uk

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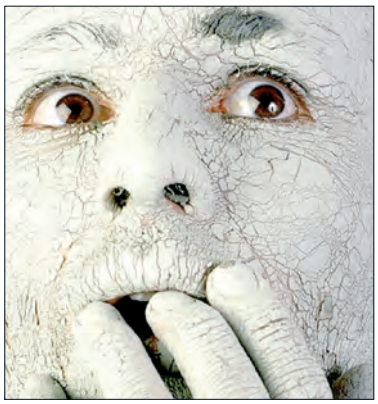


Page 18

Page 19

Page 24

Page 50

17 Subscribe On-line!
We announce a change to our subscription service, which means that you can now manage, renew and update your subscription via your computer.

18 Technical for the Terrified
Tony Nailer G4CFY encourages you to make 'friends with maths' as he looks at applying the theory of radio maths to practical applications.

19 Palstar ZM-30 Digital Antenna Impedance Bridge Review
As an antenna enthusiast, **John Heys G4BDQ** was keen to evaluate his antenna measurements by putting the new ZM-30 analyser through its paces.

24 The Newton Experience
Richard Newton G0RSN says taking Amateur Radio into the great outdoors can enhance your enjoyment of the hobby no end. His on-air holiday activities are certainly proof of that, as you'll soon discover when you read his article on making the most of mobile and portable operating.

31 Dayton Delights
A selection of some of the new products launched at the Dayton Hamvention in the USA are profiled here.

33 The PW Avon
The PW Avon project was a real hit back in the 1970s and now Rob Mannion G3XFD presents the transmitter driver unit for those who missed it first time round to enjoy - and for those who remember it to wallow in nostalgia!

40 The W3EDP Antenna Revisited
Vince Lear G3TKN/ZL1VL takes a look at an effective antenna that can be traced back to the mid-1930s. Even though it's cheap to construct, Vince says it can still give many other antennas a run for their money!

42 Carrying on the Practical Way
A QRO project that makes use of multi-transistors is the offering from **George Dobbs G3RJV** this month.

44 Valve & Vintage
Ben Nock G4BXD opens his treasure trove of radio equipment for us all to indulge in as he takes his turn in the 'vintage wireless shop'.

50 Antenna Workshop
Don't get caught out! Prepare and maintain your antenna masts and supports at all times, that's the advice from **Roger Cooke G3LDI** our resident 'antenna farming' specialist.

Cover subject

Cover Subject

Summer's finally here and so we're encouraging you to get out and about with your Amateur Radio as much as possible! The front cover photo is from a selection of **Richard G0RSN's** and shows one of his holiday radio set-ups at North Hill with the Welsh coastline looking across the Bristol Channel in the background. For lots of inspiration, ideas for operating mobile and portable and a good read take a look at G0RSN's article this month. Enjoy the issue, see you next month!

Design: Steve Hunt
Main Photograph: Richard Newton G0RSN
Inset Photograph: Tex Swann G1TEX

august regulars

8 Keylines
Topical chat and comments from our Editor. This month **Rob Mannion G3XFD** looks at opinions expressed in adverts and deals with feedback on projects with kit options offered in *PW* recently.

9 Amateur Radio Waves
You can have your say! There's a varied and interesting selection of letters this month as the postbag's bursting at the seams with readers' letters. Keep those letters coming in and making 'waves' with your comments, ideas and opinions.

10 Amateur Radio Rallies
A round-up of radio rallies taking place in the coming months.

11 Amateur Radio News & Clubs
Keep up-to-date with the latest news, views and product information from the world of Amateur Radio with our News pages. Also, find out what your local club is doing in our club column.

54 VHF DXer
Sporadic-E openings on the 50, 144 and 430MHz bands are reported on by **David Butler G4ASR** in his regular look at the activity on the v.h.f. bands.

56 HF Highlights
Carl Mason GW0VSW has lots of your reports to pass on through his column this month. The bands have been busy again and so his column's fizzing with enthusiasm.

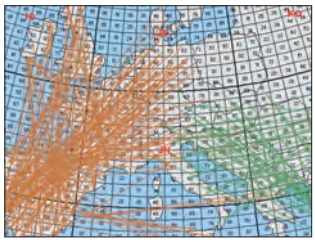
59 In Vision
Test cards and the UK's newest Amateur Television repeater are spotlighted this month by **Graham Hankins G3EMX** in his regular look at the ATV scene.

60 Book Store
If you're looking for something to complement your hobby, check out the biggest and best selection of radio related books anywhere in our bright and comprehensive revamped Book Store pages.

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

68 Subscribe Here
Subscribe to *PW* and/or our stable-mates in one easy step. All the details are here on our easy-to-use order form and you know have the option of subscribing on-line too!

69 Topical Talk
Rob G3XFD announces details of an a.m. v.h.f. transmitter project coming soon that he hopes you'll all enjoy, as well as the 70MHz activity afternoon in July.



Page 54

Page 56

Page 59

book store

Page 60 - The biggest and best selection of radio related books anywhere!

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Components For *PW* Projects

In general all components used in constructing *PW* projects are available from a variety of component suppliers. Where special, or difficult to obtain, components are specified, a supplier will be quoted in the article.

Photocopies & Back Issues

We have a selection of back issues, covering the past three years of *PW*. If you are looking for an article or review that you missed first time around, we can help. If we don't have the whole issue we can always supply a photocopy of the article. See page 72 for details.

Placing An Order

Orders for back numbers, binders and items from our Book Store should be sent to: **PW Publishing Ltd., Post Sales Department, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW**, with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling. Credit card orders (Access, Mastercard, Eurocard, AMEX or Visa) are also welcome by telephone to Broadstone **0870 224 7830**. An answering machine will accept your order out of office hours and during busy periods in the office. You can also FAX an order, giving full details to Broadstone **0870 224 7850**. The E-mail address is **clive@pwpublishing.ltd.uk**

Technical Help

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

rob mannion's keylines

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

Opinions Welcome - that's the invitation from *PW* to its readers! And I issue the invitation again even though when contentious subjects are aired in the magazine, regular readers will hopefully fully understand that as Editor of *PW*, I aim to publish letters to balance the opinions expressed.

At times, the invitation can cause difficulties because often there is no balance of opinions, one argument completely outweighs the other. Despite this, we maintain the ethical approach and try! Remember though, the publication of a letter should not be inferred that the Editor or publishers either agrees or disagrees with the topic.

However, when opinions are aired within adverts, it can be all too easy in a specialist magazine such as *PW*, for the readers to assume that the Editor approves of those opinions/statements. Despite the assumptions, the opinions expressed in adverts are not within my control. In fact, with some legal limitations, advertisers can, and do, promote their products and opinions in whatever way that suits their purpose.

After all - most adverts are designed to bring in business. Although we need advertising to help produce *PW* and couldn't survive without it, please remember the opinions expressed within the adverts belong to the advertiser - not those of the publisher or the staff working on this, or any other magazine.

Kits & Projects

In his letter, (page 9) **Tony Jaques G3PTD**, from Manchester clearly expresses his disappointment in the Sutton and Mallet projects from the designer's desk of **Tim Walford G3PCJ**. However, in writing to the letters pages Tony has in fact highlighted a major problem for the Editor of *PW*: Just how do we keep interesting projects coming into the magazine - in a form where literally any of our readers could - if they so wish - build the project themselves?

At this point I must mention just how discouraging it is to hear from Tony, that he at least, thinks *PW* is acting in an underhand way. In defending my efforts, as a member of the **Chartered Institute of Journalism** - I strive to work in an ethical way.

In recent years I've been delighted to find a new approach to enable *PW* to bring reliable, truly repeatable projects where - if they so wish - readers could also purchase 'kits & bits' from any author (wishing to provide the service) following the publication of their commissioned project.

Following discussions with my publishers and my colleagues here at the *PW* offices, I'm extremely confident this approach is the way forward. At one stroke we've removed one of the most difficult problems - getting all the necessary parts special components and wherever possible - the all important printed circuit board (p.c.b.).

Generally, I'm very pleased indeed with the way our two main authors providing kits and bits (**Tony Nailer G4CFY** and Tim Walford G3PCJ) are working with us to provide what I consider to be some excellent ideas.

The Doing it by Design series by Tony G4CFY has turned out to be a resounding success. Readers have expressed their support for the series, which is fast becoming a *PW* classic. Both the author and myself are satisfied the series is producing what's required: technical knowledge, design explanation with the monthly projects.

Again, if readers wish they can buy a complete kit to build the project of their choice. All G4CFY's work is specifically commissioned (as is the series), written and published for *PW* only. The kits however, with agreement between G4CFY and PW Publishing Ltd., remain his copyright and this, I feel is the correct way to do it. Tony has worked hard to produce the kits and bits, and along with any other author keen to do the same - we're pleased to help in this way to encourage readers to 'have a go' themselves.

Tony G3PTD suggests the Sutton project is an extended review - but of course reviews don't normally contain circuitry as they would be proprietary to the equipment owner/ manufacturer/or supplier. Additionally, Tim Walford G3PCJ's projects are also commissioned by *PW*, although his kits and bits service also remains his copyright. We allow (**and encourage**) the publication of a panel detailing what the reader can purchase if necessary.

Tim Walford G3PCJ does not provide overlays printed on the p.c.b.s (to provide direct component overlays for positioning). Because of this, and the fact he provides a component placing diagram with his kits, I decided it would involve changing the G3PCJ design approach, Readers can however, buy p.c.b.s from Tim.

For Tim's future projects we will aim to provide full p.c.b. designs and overlay diagrams, in conjunction with the author. Note that I say "we will" - because I see the design/publish/ provisions kits (where possible or desirable) approach as being the best to ensure we achieve *PW*'s goal - the continuing enjoyment of home-brewing Amateur Radio equipment.

Incidentally, on the subject of kits and bits, *PW* will soon be publishing a project from an established author who will supply (if required) a pre-programmed PIC i.c. for a c.w. keyer design. However, although the intending constructor can take advantage of what the author is prepared to supply - enough information will be provided in the article to allow anyone to program the PIC themselves. The choice will be theirs! **Rob G3XFD**

amateur radio waves

Positive eBay Success!

● **Dear Sirs**

I am writing to tell you of a very positive experience, which I've had. I recently saw an advert on eBay for ultra bright white light emitting diodes (l.e.d.s), I purchased two packs of five for a total of £4.58 including £1 P&P, they arrived by return first class post, well packed recorded delivery. They were excellent, and even had resistors with them to suit 12V operation.

Well pleased I sent positive feedback to eBay. A couple of days later I received an E-mail from the seller telling me that as I had been the 2000th feedback he'd received, he would mark this by sending me some complimentary l.e.d.s, a pack of his complete range, asking what size I would like. I replied to the E-mail stating that I would prefer the 5mm size, it turned out that the seller, Photoelektric was in fact **Adam G0ORY**!

Two days later my complimentary pack of l.e.d.s arrived, again well packed and by recorded delivery. When I opened the pack I was even more delighted to find that Adam's expected pack of 1 of each l.e.d. in the range was in fact one pack of five of each l.e.d. in the range, a total of 50, again with resistors.

My original thought was, that someone who doesn't try to boost their profit by jacking up the P&P, should be an honest seller to buy from. Adam to me, by his actions, has demonstrated the best spirit of a trader and Amateur Radio.

My only regret in all of this is that I now have so many l.e.d.s for my home-brew, that I'll not need to purchase any more for quite a while! But when I do, guess where I will buy from?

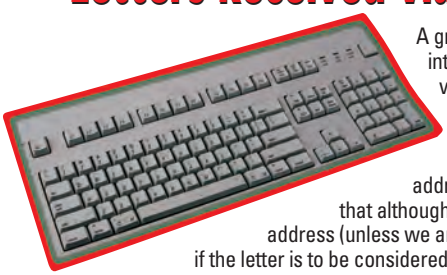
John Young GM6LYJ
Dumfriesshire
Scotland

Editor's comment: Good to hear of your success John! Although I'm too nervous to have a go - my youngest daughter Alex is a keen eBay user, saving a small fortune (several hundred £) buying curtains for my wife when we were fitting out our new home. All the material arrived promptly, were superbly packed and from reputable retailers. Now there's no excuse for me not to try!

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

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**

Project or Review?

● **Dear Rob**

I am very disappointed at *PW*'s most recent 'project', and feel rather cheated that what I think is merely an extremely extensive review of a commercially available kit should be passed off as a constructional article.

When the Sutton receiver appeared in the May issue of *PW* I got quite exited about it. The change from yet another trivial two transistor DC receiver was something to look forward to building. But then I saw "Buying your Sutton kit" on page 27 and enough alarm bells rang for me to wait and see before collecting components.

With the transmitter in the June issue it began to look even more promising, but still no suggestion of p.c.b. layouts. And now of course it has become evident that there never will be. With wireless projects that are practical the layout has always been more important than the circuit. While there may be optimum component values for a circuit, the reality is that very often considerable liberties may be taken. Not so with the layout though, especially with modern tiny components and high gains in small spaces.

Sorry Rob; I do realise that it filled up a lot of pages for you, but to print what is supposed to be a constructional article with the most important information omitted is just not on! Instead of Tim Walford being paid for his articles he should be charged for 12 pages of high quality advertising space! (I can't see you wanting to publish this, but by all means feel free!).

Yours faithfully

Tony Jaques G3PTD
Stretford
Manchester

Editor's comments: Thanks for your comments. However, I regard it as a very disturbing letter indeed, especially the inference that something underhand was published. For my full reply on the subject please see Keylines, page 8. For further news on new projects (with kits available!) please see Topical Talk on page 69 this issue.

Beacons On 7MHz?

● **Dear Rob**

I was interested to discuss with you, your ideas for conducting some propagation studies on 7MHz. As you probably appreciate, the recent increased access for Amateurs at 7MHz gives the possibility for some experimentation along the lines you suggest, however given our position in the sunspot cycle even the extended bandwidth means that the band is going to be very busy at times. The high band occupancy/limited space is, I believe, one of the reasons why IARU Region 1 doesn't support permanent beacons on this band. This, of course may change once the 7MHz expansion is fully implemented.

On the more general subject of propagation studies I would like to draw your attention to the opportunity to undertake propagation studies, and indeed other experiments, on frequencies normally used by MoD at 5MHz. A few years ago the RSGB negotiated a NoV to our Amateur licence to experiment on five specific channels around 5MHz until mid-2006. There are around 400 Amateur stations and three beacons (located in Oxfordshire, Cumbria and the Orkney Isles) active in the UK and whilst all NoV holders are free to do their own experiments, the RSGB's 5MHz Working Group, which I have the dubious honour of chairing, is co-ordinating amongst other things the collection of QSO and beacon monitoring data for later analysis. There is full information about this activity at: **www.rsgb-spectrumforum.org.uk/5MHz.htm**

You also might like to know that we are planning to discuss some of the early analysis results at HFC2005, the annual HF Convention, which is to be held over the weekend of 7th to 9th October at the Worth Hotel, Gatwick, see **www.rsgb-hfc.org.uk/** for further information.

John Gould G3WKL
Newport Pagnell
Bucks

Editor's comments: John's letter is the result of original enquires to Ofcom. They kindly passed the letter to John and his colleagues. I've also written to (and had a detailed reply from) Professor Martin Harrison G3USF, the IARU Beacon Co-ordinator on the subject. I'm very keen on the idea of very low power beacons on 7MHz. Recently I've worked down to Australia on the band in the wee small hours, and chatted all over the UK and Ireland during the day. The propagation is fascinating with some very strange conditions at times. I intend to devote more to this subject soon. Meanwhile, I'm thoroughly enjoying 7MHz - a great band, and it's not crowded all the time!

Ofcom & Consultation

● **Dear Editor**

The long awaited Amateur Licence consultation document has been released by Ofcom. I hope that Amateurs will be unanimous in their rejection of the option for WT Act Licence exemption.

There was a lot of debate prior to the document being issued about the merits of a free Life-Time licence versus a free 10 year licence. In reality there is not a great deal to chose between them. The United States has for some time had a free 10 year Amateur Licence and this has proved satisfactory. In recent years a number of other countries have been adopting free Life-Time Amateur licences. New Zealand is the most recent example and this seems to be the way the rest of the world is going.

Ofcom has presented us with a choice between a free Internet Life-Time licence and an expensive manually processed paper based system with the licence running for say, five years.

The bulk of the licence fee UK Amateurs currently pay is consumed by the costs of pushing pieces of paper around. These days there is no need to pay for a cumbersome, expensive paper based system when the Internet can achieve the same thing at near zero cost. I am fully in favour of a Internet based licensing system providing of course there are facilities to handle applications from those who are unable to use the Internet.

One thing that initially concerned me when reading through the document was the lack of any mention that Amateurs have the right to build and operate to their own design, transmitters of up to 400W output without any formal EMC compliance requirements. The initial emphasis of the document seemed to be on Amateurs as "Operators". I was relieved when I got to page 15 and saw that Ofcom did recognise home construction as a vital part of the hobby. I hope everyone will submit a reply to this consultation document. It is vital for the future of the Amateur Service that Amateurs make their views known to Ofcom.

The consultation document can be downloaded from: **www.ofcom.org.uk/consult/condocs/aradio/**

A paper copy will be posted to you free of charge if you ring **Ofcom on 0207 981 3000**.

Trevor M5AKA
Chelmsford
Essex

Ofcom To Be Congratulated!

● **Dear Editor**

Now that the Ofcom Consultation on proposal to reform Amateur Radio has appeared, despite the near hysteria shown by many amateurs and regrettably by some sections of the RSGB, Ofcom are to be congratulated on producing a balanced document which represents all reasonable arguments on possible ways forward for Amateur Licensing.

I agree fully with the recommendations of Ofcom detailed in the document 'Consultation on a proposal to reform amateur radio (Of243), a lighter electronic licensing process'. Their proposals for licenses for life' are a fair and reasonable compromise that retains the need for technical competency to be demonstrated before issuing a licence and still upholds and protects Amateur Radio as we enjoy it today.

I would urge as many of you download the document at www.ofcom.org.uk as soon as possible to reply 'yes' to Ofcom to all eight questions raised in the document. Only a high response rate will guarantee that the full views of the Amateur Radio community are represented.

Len Paget GM0ONX
Ayrshire
Scotland

The RSGB Editorial

● **Dear Editor**

It was admirable of *PW* to allow the Editor give up his Keylines column, and laudable of **Peter Kirby G0TWW** of the RSGB to take up your offer. However, Peter's remarks could have come straight from a recruitment leaflet for the RSGB and failed to answer any of what I think are the most pressing issues regarding amateur radio, the RSGB, Ofcom and the very future of our hobby.

Peter did not intimate in any way how the RSGB intends to recruit more members or even improve its communication with existing members. I am not alone in some of my views of the RSGB. Recently, I organised a meeting of the **British Railways Amateur Radio Society** in Dundee. I was surprised to hear several other RSGB members (all from England) intimate that in their opinion the RSGB was only interested in amateurs living in and around the M25! While I don't think this is the case, at least I hope not, the RSGB has to redress this perception.

If the *PW* Editor is the only RSGB member out of seven licensed amateurs in the *PW* office, why isn't the RSGB asking what they are doing that discourages prospective members from joining?

Thank goodness *PW* is not afraid to air contentious issues, as the RSGB's *Radio Communications* journal is very selective in publishing members' letters.

Colin Topping GM6HGW
Fife
Scotland

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.

July 17
23rd McMichael Rally
Contact: **Min**
Tel: **0118-972 3504**
E-mail: **g0jms@radarc.org**
The 23rd McMichael Rally will take place at the Reading Rugby Club, just off the A4 at Sonning, East of Reading, Berkshire Talk-in (GB6MMR) on S22/V44. There will be a large boot sale on level site, indoor traders area and demonstrations by special interest groups, plenty of free parking with disabled parking on level ground, snack bar and licensed bar with real ale, outdoor BBQ (weather permitting!). Admission is just £1.50 per person.

July 30
Martin Lynch & Sons Summer BBQ
Contact: **Martin Lynch**
Tel: **0845 2300 599**
Website: **www.hamradio.co.uk**
The Martin Lynch & Sons' Summer Barbecue & Boot Fair takes place 30 July. Entry is free and there will be plenty of free parking on site. Attractions include: massive FREE boot fair organised by the Whitton ARC, summer barbeque sponsored by Yaesu, Kenwood & Icom, special bargains across the whole range of products. Doors open 0900 and close at 1600 hours. Representatives will be on site from Yaesu, Icom & Kenwood. There wil be a Talk-in to the Boot Fair on S22 by Whitton ARC.

July 31
Colchester Radio Amateurs Annual Rally
Contact: **Garry M0JJH**
Tel: **(01621) 818620**
E-mail: **m0jjh@despammed.com**
Colchester Radio Amateurs are holding their annual rally at St. Helena School, Colchester, Essex located next too the A313 by-pass. Talk-in will be provided. There will be a Bring & Buy and a main Essex dealer will be attending, as well as special interest groups. Refreshments will also be available.

August 6
The Rugby ATS Rally
Contact: **T.M. Humphries**
Tel: **(01455) 552519**
E-mail: **thumph3426@aol.com**
The Rugby Amateur Transmitting Society are holding their Annual Rally at the Stanford Hall, Lutterworth, Leicestershire. For more information use the above contacts.

***August 7**
Flight Refuelling ARS Hamfest
Contact: **Mike**
Tel: **(01202) 883479**
Website: **www.frars.org.uk**
The annual Flight Refuelling ARS Hamfest will be held at the Flight Refuelling Sports and Social Club, Merley, near Wimborne, Dorset. Large marquees, boot sale, refreshments, something for everyone!

August 7
Lorn ARS Radio Rally
Contact: **John GM8MLH**
Tel: **(01838) 200304**
E-mail: **Shirley** at **gm0erv@dsl.pipex.com**
Website: **www.gm0lra.freeuk.com**
The Lorn ARS (Scotland) are holding their Radio Rally in Crianlarich Village Hall, junction of A82/A85, 12 miles north of Loch Lomond. There will be the usual stalls and entrance fee is £1. Doors open 1030 for disabled visitors and 1100 for others.

August 12
Cockenzie & Port Seton ARC Junk Night
Contact: **Bob Glasgow GM4UYZ**
Tel: **(01875) 811723**
E-mail **bob.gm4uyz@btinternet.com**
The 12th Annual Junk Night of the Cockenzie & Port Seton Amateur Radio Club will take place at the Cockenzie & Port Seton Community Centre, South Seton Park, Port Seton, Scotland. Entrance fee is just £1 and all proceeds will go to the British Heart Foundation. Tables are available on a first come, first served basis. There will be disabled access and a raffle at approximately 2100. Refreshments will also be available.

At Rallies marked with a * look out for a representative from PW Publishing Ltd. at this Rally. Go along to the stand for great deals on subscriptions to *Practical Wireless, Short Wave Magazine* and *Radio Active,* clearance books and a selection of back issues.

If you're travelling a long distance to a rally, it could be worth 'phoning the contact number to check all is well, before setting off.

amateur radio news & products

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

Summits On The Air

The Summits on The Air website has recently been enhanced by the addition of a new alerting and spotting system.

Known as SOTAwatch, alerting & spotting has been developed by **Jon GM4ZFZ** and allows users to post their forthcoming activation plans. The activation plans are then sorted into date/time order for the convenience of the many avid chasers in the programme.

The spotting system works in a similar way to DX clusters and provides chasers with a means of real-time live spotting of activations in progress. The SOTAwatch system should also help any activator that might be struggling for that elusive fourth contact!

The SOTA award programme has also just launched a new facility called SPOTlite, which allows summit activators to post real-time information on their activities to the Internet using a mobile 'phone. The information is automatically disseminated to the whole SOTA community using SOTAwatch.

SPOTlite is especially useful for summit activators in areas far from other radio amateurs (but in range of the mobile 'phone network).

