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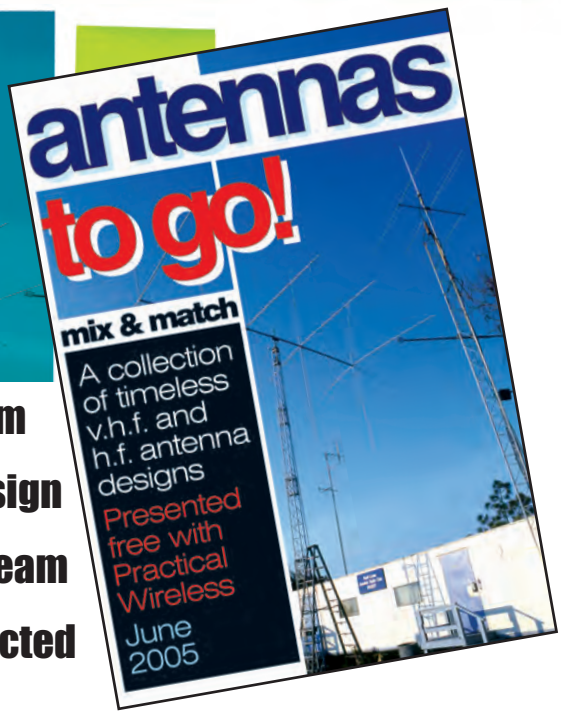
ICOM

IC-756PROIII Transceiver Reviewed

FREE Antennas to Go! magazine



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- A Practical Yagi Design
- '2BCX 16-Element Beam
- DX Dipole for Restricted Sites

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- QRP Contest Rules
- Sandpiper Delta Quad Reviewed

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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-756 PRO MkII £1499 C
Last few of this model at knock-down price. If you don't want the latest model - then save £600!!

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 16 - 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. 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. HF/VHF/UHF or up to 23cm with the optional module. Built-in auto ATU, DSP and its unique TNC. **£1389 C**

TS-2000
The station in a box. 160m - 70cm with every feature imaginable inc. DX cluster. Kenwood fans dream rig.

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-870S £1249 C
Kenwood's great HF radio that uses phasing for SSB. No more filters to buy - they are all inside the box!

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

TS-50S £595 C
A great rugged mobile for 160m to 10m with up to 100W output. Also a great price.

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

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

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

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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-2100H £189 C
2m 55W FM mobile with rugged construction and all-in one die-cast chassis.

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
Dual 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

WSM-270 **£19.95 B**

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.

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.
FREE VC-27 EAPHONE MIC
£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 withkeypad Ni-Cds & charger

DJ-C7E £124 C
2m, 7cm 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 £849.95 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

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 heterodynes. 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

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.

Watson
Mobile Antennas

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

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MANSON SDC-2010

£9.95 A

NEW

* 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

£84.95 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-m	Medium ceramic egg insulator	£2.15	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 4:1 1.5kW 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

£249.95 C

MFJ-991 £209.95 C
1.8 - 30MHz auto ATU. Similar to MFJ-993 but no digital display. Works with any HF transceiver. 150W PEP

MFJ-994 £349.95 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.

MA5V
£239.95 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

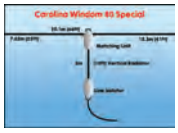
CW-160 £129.95 C
8-band 160m - 10m dipole with 22ft vertical radiating feeder. 1.5kW. Balun fed. 265ft long.

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

Rugged 2kW balun matched G5RV with 102ft element and 31ft ladder line. Requires ATU. Made in USA

Hustler Base Antennas

6-BTV £229.95 C
80 - 6m 6-band vertical. 7.3m tall 1kW. Can be used at ground level with earth stake. Ideal small gardens

5-BTV £199.95 C
80 - 10m 5-band vert. 7.64m tall 1kW. Can be used at ground level with earth stake. Ideal small gardens

4-BTV £169.95 C
40 - 10m 4-band vert. 6.52m tall 1kW. Can be used at ground level with earth stake. Ideal small gardens

Butternut Antennas

HF-2V £229.95 C
80 / 40m high performance vertical. 1kW PEP 9.75m tall. Self supporting for ground mount use.