This is another first for the Summits on the Air award programme, which aims to use appropriate new technology wherever possible to enhance the award scheme. SPOTlite has been created by Jon GM4ZFZ.

SOTAwatch and SPOTlite can be accessed via **www.sota.org.uk**

Cadets take to the Air

Seven cadets and one adult staff member of the 49F (Greenock) Squadron Air Training Corps have recently passed the Amateur Radio Foundation Examination.

All the successful cadet candidates are currently awaiting issue of their Amateur Callsigns. The Course was run by instructors from the Helensburgh Amateur Radio Club and took place at the request of the cadets who were keen to learn about other aspects of radio communication. Listen out for the 49F Squadron cadets on the Amateur Bands with the special event station callsign **GBOATC** on the air from the former RAF Machrihanish base on the 6-13th August.

The Squadron also teach Cadets how to use the Air Training Corps radio systems working through various skill levels to attain their Communications Badge. The Cadets meet at the Squadron HQ at **26A Ardgowan Street, Greenock** on Monday and Thursday nights from 1930-2200 hours. If you are 13 years or over why not go along, have a chat and see what they have to offer?

Intermediate Examination at Farnborough

Building on the Foundation exam success Farnborough & District RS are now offering an Intermediate examination evening.

The first Foundation licence course run by the Farnborough & District Radio Society was an outstanding success with all seven candidates passing the examination with flying colours, two of them achieved 100% and the lowest mark was a still excellent 22/25!

As a result the club are now offering the Intermediate licence examination at The Farnborough Community Centre on the evening of **Monday 15 August.** Places are still available for Foundation licence holders who are not club members but wish to sit the Intermediate examination on this date.

To enrol for the exam please contact:
Paul Whatton G4DCV
Email:
paul.whatton@ntlworld.com
Tel: (07711) 708066

Pictured here is John Hardy G3KND, The Farnborough & District Radio Society's Lead Instructor teaching an excellent class!

Subscribe On-Line!

We've got some exciting news this month on how you can now subscribe to your favourite radio magazines on-line.

As from this issue we are able to offer readers the facilities to manage their *PW* suhscription via the Internet (this service also applies to *Radio Active* and *Short Wave Magazine*). We have teamed up with Webscribe, a subscription agency, to enable readers to enjoy the benefits of on-line subscription management.

The new service means that you can now check, update, renew, extend or start a subscription from the comfort of your computer. You can still subscribe via E-mail, telephone, FAX or post.

See page 17 for a full description of the service and page 69 for a full list of subscription prices. You'll also find a form there,which you can use to subscribe by post if you wish. Pleasenote that **cheques must** be made payable to **PW Publishing Ltd** and that **cash** is **NOT** accepted with orders.

Finally, we're sure readers will join the Editorial team in thanking Kathy Moore for managing the subscription database over the years and in wishing her all the best for the future. Thank you Kathy!

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Please Note: All subscription queries must be directed to the above address with immediate effect.

New M3s for Burnley RC

Martin Durkin, Foundation course instructor at Burnley Radio Club, Burnley Lancashire, contacted the News Desk with details of the club's recent exam success.

The Burnley Radio Club has recently finished a compressed eight week (it normally takes 12 weeks to complete the course) Foundation licence course and are proud to announce they now have four new M3s among their members.

Two of the candidates, **Lauren Dixon**, aged 9 and **Morgan Roe**, who we believe to be the youngest M3 in the UK aged 6 years and 4 months, had eight weeks extra training prior to the course from their already licensed parents. A great achievement from all candidates and four more welcome additions to the hobby!

Well done to all from the *PW* team!

The photo shows, front left to right: Lauren Dixon aged 9 and Morgan Roe aged 6. Back left to right: Steve Hindle, Vice Chairman, Melanie Entwistle, Catherine Mathewson and Arnold Benns, Chairman.

Japan to relax Morse Requirements

Japan is the latest in a growing group of countries who are relaxing or phasing out the Morse Code requirement of Amateur Radio Licensing.

The Japanese Ministry of Internal Affairs and Communications (MIC) took action on 24 May to relax Morse code requirements for Amateur Radio licensing, but it did not eliminate them altogether.

With effect from 1 October 2005, the MIC will reduce the requirements for First and Second class licenses to 5w.p.m. - solid copy for two minutes. The previous code requirements for these licenses were 12 and 9w.p.m. respectively. The MIC will drop the Morse requirement, now 5w.p.m., for the Third class licence.

Andy Joins the Club!

Company director Andy Stockley G8ELP has recently joined an exclusive club at Icom (UK) Ltd.

Andy G8ELP joins a select group of people who have completed 25 years of service at Icom. Andy not only joins his dad **Dave Stockley G4ELP** who founded the company but also Managing Director **Philip Hadler G4CZU**, IT Manager **Jerry Kelk G4JMP**, Workshop Manager **Chris Gibbs G8GHH** and Bought Ledger Co-ordinator **Carol Harvey**.

When asked about his time spent at Icom Andy replied, "During my school days I used to help out during the weekends and in the school holidays. After finishing school I joined the company full time where my first job was packing

continued on page 13

The GMDX Convention

The GMDX Convention, which took place in April in Stirling was attended by a significant number of the UK's Top Dxers and Contesters.

The speakers at the GMDX Convention were **Roger Western G3SXW** on Modern DXpeditioning, **Peter Hart G3SJX** speaking on h.f. radios for DXing and **Mark Haynes M0DXR** on the FT5XO Kerguelen DXpedition. The DX Dinner in the evening was fully subscribed to and a great time ensued.

The star prizes in the raffle were donated by Yaesu UK. The first prize of a FT-817 plus a ATAS-25 portable h.f. antenna went to **Nigel G3TXF** and the door prize also donated by Yaesu - an MD-200 desktop microphone went to **Willie GM4ZNC**.

The GMDX Convention kicks off the DX year and whets the appetite of the UK's DXers for the year ahead. Next year's Convention will be on Saturday April 1 2006.

Nigel G3TXF receiving the FT-817 star prize donated by Yaesu

Willie GM4ZNC receiving the Yaesu MD-200 from GM4FDM and GM3YTS.

Crazy Radio!

Radio Amateurs are often being accused of being quirky but M0DMG takes it to the extreme.

Shola Ogunlokun M0DMG from North West London is learning to hang-glide so he can glide from Land's End to John O'Groats, a total of 1600km (1000 miles) around the UK. Shola has given himself a year from January 2005 to complete his challenge, which he is simply doing to fulfill a lifelong dream.

More information can be found at **www.meet-britain.org.uk/** or **www.mbchallenge.blogspot.com/** and who knows if he's successful you may be able to tune-in as he glides around the UK!

MREN Rally Date

The Mayo Radio Experimenters Network (MREN) has announced the date for the 2005 rally.

Rally director **Padraic Baynes EI9JA** announced during the June meeting of the group that the rally would be held on Sunday 20 November at the usual venue of the Belmont Hotel, Knock. Bookings for accommodation should be made directly with the hotel. The rally will follow the highly successful format of previous years, and doors will open at 1100. Right of admission is reserved.

Traders should contact Padraic EI9JA for exhibition space. More details will be announced as they become available. **Note**: *PW* Editor, **Rob EI5IW/G3XFD** plans to attend the rally.

Venue Change

If you are thinking of joining in with the South Dorset Radio Society activities then make sure you go to the right venue!

With effect from 12 July the South Dorset Radio Society will be relocating to the Chickerell Youth Centre in Chickerell Village, it is not far from the old club site, it's just on the other side of the village. To mark the event the Club will be holding a Hot Potato Night with Table Top/Car Boot Sale.

All are welcome to attend the evening, but the Club's Secretary, Carol Hodges, would appreciate you letting her know if you wish to attend. You can contact Carol, either by E-mail at **carolonfraggle@tiscali.co.uk** or by 'phoning **(01305) 820400** direct.

Send all your news and club info to Donna Vincent G7TZB at the PW editorial offices or e-mail donna@pwpublishing.ltd.uk

goods and running them to the post office. I used to work at a small bench, with just a set of scales and brown paper to wrap the goods. Since then I have been involved in sales and in 1989 I became stores manager. I spent about 7 years in stores until I moved into my current position and a few years back I was overjoyed to become a director".

Andy went onto say, "At first I found it awkward working with my family all the time but now it feels like second nature. I really enjoy how close we are, I wouldn't change it for the world. I enjoy my job immensely and especially enjoy the responsibility of ensuring the credit returns are completed and liasing with other Icom agents world-wide. Its great to see what started out as a hobby can turn into a worthy career, I've been very lucky".

Dave Stockley said, "I am very pleased that Andy's completed 25 years of service here. Both my sons work with me and I am very proud that it is a real family business". With the growing number of people who have completed over 25 years at Icom, Dave commented, "I feel that staff appreciate good working conditions. The directors' doors are always open (well nearly always!) enabling staff to air their views and settle problems as quickly as possible. I find it very rewarding knowing that we have such a positive working environment here".

Who said Amateur Radio couldn't become a life-long career as well as an enjoyable hobby!

Don't forget the ML&S Barbeque & Boot Fair!

If you haven't visited Lynchy & his team, this may be the ideal opportunity...

Based on the format of their successful December 'Hog Roast', ML&S are having their very first Summer bash at their massive showroom in Chertsey, Surrey on **Saturday 30 July**. Because of the enormous amount of space, not only inside the premises (over 4000sq ft all dedicated to Amateur Radio, scanners and receivers), ML&S have also got what is probably the largest free on-site parking area in the UK for their customers.

The superb Boot Fair will again be held outside and admission is free. If you have any old kit you want to sell then bring your car and a table and set up early, anytime from 0730 onwards. If you have a van load the charge is only £10 a table and the fee will be given directly to charity. Please note that space is purely on a first come first served basis.

The on-site Barbeque will be handing out hot dogs and burgers and is kindly sponsored by the 'big three', Kenwood, Icom and Yaesu. There will also be other traders on-site selling their wares and so a good day should be guaranteed. Martin promises at least a 10% discount on all products from his range where they are not already on special offer.

For further details and maps on how to get there see **www.HamRadio.co.uk** or telephone **0845 2300 599**.

ML&S Martin Lynch & Sons Ltd
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Chertsey
Surrey KT16 9AS
Tel: (01932) 567333
FAX: (01932) 567 222
E-mail: Martin@MLandS.co.uk

Bolsover Special Event

Listen out for GB2PF on air in August as the special callsign is activated by members of the Bolsover & District Radio Society.

The Bolsover & District Radio Society are again organising a special event station to commemorate the birthday of Peter Fidler, a Bolsover man who helped chart a large area of Canada. The event takes place over the weekend of the 13 & 14 August when **GB2PF** will take to the air.

The GB2PF station will be activated on as many bands as possible and will be operated from the grounds of the Coalite Sports and Social Club off Moor Lane in Bolsover. More information can be obtained by contacting **David Ackrill G0DJA** on **(01246) 824994** or via E-mail to: **dave@g0dja.co.uk**

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: David Wright G4BKE,
Tel: (01202) 697338
Website: www.brswebsite.freeserve.co.uk

Bournemouth Radio Society meets on 1st & 3rd Fridays each month at 1930 for 2000 hours at Kinson Community Centre, Millhams Road, Kinson, Bournemouth.

The next meeting takes place on **15 July** and is a talk by **Mike G3TOI** on 'RF & Materials Testing'.

READING

Reading & District ARC
Contact: Pete G8FRC
Tel: (01189) 695697
Website: www.radarc.org

The Reading & District Amateur Radio Club currently meet once a month from April through to August on the 2nd Thursday, then from September through to November they meet on the 2nd and 4th Thursday of the month. In December there is only one meeting on the 1st Thursday. Meetings are held at Woodford Park Woodley Reading, commencing at 2000hours. Forthcoming meetings include: **14 July:** ATV and Digital ATV (with possible demo) by **Noel Matthews G8GTZ; 11 August:** Natter Night and **8 September:** Magnetic Fields and their effects (part 2-with demo) by **Eamus Ivan G3KLT.** Why not go along and join in the fun?

WALES

Barry Amateur Radio Society
Contact: Glyn Jones GW0ANA
Tel: (01446) 774522

The Barry Amateur Radio Society, Wales meet every Tuesday at 2000 hours at Sully Sports & Leisure Club, Vale of Glamorgan, South Wales. The club will be on Flatholm Island from **28 July** to **1 August 2005** for the Islands on The Air Contest and the club Fun Trip to Flatholm Island will be from **26** until the **31 August**. All members are invited to both trips.

Dragon Amateur Radio Club

Contact: Les Hayward MW0SEC
Tel: (01248) 470606
E-mail: les@corfe-castle.demon.co.uk

Members of the Dragon Amateur Radio Club meet on the 1st and 3rd Monday of each month at the Ebenezer Hall, Llanfair PG., Isle of Anglesey, North Wales. The current club programme is as follows: **1 August**: 'More uses for your oscilloscope' by **Stewart GW0ETF**; **15th:** To be arranged and **31st:** New date for visit to RAF Valley.

We all know the benefits of subscribing - never missing a copy, getting the latest issues before they go on sale to everyone else, snapping up the bargains in the private adverts and so on. But we also know that sometimes it can seem like just too much trouble to fill in the forms and post them back to us.

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Technical FOR THE TERRIFIED!

Tony Nailer G4CFY presents the latest in his series designed to encourage you to 'have a go ' at radio mathematics. Try it yourself...it's quite painless!

In T4T in the June issue of *PW,* calculations were undertaken on inductive and capacitive reactance. A low-pass filter was evaluated to see how the reactances appeared at 2kHz and at 9MHz.

Inductive reactance is:

To calculate the inductive reactance X_L

$$X_L = (2\times\pi\times f\times L)\Omega$$

It should be noted that an increase in frequency will produce an increase in the reactance.

Capacitive reactance is

To calculate the capacitive reactance X_C

$$X_C = \frac{1}{(2\times\pi\times f\times C)}\Omega$$

It should be noted that an increase in frequency will produce a **decrease** in the reactance.

Tuned Circuits

If a capacitor and inductor are connector in parallel the reactance at low frequency will be dominated by the low value of inductive reactance. At high frequency the reactance will be dominated by the low value of capacitive reactance.

At some point between low and high frequencies there will be a single frequency where the reactances are equal and opposite. This is called the resonant frequency. If such a circuit has a signal fed to it at the resonant frequency, it will cause quite high currents to pass back and forth between the two components. This is a bit like a pendulum, which continues to swing for some time with just a small amount of additional push at the right times and can cause the swing to increase enormously.

At resonance

At resonance $X_L = X_C$ Therefore:

$$(2\times\pi\times f\times L) = \frac{1}{(2\times\pi\times f\times C)} \qquad \textit{Eq. 1}$$

This may be transposed to give:

$$f = \left(\frac{1}{2\times\pi\times\sqrt{(L\times C)}}\right)\text{Hz} \qquad \textit{Eq. 2}$$

Practical Application

Let's now try a practical application. We'll calculate the resonant frequency of a parallel tuned circuit containing an inductor of 50µH and a capacitor of 47pF.

Now $50\mu H = 50\times10^{-6}H$ or $5\times10^{-5}H$

Likewise:

$47pF = 47\times10^{-12}F$ or $4.7\times10^{-11}F$

From Eq. 2

$$f = \left(\frac{1}{2\times\pi\times\sqrt{(L\times C)}}\right)\text{Hz}$$

$$f = \left(\frac{1}{2\times\pi\times\sqrt{(5\times10^{-5}\times4.7\times10^{-11})}}\right)\text{Hz}$$

Multiply out the numbers so:

$$f = \frac{1}{6.283\times\sqrt{(23.5\times10^{-5}\times10^{-11})}}$$

$$f = \frac{1}{6.283\times\sqrt{(23.5\times10^{-16})}}$$

$$f = \frac{1}{6.283\times 4.847\times10^{-8}}$$

$$f = \frac{1}{30.45\times10^{-8}} = \frac{1}{0.3045\times10^{-6}}$$

$f = 3.28\times10^6$ or 3.28MHz

Another problem

Now we'll look at another problem using the same formula. If it's required to find the value of a capacitor C to resonate with an inductor L of 5.5µH at a Frequency F of 14.2MHz.

Equation *Eq. 1* can also be transposed to make C the subject of the formula and results in:

$$C = \frac{1}{(4\times\pi^2\times L\times F^2)}\text{F}$$

Now let's put some values in

$$C = \frac{1}{4\times\pi^2\times5.5\times10^{-6}\times(14.2\times10^6)^2}\text{F}$$

Firstly, square the terms in the brackets

$$C = \frac{1}{4\times\pi^2\times5.5\times10^{-6}\times(201.64\times10^{12})}\text{F}$$

Next, put the value of π into your calculator, square it, then multiply the answer by 4, then multiply this answer by 5.5, finally multiply this number by 201.65 and rewrite the formula:

$$C = \frac{1}{43782\times10^{-6}\times10^{12}}\text{F}$$

$$C = \frac{1}{43782\times10^6}\text{F}$$

$$C = \frac{1}{4.3782\times10^{10}}\text{F}$$

$C = 0.228\times10^{-10}F = 22.8\times10^{-12}F$ or 22.8pF

Transposed formulas

To assist the reader there follow formulas which have already been transposed and the value for 2π and $4\pi2$ have been calculated in advance.

$$F = \left(\frac{1}{6.283\times\sqrt{(L\times C)}}\right)\text{Hz} \qquad \textit{Eq. 3}$$

$$C = \left(\frac{1}{39.5\times L\times F^2}\right)\text{F} \qquad \textit{Eq. 4}$$

$$L = \left(\frac{1}{39.5\times C\times F^2}\right)\text{H} \qquad \textit{Eq. 5}$$

Applying Eq. 3 to finding the resonant frequency of a 2.7µH inductor and a 180pF capacitor in parallel.

$$F = \left(\frac{1}{6.283\times\sqrt{(2.7\times10^{-6}\times180\times10^{-12})}}\right)\text{Hz}$$

$$F = \left(\frac{1}{6.283\times\sqrt{(486\times10^{-18})}}\right)\text{Hz}$$

$$F = \left(\frac{1}{6.283\times22\times10^{-9}}\right)\text{Hz}$$

$$F = \left(\frac{10^9}{138.5}\right)\text{Hz} \qquad f = \left(\frac{1000\times10^6}{138.5}\right)\text{Hz}$$

$F = 7.22\times10^6$ or 7.22MHz

Tuning a VFO

Now we'll try applying equation 4 to find the capacitor necessary to tune a v.f.o. using a 9µH coil at 5MHz.

Now applying equation *Eq. 4* to find the capacitor necessary to tune a v.f.o. using a 9µH coil to 5MHz

$$C = \left(\frac{1}{39.5\times9\times10^{-6}\times5\times10^6\times5\times10^6}\right)\text{F}$$

$$C = \left(\frac{1}{39.5\times9\times5\times5\times10^6}\right)\text{F}$$

$$C = \left(\frac{10^{-6}}{8887.5}\right)\text{F}$$

$= 0.0001125\times10^{-6}F$ or 112.5pF

Give them a try using standard component values and see how you get on! I also encourage you to try the following exercises.

Exercise 1: Find what capacitor will resonate with 1mH at 28MHz.

Exercise 2: Determine the inductance to resonate with 47pF at 70MHz.

Exercise 3: Calculate the resonant frequency of 0.1µH and 15pF.

Subscriptions list

If you would like to correspond regarding this article or previous ones subscribe to the list **pw-g4cfy-on@pwpublishing.ltd.uk** by sending a blank E-mail with the word subscribe in the subject box. When you receive confirmation from the server you can send an E-mail to **pw-g4cfy@pwpublishing.ltd.uk** and your comments will be answered by myself or the *PW* team. I look forward to hearing from you. **PW**

The Palstar ZM-30 Digital Antenna Impedance Bridge

Tucked away high above Hastings in East Sussex, John Heys G3BDQ always enjoys experimenting with antennas. We gave him something different this time - and he's been evaluating his antenna measurements!

The Palstar ZM-30, which G3BDQ says is "Ergonomically friendly".

PALSTAR®

For seven or eight years now I've been using an Autek RF-1 Antenna Analyser and it has proved to be a most useful tool during my antenna tests and trials. So, I was very pleased when *PW* asked to test and review the Palstar ZM-30 Digital Analyser.

My Autek weighs just 225g, which includes the 9V battery but the Palstar instrument weighs three times more with its eight AA batteries. It is also considerably larger and with my hand-size only just qualifies as a 'hand-held' instrument.

The Palstar can be connected to an external d.c. supply, requiring between 9 and 16V at around 200mA. Such a high current demand could rapidly exhaust its internal batteries but Palstar have cleverly arranged for time limit functions that allow an automatic switch that can be put into its memory circuits. The user can decide the number of minutes of inactivity before an automatic switch-off takes place. There's also a default time of ten minutes.

The Palstar ZM-30 also has a radio frequency (r.f.) input socket (more about this later), a small socket to admit the external d.c. supply and a 9-pin socket (RS-232 Serial Port) to allow connection to a PC. This latter feature enables the loading of an updated software programme that's provided on the product's Internet Web site. This is a feature that illustrates how far the analyser has progressed from the earlier Autek design!

Back-lit Display

The back-lit liquid crystal display (l.c.d.) on the ZM-30 has two lines, each of which can hold up to 16 characters. There's a button marked **Set-up**, which allows the choice of many function settings.

A **Mode** button allows a choice of any of four available operating modes; **Impedance**, **Capacitance**, **Inductance** and **VFO**. The **SWR** (standing wave ratio) evaluations are normally read on the display, but they can also be indicated by an audible tone, the lowest tone indicating the lowest s.w.r. This feature would be a Godsend if you checking out a beam antenna when high up a tower!

The front of the Palstar also has a **Band Select** button and a **Scan** button. This latter control starts tuning through user selected frequency bands or segments and stops at the resonant frequency of the antenna, etc., being tested. The display will then show the s.w.r., impedance and reactance on that frequency.

There's a central knob on the Palstar unit to tune the frequency settings and when pushed this can select menu settings. The power control is an **On/Off** button incorporating a delay-by-hold design to prevent any accidental switching of the unit.

For HF Only

The ZM-30 analyser is an h.f. only instrument designed to operate between 1 and 30MHz. It's a solidly built piece of equipment that's also ergonomically friendly - feeling just right in the hand.

However, I must warn any readers that before even switching the ZM-30 on for the first time - the comprehensive 16-page operating guide must be studied and read through more than once. It took me some time to adjust to the complexity of a modern microprocessor controlled instrument after several years using the Autek RF-1!

Measuring Capacitance

When the instrument is measuring capacitance and inductance an internal 10MHz oscillator operates. The analyser has a 600Ω maximum resistance or reactance specification and the display will show a numeric value for capacitance when the reactance is under 600Ω.

If the capacitance's reactance at 10MHz is outside the ZM-30's range the display shows C = (Z > 600). I can measure a wide range of capacities or inductances using a 'White Gold' multimeter, and a somewhat limited range using my Autek

Product
Palstar Inc. ZM-30 digital antenna impedance bridge.

Company
Palstar Inc, Piqua, Ohio, USA.

Contact
Nevada (UK Agents)
023-9231 3090

Pros
Designed to operate between 1 and 30MHz. It's a solidly built piece of equipment that's also ergonomically friendly - feeling just right in the hand.

Cons
High current consumption. Heavy duty rechargeable batteries recommended.

Summary
This instrument, is perhaps the best of its kind available on the amateur radio market at present, and would prove useful to any keen antenna experimenter.

Price
£299.95 plus £8 P&P

analyser. The capacitance readouts displayed by the Palstar analyser all fell within 1pF of readouts on the other instruments and I measured a wide variety of silvered mica capacitors.

Measuring Inductance

The limitations just outlined, regarding capacitance measurements also apply when making inductance measurements. Again I made comparisons of readings between the ZM-30, my Autek and the multimeter.

Many years ago, when I had no means to measure inductance I wound a high '*Q*' coil for a variable frequency oscillator (v.f.o.) which was designed to have an inductance of 10µH. This coil's inductance measured 9.2µH on the Autek, 9µH on the multimeter and 9.3µH on the Palstar.

Once again the limitations of range apply to inductance measurement with the ZM-30, which only displays inductance when the item being measured has a reactance (at 10MHz) below 600Ω.

The VFO

The Palstar ZM-30 uses an internal v.f.o. that employs Direct Digital Synthesis (DDS). This produces rock stable r.f. outputs between 1 and 30MHz.

When the v.f.o. is used to determine impedance and s.w.r. and when using the frequency **Sweep Mode** the frequency readout can be set to show frequency steps of 1, 10 and 100kHz. (The 1kHz readout is the default setting).

The ZM-30 can also be used as an external v.f.o./local oscillator or test signal. Its output level is 2V peak-to-peak (p-p). For some reason the frequency steps in the v.f.o. output mode are limited to 10kHz and tuning between each 10kHz step is not possible. If the ZM-30 had v.f.o. output steps at 100Hz and 10kHz it could be used as the oscillator, the 'heart' of home-brew direct conversion (DC) or superhet receivers - and transmitters. **Note:** In the v.f.o. mode I discovered that the indicated frequency on any band lay between 30 and 80Hz of the digital readout on my Kenwood TS-870 transceiver.

Impedance & SWR

Measuring impedance is the main operational mode of the Palstar analyser and after the switch-on sequence this mode is displayed together with the s.w.r. The display shows the frequency on the top line, with the s.w.r. to the left of the second line. The resistance is displayed in the middle of the second line and reactance is shown to the right of that line.

When the reactance is inductive it's shown with a **+j** and when capacitive **-j** is displayed.

Should the s.w.r. be shown as 1.8 it means that it's actually **1. 8: 1**.

When using the ZM-30 in the impedance mode I discovered that on my 28MHz band, my home-brew tri-band vertical's lowest s.w.r. was 1.4:1 on 29.4MHz. On 28.5MHz it was an unusable and atrocious 2.6:1!

My 'Slinky' 7MHz dipole* gave s.w.r. readings of below 2: 1 from 6.9 to 7.25MHz which confirmed the antenna's broad-band characteristic.

I also use a long wire that has been up for at least 20 years and which at different times has suffered additions or subtractions to its length. It's impossible to measure it physically for it runs up to a mast on the chimney after leaving the shack! Normally this antenna is grounded at the far end but the earth connection can be removed with a mercury tilt switch.

Visiting Amateurs usually ask how long the wire is and I reply "About 200 feet"! (61m). With the ZM-30 analyser the wire was measured against ground (unearthed at the far end) as a quarter-wave and resonance was at 1.1MHz. (A quarter-wave wire on 1.1MHz is 64.6m long, which is 212.7ft. Now I know just what to tell my inquisitive visitors!

I then cut a half-wave dipole for 28.5MHz and hung it up along my upstairs landing. I connected the Palstar analyser to the dipole and resonance, measuring a low s.w.r. was on 28.48MHz.

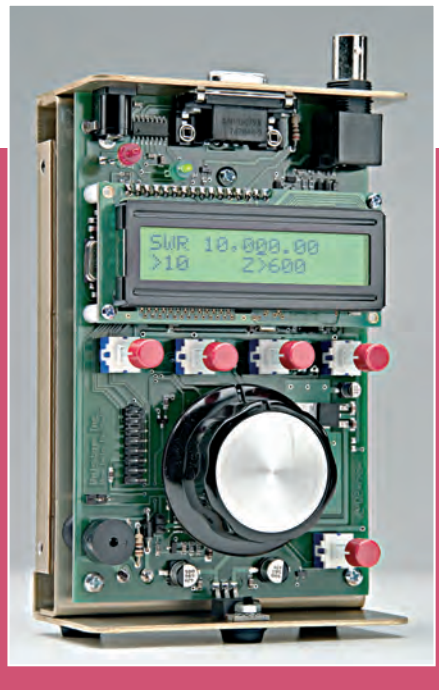
Next I made up a half-wave length (shortened to allow for velocity factor) of 50Ω coaxial cable, connected to the dipole and coupled its end to the analyser. I obtained almost the same s.w.r. and impedance readings.

***** *This antenna was described in Antenna Workshop on page 34 of the May issue of* PW. **Editor**.

Other Uses

Some other uses for the Palstar ZM-30 include the measurement of vertical antenna ground loss, coaxial cable loss, antenna tuner unit (a.t.u.) losses. You can also find the characteristic impedance of a transmission line, and measure balun loss.

The ZM-30 is supplied with accessories to enable measurements to be taken, including a balanced transformer adapter (see text).



An inside view of the ZM-30. The main tuning control also doubles as a selector switch for the various modes (see text).

The ZM-30 can also measure inductor 'Q', and the resonance of tuned circuits. It can also determine stub lengths, estimate the resonance and s.w.r. of magnetic loop antennas and other functions, all listed in the instrument's operating guide.

Enjoyable Brief Acquaintance

I enjoyed my brief acquaintance with the Palstar ZM-30, which has features unavailable on my old Autek analyser. This instrument is perhaps the best of its kind available on the amateur radio market at present, and would prove useful to any keen antenna experimenter.

There were however, little things, which I found irritating. The chief annoyance was the use of a BNC r.f. socket. I hate BNC plugs and sockets! So, before I could use the ZM-30 I first had to locate a used BNC plug in my 'plug and socket box' and then spend a full hour connecting them up to a few inches of coaxial cable and 'croc' clips for connection to the items being tested. The common PL-259 plug is often reviled but it's easy to wire up and has insignificant losses up to 150MHz. The Palstar Analyser itself only works up to 30MHz anyway.

The instrument has a high operating current and replacing the eight batteries could be costly. I've already mentioned that the v.f.o. output can only be tuned in 10kHz steps (*See end panel.* **Editor**) - but perhaps this could be changed in future models? Accessories supplied include a useful a.c. mains adapter, a 1:1 balanced transformer - for use with balanced antennas and feed lines - and three plug-in calibration resistors. Altogether very useful!

I can certainly recommend the Palstar ZM-30 to anyone contemplating the purchase of a reliable and effective antenna analyser. **PW**

Manufacturer's Reply Panel

Paul Hrivank (President of Palstar USA) provided the following comments on G3BDQ's review: "The frequency resolution on the ZM-30 is 10Hz, and not 10kHz as John G3BDQ suggests. He may not have realised that the resolution can be changed by depressing the tuning knob and rotating it at the same time to select the resolution. The battery power consumption can be lowered by shutting of the back lighting. On this point, we now ship current units having a new display that's very readable with the back lighting off, and with an exceedingly bright bluish colour when it's on. I also recommended rechargeable Nickel Metal Hydride batteries, which could last up to five years.

The digital circuitry on the ZM-30 results in a high current demand. The use of Nickel Metal Hydride rechargeable cells are recommended by the manufacturers (see text).

Thanks from G3BDQ
My thanks for the loan of the review instrument go to **Nevada, Unit 1, Fitzherbert Spur, Farlington, Portsmouth, Hampshire PO6 1TT. Tel: 023-9231 3090, E-mail: sales@nevada.co.uk Website: www.nevada.co.uk**

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the newton experience

Operating O

Richard Newton G0RSN suggests you get the most out of Amateur Radio by operating portable and mobile. The 'Newton experience' is great way of trying out different radio locations and enjoying our flexible hobby!

Hi everyone! I've said it before - and I'll say it again; Amateur radio is a great hobby! The reason it is so fantastic is that it has so many facets and it's a hobby for all seasons. When the *PW* Editor **Rob G3XFD** asked me to write an article on one particular facet, I know he did so because he knows I love

Fig. 1: The special antenna mount, built on to on Richard G0RSN's car towing bracket. The unit was made by Terry Wood G7VJJ.

Fig. 2: Richard enjoyed using the Kenwood TS-50 and was most impressed at the pioneering mobile transceiver's quality and effectiveness. Eighteen TS-50 transceivers are used on the automated International Beacon Project (IBP) which is in operation 24 hours a day, 7 days a week.

Out & About

● **Fig. 3: As Richard G0RSN's mobile set-up grew he graduated to a Ford Escort and it literally became his mobile shack! (see text).**

● **Fig. 4: Over the years Richard G0RSN has tried out many different antennas. The Australian made Highlander mobile antenna was reviewed by Richard on behalf of *PW* in May 1999.**

it with a passion, and not that I am a technical expert! However, in the next few pages I would like to share my love of portable and mobile Amateur Radio operation with you, and perhaps give you the benefit of my hard learned mistakes along the way!

Start At Beginning!

As I sat to plan this article I was overwhelmed with the enormity of the task; where to start? Well, it's best to start at the very beginning, so I did - and off we go.

My passion for radio was born from portable operation during the early 1970s. This was when, at a very early age, long before I reached the elevated heights of double figures, I would join my Dad, **John G8EAM** while he operated from North Hill overlooking Minehead, Somerset, the Bristol Channel and Wales across the water.

Sadly, Dad became a Silent Key in 1999. But he left my brother **William G7GMZ** and I with a wonderful legacy in Amateur Radio, as you will discover a little later. For hours I would sit next to Dad while he was calling "CQ" in sunshine, mist and rain, pencil poised, waiting for a contact to log. His first mobile set up was a Trio 2300 144MHz f.m. rig running 1W into a Revco 5λ8 whip mount antenna. He would speak to stations from South Wales, Somerset, Gloucester and Devon. I was amazed and completely hooked.

My Dad's mobile operating excursions on North Hill progressed and in the late 1970s Dad acquired an Icom IC-202S, a single sideband (s.s.b) 3W 144MHz rig. This he ran into a halo antenna on a gutter mount. You can imagine our sheer delight with the first contact he made into the Continent!

Next, Dad built a home-brew mast, onto which he would strap, a 5-element beam. This would then be secured to the ground and the roof rack on the car. You have probably already guessed what, or rather who, was the rotator! I wrapped up warm though! This mast is still in service with my brother, William G7GMZ.

Licensed In 1980s

I finally got round to getting a Licence in the late 1980s and really got into the hobby along with my friend **Norman G0RCN** (then G7GDZ). Norman and I went on several walks over the Purbeck Hills near Swanage trying out our newly acquired licences.

What a sight we must have been, me with my Trio TR2300 and Norman with (I think I have remembered correctly) his Yaesu FT-290. In modern terms these were large radios, which hung on straps over our shoulders!

In fact, I thought I was the bee's knees with my '2300 operating on its internal batteries. However, I'm not entirely sure that my wife **Diane**, or Norman's wife **Lesley** were ever quite as impressed as Norman and I were!

My first mobile set up in the car followed in Dad's footsteps exactly. I had my Trio 2300 and 5λ8 whip on Revco mount. The whip was

● **Fig. 5: At about the same time as G0RSN retired his Ford Escort, the Newton family bought a caravan and Richard treated himself to the then new Icom IC-706.**

cut to the correct length for the frequency using a hacksaw and s.w.r bridge and a bucket load of patience!

I once cut off too much from the whip. Fortunately, **Colin G3XAS**, who used to run the local radio shop gave me a tip; "Wrap a length of solder around the top of the whip several times and then straighten it. You should extend it a couple of inches beyond the end of the whip. You can then use this to effectively tune the whip". (Obviously not ideal, but it works - I had that antenna on the car for years and it worked really well!).

I also found that the best-case scenario is that you ground the antenna to the bodywork, sometimes not possible; it was

the newton experience

Fig. 6: Anyone can flatten a car battery when operating /P - and Rob G3XFD was no exception. He forgot to check battery levels during the 1999 144MHz QRP contest. Nowadays (as here in the 2003 event) he uses a separate battery (see text).

certainly not possible as far as my wife **Diane** was concerned! On 144 and 430MHz bands you can get away with not grounding to the bodywork at all. A magnetic mount for the antenna is quite acceptable, especially if the antenna has a loading coil, as this seems to reduce the need for such an effective ground plane.

Mobile On HF

However, I was to discover that when operating on the h.f bands, it's far more critical to have a good, direct earth to the vehicle. From my experience I suggest that (wherever possible) you take power direct from the vehicle battery.

Make sure all leads are protected when going through the bulkhead (to prevent fraying) and are correctly routed through the engine compartment. And it should go without saying that they should be appropriately fused. If you are able to do this you will cut down on interference such as alternator whine and general 'noise'.

When I passed the Morse test and got my G0RSN callsign I wanted to transfer my interest in mobile and portable working to h.f. Fortunately, I had much help and encouragement from **Colin G3XAS** and **Gary G4UVE.**

The first h.f. rig I used mobile was the Kenwood/Trio TS-130S. This was a large rig in modern terms, perhaps two and a half or even three times the size of an Icom IC-706! Despite the size, it was strapped to the floor of my Vauxhall Astra with canvas straps and Velcro fastener strip as I was determined to get h.f. mobile! This is where a good d.c. earth is essential; the antenna and the rig need to be e°arthed to the body of the vehicle.

Having bought a centre-loaded single-band whip for 7MHz, which was an heavy-duty magnetic mount. I spent hours trying (and failing) to get the thing tuned. And in the process of trying to tune it - I learnt two important lessons.

The first lesson I learned may seem obvious, but believe me, **never touch the antenna** when you are transmitting! It really hurts!* So, for safety reasons when you are tuning antennas, especially on h.f. make sure you communicate very clearly with the person operating the p.t.t. for you!

The second lesson is that stray r.f. can totally ruin car relays and the (very common nowadays) computer-controlled engine units. If in double check with the vehicle manufacturers regarding r.f. field strengths and other advice when using radio equipment in your car.

Richard's advice is very important. Radio frequency (r.f.) burns on the skin can be extremely painful and - because the surrounding deeper tissue can be destroyed or badly damaged by the heating process (heating up, expanding and bursting individual cells), healing can be a lengthy process even though the burn (at first) might seem to be very minor in nature. Avoid the problem - be very careful! **Editor.*

Wood's Metal Skills!

Getting going on h.f. mobile I was grateful for the help of my father-in-law, **Terry Wood G7VJJ** and his metalwork skills. He manufactured a piece of metal that bolted to my car's tow bar bracket **Fig. 1**. After fitting a coaxial cable lead and SO239 connector I had the 7MHz

● **Fig. 7: The Buddipole antenna, out of its carry-case ready to be erected (see text).**

whip tuned in no time with a 1:1 s.w.r. I operated for years running 100W and never blew another relay!

My next progression was to a Kenwood TS-50, **Fig. 2**, what a lovely radio it was. I could not believe how small the transceiver turned out to be. The audio quality both on transmit and receive was something to behold, I made up a gooseneck hands free microphone for the radio with up and down tuning controls. It's not surprising that 18 TS-50s are in use, 24 hours a day, 7 days a week on the automated International Beacon Project (IBP). It says much for their reliability!

The mobile set-up grew and I got hold of a Ford Escort that I could call my own. **Fig. 3**, the dashboard shows it was truly a mobile shack! **Terry 2E1EJC**, helped me drill hole after hole in the bodywork - with great glee I seem to recall! We attached several different antenna connections, S0239, Revco quick-release mount and some CB style mountings that I used for 29MHz f.m. working. I cannot begin to tell you how much fun I had.

Working Shifts & Mobile

My job involves shift working and used to work 32km (20 miles) away from where I lived. When on the early shift, starting at 0600, I used to regularly talk into Australia and New Zealand on 7MHz on the journey to work. In fact I was almost late for my shift several times because I was sat in the car park chatting away to a DX station!

Over the years I've tried different antennas, multi-band antenna such as the Australian made Highlander, **Fig. 4,** which was very good and got excellent results. I have also tinkered with mobile antenna tuning units (a.t.u.s) but I have found that a dedicated whip tuned to the portion of the band you are most likely to use is the best way to go for true on the road mobile work. I stress this is just personal preference.

Apart from working Australia and New Zealand on the way to work I've also had contacts all over the United States, Europe and Canada. One of my most memorable contacts was with a station at the United Nations building in New York, I was on my way home from work!

Like all good things my mobile shack was to come to an end with the demise of my Ford escort when it finally failed the MOT and was beyond economic saving. So, I had to downsize my mobile operation and had to look for another way in which to enjoy the 'out and about' side of the hobby.

Just before my Escort went to the garage in the sky I had replaced the Kenwood TS-50 with the Icom IC-706, **Fig. 5**. Coincidentally we also went from tent to caravan at about the same time. A chance not to be missed!

Safety In The Caravan

Having convinced my wife Diane it was best to have electricity in the caravan I obtained a small consumer unit with circuit breakers and also equipped with a Residual Current Device (RCD). This combination is a 'must' for safety's sake. Incidentally, you can get these as stand alone units for tents as well. They plug into the site electricity supply if it's available.

I also used ran a 30A 12V d.c. power supply, which quite happily coped with all our power needs in the caravan. It was also available to power the IC-706! How convenient!

On the occasions I don't have the luxury of a mains supply I either use a 'Leisure'* battery or a 12V Yuasa type sealed lead acid batteries. These are a good choice, their compact size and the fact they are spill-free means that they can be carried far more easily than a Leisure or car type battery.

The Leisure' type battery is specially designed for deep discharge, full-recharge applications. Although they appear expensive (compared to car type accumulators) they're ideal for Amateur Radio portable working. They usually also come with strong carrying handles. **Editor.*

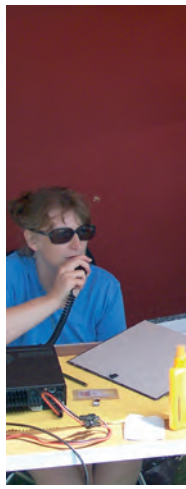
Watch That Current!

When operating away from the mains, the thing to watch is the current drain of the rig you are using. Operating QRP is the way to go. But beware! Some of the more modern rigs such as the IC-706 Mk IIG have a hefty current drain **even on receive - never mind transmit**.

Anyone can make the mistake, and father-in-law Terry G7VJJ and I flattened a fully charged leisure battery on a *PW* 144MHz QRP contest one year using a IC-706Mk IIG. This was during the same

● **Fig. 8: North Hill overlooking G0RSN's home town of Minehead in Somerset. The site, featured on this month's *PW* front provides views of the Welsh coastline in the background across the Bristol Channel.**

the newton experience



● **Fig. 12: In 2003 while on a caravan holiday at Longleat in Wiltshire, Richards G0RSN worked a collection of GB90RSGB stations in celebration of the RSGB 90th anniversary. All were worked with a wire antenna and my IC-706 MkI running a maximum of 10W and a 12V d.c. leisure battery.**

contest in which *PW* Editor Rob G3XFD got stranded in his car, having done the exact same thing for the exact same reason with the Yaesu FT-100, while operating in the 1999 QRP Contest. Rob was lucky that his mobile 'phone still worked and he could call the AA via the cell phone mast (disguised as a fir tree and in the background of **Fig. 6**. The moral of the story? - best to use a separate battery for the equipment, which G3XFD does nowadays!

Trying Antenna Systems

Choosing and trying out different antenna systems is the real fun part of portable working. Terry G7VJJ and I enjoy cutting our own single band dipoles to throw up in trees. Just a simple centrepiece and ordinary thin stranded wire is quite acceptable. I have a quarter-wave dipole for 7MHz that rolls up in my pocket and is just fantastic; it cost me under a fiver!

We have also invested in commercially available antenna systems such as the Buddy Pole, **Fig. 7**. In fact, I've used everything from a random bit of wire to a mobile whip clamped to a metal pole. However, no matter how successful (or not) you may be, one thing is for sure; you always have a lot of fun and learn more each time you try something new.

The one thing to always remember about antennas and portable working is where to site them. Please make sure you site your antenna far away from where a stray member of the public could get too close. As previously mention r.f. burns are very painful and can be potentially fatal! Also, don't forget that guy ropes on masts should be protected and clearly marked.

Hobby & Family

Radio has become a family affair for William and myself. My wife Diane is now licensed as **M3HJN** and William's wife **Carolyn** has just obtained her Intermediate callsign, **2E0WEC**. We have many licensees in the immediate and extended family and radio is often part of great day out. It's always an

● **Figs. 9, 10 and 11, feature William G7GMZ, his wife Carolyn 2E0WEC, my father in law Terry G7VJJ, G0RSN's wife Diane M3HJN, my son Thomas M3TJN (Oliver M3ORN was out of shot!) and William's father-in-law Robin M3GQI. However, despite Richard's best efforts to get her licensed, Mum (Ailsa) remains a dedicated s.w.l.**

intrinsic part of a family caravan holiday.

My Dad's callsign, G8EAM has been reissued and is now the club callsign of **The John Newton Memorial Radio Club**. Members are made up from family and close friends of my Dad.

Dad loved entering the *PW* QRP contest every year, and nowadays the club activates the G8EAM call for this activity. It still takes part, often operating from the same spot in which my love of radio started over 30 years ago - sat in Dad's car on North Hill overlooking his home town of Minehead in Somerset. The site is featured on this month's *PW* front cover and **Fig. 8**, with the Welsh coastline in the background across the Bristol Channel.

I've also included some family pictures of the portable set up on North Hill. The photographs **Figs. 9, 10** and **11**, feature William G7GMZ, his wife Carolyn 2E0WEC, my father-in-law Terry G7VJJ, my wife Diane M3HJN, my son **Thomas M3TJN** (**Oliver M3ORN** was out of shot!**)** and William's father-in-law **Robin M3GQI**. However, despite our best efforts to get her licensed, Mum (**Ailsa**) remains a dedicated s.w.l.

In 2003 while on a caravan holiday at Longleat in Wiltshire, **Fig. 12**, I had a great time working a collection of **GB90RSGB** stations in celebration of the RSGB 90th anniversary all with a wire antenna and my IC-706 MkI running a maximum of 10W and a 12V d.c. leisure battery.

Making Friends

As many of you have undoubtedly done, I have made some great friends through this hobby. One such friend is **Hank K2HJB**, from New York, **Fig. 13**, who shares my passion for portable working and when he heard I was doing this article he was keen to share his exploits.

Hank and his friends **Ira KB2DJJ** and **Kevin KA2NUE** enjoy monthly expeditions to Bear Mountain in New York along the Hudson River. The height of location they use is over 243m (800ft) above sea level (a.s.l.). They use The SGC-2020 and string some dipoles up in the trees.

Hank and his friends have made numerous contacts into Europe when propagation is favourable so listen out for them! They use 12V gel-cells to power the rig and a transmit power of 20W or less.

While operating mobile and portable I have worked many stations from all over the world, some countries I have not even heard from home. I recommend you try it for yourself!

Low Resistance

A few years ago I saw a rig in a radio shop that just had to be bought, I could not resist it! It is a Japan Radio Company JST-10, a 1/10W rig powered by its own batteries covering 7 and 21MHz. I have decided that this summer I will to take the rig, my Buddy Pole and my push bike and find a great location on the nearby hills and operate until the batteries run out!

For me, portable working encompasses all that's good about this great hobby. It's about friends and family, about trying something new, about technical investigation, expanding your knowledge and understanding. When all is said and done, it's absolutely great fun! Get out and about and give it a go, you won't be disappointed! **PW**

● **Fig. 13: Richard G0RSN has made some great friends through this hobby. One such friend is Hank K2HJB from New York. Hank shares the passion for portable working, he's pictured here above the mighty Hudson River. He enjoys using the SGC-2020 portable transceiver with his friends Ira KB2DJJ and Kevin KA2NUE (see text).**

Imagine a country where the “friendly” radio administrator says “I’m feeling generous you can have your amateur radio licence for free and tell you what for life as well”. Two years later the friendly administrator says “actually this licence for free, is expensive to run - no more licences are required, anyone can operate without a licence”. A little later the not so friendly regulator says “these amateur radio operators cause all sorts of interference problems and someone else wants to buy their bit of the spectrum – lets ban amateur radio and sell their spectrum!”.