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
40m - 2m vertical is half a Buddipole. Ideal for QRP and rucksack - as used by Peter Waters G3OJV.

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

MP1-SA £139.95 B
Screwdriver style adjustable HF QRP whip 40m - 70cm. 150W PEP. Max extended 185cm approx

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

MP-80M £29.95 A
Add on 80m coil to extend the LF coverage of the MP1 and MP2.

High Sierra Mobile Whips

HS-1800/PRO
£379.95 C

The ultimate mobile whip. Electrically tuneable 80m - 6m 1kW PEP Includes switch box and 12V cable. Massive 2" coil. Made in USA. Superb!!

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

Get mobile on all bands from 80m to 6m in minutes. This compact screwdriver antenna comes with cables and control box. Designed to go on our 3-way magnetic mount (£39.95 extra) it is an amazing performer and only 1.37m maximum!

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

KENWOOD

Listen to the Future

On or off the road, Kenwood's new TM-271E delivers powerful mobile performance with 60W maximum output and such advanced features as multiple scan functions, memory names, and TNC connectivity for packet communications. Yet this tough, MIL-STD-compliant transceiver goes easy on you, providing high-quality audio, illuminated keys and a large LCD with adjustable cool-green backlighting for simple operation, day and night.

● 200 memory channels (100 when used with memory names) ● Frequency stability better than ±2.5ppm (-20~+60°C) ● Wide/Narrow deviation with switchable receive filters ● DTMF microphone supplied ● Data connector for packet communications (using 1200/9600bps TNC) ● CTCSS (42 subtone frequencies), DCS (104 codes) ● 1750Hz tone burst ● VFO scan, MHz scan, Program scan, Memory scan, Group scan, Call scan, Priority scan, Tone scan, CTCSS scan, DCS scan ● Memory channel lockout ● Scan resume (time-operated, carrier-operated, seek scan) ● Automatic repeater offset ● Automatic simplex checker● Power-on message ● Key lock & key beep ● Automatic power off ● Compliant with MIL-STD 810 C/D/E/F standards for resistance to vibration and shock ● Memory Control Program (available free for downloading from the Kenwood Website: *www.kenwood.com/i/products/info/amateur.html)*

144MHz FM TRANSCEIVER

TM-271E

60W Model

- **High RF power output (60W)**
- **Alpha numeric LCD and illuminated keypad**
- **200 memories, memory name function**
- **MIL-STD 810 C/D/E/F and E-Mark**
- **DTMF Microphone**
- **CTCSS, DCS and 1750Hz functions**
- **Built in TCXO**

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

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june features

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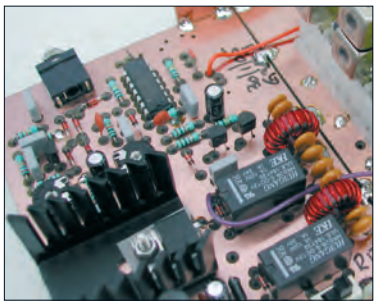

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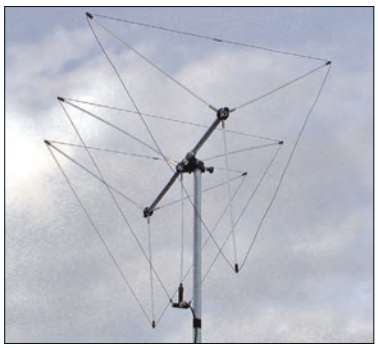

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Page 38

We've got a variety packed issue for you this month. Among the articles on offer is a review of the Icom IC-756PROIII, the latest version of this popular transceiver, part 2 of the Sutton transceiver project and of course there's the free 32 page *Antennas to Go* supplement for you to enjoy too. So, settle down to a feast of radio reading and it won't be long to wait until the next dose is due!

Design: Steve Hunt

Photograph: Courtesy of Icom UK Ltd.