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Dayton Delights

Here is a snippet of some of the new products introduced to the hobbyist market at the Dayton Hamvention held in May in Ohio, USA. Even though some of these products are not necessarily going to be made 'UK ready', we thought you'd like to know what's available 'across the pond'. Please note you should contact the manufacturers direct to check on UK availability and exact

Digital Voice Technology from AOR

All over the world Radio Amateurs have, over the years, discovered how much fun it is to work h.f. without background noise. To help, AOR set the pace in this breakthrough technology with its ARD9800. Now, in response to world-wide demand, they have developed the ARD9000, which makes digital voice communications even more affordable.

With an ARD9000, it's easy to convert existing h.f. analog transceivers to work digital voice with **no** transceiver modifications. The ARD9000 automatically detects a digital signal and decodes it, so you also maintain full analog capabilities. Whether a contact comes in as digital or analogue, the ARD9000 can handle it.

Main Features

- Digital voice communications using existing analogue transceivers
- Amazing audio quality
- Works on single side band
- Automatic digital receive
- Optional interface cables for most popular transceivers
- Built-in high grade Vocoder (AMBE)
- Utilises a uniquely designed high performance DSP engine

For a downloadable pdf leaflet and for details of prices etc., see **www.aorusa.com** At the time of writing the ARD9000 was still awaiting CE approval, keep any eye on **www.aoruk.com** for the up-to-date news on the process.

SGC's Mini Lini

The patent-pending MINI LINI from SGC has 500W output and weighs only 1.8kg (4lb) including its a.c. power supply. SGC say the MINI LINI is extremely efficient due to its unique design based on the innovative use of Class E technology.

The unit operates on single h.f. Amateur bands via plug-in modules and is said to be the first of its kind, featuring the reliability, self protection and simple operation you'd expect from SGC products. Just plug in the a.c. power cable, connect r.f., select your band, power-on and transmit.

The MINI LINI uses Class E technology that is capable of efficiency close to 90%. Separate plug-in amplifier modules are used for each band and the unit is supplied with a 14MHz module. Additional modules are available for the 1.8, 3, 7, 18 and 21MHz bands.

It's unclear whether this power supply will be developed for European use and imported but if you'd like to find out more check out **www.sgcworld.com**

Icom Offering

As mentioned briefly in last month's Stop Press, Icom USA unveiled a prototype version of their new IC-7000 all-mode transceiver. The reaction to this launch was extremely positive and Icom have received many enquiries regarding the new transceiver. So, what's all the fuss about? Selected features of the '7000 include:

- **Digital voice recorder (DVR)**

Record your callsign, CQ, or other information in four transmit play-back memories with alphanumeric labels. Using the front panel REC control you can record incoming signals too!

- **2-mode band scope**

The band scope function lets you watch activity around the band.

- **2** x **DSP**

That's two times the DSP - this feature in the IC-7000 will leave many base station rigs in the noise!

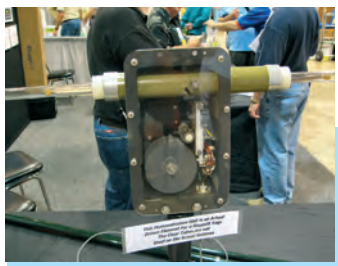
- **Improved AGC loop performance**

The IC-7000 has 41 different filter widths, just dial in the width you want and select whether you want a sharp or soft filter shape for s.s.b. and c.w. modes.

- **Manual Notch Filter**

Pull out the weak signals in crowded band conditions with Icom's **new** two-point MNF manual notch filter.

At the time of going to press Icom UK have said that the Japanese version of the IC-7000 is planned for release at the end of July 2005. However, there is currently, no fixed schedule or pricing information available relating to the release of the UK version of the IC-7000. Keep an eye on **www.icomuk.co.uk** and *PW*'s news pages for more information.



A Monoband for Every Frequency!

The SteppIR™ antenna system is something of a revolution! Whereas most multi-band antennas use traps, log cells or interlaced elements to cover several bands, the SteppIR™ antenna system solves the need for all this by 'tricking' the antenna into thinking it's a different length, by controlling each element length so a long boom is not needed. The SteppIR™ system is remotely adjustable from 7-54MHz giving continuous coverage.

Each antenna element consists of two spools of flat copper-beryllium strip conductor mounted in the antenna housing. The strips are perforated to allow a stepper motor to drive them simultaneously with a sprocket. The copper strip is driven out into hollow, lightweight fibreglass support elements to form an element of any desired length up to 36' long. The fibreglass poles are telescopic,, light weight and said to be very durable.

The fact that you can completely retract the copper antenna elements coupled with the collapsible fibreglass poles makes the SteppIR™ extremely portable. Check out **www.steppir.com** for more info.

The PW Avon

Continuing the republishing of *PW* v.h.f. and u.h.f. classic projects, Rob Mannion G3XFD presents the Avon f.m. transmitter by Brian Philips G8FWM. This excellent design provided many Amateurs, active in the 1970s, with a useful transmitter and is still an attractive driver unit project for 2005.

Commercially made 144MHz f.m. transmitters were expensive in 1978, and I had two young daughters - so buying a transmitter wasn't an option! The Avon transmitter was quite a big project and I didn't intend to build the complete unit. However, like many other Amateurs I was interested in the basic transmitter. It was easy to build, could run into a separate r.f. amplifier (I actually ran it barefoot on several occasions) although the crystals weren't cheap. Despite this the transmitter proved to be an excellent constructional choice.

In republishing the 1978 project in 2005 I'm, doing so with the specific intention of offering the basic transmitter unit. Any reader wishing to build the entire project can do so (photocopies available, contact me please) but I cannot guarantee that all the components are available. The Part 1 project however, as published here, uses components, which are still easy to get. The Avon provided me with much pleasure - and if any readers who built the complete project read this, I ask them to please contact me at the *PW* offices. I'd like to hear from you!

G3XFD

The 1978 Article

With the increased activity on 144MHz, some who may have contemplated working this band have possibly been deterred by the cost of a black box and the uncertainty of modifying commercial equipment. With this situation in mind, the author has designed a simple, easily built 2m f.m. transmitter, that can be assembled by anyone who can use a soldering iron and small tools whilst possessing a reasonable amount of patience.

The completed unit will perform very well, being as versatile as the constructor ultimately wishes to make it. An r.f. output of around 10W* can be expected if the unit is constructed as described, but power far in excess of this mat be achieved if the design is regarded as a working basis and the p.a. stage is developed.

**Editor*

**See introductory note opposite.*

Printed Circuit Board

A simple printed circuit board (p.c.b.) technique is employed, with most components fixed directly to the print side of the board. There are very few holes to be drilled and the units may be secured in a suitable housing by straightforward fixing screws.

For continued ease of assembly, the transmitter is made on three separate boards. One contains the audio modulator and crystal oscillator, the others the frequency multipliers and the final power output stage (see 2005 introduction). For low power working (QRP) only the first two boards need to be made as the output of the second is on 144MHz, although at only a few tens of milliwatts.

Constructors who have not yet etched a printed board will soon find how easy it really is and full instructions are given

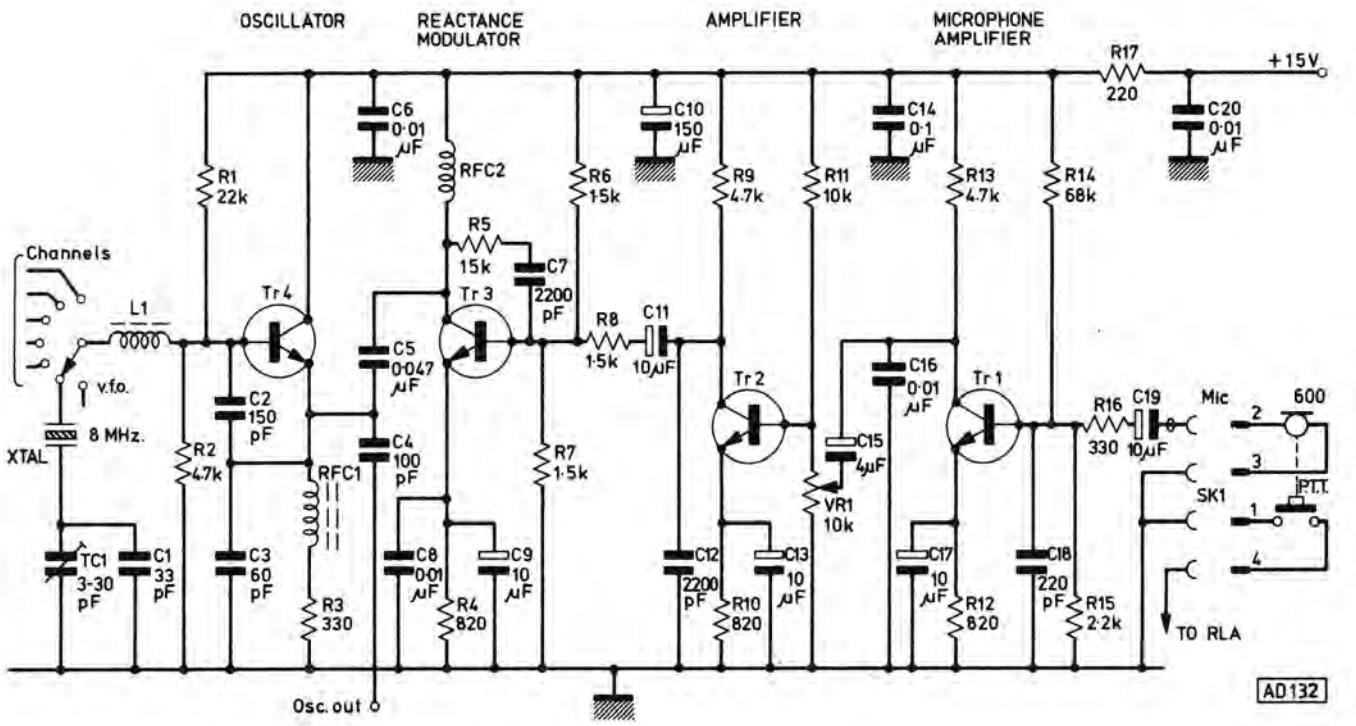


Fig. 1: Circuit diagram for the crystal oscillator and audio stages, Board 1 (see text).

with the details of the board layouts. As with all projects of this nature, it is strongly recommended that the components used are of the kinds specified. The power rating of resistors is not critical, but as their ultimate size is governed by their power handling capacity, space may determine type.

The Circuit - Board 1

The theoretical circuit on board 1 is given in **Fig. 1** and consists of a Colpitt's oscillator using 8MHz crystals. Six channels are shown in the schematics - three, in fact, were used for the prototype - but there's no reason why many crystals cannot be included by using a suitable multiway switch and increasing the number of 'islands' on the board.

Using the smaller HC25 series crystals would permit more channels to be fitted in the space allotted. The trimmers in series with each crystal allow easy netting to the assigned frequency.

The f.m. is applied to the oscillator by a reactance stage, fed by two audio pre-amps. Deviation is controlled by a 10kΩ potentiometer and the maximum attained on the prototype was 8kHz. Notice the inclusion of the decoupling in the audio stages to prevent r.f. pick up, so often a cause of poor audio quality in home constructed equipment. The p.c.b. layout is shown in **Fig. 2**.

Preparing Board 1

Now we can prepare Board 1, as shown in **Fig. 2**. First, cut a piece of single sided copper board to the size shown and with some fine abrasive paper, clean the copper surface to remove any oxide or tarnish. Place an accurate photocopy of the tracks on the board and 'prick through' the component holes into the material.

Next, using a soft, lead pencil, draw out the islands on the board and then draw around these and the inter-connections of the earth plane edge. The small islands and fine connections are then filled in by means of an etch-resist pen or fine paint brush, using quick drying paint, such as car touch-up paint, thinned down if necessary.

The larger areas are then put in carefully and when the board is dry, each island and connection examined to make sure no copper bridges exist between them. You should also ensure adequate clearances.

Place the board in a suitable plastic or earthenware container and pour on just sufficient ferric chloride solution as is necessary to cover it. The solution can be purchased ready-mixed from most radio component stores such as Maplin. It is however, a corrosive substance, albeit, mild one, so handle carefully and wash off any solution that comes into contact with the skin **immediately as it stains very badly!**

Initially, leave the board submerged for about 20 minutes, agitating occasionally. You'll see the chemical action taking place quite clearly and when all the unwanted copper has been eroded, take the p.c.b. out of the fluid, wash in clean water and then dry.

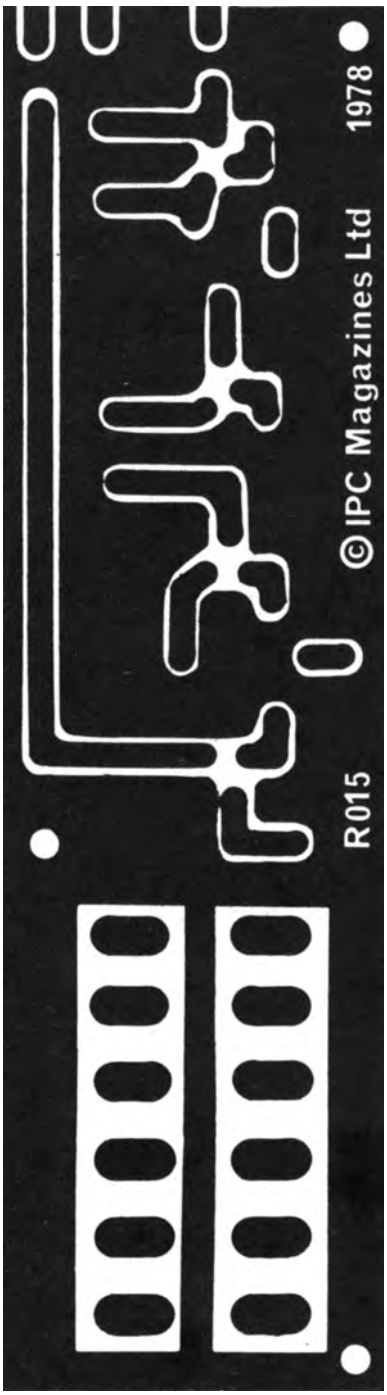
Using a wet, abrasive pad, such as a pan scourer, the paint is now removed and a final wash and dry will leave the copper gleaming. After a final check on the work, drill the mounting holes for fixing to the metal chassis.

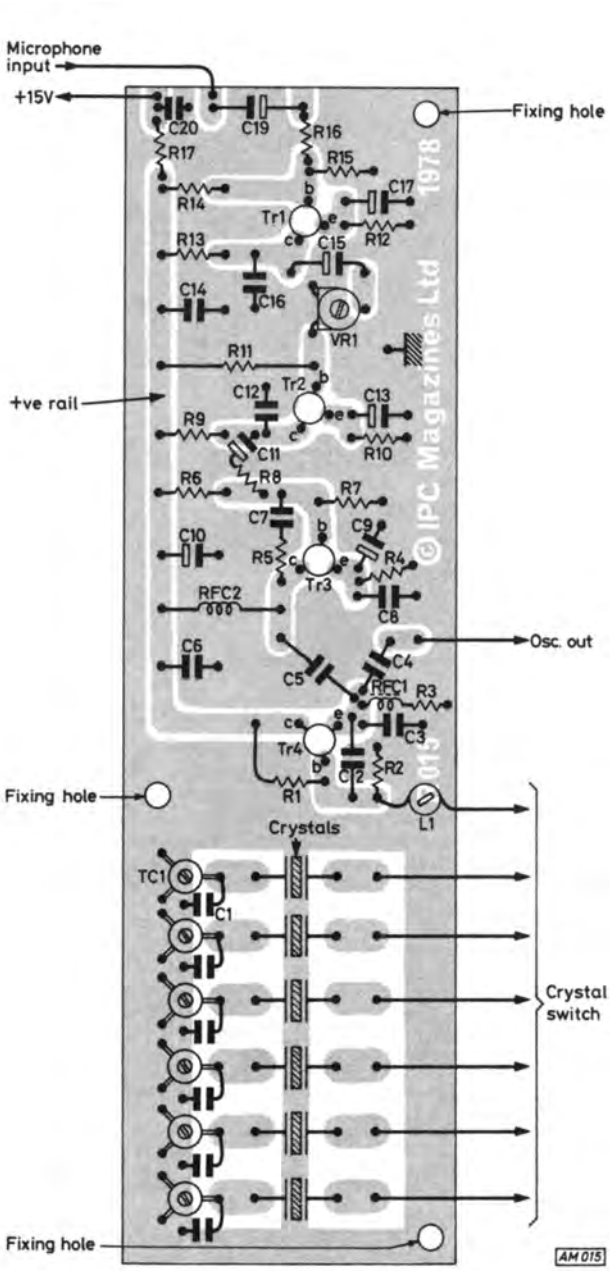
Each board in the transmitter is etched in this way and provided the simple instructions are followed, you should easily be able to provide good examples.

Mounting Components

Next we come to mounting the components, **Fig. 3**. There is no hard and fast rule about fixing the components to the board, but I personally favour soldering the resistors first, followed by the capacitors, the coils and finally the transistors.

Keep lead lengths short, typically 6-12mm for transistors,





● **Fig. 2 (far left): Copper side layout of Board 1 (see text).**

● **Fig. 3 (left): Component layout of Board 1. Note components soldered direct to copper side of the p.c.b. (see text).**

and solder neatly, holding the iron in place just long enough for the solder to flow to the joint. An iron of 15W rating with a bit size of 3mm or so is to be preferred for work of this nature.

Testing Board 1

Once Board 1 is finished it's ready for testing. Start by connecting a 15V supply to the board, having first established that the polarity is correct. Next, check the voltages shown, a 15% error is quite acceptable, due to component tolerances.

Then, connect a 600Ω microphone and a pair of earphones across C11 to the earth line. You should then check for clean audio and the operation of the deviation control.

The oscillator can be tested by connecting a suitable 8MHz crystal in position (i.e. 8.08333MHz for S20-145.5MHz). Listen out for it the 8MHz signal on a tuneable h.f. receiver, coupled loosely to the vicinity of the oscillator stage.

For the moment, no audio will be apparent on the signal, because the amount of deviation available at the oscillator is small. It requires the multiplication of subsequent stages to raise this to the required level of 5-6kHz.

The Multiplier Stages

Next, it's on to Board 2. The circuit of the multiplier is given in **Fig. 4**, and consists of a stage of tripling to 24MHz followed by

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Daiwa CN-801V SWR/PWR Meter 140-525MHz
Power range: 20/200W ..... ML&S only £119.95

Daiwa CN-801S SWR/Power Meter 0.9-2.5Ghz
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The MFJ-974H is a fully balanced true balanced line antenna tuner. It gives you superb current balance throughout its very wide matching and frequency range. **£159.95**

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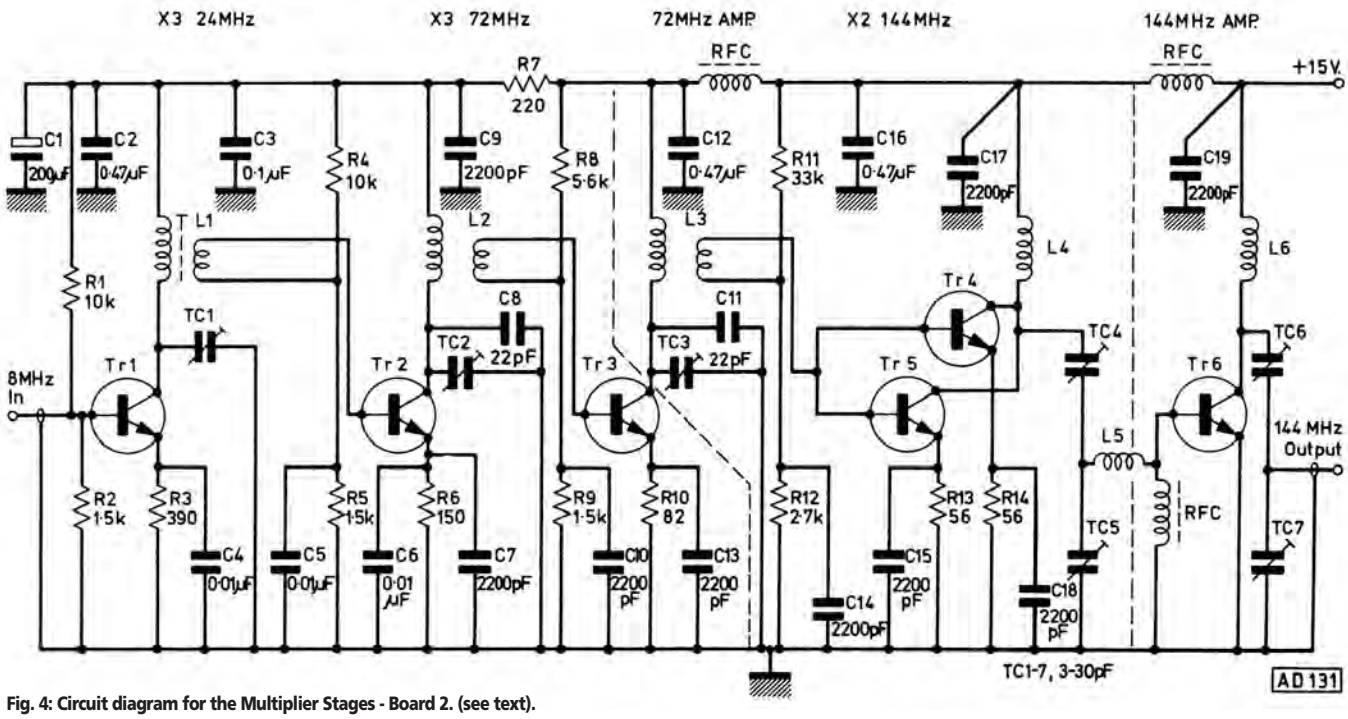
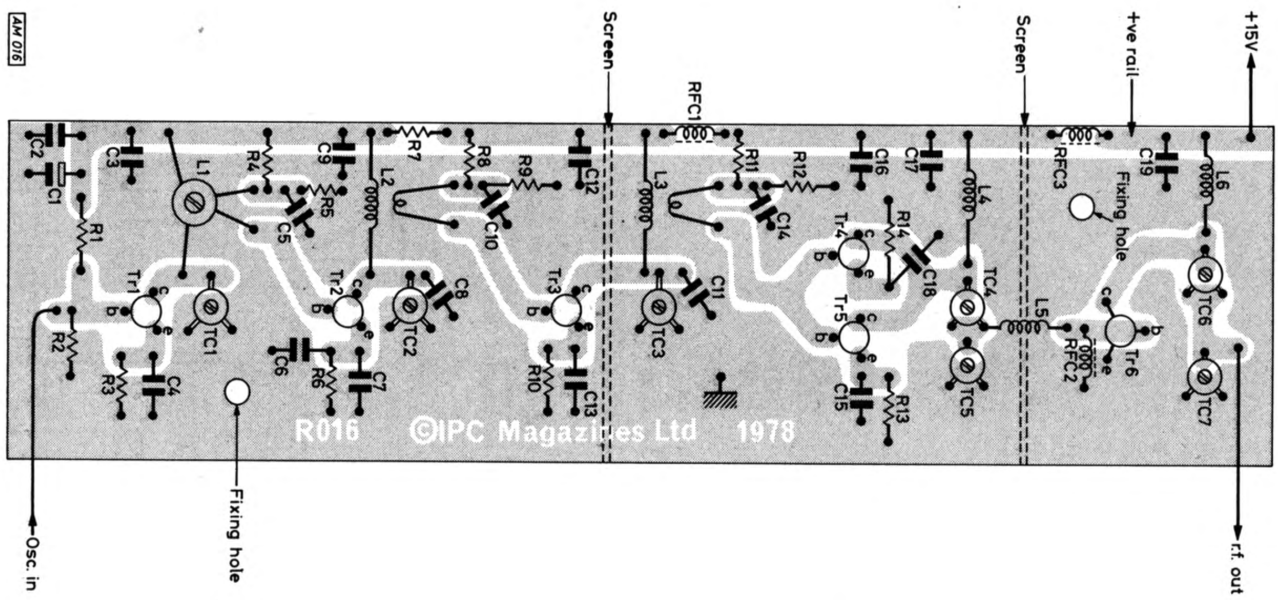


● **Fig. 4: Circuit diagram for the Multiplier Stages - Board 2. (see text).**



● **Fig. 6: Component layout of Board 2. Note components soldered direct to copper side of p.c.b. (see text)**

a further tripler to 72MHz and an amplifier into a doubler for 144MHz.

The transistor, Tr1, accepts the crystal oscillator input in its base circuit and the collector is tuned to 24MHz. Its output is link-coupled to Tr2 and its collector is tuned to 72MHz by L2, which in turn is link-coupled to Tr3, also tuned to 72MHz. This brings the signal to a suitable level, sufficient to drive Tr4 and Tr5 in parallel to double to 144MHz in the collector circuit, via L4.

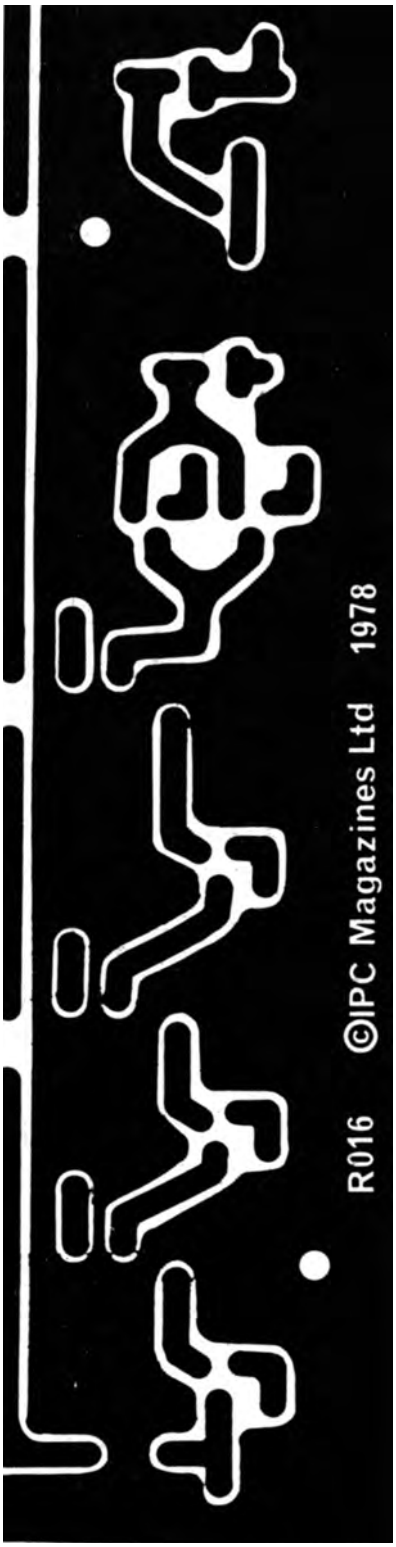
Separate current-limiting resistors are used in each emitter circuit to ensure both transistors contribute equally to the output signal. Tests using a common emitter resistor proved that invariably one transistor tends to be 'lazy' and its partner does all the work. This, of course, due to differences between transistor characteristics.

Drive to Tr6 is fed via a low impedance network through TC4 (tune), TC5 (load) and L5. This stage is tuned at its collector to 144MHz and again a capacitance/resistance arrangement is used to feed either the antenna (low power) or the following stage on Board 3. The r.f. output available at this point is about 80-100mW. The board etching layout is given in **Fig. 5**.

Board 2 Component Layout

Let's now look at the component lay out on Board 2, **Fig. 6**. A plan view of the board for etching purposes is given in Fig. 5

Component List



Board 1

Resistors 1/8W 20%

220Ω	1	R17	4.7kΩ	3	R2, 9, 13
330Ω	2	R3, 16	5.6kΩ	1	R6
820Ω	3	R4, 10, 12,	22kΩ	1	R1
1.5kΩ	2	R7, 8	33kΩ	1	R11
2.2kΩ	1	R15	68kΩ	2	R5, 14

Potentiometer

10kΩ log. pre-set	1	VR1

Capacitors
Ceramic 50V

33pF	*	C1	220pF	1	C18
60pF	1	C3	2200pF	2	C7, 12
100pF	1	C4	0.1µF	4	C6, 8, 16, 20
150pF	1	C2	0.47µF	1	C5

Polycarbonate

0.1µF	1	C14

Electrolytic 25V axial leads

4µF	1	C15
10µF	5	C9, 11, 13, 17, 19
150µF	1	C10

Trimmers

3-30pF ceramic	*	TC1

Semiconductors

BC173	4	Tr1, 2, 3, 4

Inductors

RCF1	10 turns 0.27mm (32s.w.g.) enamelled copper on ferrite bead
RFC2	As many turns as possible of 0.27mm (32s.w.g.) enamelled copper pile-wound onto a 1/2W 1MΩ carbon resistor
L1	10 turns 24s.w.g. enamelled copper close wound on 6mm former with iron dust core

Miscellaneous
Crystal(s) within the 8MHz range
Carrier frequency = crystal frequency x 18
Holders for type of crystal(s) selected
Miniature BNC socket - v.f.o. input,
RS type 455-703
SK1 4-pin Tuchel socket, chassis mounting (microphone input) or similar to suit.

* = 1 required for each crystal.

Board 2

Resistors 1/8W 20%

55Ω	1	R14	2.7kΩ	1	R12
82Ω	1	R10	5.6kΩ	1	R8
150Ω	1	R6	10kΩ	1	R1
220Ω	1	R7	18kΩ	1	R4
390Ω	1	R3	33kΩ	1	R11
1.5kΩ	3	R2, 5, 9	56kΩ	1	R13

Capacitors
Ceramic 50V

22pf	2	C8, 11
2200pF	9	C7, 9, 10, 13, 14, 15, 17, 18, 19
10nF	3	C4, 5, 6

Polycarbonate

0.47µF	3	C2, 12, 16

Electrolytic 25V

200µF	1	C1

Trimmers

3-30pF ceramic	7	TC1, 2, 3, 4, 5, 6, 7

Semiconductors

BC173	5	Tr1, 2, 3, 4, 5
2N4427	1	Tr6

Inductors

RFC1	10 turns 0.27mm (32s.w.g.) enamelled copper on ferrite bead
RFC2	3 turns 0.58mm (24s.w.g.) enamelled copper on ferrite bead
RFC3	10 turns 0.27mm (32s.w.g.) enamelled copper on ferrite bead
L1	18 turns 0.58mm (24s.w.g.) enamelled copper, close-wound on 6mm former with iron-dust core. Coupling coil: 4 turns insulated, single core wire at lower end of former. Fix with cyano-acrylate adhesive.
L2, L3	5.5 turns 1.2mm (18s.w.g.) enamelled copper 6.3mm dia., spaced one wire apart. Coupling coil, 1.5-2 turns insulated, single core wire over centre of winding. Fix with Cyanoacrylate adhesive.
L4, L6	3.5 turns 1.2mm (18s.w.g.) enamelled copper 6.3mm dia.
L5	1 turn 1.2mm (18s.w.g.) enamelled copper on 6.3mm mandrel.

Miscellaneous
Heat sink, push-on type 85° c/w for 2N4427 RS type 401-419.

● **Fig. 5: Copper side layout of Board 2 (see text).**

and Fig. 6 shows the component locations.

There are two screens 25mm high on this p.c.b., to prevent feedback and instability. These are made from brass or tinplate and cut to size and soldered vertically across the board to the earth plane. Care is necessary when crossing 'live' tracks, undercut the screen with a small file before fixing, to ensure adequate clearance.

PW

The W3EDP Antenna *Revisited*

Vince Lear G3TKN/ZL1VL has another look at an old favourite antenna - the W3EDP. He says it's cheap to create, and can still give many other antennas a run for their money!

The W3EDP antenna can be traced back to the mid-1930s. Mention of it appears in a number of antenna books and some interesting references to it are made on the Internet. Although the W3EDP antenna does not appear to have enjoyed the same popularity as some other multi-band antennas, its use can still be heard of on the Amateur bands from time-to-time.

Simplest design

The W3EDP antenna is probably one of the simplest antenna designs around. The antenna is nothing more than a 25.9m end-fed wire tuned against a 5.18m counterpoise. The original configuration (**Fig. 1**) shows the antenna and counterpoise coupled via a link coil to the power amplifier (p.a.) tuned circuit. In most older valved p.a. stage transmitters, the p.a. tuned circuit is usually able to accommodate a wide range of impedances. The length of 25.9m shows impedances that are neither too high nor too low on most bands and it is therefore reasonable to assume that this was a contributory factor in W3EDP's original choice of length for his design.

Tuning The W3EDP

Of course, because the antenna is not matched to 50Ω on any one band, users have to look to how they would tune the W3EDP antenna in normal use. The solid state p.a. stages in modern transceivers should be terminated in a 50Ω non-reactive load, if they are to deliver full output power.

The internal automatic antenna tuning units (a.t.u.s) incorporated into many modern transceivers, have only limited matching ranges. So, as with any end-fed wire, a separate a.t.u. capable of matching the rig to a wide range of impedances, should always be used.

Looking at the original W3EDP design (Fig. 1), you can see that the counterpoise is isolated from the earth. The antenna plus its counterpoise, may both be viewed as forming the radiating part of the antenna. As it's really one radiating elements, then the antenna may, in fact be viewed as a single 31.08m wire, that is fed 5.18m from one end.

With such an antenna and feed combination, if a conventional singled ended 'T' or 'L-match' network a.t.u. is used and the counterpoise connected to the earthy side, or the case of the a.t.u., the counterpoise will no longer be isolated from earth. Under these circumstances, the antenna will now function as a simple end-fed wire tuned against earth. There is nothing wrong with this and if a good earth system is used, results may be as good, or even perhaps better than just using the 5.18m counterpoise. There is obviously room for experimentation here!

Now to look at some of my experiments. When I erected the antenna at a temporary location, my operating position was in an upstairs bedroom where I did not have access to a good earth. I decided that I wanted to implement the W3EDP antenna design as shown in Fig. 1 and effectively isolate the 5.18m counterpoise from the mains earth. This can have advantages, which I proved later of reducing general noise pick up and in some cases TVI/AFI.

The a.t.u. available was a single ended 'Transmatch' design covering 1.8 to 30MHz. However, if I had connected the 5.18m counterpoise to the earth/case of the a.t.u., the counterpoise would have been effectively connected to mains earth via the coax outer sheath linking the a.t.u. to the transceiver.

The solution to the problem was to insert a current mode choke balun in the coax coupling the a.t.u. to the transceiver (**Fig. 2**). I used a commercial current mode choke balun (made by DX Engineering), but any suitably designed choke balun that offers effective choking

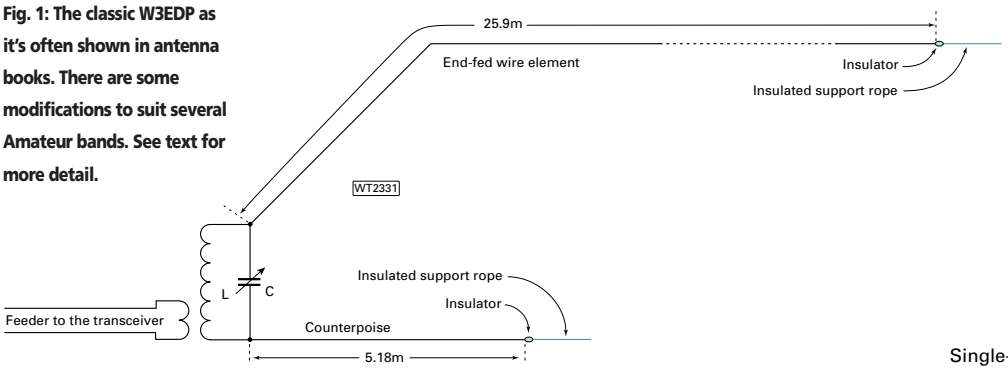


Fig. 1: The classic W3EDP as it's often shown in antenna books. There are some modifications to suit several Amateur bands. See text for more detail.

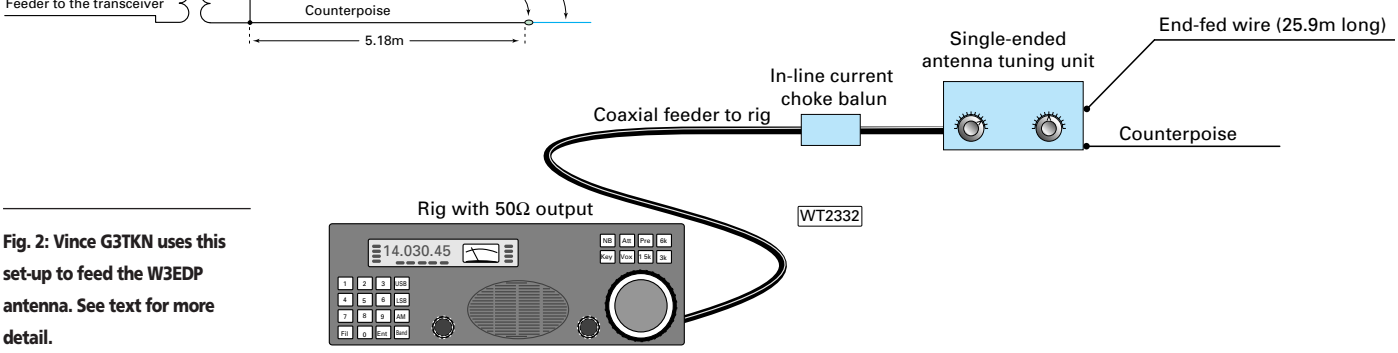


Fig. 2: Vince G3TKN uses this set-up to feed the W3EDP antenna. See text for more detail.

action on the frequencies to be used would suffice.

Note: It's important that the a.t.u. should be physically separated from the transceiver. The choke balun serves to electrically isolate the a.t.u. case at r.f. from the rig too. As the case of the a.t.u. is slightly 'hot' at r.f. frequencies, it's important that its case and that of the transceiver are 'separated' at r.f.

Fig. 3: The commercial and physically small choke balun should be fitted close to the single-ended a.t.u. to be effective. A simple multi-turn coil made up of extra coaxial cable could be just as effective. See text for more detail.

The Choke Balun

An alternative to a commercial choke balun, **Fig. 3**, could be about 10 or 11 turns of RG58/UR43 (5mm diameter) 50Ω coaxial cable wound with a diameter of about 140mm. I also found that about 10 turns of RG58/UR43 coaxial cable wound on a pair of stacked FT240-61 ferrite cores worked well too.

The Z-Match

The Z-match a.t.u. is in some ways better suited to use with the W3EDP antenna, since the antenna and counterpoise are connected to a link coupled coil (similar to Fig. 1) in this type of a.t.u.. The antenna and counterpoise are therefore isolated from d.c. earth, and no choke balun is required. An efficient Z-match design by the late **Louis Varney G5RV** can be found in [1].

Impedance Measurements

It's important to realise that antenna height and general layout will always affect feed-point impedance. At my temporary location, the 25.9m wire ran from an upstairs window at around 6m height to an 8m temporary mast at the bottom of the garden, with the last 5m of the antenna running off at an angle from the mast. The 5.18m counterpoise was allowed to hang out of the window.

When I connected my MF-J259 antenna analyser between the 25.9m end-fed wire and 5.18m counterpoise it showed resonance points at 3.7, 8.89 and 13.9MHz with resistive impedances of 195, 174 and 97 ohms respectively. On 7 and 14MHz the impedances were slightly reactive, but all were easily matched with my Transmatch a.t.u.

Earths & Counterpoises

Now let's look at some alternative earth and or counterpoise connections.. The 5.18m counterpoise worked very well on the bands between 3.5 to 14MHz. When the central heating system was connected as an earth in place of the 5.18m counterpoise, there appeared to be an increase of noise introduced into the system without any noticeable improvement in transmitted signal.

The use of a central heating system as an earth may cause interference in some circumstances and is not an ideal solution. However, for temporary portable operation, it may suffice so long as no TVI/AFI is caused. My maximum power on any band never exceeded 100W.

I've used the W3EDP successfully on 1.8MHz by tuning it against a separate 36.57m counterpoise some 600mm off the ground. This element was run around the perimeter of the garden. The original 5.18m counterpoise is too short for 160m operation, although it can be left connected to the a.t.u. when the 36.57m counterpoise is used.

The use of the 36.57m counterpoise on 1.8MHz actually resulted in a couple of S-points reduction in local noise on reception. In some cases this made it possible to hear weak signals that were otherwise inaudible when I used the central heating system in place of the counterpoise.

I did not use the antenna on frequencies higher than 14MHz. However, it has been suggested in *Antenna Topics*[2], that a counterpoise length of 1.02m gives good results on 21MHz. Bearing this in mind, there's obviously still some room for further experimentation in this respect.

Results

How well any end-fed wire antenna performs will depend on its height above ground, general configuration and how well it is matched.

At my temporary location and with the configuration described, results were very good on 3.5 and 7MHz in terms of inter-G contacts. A low wire such as this is to be preferred for high angle inter G and European working.

On 1.8MHz I was able to work around the UK with signal reports varying from S6 to S9. One contact of note on 160m was a 57 report from G3OLB/M at Saint Austell, Cornwall, who was using a 3.05m whip at 1700hrs (still daylight in September) from my temporary location in Coventry!

I was able to maintain a regular 'sked' with VO1MP on 14MHz, although signals varied in QSB from S6 to S9. I don't feel that the antenna performed as well on 14MHz as a dedicated dipole I had used on that band on previous occasions, but results were still very satisfactory.

Effective Antenna

I was surprised at how effective the antenna was on 3.5, 7 and 14MHz with just the 5.18m counterpoise, while the addition of the 36.57m counterpoise enabled the antenna to work on 1.8MHz. The W3EDP (as with any end-fed wire) offers simplicity and a high degree of flexibility in terms of band coverage, provided a suitable a.t.u. is used.

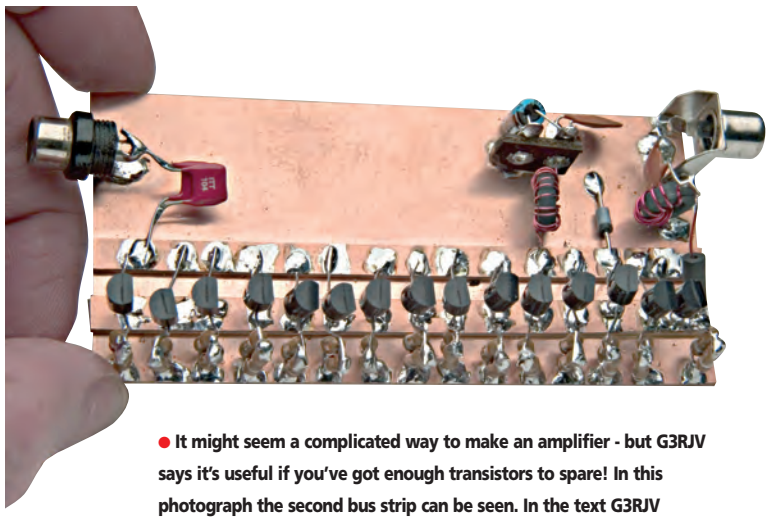
However, if you is to implement a W3EDP antenna, care should be taken to d.c. isolate the counterpoise system as described unless a Z-match a.t.u. is used. The W3EDP is an ideal antenna for temporary or portable operation, although it would also make a very effective all band system if sited in the open at a permanent location.

PW

CARRYING ON THE...

Practical Way

This month the Rev. George Dobbs describes a 'QRO' project using multi-transistors to make an amplifier. Sounds like fun to do - after first reading the appropriate quotation!



● **It might seem a complicated way to make an amplifier - but G3RJV says it's useful if you've got enough transistors to spare! In this photograph the second bus strip can be seen. In the text G3RJV discusses the preparation of the strips (cut from p.c.b. material).**

"Give me a lever long enough, and a prop strong enough, I can single handed move the world".
Archimedes

Twelve years ago I set out on a journey to meet a hero of mine in his home. Since the early 1970s I had been an avid reader of anything written by **Doug DeMaw W1FB**. It was about the time that I was beginning to move away from constructing radios using valves and trying my hand with solid state construction. For most of my life I have often run a little behind the pack!

Doug W1FB was a technical writer who wrote articles I could not only understand, but was also writing technical articles about the sort of things I wanted to build. In short Doug was writing a succession of practical construction articles on QRP equipment; transmitters, receivers and sometimes transceivers which used easily available parts to build useful Amateur Radio station equipment.

The average home constructor was not to be limited to small peripheral accessories but could build projects which could form the heart of a radio station. Doug's designs were also very forgiving. I had little access to the American components he named, but I found that using those that were to hand in the UK usually produced the desired result.

Technical Editor QST

The articles I enjoyed so much were written when Doug was the Technical Editor of *QST*, the journal of the **American Radio Relay League** (ARRL), the official Amateur Radio organisation in the USA. Doug served on the ARRL staff for over 18 years and is said to have written more than 200 technical articles in *QST*. In 1970 Doug had succeeded the late **George Grammer W1DF**, as Senior Technical Editor and Technical Department Manager.

I could not afford a subscription to *QST* and so relied on the local library to supply me with a copy. With one eye open for the librarians, I illicitly photocopied many articles for my home consumption. From these came my first steps in building QRP equipment; something that has occupied my Amateur Radio time every since.

After the G QRP Club was formed I added Doug DeMaw to the list of people who received free copies of the club journal, *Sprat*. There followed many years of exchanging letters and little scribbled circuit ideas and he contributed several articles to *Sprat*.

My first visit to Doug after his retirement was a real delight. When his father died, Doug had taken early retirement and moved back to the farm house in north Michigan where he had been raised. The farm house was delightful and we enjoyed eating locally raised food, black powder shooting and lots of talking about Amateur Radio. I was to return a couple of times before Doug's death in 1997.

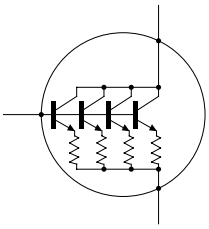
Innovative Circuit Ideas

Doug produced many innovative circuit ideas. Many of these became classics and still appear in various forms up to 20 years after their first publication.

Recently, I have found a revived interest in the W1FB idea of using parallel transistors to make an r.f. power amplifier. My introduction to this idea was in a small article by Doug in the summer *Sprat* for 1987 with an update in summer issue of 1997.

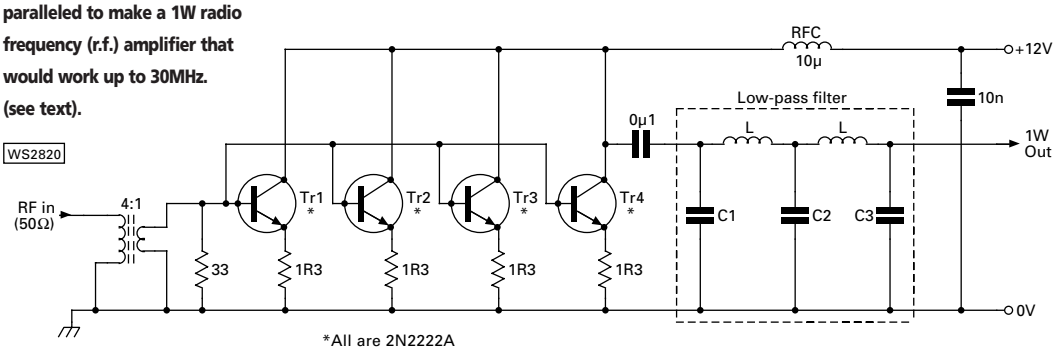
The principle used is that of ballasted transistors. Some r.f. power transistors sold as ballasted devices are composite devices, in effect a number of small transistors formed on a single silicon substrate. The base and collector connections are all common but each individual emitter connection has its own low value series resistance, as shown in **Fig. 1**.

The resistances, called the ballasting resistors and are included to prevent what the industry calls 'hot spotting'. That is they prevent any single transistor in the arrangement drawing more current than the rest. The resistors tend to equalise the current flow through the group of transistors,



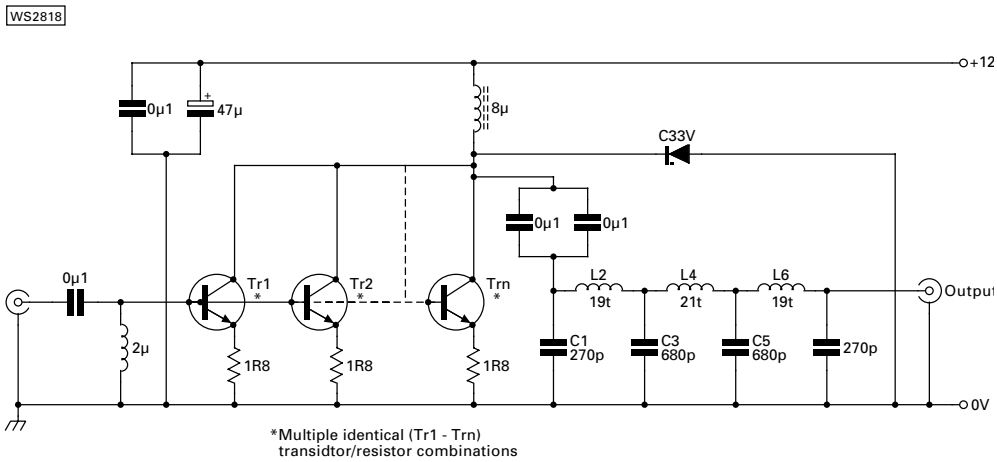
● **Fig. 1: In ballasted transistors the base and collector connections are each commoned, but the individual emitter connections has its own low value series resistance, as shown. (see text).**

● **Fig. 2: This circuit is the example where W1FB used four 2N2222A transistors paralleled to make a 1W radio frequency (r.f.) amplifier that would work up to 30MHz. (see text).**



thus minimising the chances of any one transistor drawing excessive current and being damaged.

The method can be used to make an amplifier using a parallel arrangement of cheap and common smaller signal devices. High ft transistors like the 2N2222A, 2N3906 and 2N4400 are all readily available and inexpensive. The example that W1FB used four 2N2222A transistors paralleled to make a 1W radio frequency (r.f.) amplifier that would work up to 30MHz. This is shown in **Fig. 2,** and regular readers will remember I've used a version of this circuit in a previous COTPW.



The circuit will provide 1W of r.f. output for a input of 100 to 150mW. I recommend that some matching be done of the individual devices and here the simple transistor testing facility found on many modern multi-meters would be ideal. These usually measure the H_{fe} of the transistor and could be used to pick four similar devices.

A makeshift transistor tester could be made by placing a milliamp meter between the collector of the transistor and a 9 or 12V supply, adding a low value resistor in series with the emitter and supplying about 1V of forward bias to the base. Choose the transistors which draw about the same amount of current.

Small Heat Sink

The transistors may require a small clip-on heat sink as they can get warm in this circuit. When selecting a small signal devices for the amplifier remember that the collector voltage under c.w. conditions will rise to twice the supply voltage.

Choose a transistor with a rated Vce (collector to emitter voltage) of at least 36V. A 33 or 36V zener diode can be inserted between the collector and ground as a safety measure, as we will see later. The collect load impedance can be calculated in the same way as for a single transistor amplifier.

To calculate the collector load impedance Z_c

$$Z_c = \left(\frac{V_{ce}^2}{2P_{out}}\right)\Omega$$

Where Z is in ohms, P_O is the expected power out, and in this example V_{ce} is 12V.

So how would this method work with even more paralleled transistors? Recently several designs have appeared using up to 15 transistors! **Jackey Carter N4UY**, used 13 2N4400 transistors to achieve about 3W of r.f. output and **Hidehiko Komachi JA9MAT**, used 15 2SC1815 transistors to give about 3.5 watts output.

I have a lot of 2N2222A transistors (I bought a bag of 1000 of them at the Dayton HamVention), hence their frequent appearance in my *PW* projects. Following the inspiration of others, I thought I would have a go at a multiple parallel transistor amplifier using the 2N2222A, although other similar transistors would be suitable.

Starting point

I looked to the circuit of Hidehiko JA9MAT as my starting point and quickly lashed up an amplifier using (very) 'ugly' construction techniques on a piece of copper clad board. The circuit is shown in **Fig. 3**.

In the diagram 'Tr' represents 15 identical circuit blocks of paralleled transistors. And, following my own advice to readers, I roughly matched the transistors on the tester testing facility of my digital multi-meter.

A home-wound r.f. choke and a ferrite bead slipped over the input lead protect the input against unwanted parasitics. The 12V d.c. power supply line also has a series r.f. choke and two decoupling capacitors to reduce r.f. signal reaching the supply.

I was short of low value resistors to use in the emitter leads, so I used two 39Ω resistors in parallel for each emitter. This circuit has extra protection for the transistors by adding a 33V zener diode between the collectors and ground. (A 36V zener would also do the job, or even three 12V zener diodes in series).

Fig. 3: The circuit developed by JA9MAT was used by G3RJV as his starting point. The amplifier was built using (very) 'ugly' construction techniques on a piece of copper clad board (see text).

Band (MHz)	C1, 7 (pF)	C3, 5 (pF)	L2, 6 (t)	L4 (t)	Core	Wire (mm/s.w.g.)
1.8	820	220	30	34	T50-2	0.32/30
3.5	470	1200	25	27	T37-2	0.38/28
7.0	270	680	19	21	T37-2	0.48/26
10.1	270	560	19	20	T37-6	0.48/26
14.0	180	390	16	17	T37-6	0.55/24

Table 1.

My 'ugly' version gave about 3.2W of output for nearly 250mW input. Remember this is a Class C amplifier, and it's biased by the drive, so at least 100mW of input is required for a viable output. An input level of between 200 and 300mW should give suitable results.

Neater Effect

My amplifier really looked a mess and since the other examples used 'island' construction for a neater effect, I converted my circuit into that format. It fits nicely on a piece of printed circuit board (p.c.b.) measuring 100 by 50mm.

Two copper clad strips measuring 100 by 5mm were cut to prove 'bus' bars for the base and collector wires of the transistors. These were then glued on the board, 5mm apart and 5mm from the edge, see heading photograph. The other parts are either connected to ground or to input and output terminations. This version certainly looked smarter!

I was a little 'slap-dash' with the low pass filter (l.p.f.) using one I already had to hand and had used in the lash-up version. The match is not perfect but it seemed to work okay.

Values for other bands are suggested in the table. It may seem a little bizarre using lots of transistors for an amplifier that only gives a few watts of r.f. output. I have no defence other than the devices are very cheap as easy to get hold of - something we home constructors like! **PW**

Valve & Vintage

Ben Nock G4BXD has been busy in the last few months and as usual he's been increasing the treasure trove of radio equipment. So, let's take a look at the latest finds.

It's that time in the calendar again when it's my turn to man the Valve & Vintage shop. It's been a busy few months, with quite a few new additions to the shop's stock and I've managed to fit in a bit of work on a few restoration projects.

My ZC1 Mk1 set (mentioned back in the August 2004 V&V) is now performing very well indeed. A few 'amateur' modifications were removed and after a bit of servicing it's been on the air with good reports. So, let's see what else I can find on the shelves today to share with you.

Fig 1: The Eddystone EB36 broadcast receiver, clean with neat styling (even by today's standards).

Fig 2: The T1333 Emergency transmitter, crank handle stowed for transport. The drum carrying wire antenna is behind the central circular door.

The Eddystone EB36

One of the baby Eddystone receivers recently found its way onto the shelves here, in the shape of the EB36 general coverage broadcast set. This little nine transistor receiver, **Fig. 1**, is quite similar to the better known EC10, with the same case and dial arrangement. However, being a broadcast set it has no beat frequency oscillator, (b.f.o.), so it will not resolve single side band, (s.s.b.), or c.w. (Morse) code signals.

The set was produced between 1966 and 1969 at what I think was quite a high price of £54. The receiver tunes 150kHz to 22MHz in five bands with the controls being limited to tuning, volume and tone control. A dial lamp switch illuminated the dial for night time tuning. The set is powered from internal batteries or a replacement mains power pack, which fits in the place of the battery holder. This would have to be purchased to run the set of the mains supply.

Despite the EB36's age, and the fact that the germanium transistors used in the set are now long past their sell by date, the receiver performs quite well even on a short length of wire. Amateur listening, though would be confined to amplitude modulation, (a.m.), reception but due to the revival of some a.m. traffic on the 3.5 and 7MHz bands it can still be used in that role.

I would hesitate to alter a working example. However, I feel that should I find a non-worker, it might be a good experiment to see if this range and type of early transistorised sets could be restored with modern transistor devices. It would be interesting to see how it would perform then.

Emergency Transmitter T1333

With the advent of increased flooding in the country I thought it wise to take precautions. To that end I found this emergency transmitter, just in case the house here has to ditch in the sea or I find myself unexpectedly floating down the River Severn* (see note at end of column).

The T1333 transmitter, **Fig. 2**, was fitted to aircraft, bombers such as the Lancaster and Halifax, etc., and was to be used in the event of the aircraft having to ditch in the sea. The transmitter enabled the crew to send out a Morse signal on the old International distress frequency of 500kHz.

The two-valved transmitter is a crystal controlled oscillator power amplifier (p.a.) using a 6V6 with a 6J7G as an audio oscillator providing modulated continuous wave (MCW) for code. I would expect an output of 3 to 5W, but even feeding that into a decent length of wire I'm sure the radiated power would be quite low.

The antenna for the set is a long length of steel wire contained in a small drum located behind the round front door on the set. This wire could be attached to a kite to lift it or a balloon was provided, filled with a hydrogen gas produced by immersing two chemical-filled canisters in the seawater.

The set was man powered; that is one of the crew actually turned a cranking handle on the top of the set rotating a generator inside. The generator provided heater current and high tension supplies for the valves and needed to be rotated at around 80r.p.m., or just over once a second. The transmitter could be keyed either manually from a button on the front of the case. Alternatively, an automated

SOS could be produced from mechanics attached to the generator.

Due to production problems during the war the US made many of these sets designated BC-778 in a slightly different form. Its distinctive shape allowed the operator to hold the set between his knees while turning the crank handle. Amazingly, after 63 years or so, when power was applied - the transmitter worked. Unfortunately, the 500kHz International frequency is no longer used so I guess it's just another item of interest on the shelf here!

** Don't worry readers - the important 'Kidderminster Kollection' is safe, as Ben lives some way above the highest water level.* ***Editor****.*

The Swiss SE-103

A most unusual Swiss radio set came via a good French friend of mine. in exchange for an item of Chinese equipment (it's certainly strange how this stuff circulates!). In essence the SE-103, **Fig. 3**, is a Swiss copy of the American BC-611 walkie-talkie and even uses the same battery arrangement.

The set is a single channel crystal controlled transmitter-receiver, using nine miniature battery valves (1T4, 1R5, 3S4, etc.) are used with six of them operating on receive, and five in use on transmit with two valves serving a dual role.

The receiver is a single conversion superhet with an intermediate frequency, (i.f.), of 455kHz. Frequency coverage is likely to be around 2 to 8MHz although I don't have exact details.

Like the BC-611 the set needs two crystals and has plug-in coils. However, unlike the BC-611, which requires the set to taken out of its case to change frequency significantly, the SE-103 has both crystals and two coils housed on a plug-in module. These can be exchanged simply by opening a small door, and no other tuning is required to change frequency or band.

Further differences between the two sets are in the way the earphone, microphone and switching take place. On the BC-611 these are mounted on the case, but on the SE-103 a more conventional headset and microphone and remote switching are fed by cable and terminated in a plug arrangement. This will allow the set to be placed away from the operator, on his back maybe, or on a mobile mount in a vehicle while he can still operate the set conventionally.

Pye Labgear LSP-30

I already had one of Labgear LSP-30 sets in the collection from years ago. Recently, I saw another that came with is antenna mount and whip, etc., so I decided that I needed two! I don't think that it could have been a popular set with the military or other users, as very few are seen around at rallies or sales.

Basically the equipment, **Fig. 4**, is a 2 to 8MHz 4-channel crystal controlled transmitter-receiver with a power output of approximately 5W. Though the 30 in the model number and a hefty p.a. transistor might imply a higher power, I have not been able to get anything like that out of my set.

I don't have any technical information for the LSP-30 set but by simple observation, etc., I could estimate the crystals needed to be 1.4MHz away from the required operating frequency due to a clearly marked 1.4MHz i.f. filter in the set. Lower and upper sideband (l.s.b., u.s.b.) and a.m. can be generated at this frequency then mixed with the crystal oscillator. A front panel meter can be switched to meter various levels, voltages, current and antenna tuning.

The set came with its side-mounted whip that has a built-in tuner. This operates by inserting or retracting a slug into a loading coil within the whip itself. Quite an ingenious arrangement, but it does make the whip a bit heavy and must have been somewhat of a hand full if the set were mounted on the operator's back.

Though the set is working I'm still not happy with the results but really need further information and a circuit diagram. So, if anyone can help I would of course be most obliged and keep you posted on developments

Fig 3: The SE-103 Swiss walkie-talkie. The thick and thin antenna sections on the right screw together, and are mounted on top of the case when in use.

And Finally

Finally, I'd like to thank those who wrote or E-mailed regarding my soapbox ranting on modern and old sets back in the February issue. Seems I hit a nerve there! Still, as I am often told this is a hobby with many facets and something for everybody, it does seem a shame though that so much history and technical knowledge can so easily be lost. There may be an ulterior motive for making the hobby so easy to enter and greater numbers does not, in my opinion, necessarily mean greater depth and strength in the hobby.

My thanks also to **Dave G6MMC**, for an interesting letter about memories revived as a result of my February column. Dave is an experienced pilot with a military background in avionics and commented on the trailing antenna, as used on the AVT-111 I mentioned and many other sets such as the T1154/R1155 in the bombers.

Dave further commented about how the Americans' faces dropped when a captured Soviet plane was found to have valved radios. Until it was pointed out that they would probably survive an electromagnetic pulse (EMP) burst during a nuclear war. The US transistorised sets would been fried!

Well that's about it for now, as usual I can be contacted via the world wide web at **military1944@aol.com** or via the old fashioned way at: **62 Cobden Street, Kidderminster, Worcestershire DY11 6RP**.

Further pictures of this month's sets and many more can be seen at **www.qsl.net/g4bxd** and I look forward to being with you again real soon. Cheerio for now. **PW**

Fig 4: The Pye Labgear LSP-30 h.f. radio, simple controls with clean lines (see text).

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FC-20 ATU £249.95
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Inc. SP-21 & SM20

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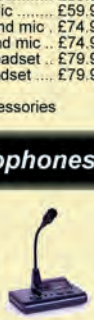

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Gain 2.15/6.2/8.4dB
Power 200W (50W 6m)
Type 1/2, 2x5/8, 4x5/8
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Bands: 80/40/30/20/15/10
Height (Adj): 26 ft (7.9 m)
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Impedance: Nom 50 ohms
VSWR: 1.5:1 or less
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One-Plug Power is the internal FT-817 battery solution you have been waiting for until now.

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NEW!

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One-Big Punch

One BIG Punch (OBP) is a custom add-on accessory for the Yaesu MH-31 microphone commonly used with many Yaesu amateur radios

OBP £49.95
Speech Compressor for the Yaesu MH-31 mic and FT817, FT857, FT897. Improve the TALK POWER.

Hand Mike £57.95
W4RT Electronics Microphone with One BIG Punch Speech Compressor included.

The One BIG Punch is an AF-based speech compressor specifically configured to provide remarkable increase in talk power while maintaining good audio quality. The OBP is NOT a clipper, but a compressor providing great voice compression, high-level limiting, and noise gating. The unit can be mounted inside the MH-31, requires no additional electrical power, and can be turned on or off by using the MH-31's TONE switch.

One-Board-Filter

The One-Board Filter (OBF) affords you the opportunity to have both the Collins CW and SSB mechanical filters available in your FT-817 together!

OBF £229.95
Replace two filters in the space of one. OBF includes the two optional filters and fitting.

Collins Mechanical Filters
for the Yaesu FT-817, 857 & 897.

500 Hz CW - £94.95 ***2.3kHz SSB - £94.95***

This is the option that many, many FT-817 owners have requested. The OBF utilizes Collins Mechanical Filters that are the same as used in the optional Yaesu filters for the FT-817. The bandwidth of the 7-pole CW filter is 500 Hz and the 10-pole SSB filter is 2.3 kHz. The One-Board Filter is NOT available for installation by FT-817 owners. This is not a "do-it-yourself" option. The One-Board Filter must be installed by RADIOWORLD, or a competent engineer . If in doubt please call for details

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It requires no external power and works with both manual and automatic tuners.

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RX - 0.6 to 460 Mhz
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Power Limits 25W PEP 10W Cont.

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Antenna Workshop

Roger Cooke G3LDI, turns to looking at the hardware needed in maintaining supports and masts in a safe, stable condition. This subject tends to be forgotten about until after the accident. With his advice, you can perhaps prevent the accident happening too!

Putting up antennas can, and should, take a large amount of time. The Americans have a saying: "If your antenna did not come down last winter, it wasn't big enough". Whilst this is quite funny and also in some cases very relevant, it can be very soul-destroying.

I can speak from personal experience. When I lived at Wymondham Norfolk, I had a four section crank-up tower, which was supporting a home-made three-element beam, and stacked above that on a 6m 'Dural' mast was a three element beam for the 21/28MHz bands. This tower was guyed with blue rope, and I left for work one morning only to see the weather deteriorating into a gale.

The gale progressed and of course worsened, then around 10a.m. I received the inevitable telephone call to say that the tower structure had collapsed. The blue rope that I'd used and thought adequate, had stretched under the wind loading. The tower was no longer braced by the stretched rope, which had allowed the top but one section to fold over. The result was that the very top section with antennas, rotator etc had plunged into my neighbour's garden.

Luckily no-one was outside at the time and so, there was no human damage, unlike the mast and antennas. The top of the mast was buried almost a metre into the ground! Around that time, there was an excellent article in *Radcom* by **Michael Gale G3JMG** who was a yachtmaster. That was one article that I printed out and kept. If you can obtain the original article in the March 1970 issue, then make it a priority, as it's an excellent reference.

Most of what I am writing is the result of many years of applying Michael's article, although it started as his material there's my own experiences added too. Even though I have drawn heavily on the original article, as it's so important when erecting antennas that I feel sure Michael will not mind!

Little idea

Most Radio Amateurs, when putting up a wire antenna on posts, or a tower with a beam on top, have little idea of ropes, knots and rigging. My guess is that few even have much of an idea of the proper way of doing it. Own up - who hasn't just made use of a hastily made random, 'granny' knot? Or perhaps, you've used a couple of ordinary knots at best in the rope that 'just happened' to be at hand, when you did the job?

Just because something's wanted quite quickly, doesn't mean that you shouldn't plan and organise it properly. Time may be a deciding factor when erecting the antenna, but this is false economy. In general, the more time spent putting the antenna or tower up properly will save money, time and heartache later!

Ropes & Guys

So, let's now have a look at some of the ropes, guys and stays that you can use, and what are the limitations of each type. As you would expect, in general use, the strongest form of guys are made from steel. These guys, should be made from good quality steel, preferably stainless. Each support length, again ideally, should be broken up into non-resonant lengths with large insulators at the junctions.

Steel guys, although strong, tend to be very heavy and before use, have to be treated with grease to prevent water ingress. This may be a really messy job, but it's very worthwhile. As well as being heavy, they need attention every year to maintain them, re-applying grease and checking them for corrosion and other damage.

Making up guys using steel wire is also heavy work, and three clamps are needed on each end **Fig. 1**. If you have broken a guy into three lengths that gives you six ends to cope with and eighteen clamps to fix. Because steel ropes are not particularly elastic and at any one temperature have a fixed length, it's desirable to fit turnbuckles to allow the tension to be adjusted over time or to take up any slight stretch.

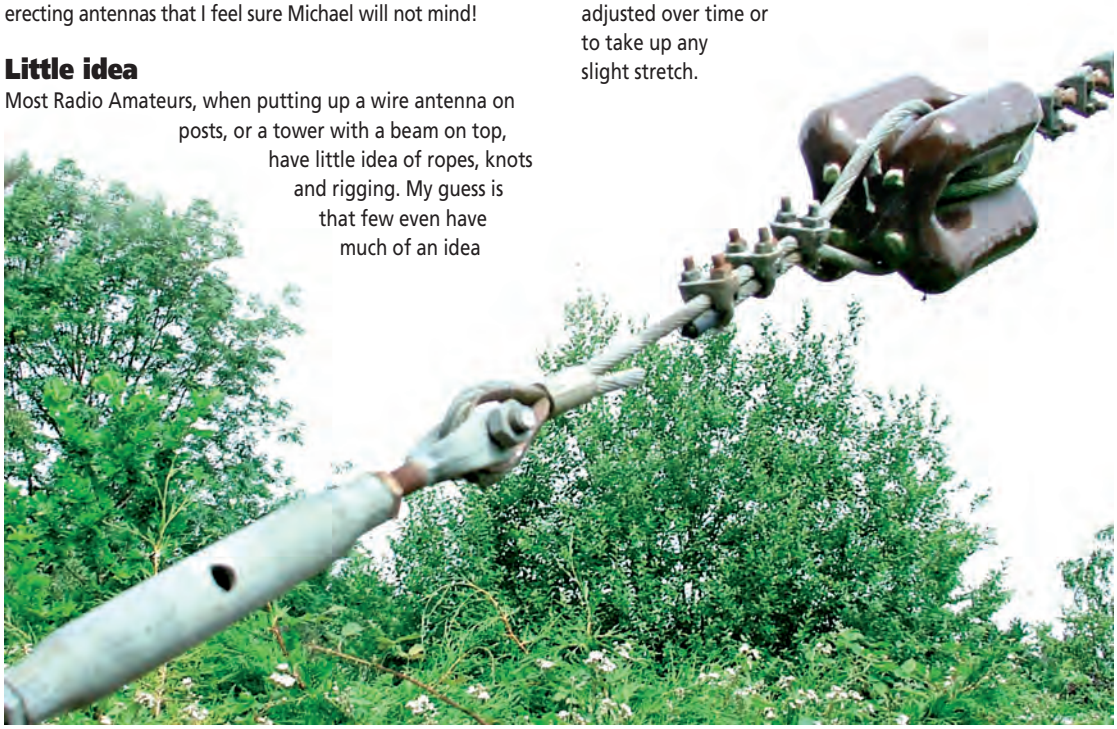

Fig. 1: A close-up shot of the bottom end of a wire support rope where it attaches via the turnbuckle to a ground anchor. Note the three clamps on the two loops passing through the insulator. The commercial clamp is put on with such pressure as to form cold-weld junctions of the sleeve and rope for security.

Turnbuckles, shown as a 'family' of three in **Fig. 2**, are effectively two rods with opposing threads cut so, that as the middle section is rotated in one direction the overall length shortens. And if the centre is turned in the opposite direction, then the overall length will increase, allowing the tension in the rope to be adjusted.

Nylon Ropes

Nylon ropes are to be found in all colours, sizes and in either woven or twisted, styles. Nylon has been used, for many years to produce ropes and was one of the earliest synthetic materials formed into ropes as it was available in very long individual fibres.

For its size and weight, nylon is one of the strongest material, but it does absorb moisture and also stretches. Because of these two limitations nylon is really most suitable for halyards, but not for really for permanent guys.

Terylene - Polyester

Terylene or as it's also known as polyester is a man-made filament derived from oil. These filaments, similar to nylon, may also be spun or woven into ropes but these size for size, they're not as strong.

Also known as Dacron, polyester does not stretch much under load, and is also available as pre-stretched form. Although this form is more stable in length, it's fairly expensive. Either type of polyester rope is suitable for both halyards and guys.

Polythene Fibre

Polythene is another man-made fibre that's also derived from oil. It's also known as Courlene and is normally a bright orange, though it's also now available in other colours. Polythene, is hard, wiry and feels slightly greasy or soapy to the touch. When formed into ropes, it's not as strong as nylon or polyester ropes of the same sizes.

While under load, polythene stretches a little less than nylon but much greater than polyester. Because its surface is 'slippery', polythene is difficult to use, and knots and splices do not hold easily. Polythene lines and ropes have largely been superceded by Polypropylene ones.

Polypropylene Filament

Like polythene, polypropylene is yet another filament manufactured from an oil base. It's still one of the most popular all-round general purpose ropes on account of its overall performance and price. It has about 90% of the strength of Terylene yet is only half the price. Under load it stretches slightly more than Terylene but nothing like nylon or polythene.

Phillystran Preferred

There is a 21st century material for ropes that's preferable to all those above. It's called Phillystran. It is strong, lighter and easier to use than steel, and won't stretch. This is used commercially and would be by far the best to use. Unfortunately, for the average Amateur, it's very expensive. So, the decision to use this is not to be taken lightly. A 6.1mm diameter rope with a 950kg breaking strain costs almost £2 per metre. Then you would also need grip kits for the ends at around £8 a time!

If, like me, you are still using the polypropylene then you should really get to grips (sorry about the pun!) with some basic knots and splicing. This can turn a mess into something really professional and attractive and I shall deal with that topic another time.

Fig. 2: Three support wire ropes each with their own adjusting turnbuckles, are attached to a substantial steel plate (via D-shackles). A single large concrete ground-anchor provided security for ropes.

Thimbles & Shackles

Tying off the guy rope to the nearest fence-post or tree is fine in the short term, but the rope will chafe and eventually wear badly. Using a suitable thimble prevents or reduces wear and also spreads the load. They are available in different sizes, depending on the size of rope used. Make sure that the rope sits in the trough of the thimble comfortably.

I use the galvanised thimbles (as seen in **Fig. 3**) as these are reasonably priced. But you can obtain nylon versions that are more expensive and will not rust at all. If you do use the galvanised variety, inspect them from time to time and replace any that do have rust as this can also damage the rope.

Fig. 3: Various bits of metalwork to be found in good mast and antenna installation. Top-left are the D-shackles, with three 'eye-thimble' to their right. All of the items shown are available from marine chandlers or motor-parts suppliers.

There are many shackles available in galvanised form, the D-type is the most common (Fig. 3). Shackles also come in various sizes and you should select the one most suitable for the job in question.

I again use the galvanised types, and of course you should make sure that you inspect them and grease them so that corrosion does not prevent you from releasing the shackle. I've learned that lesson the hard way! Once a shackle is tightened, preferably with a bar through the hole in the pin, you can secure it with a piece of wire through the hole.

False Economy

I managed, many years ago, with 'el-cheapo' pulleys that were really meant for washing lines, but I've since found that this is false economy. They don't last and soon corrode. When sourcing pulleys, **Fig. 4**, a visit to the ships chandlers is a wise move here.

Choose a pulley according to the weight that you will be hoisting. The smaller 2-3 inch pulleys are amply suitable for wire antennas of the dipole variety.

Fig. 4: Simpler parts for installing wire antennas, on the left are two support rope pulleys, shown alongside various insulating supports for the ends of the antenna. (A commercial dipole centre is shown lower right for size comparison.).

However, if you are hoisting a large amount of wire, such as a V-beam several wavelengths long or a rhombic of similar design, you may need a larger pulley to give an advantage. It's seldom necessary to adopt the block and tackle design, though this system will make it even easier and lighter to haul. However, this would be expensive on pulleys and the marine pulleys are not cheap!

I've run out of space for this issue, so I'll have to deal with knots and splicing in next month's Antenna Workshop. See you then! **PW**

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REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

DAVID BUTLER G4ASR HAS REPORTS OF NUMEROUS SPORADIC-E OPENINGS ON THE 50, 70 AND 144MHZ BANDS

May was a fantastic month for the v.h.f. DXer as virtually every type of propagation mode was reported on the various v.h.f. and u.h.f. bands. The highlights of the month included numerous Sporadic-E (Sp-E) openings on the 144MHz band some as far as North Africa, lengthy openings on the 70MHz band, multi-hop Sp-E propagation to North America and the Caribbean Islands on the 50MHz band.

A number of excellent auroral (Au) back-scatter events some of which reached as high as the 430MHz band, tropospheric ducting on the 144MHz band with stations up to 3000km away, trans-equatorial propagation (t.e.p.) deep into Africa and South America on the 50MHz band, auroral-E openings, daily meteor scatter (m.s.) contacts and some very good moonbounce (e.m.e.) conditions.

SPORADIC-E ON 50MHz

Sporadic-E propagation on the 50MHz band during much of May was quite exceptional. The openings during the first two weeks of the month were fairly short but from May 16 the ionisation intensified to produce lengthy daily openings.

Nearly all European DXCC countries were worked from the UK and countries located on the fringes of Europe could also be contacted via single-hop propagation. During the more intense openings the ionisation would spread over a considerable area allowing multi-hop contacts to be made.

Some c.w. and s.s.b. contacts made from the UK during May included the stations of A45XR (Oman), A61Q (United Arab Emirates), A71EM (Qatar), CN8IG (Morocco), CT3MD (Madeira), D4B (Cape Verde), EH8BFK (Canary Islands), EH9HA (Ceuta & Melilla), JY4NE (Jordan), OD5UT (Lebanon), SU1SK (Egypt), SV8RV (Greece), SV0XAI/9 (Crete), TA7OM (Turkey), ZB2EO (Gibraltar), ZC4CW (UK Bases Cyprus), 4L7AZ (Georgia), 4Z5LA (Israel), 5B4FL (Cyprus), 5T5SN (Mauritania), 7X0AD (Algeria) and 9H1TX (Malta). Trans-atlantic multi-hop openings to South America, North America and the Caribbean area also occurred on a few occasions. Contacts were made on May 16 around 1230UTC with KP4EIT (Puerto Rico), on May 22 between 1200-1330UTC with the stations of FJ5DX (St. Martin), FM5JC (Martinique), KP4EIT, YV4DDK (Venezuela) and later in the day at 2115UTC with K1TOL (USA), on May 26 at 1915UTC with FM5JC and on May 29 between 2015-2030UTC with the stations of VP9/N0JK (Bermuda) and W4SO.

The VO1ZA beacon (50.039MHz) in Newfoundland was also heard on a few occasions during the month. Sometimes the European Sp-E conditions linked up with the southerly trans-equatorial propagation allowing contacts to be made with stations in Africa and South America. Contacts were made on c.w. at 1915UTC on May 16 and between 1930-2000UTC on May 29 with the station of 9Q0AR (Democratic Republic of Congo) and around 1920UTC on May 21 with the s.s.b. stations of PP5AR and PP5JD (Brazil).

An analysis of the DX Cluster 'spots' showed that over 80 countries were heard or worked from the UK during this four week period, which is really amazing.

Andy Foad G0FTD (Kent JO01) mentions that he has a fairly unconventional home station that consists of an Icom IC-706 transceiver running 5W of c.w. into a loop of wire pinned to the bedroom wall. The antenna is essentially a quad loop for 28MHz with a matching network at the bottom so that it can be used between 3.5-50MHz.

There is also a switchable inductance at the top centre that has a high reactance at 24-30MHz and in effect breaks the continuity of the loop so that it becomes 2 verticals in phase and switches the radiation pattern by 90°. Using this arrangement over the weekend of May 21-22 Andy made c.w. contacts on the 50MHz band with the stations of LY1CX (Lithuania), T94FC, T96Q, T98U (Bosnia-Hercegovina), YU1JW (Serbia & Montenegro) and one s.s.b. QSO with IW3SNU (Italy). Regretfully more than 5W of r.f. causes severe television interference at his QTH but it does show that fun can be had with low power.

Another station running low power is **Angus Young M3IKB** who uses a Yaesu FT-817 transceiver running 5W output. On May 27 he was tuning through the 50MHz band and heard a German station calling CQ. At the time he was using a home-brew quarter-wave h.f. ground plane antenna for 14, 18 and 121MHz.

As the band was open Angus decided to add another quarter-wave radiator for 50MHz but obviously by the time he had done this the DL station had disappeared. However, he did find the station of OM3SEM (Slovakia) who responded to the call from M3IKB with a 55 report. Angus reports that he was able to go down to 1W and still work the station, which was quite exciting.

SPORADIC-E ON 70MHz

Sporadic-E propagation on the 70MHz band was tremendous with 10 days of openings being reported during the last two weeks of May. Openings were lengthy and although there are relatively few countries with access to the band there was a good level of DX activity with many new stations being worked.

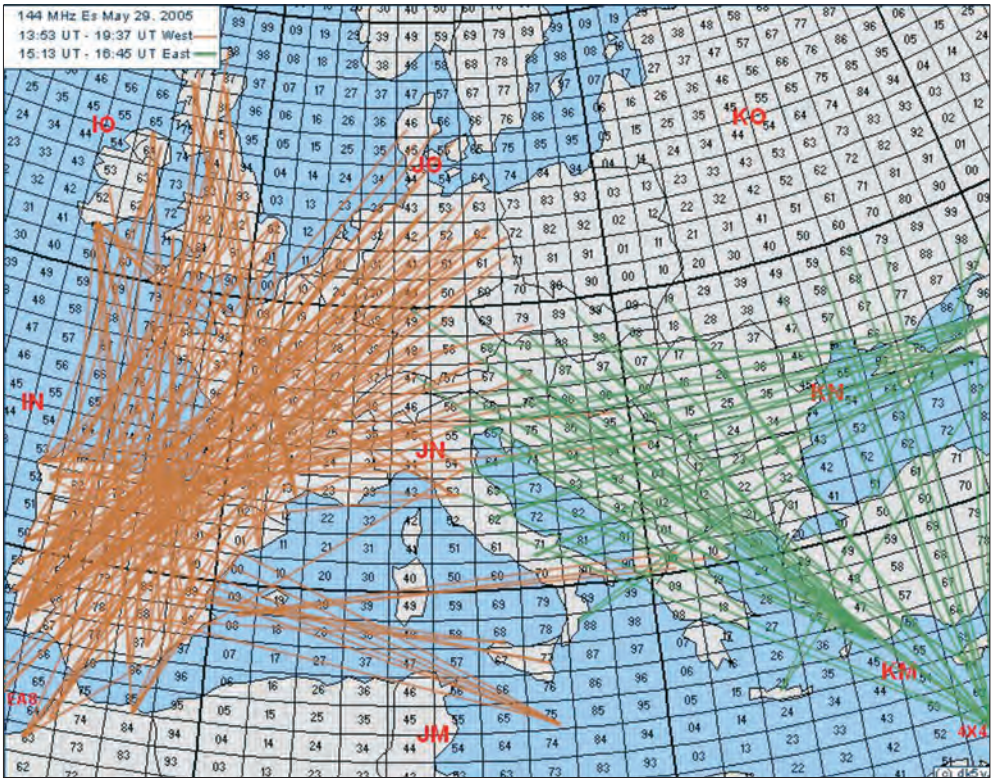
A number of keen European DXers have also built receivers to allow them to make crossband contacts between the 70 and 50MHz bands. Stations are often heard calling for these types of contacts on and around 50.185MHz during Sp-E openings.

Unlike the 50 and 144MHz bands many DX contacts are now being made with low-power f.m. equipment. That's because there is currently a very large amount of surplus p.m.r. equipment available throughout much of Europe.

The use of f.m. during 70MHz openings is very effective as most of the European countries with access to the band are between 1000-1500km from the UK. This is the ideal distance for single-hop Sp-E contacts where signals are often rock-crushingly strong.

Much activity can still be found on c.w. and s.s.b. of course but the f.m. route is considerably cheaper. Stations worked from the UK during May included S51DI, S54M, S54T, S59MA (Slovenia), YO2IS, YO4FYQ (Romania), YU1EU, YU7EF (Yugoslavia), ZB2CF, ZB3B (Gibraltar), 9A1Z, 9A2SB, 9A4K, 9A6R, 9A6Z (Croatia) and around 20 Danish (OZ) stations. The S55ZMB (70.029MHz) and 5B4CY (70.114MHz) beacons were also heard on a few occasions. The Cyprus beacon is running 10W into a 6-element Yagi and if you hear it the beacon keeper would like to have your reception report via **5B8AV@qsl.net**

At my QTH (Herefordshire IO81) s.s.b. contacts were made on May 23 with the



● **Fig.1: The 144MHz Sporadic-E opening on May 29**

stations of LZ5UV, YU1EU, 9A2SB and 9A6R, on May 28 with ZB2CF, on May 29 with S51DI and on May 30 with S54M and 9A6Z. **Kevin Nice G3UNR** (Editor, *Short Wave Magazine*) reports making his longest distance ever v.h.f. contact on May 19 when he worked Ivan S51DI (Slovenia JN76) over a distance of 1400km. Kevin uses an Ascom SE550 transmitter/ receiver running 25W into 3/4 wave vertical antenna and made the contact on the f.m. simplex channel 70.450MHz.

Christian Nielsen OZ2LD (Denmark) mentions that on May 30 he was operating on 70MHz from his car when the band opened up to the UK. Using an old AP2000 p.m.r. transmitter/receiver and a quarter-wave vertical OZ2LD/M made low-power f.m. contacts with the stations of EI3IO, G0JJL, G0RBD, G1BWG, G1HDQ, G3HYH, G3LUO, G3TAR, G3UVR, G3WZR, G3YPQ, G4DGM, G4GFD, G4PBP, G4ZXN, G6AHX, G6DEG, G6GJW, G6GWI, G6NWT, G7DSA/M, G7WAW, G8BCI, G8UWJ, G8XVJ, GI3YDH, GW0GHF, GW0GZI/M, GW1MCD, M1APC, MI0OPM, MW0CHU, MW0CXH, MW1FGQ, MW3CDJ and MW3NJL/M.

SPORADIC-E ON 144MHz

It has been a dream start to this years Sp-E season on the 144MHz band with one very large opening to Austria (OE), Bosnia-Hercegovina (T9), Croatia (9A), Czech Republic (OK), Hungary (HA), Italy (I), Malta (9H), Poland (SP), Sardinia (IS0), Sicily (IT9), Slovenia (S5) and Yugoslavia (YU) on April 28 and a further seven days of lengthy openings on May 19, 21, 23, 25, 29, 30 and 31. It was really amazing!

The first 144MHz event of the month on May 19 commenced at 1430UTC and lasted for over 90 minutes. Propagation for most UK operators was to the southern tip of Spain (EA7) and Portugal (CT). At 1500UTC a multi-hop path opened up from south-east England extending the range to over 3000km to the Canary Islands (EA8). Incidentally, the actual paths worked are very much dependent on your geographical location so a station in Cornwall may work into a completely different area compared to someone located in Kent. That assumes of course that both stations can 'see' the same patch of E-layer ionisation. Two hours after the main event had finished there was a brief opening again to the Canary Islands (EB8EHT and EB8BOY) for stations located in the southwest of the UK.

An opening on May 21 was very brief and occurred around 1720UTC to stations in Romania (YO). The western edge of this opening was to stations in Belgium, Holland and Germany but the path shifted very slightly enabling stations in southeast UK to make a handful of contacts. The next Sp-E opening occurred on May 23 but it was a 'spotty' event, very similar to the previous opening on May 21. A few lucky stations in southeast England made isolated contacts between 1640-1720UTC with stations in Bulgaria (LZ), Greece (SV7VU) and Macedonia (Z35Z).

Sometimes Sp-E openings can be tightly focused to one particular geographical area and this was the case during the next event that took place on May 25 between 1650-1705UTC. Operators located over much of southern England reported making 144MHz contacts with Portuguese stations CT1DIZ (IM58) and CT1HZE (IM57) and no one else.

A five hour Sp-E opening on Sunday May 29 between 1400-1900UTC was one of those mega-events that you dream of! The 144MHz band was open from England, Scotland and Wales to Portugal (CT), Spain (EA7), Gibraltar (ZB3Z) and to three countries in the African continent Morocco (CN8CV, CN8IG, CN8LI, CN8PA), Canary Islands (EA8BTV) and Ceuta & Mellila (EA9IB, EA9LS) as shown in the diagram **Fig. 1**. This event was so huge that many seasoned operators even resorted to working stations on the f.m. simplex channels. It was really amazing and the pile-ups were very intense.

David Johnson G4DHF (Lincolnshire IO92) was testing a home-brew 5-element wire (16s.w.g.) ultra-portable Yagi in the garden when the opening occurred. Running 20W into the antenna, which folds down into a jacket pocket, he contacted CT1EPC, CT1GVN, CT1HZE, a total of 13 EA stations, CN8LI and EA9IB.

Colin Roberts G4ZFJ (Essex JO01) worked the stations of EA7RM, EA7TN, EB7BHO, EB7BKY and heard CN8LI in the first phase between 1400-1440UTC. Later in the evening from 1800UTC he managed to contact CN8LI for his 50th country on the 144MHz band, CT1DIZ, CT1DRB, CT1EPC, CT1ESJ, CT1GVN, CT1HZE, CT2GQN, 13 Spanish stations and heard African operators CN8PA and EA9LS.

There where two openings on Bank Holiday Monday, May 30, the first between 0700-0800UTC to Italy, Spain and Portugal and the second phase between 0840-1040UTC to stations in southern Germany, Czech Republic, Poland, Italy, Switzerland and Spain. Within an hour of the event fading out a large-scale aurora occurred with 144MHz c.w. contacts being made with stations all over Europe. Surprisingly this large aurora didn't wipe out further Sp-E openings, as on the following day May 31 there were two events, the first between 1500-1520UTC to Poland and another briefly at 1743UTC to Greece (SV7AYM).

DEADLINES

Incredibly there's no room to mention in detail the first ever 50MHz e.m.e. contact with KH0/KH2K (Mariana Islands) or two truly excellent auroral openings that affected all v.h.f. bands or even the 3000km contacts made via tropospheric ducting on the 144MHz band! As you read this the summer Sporadic-E season will still have a few more weeks to run so, as I've suggested on many occasions before put down the magazine and go check out the 50, 70 and 144MHz bands now for any propagation openings.

Good luck with your DX contacts and please let me know what you managed to work or hear. Send any reports or news, preferably by E-mail, to reach me by the last weekend of the month.

73, David G4ASR

HF HIGHLIGHTS

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

I begin this month with some information *PW* reader and contributor **Henryk Kotowski SM0JHF** sent in, regarding the impressive **Diplom Sverige** given for contacting parishes in Sweden. It was recently announced that the Diploma would be discontinued after the 31 December this year so, you do not have a great deal of time to check your QSL cards and get an application in. There are some 2250 parishes in Sweden at this time, but that will change with re-organisation next year.

The **Nykoping Radio Club,** which uses the callsign **SK5BE** has further information on the diploma and how to get it at **www.qsl.net/sk5be** but the basic requirement is to have contacted 100 parishes after 15 June 1978. The manager for the award is **Evert Kallander SM5BDY** shown in the accompanying photograph displaying both the gold and silver versions of the diploma. The silver diploma is for parish contacts, which are now no longer available!

MOST WANTED SURVEY RESULTS

The *DX Magazine*'s annual 'Most Wanted' Survey was conducted between mid-September and late October last year when the VU4RBI and VU4NRO DXpedition to the Andamans was still to take place. The top 20 Most Wanted DXCC Entities are now **1** North Korea; **2** Andaman & Nicobar Is; **3** Scarborough Reef; **4** Lakshadweep Is; **5** Yemen; **6** Peter I Island; **7** Navassa Is; **8** Desecheo Is;. **9** Bouvet Is; **10** Kure Is; **11** Crozet Is; **12** Kerguelen Is;.**13** Prince Edward & Marion Is; **14** Glorioso Is, **15** Amsterdam & St. Paul Is; **16** Heard Is; **17** Mount Athos; **18** Aves Is; **19** Palmyra & Jarvis Is. and **20** South Orkney Island.

I am sure that there are one or two of us who would like to add a few of those to out country totals! Further details on the survey can be found at **http://www.dxpub.com**

DX NEWS

On to some DX news now and **Enrico Li Perni IV3SBE** who is currently working in Kenya and has just received his **5Z4ES** licence. He plans to operate most weekends on 3.5, 7, 14, 21, 24 and 28MHz using s.s.b. only. Enrico will be there until 2007 so there is plenty of time to work him. Please QSL via bureau to IV3SBE.

Some members of **The Canary Islands DX Society** have announced that they will be active from Tunez on Djerba Island, Tunisia AF-083 as **3V8SM,** which is the callsign of the Tunisian Scout Radio Club in the Houmt Souk City. Activity will be on the WARC bands using s.s.b., PSK31 and RTTY between 26 and 29th July. They will also be active on s.s.b. during the IOTA Contest over the weekend of the 30-31st July.

The team includes **Dunia EC8ADU, Javi EC4DX, Edu EC8AUA** and some Tunisian operators, QSL will be via the Bureau to EC4DX. The team also recommends that DXers pay special attention to their pilot station **Oscar EA4TD** and check out his website for the latest news from the team at **www.ea4td.com**

A group of operators from the **Cray Valley Radio Society**, **www.cvrs.org/**, will be active from St. Mary's, Scilly Isles EU-011 from 25 July to the 1st August. Look out for M3CVN, G0VJG, G4BUO, G7GLW, 2E0ATY and G0FDZ to operate as homecall/P on 3.5-28, plus 50, 144MHz and 10GHz before the IOTA Contest in which they will operate using the call **M8C**. Two full stations will be set up, comprising an FT-1000MP MkV plus Quadra amplifier and FT-1000MP plus Dentron MLA2500 amplifier along with many other items of back-up equipment so there should be no problem hearing them. QSL via G4DFI.

Also on St. Mary's, Scilly Isles will be for special event station **8N5SAIT,** which will operate until the 31st July. Each letter in the callsign's suffix represents the old name of Shikoku's four prefectures S for Sanuki (kagawa Pre), I for Iyo (Ehime Pre), A for Awa (Tokushima Pre) and T for Tosa (Kouchi Pre). QSL will be via the JARL QSL Bureau.

Evert Kallander SM5 BDY.

Dominic Baines M1KTA who plans to operate on all bands s.s.b. as **G2XV/P** between the 29 and 31st July. He will participate in the IOTA contest and will attempt to operate slow Morse during the event. All QSLs via home call.

Finally, in Angola **Janne OH5NKD (OH3DD)** will operate as **D2DX** and is expected to be there until 2007. He has been very active on PSK31 especially on the 14 and 21MHz bands though his operating schedule also includes 14, 21 and 18MHz s.s.b. with activity expected to be from 1100-1330 and again after 1700UTC.

SPECIAL EVENT

To celebrate the Japanese 'Shikoku Information Telecommunication Month' keep an ear open

CARL GW0VSW HAS LOTS OF LOGS TO REPORT ON THIS MONTH, SO WITHOUT FURTHER DELAY, TAKE IT AWAY CARL...

YOUR REPORTS

On to your reports now and the first log this month is from **Ted Trowell G2HKU** on the Isle of Sheppy, Kent who appears to be the only operator on the lower bands! Although Ted says "conditions have been poor with extremely high noise levels" he managed to find OJ0J (Market Reef) EU-053 at 2000 and C31LJ (Andorra) at 2100UTC on 1.8MHz using his Ten-Tec Omni V at 70W to a Butternut HF6 vertical antenna.

Several of you operated on the crowded 7MHz band including **Martyn Medcalf M3VAM** in Chelmsford, Essex who used his Icom IC-746 and long wire antenna with s.s.b. to contact OZ/DJ4MG (Denmark) on EU-171 at 1151 followed by GI4FP (Northern Ireland) at 1507. Once again the band was described as "very poor" with only a few Europeans heard.

The s.s.b. mobile log of **Mark**

Taylor G0LGJ in Dereham showed HZ1IK (Saudi Arabia) worked at 2247UTC using a Kenwood TS-480 and his DK3 Screwdriver antenna.
In Middlesbrough **Keith Winward M3KWI** made 5W QRP s.s.b. QSOs with UA3QU/P (European Russia), DQ80IARU (Federal Republic of Germany), CN8SG (Morocco) and EI0CL (Ireland) using a Yaesu FT-897, SGC Smart Tuner, which replaces a manual a.t.u. and inverted Carolina Windom.

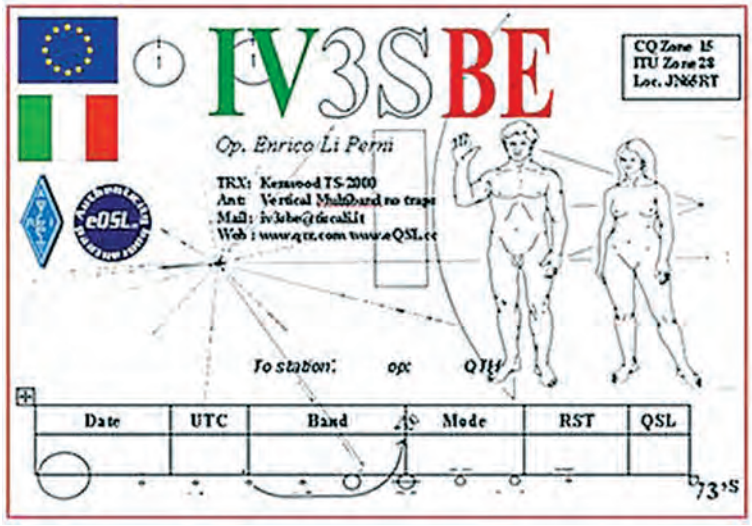
THE 14MHz BAND

The 14MHz band is by far the most popular and this was where most of our reporters spent their operating time. In Liverpool **Billy Clayton 2E1WHC** found the band in "excellent shape" between 1700 and 1930UTC. Stations making his log included HS0ZFS and E20KIR (Thailand), JR1AEV and JA7DOT (Japan) BG7LHY and BD7OH (China) and VU3SPQ (India) all using a Yaesu FT-1000MP with 50W s.s.b. to a Cushcraft MA5B mini beam antenna.

Also active on the band **Chris Colclough G1VDP**, Nuneaton made voice contacts using his Yaesu FT-897, Ranger 811H amplifier running at 200W and Cushcraft MA5B beam with RX3AJL (European Russia) on Vaygach Island EU-086 at 0835, LA5UKA (Norway) on Grossen Island EU-056 at 1153, 8Q7BR (Maldive Islands) AS-013 at 1153, VO2ZT (Canada) 1431, 3DA0TM (Swaziland) 1710, EZ8CQ (Turkmenistan) 1714, YB1YG (Indonesia) on AS-021 at 1719, A47RS (Oman) 1735, JY5FA (Jordan) 1757, HV0A (Vatican City) 1806, 9N7JO (Nepal) 1810, 9M2MT (West Malaysia) AS-073 at 1830, TF3XEN (Iceland) EU-021 at 1917, CP6XE (Bolivia) at 2133UTC.

In to the log of **Jim Pedley GM7TUD** now who lives in Dumfries. Jim made s.s.b. contacts with 7V2SI (Algeria) on AF-097 at 0832 followed by VI5PN (Australia) on OC-022 at 1323, ZK2QQ (Niue) OC-040 and BI4Q (China) around 1835 followed by 8Q7EX (Maldive Islands) 190UTC all made using a Kenwood TS-450S, 100W and a TGM MQ4 beam. Jim has now worked 275 islands for IOTA and is looking to make that 300 by the end of the year!

In Chelmsford, Essex **Rob Hastings 2E0BOB** used s.s.b. to work RP3DRP (European Russia) 1510, W1WG (USA) in Shelton 2147 and NZ1U East Killingly at 2155 with both stations in Connecticut. Shortly after that Rob worked VO1BC (Canada) in Clarenville, Newfoundland at 2209 and LU2NI (Argentina) at 2214UTC. Back to Middlesbrough now and the log of Keith M3KWI who ran QRP s.s.b. again finding IZ5KM (Italy), 9A9A (Croatia), YL1ZS (Latvia) and SM5HPB (Sweden).



David Cutts 2E0EBV, who lives in Hornchurch, Essex chose BPSK31 mode. His home station is equipped with an Icom IC-756 ProII and his antennas include a G5RV and a AP8A vertical. However, he also operates from Cromer in North Norfolk where this month's contacts were made.

David's digital QSOs included ER1AO (Moldova) 0926, N2CHI (U.S.A.) in Saugerties, New York at 1542, HP1AC (Panama) 2328, VA3PL (Canada) in Brampton, Ontario at 2340, K8OSF (U.S.A.) in Davenport, Florida at 2355, CO2WZ (Cuba) HA-015 at 0023 and KP4FKN (Puerto Rico) NA-099 at 0037UTC. David also made three contacts using RTTY, YU4DPR (Republic of Bosnia and Herzegovina) 1942, YO8RAA (Romania) 1948 and K0COP (U.S.A.) in Georgetown, South Carolina at 2159UTC.

Owen Williams G0PHY, Biggleswade, Bedfordshire made s.s.b. contacts with TI2GBY (Costa Rico) at 2312 followed by HK1XX (Columbia) at 2326UTC using his Yaesu FT-747 at 100W to a dipole. In Chelmsford the long wire of Martyn M3VAM pulled in EA8EW (Canary Islands) AF-004 at 0826, RD3A (European Russia) 0831, Z37HWK (Macedonia) 1349, IK8WEJ/P (Italy) 1543, SP8NTU (Poland) 1842 and ED5SST (Spain) at 1911UTC.

The key of Ted G2HKU was in action again finding c.w. stations TA3X (Turkey) at 1600UTC, CN8YR (Morocco), P43E (Aruba) SA-036, 4X1VF (Israel), 7X7AN (Algeria), 8P6CF (Barbados) NA-021, A71BX (Qatar), JW1CC (Svalbard) EU-026 and 8R1J (Guyana) between 2100 and 2230UTC.

THE 18 & 21MHz BANDS

On to 18MHz where Mark G0LGJ found s.s.b. stations ZK1JD (South Cook Islands) OC-013 at 0704UTC and an interesting one with NQ4I/AM (Aeronautical Mobile) at 1115 followed later in the day by PT2ND (Brazil) 2126, LU2NI (Argentina) 2130, HK3JJH (Columbia) 2152 and YN4SU (Nicaragua) at 2245UTC. Also spending some time here was Chris G1VDP who logged 4L4MM (Georgia) 1226, KP4SQ (Puerto Rico) 1643, 8Q7NB (Maldive Islands) 1646, UN8GF (Kazakhstan) 1737 and IS0/DL2GWZ/P (Sardinia) EU-024 at 1904UTC.

At 1500UTC SU9BN (Egypt) and A61Q (United Arab Emirates) made it to the log of Ted G2HKU. On 21MHz David 2E0EBV worked HZ1IK (Saudi Arabia) and YB1IQE (Indonesia) around 2240 using BPSK31 and MFSK contacts with ZS6BUJ (Republic of South Africa) 1531, Z21FO (Zimbabwe) 1552 and LU6DEZ (Argentina) at 1640UTC.

Also on 18MHz band was Owen G0PHY who worked two countries, 3B9FR (Rodriguez Island) AF-017 at 1542 and ZP8VAO (Paraguay) at 2104UTC. In Nuneaton Chris G1VDP made voice QSOs with VR2XMT (Hong Kong) AS-066 at 1028 followed by 5V7BB (Togo) at 1641 and V8NOW (Brunei) at 1703UTC. Chris is looking forward to some light house activations from Cornwall at this time so keep an ear open for him!

SIGNING OFF

Well that about wraps things up for another month and a busy one it has been even if the higher bands have suffered once again! The conditions have been up and down on all bands this month though openings have allowed some good long distance stations to break through at various times of the day.

Even if the band is quiet, listen out for a while or put out a few CQ calls. As the propagation changes so quickly at the moment your patience is bound to be rewarded at sometime. Who knows, you may even add to your DX total!

As usual my thanks go to all our reporters and to **Tedd Mirgliotta KB8NW** editor of the *OPDX Bulletin* for the DX information. Until next time have a good DX filled month.

73, Carl GW0VSW

IN VISION

GRAHAM HANKINS G8EMX
17 COTTESBROOK ROAD
ACOCKS GREEN
BIRMINGHAM
B27 6LE

GRAHAM G8EMX HAS NEWS OF THE UK'S NEWEST ATV REPEATER, AS WELL AS A NOTE ABOUT TEST CARDS

A trawl through the British Amateur Television Club's committee for some recent ATV news brought this from **Giles Read G1MFG**: "At about 1600 hours on Wednesday 20 April the country's newest ATV repeater went on the air, **GB3PD**, at Stenbury Down on the Isle of Wight. Operated by the Solent Club for Amateur Television (SCART), GB3PD is currently using equipment hurriedly built by (and on loan from) Giles Read G1MFG. Final equipment is still being developed by **Howard G3NZL**, in association with other members of SCART including Giles. The current 'box' will then become the standby equipment in case the main gear fails or needs modifying".

Giles continues: "During installation we put a spectrum analyser on the transmit and receive antennas. There was a strong wideband signal at around 1285MHz - we did not have time to identify it, but at around 20dBm on the receive antenna it dwarfed the 1297MHz Packet transmitter on the same mast! Thankfully, there was no significant interference on the input frequency".

The antenna system is crucial in achieving the expected coverage coverage of any repeater and Giles explains that the SCART Group had some initial constraints: "We were only able to install temporary antennas, rather than the two pairs of stacked plates, which will be on the final system. Instead, we had to make do with a plate for transmit and an Alford Slot for receive. This means that the repeater is currently somewhat deaf, with at least 10dB more gain expected when receiving on the plate antennas.

"Likewise, a single plate for transmit has a much narrower radiation pattern than the pair which will be installed so we expect better reception reports from what are currently 'fringe' areas. We are also hoping to get the antennas about 10m higher when a new mast is installed on the site later in the year. This will overcome some shadowing problems we are currently seeing from a lump of land 10m higher about 100m north of the site".

The actual repeater equipment consists of a 7-pole interdigital receive filter followed by a G1MFG receiver. Beacon video is provided by an R.T. Russell test card generator, while idents are taken care of by a G1MFG home-brew PIC circuit, which also contains the sync detector and A/V switch on the same board. The audio and video is then processed by a GTH Electronics 'ACE' timebase corrector – this is a clever piece of kit for repeaters because when it has the ATV software it will always provide a re-timed, re-coded and re-synced signal - it will put perfect sync pulses and colour burst onto 'white noise' and you can get colour lock on a P2 input!

Audio and vision for GB3PD then passes to a G1MFG transmitter and 1W amplifier, followed by a DL2AM 18W p.a. and another 7-pole filter. Tests showed that the filter was good enough to prevent interference to the 1297MHz packet link on the same mast! Following local traditions, the first person through the new box was G8CKN, who put in a lovely P5 signal from his home 60km away.

Giles concludes his report with some acknowledgments: "The SCART group would like to extend its most grateful thanks to the Isle of Wight Repeater Group for allowing us on its mast and particular thanks to **Simon G1VGM** for donating his time and assistance on installation day".

TEST CARD

An ATV repeater is perhaps one of the few places you will find a test card these days. In the times that seem so long ago now, when just BBC and ITV existed and closed down during the 'wee small hours', not to return until mid-morning, the nation's screens would be filled with the test card (or, more correctly, a test card) with an accompanying sinusoidal tone or music. Studio cameras would be pointed at huge physical cards for alignment, and the complex patterns on domestic televisions provided accurate convergence, antenna, contrast and colour guides when the 'TV engineer' was called out.

Do you remember the 'Girl on the Test Card', drawing a game of 'noughts and crosses' together with a toy teddy? All for an engineering purpose; the child provided genuine flesh tones, the X in the game was screen dead centre for convergence adjustments, the colours on the bear were selected to test decoder performance. 24/7 programming and stable TV electronics brought the end of the transmitted test card in the UK (well, I haven't seen any lately?) but test patterns continue to be extensively used internally by the broadcasters and by service engineers, locally generated on site.

The ATV Amateur wishing to transmit a test card can use circuit boards with programmed EPROMs or PICs, or they could download PCATV.ZIP from the 'software' section of the British Amateur TV Club's website. Input a callsign, select a card (there are 37 card patterns and seven colour bars to choose from) your choice will appear on screen with callsign.

I might be using one of the above patterns for the International Amateur Radio Union (IARU) ATV contest. This will run from 1800UTC on Saturday 10 September to 1200UTC on the Sunday, and is Fast-Scan ATV on all bands. Contest exchanges are groups of four, non-consecutive numbers in vision, the receiving station needing to confirm that it can resolve these by stating their addition on an audio channel. This can be the 6MHz inter-carrier sound channel, or via 144MHz.

A bit of a reminder here that the ATV calling frequency on the 144MHz band is 144.750MHz; please, please remember to find a clear channel away from '750 once contact with the other station has been set up. This is easy to forget in the excitement of making an ATV contest contact. The BATC Contest Manager is **Richard Parkes G7MFO** and all contest logs should be sent to him.

Graham G8EMX

● **Ident card from 24cm ATV repeater GB3PD courtesy of Giles Read G1MFG.**

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AIR TRAFFIC CONTROL		£9.99	ATC9
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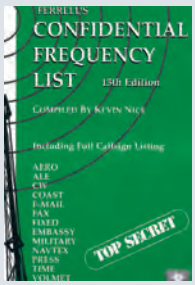

The 13th Edition of 'The Definitive HF Utility Guide' has been updated and includes MIL-STD-PSK modes, high speed HF E-mail services, extensive callsign listing, international call allocations, utility abbreviations and much more. **£21.50**

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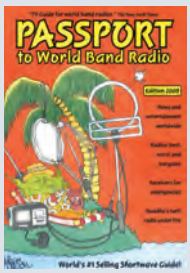
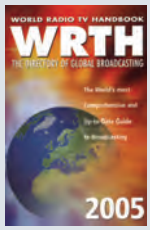
One of the most comprehensive, reliable and up-to-date manuals containing over 11,200 frequencies, 1900 stations, meteo radiofax, radiotelex and NAVTEX schedules, abbreviations, frequency allocations and radio regulations. **£31.50**



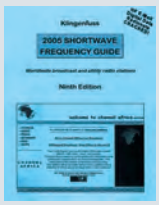
Passport to World Band Radio 2005

This book includes what's on world band radio, what to buy, how to get started and is written to make interesting reading. It contains a mix of articles, from an idiot's guide, to a five-minute start and ten easy catches to best times to listen. It also has a channel by channel guide to what's on the air. Everything the short wave broadcast listener needs to know. **£17.50**

World Radio TV Handbook 2005



A handy reference book that contains the names, addresses, programmes and frequency details of radio stations all round the world. Radio stations are listed under the country and all countries are split up into continents making it much easier to turn to the station you need. Also included are articles on HF broadcasting conditions, radio reviews and a section on how to use the book. **£22.50**



Klingenfuss Shortwave Frequency Guide

This 2005 edition contains a new, clearly arranged alphabetical list of stations and user friendly listings in convenient frequency order. There are over 10,000 entries covering broadcast stations world-wide and 11,000 entries covering utility stations world-wide. **£24.50**

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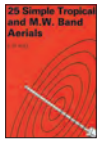
25 Simple Tropical & MW Band Aerials



This concise book describes how to build 25 simple and inexpensive antennas for operation on the medium wave broadcast band (550 - 1600kHz) and on the 60, 75, 90 and 120 metre tropical bands. There are also designs for the 49m band. **£1.75**

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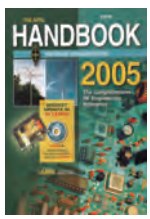
ARRL Handbook

Radio amateurs and professionals rely on The ARRL Handbook for current antenna theory and a wealth of practical, how-to construction projects. This 20th edition is extensively revised and includes contributions from leading antenna experts. Many designs are the result of the latest advances in computer modelling. **£32.00**



Antenna Toolkit

This book acts as a miniature antenna manual with very good technical explanations without ever over-doing the maths for the not-so-keen mathematicians! The drawings and illustrations are very clear and the section on instrumentation is very helpful. **£25.00**

RSGB Yearbook

There are almost 500 pages in the 2005 Yearbook, eight more than last year, but only a very small handful are the same. Everything you need is covered within its pages: contact names, addresses, phone numbers, websites and E-mail addresses. A major new feature for this Yearbook is the RSGB Contesting Guide, which was published in RadCom. **£16.95**

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Your receiver is only as good as your antenna or so says the author of this book. It is a complete guide to high performance receiving antennas for long wave all the way to the upper end of the short wave spectrum. The designs aren't slightly modified amateur transmitting antennas but ones intended specifically for receiving purposes. **£17.50**

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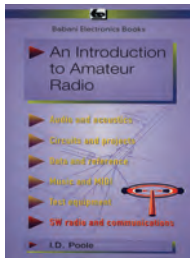
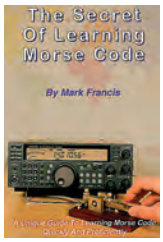
HF Amateur Radio
This could be the considered as the natural 'follow-on' volume to accompany Basic Radio Principles & Technology. Aimed at the more active radio amateur who is just beginning to get to grips with their new HF transmitting station, it will also appeal to the newcomer. **£13.99**



An Introduction to Amateur Radio
Amateur radio can be a fascinating hobby that has attracted many people all around the world. It encompasses a wide range of subjects from the historical to the latest technology and from operating to construction. Perfect for the fledgling enthusiast. **£4.99**



Secret of Learning Morse Code
Don't be fooled, the requirement for Morse may have been removed, but Morse code still has a place in the scheme of things for the radio amateur. It can consistently be used to 'talk' to others around the world, you don't even need to speak their language to hold a conversation. **£6.95**

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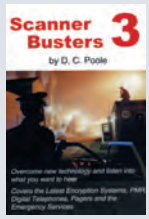

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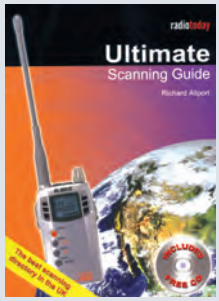

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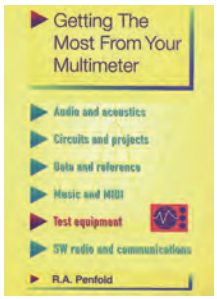

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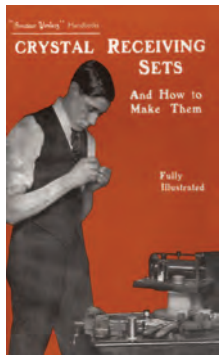

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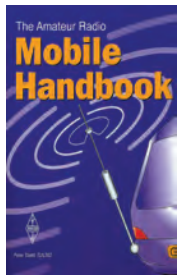

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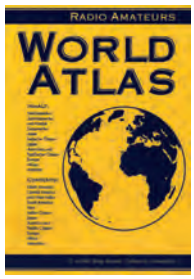

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rob mannion's topical talk

This month Rob G3XFD chats about the latest *PW*/G4CFY project for 70MHz. He also invites keen /P operators to join him on the next PW 70MHz 'activity afternoon'.

The 70MHz a.m. transmitter-receiver project, originally published in *Short Wave Magazine* in 1968, which featured in Radio Basics (RB), April *PW*, certainly aroused much interest. In fact, the number of letters and E-mails regarding **John Hey G3TDZ**'s 37-year old project took me by surprise. I thought there would be quite a reaction from *PW* readers - but not the level of feed back which arrived on my desk!

A number of readers have written to me to say they enjoyed building the project and achieved success. However, as I pointed out in the RB article - back in 1978 I'd had quite a bit of difficulty with the modulation transformer. Various other aspects of the project led to readers trying out different ideas for the modulation and receiver sections.

The difficult 'repeatability' factor on the fascinating G3TDZ 70MHz project (which provided much pleasure for me all those years ago) led to much discussion between **Tony Nailer G4CFY**, **Tex Swann G1TEX** and myself. Those discussions culminated in the *PW* Mellstock 70MHz a.m. low power (1W transmitter), to be published very soon.

The design process and the efforts Tony G4CFY put into the little transmitter will - I have no doubt- make informative reading. You'll also end up with a working (and repeatable) project to get you going on 70MHz.

From my point of view the whole exercise has been most absorbing and the work put into the project by Tony G4CFY, coupled with my keen support - leads to more of us enjoying 70MHz - I'll have succeeded in my goal! So, lookout for the *PW* Mellstock design, complete with p.c.b. drawings and component overlays (a kit will also be made available) in the September issue of the magazine. You'll soon be busy using 'ancient modulation' on Four!

Activity Afternoon

It's been an incredibly busy 'personal' year for me and I'm very conscious that my Amateur Radio activities have suffered somewhat! Determined to enjoy the hobby as much as possible I made a real effort to join in the 144MHz QRP contest this year. It was worth it- even though my station was only on the air for two hours it was great fun. That was when the 70MHz activity afternoon came to mind again.

If you are on the *PW* 70MHz activity listing on my e-mail address book you will already know that **Saturday 30 July** is the time to head for the local hills. I'm planning to operate near Compton Abbas airfield, near Ashmore on the Dorset/Wiltshire borders. This site has often provided a great take-off for the south west, the west (especially towards Wales and Ireland) with equally good take-offs for the north and east. Hopefully I'll be able to work a good number of stations.

Equipment this year will comprise my Spectrum Communications 28 in and 70MHz output transverter, my AKD 4001 f.m., transceiver and (hopefully) my newly built *PW* Mellstock 1W a.m. transmitter. The antenna will be the Sandpiper 3-element delta beam (I was most impressed with the results form the 144MHz version and purchased the 70MHz model).

So, I hope we'll meet on 70MHz on Saturday 30 July, during my operating session starting at 1200BST, and extending to around 1500 BST. Let's hope for a fine day with a bit of a lift'!

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Index to Advertisers

bhi 67
Birkett, J 67
Bowood Electronics 53
Castle Electronics 32
Chelmer Valve 67
Don't Pay Retail 67
Electrovalue 67
Haydon Connunications 22, 23
Icom (UK) Ltd 71
John's Radio 67
Kenwood Electronics 5
Kit Radio Company 53
Martin Lynch & Sons 36, 37
Moonraker 14, 15, 16
Nevada 21
Peak Electronics 53
Practical Wireless 69
Radio Active 58
Radioworld 46, 47, 48, 49
RSGB 30
Short Wave Magazine 58
Spectrum Communications 32
Sycom 67
Telford Radio Rally 67
The Shortwave Shop 53
Waters & Stanton 2, 3, 4
Yaesu 72

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