Design: Bob Kemp

Photograph: Henryk Kotowski SM0JHF

june regulars

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book store

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

Please Note

Readers will no doubt notice that there is no Radio Basics (RB) column in this month's issue, this is due to the fact that the author **Rob Mannion G3XFD** has been so busy in his workshop preparing the various projects for you that we couldn't drag him away! Look out for lots more RB 'goodies' in the coming months.

Also the promised review of the Yaesu FT-60 has been held over due to space constraints and will now appear in the July issue.

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

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practical wireless services

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

Subscriptions

Subscriptions are available at £33 per annum to UK addresses, £41 Europe Airmail and £50 RoW Airmail. Joint subscriptions to both *Practical Wireless* and *Short Wave Magazine* are available at £62 (UK) £75 Europe Airmail and £93 RoW Airmail.

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.

My office computer has been busy dealing with a large number of E-mails recently. Most E-mails were, and still are, reacting to the crisis caused by Ofcom's muddles, and to the RGSB's assumption (from the objector's point of view) that they, and only they, represent the Amateur Radio hobby in the UK. This attitude has been clearly indicated by the society's widely publicised reaction to Ofcom's proposals, together with the effect of the not-so-public RSGB internal 'political party rally style' memo, which was well and truly 'leaked' (Government style) following a meeting at the Norbreck Rally in Blackpool in March.

As I was extremely interested (and dismayed) at the unprecedented reaction from the Amateur Radio community, I decided to carry out a survey of support for the RSGB at the PW Publishing Ltd. offices. It was then I discovered that I'm the only RSGB member within the company!

The reasons for non-RSGB membership given by my seven Amateur Radio colleagues were interesting. They ranged from the price of membership to questioning the relevance of the society to them personally, and also to the perceived public image of the society.

Strong Society Needed

I firmly believe that we really do need a strong, fully representative National Society in the UK. However, even though I'm a member of the RSGB I feel very uncomfortable with its obvious 'Not Invented Here' attitude and equally prominent air of superiority. I feel it's time to lose the 'semi professional/academic body' outlook and concentrate on our hobby's future.

When the often, almost tangible, animosity towards the RSGB is added to the chaos introduced by the apparently incompetent regulator (Ofcom) we have a real crisis on our hands, which demands we all stand together. However, despite the fact I think Ofcom is causing chaos, they are following the HM Government's remit. That remit must surely be that 'Regulation should not cost us money'!

Money Subject

While on the money subject, I fully acknowledge that PW Publishing Ltd., is a commercial organisation and of course I and my colleagues earn our living from the sale of the magazine. Despite this, I'm sure readers will realise that I regard my work here as a vocation. I'm totally dedicated to *PW* on their behalf, and I'm sure this attitude also extends to my Editorial colleagues.

The RSGB is also commercial in many senses. It also has full time paid staff. Jobs, as in *PW*, are dependent on the Amateur Radio hobby. And it's this particular aspect, which seems to have aroused the suspicions of many people in Amateur Radio when the RSGB reacted so strongly to the 'Licence for Life' proposals. The objectors mainly see this objection arising because the RSGB could lose licence revenue if it became the administrative service for Amateur Radio.

It's a shame that the RSGB attracts the suspicions of many non-members. I try to look past the RSGB's 'not invented here' attitude, especially as the Society - as far as possible - seemingly ignores anything that's not of/or associated with the RSGB (this includes *PW* and its support for the hobby). Instead, I do my utmost to work with the Society, and am proud to say that a number of RSGB Presidents have been, and remain good, close friends.

To overcome the difficulties (mainly caused by Ofcom) we must all work together. I'm sure that the National Society could, and should run the administration of Amateur Radio in the UK, **even if it didn't have the income because of a 'Licence for life'**. After all, many National Societies are run without the aid of permanent (and expensive) headquarters building and minimum staff. In fact, they are often operated from the elected officer's homes, with no paid staff whatsoever.

In my opinion it all comes down to what the RSGB's priorities are. They have a choice: preserving jobs, prestige and perceived image in the present form, or the future administration and protection of our wonderful hobby, while at the same time providing a strong National Society supported - without hesitation - by everyone.

Goodbye Zoë Shortland

Within the Editorial Department in particular, we seem to form long lasting, excellent working relations. And I'm pleased to say that **Zoë Shortland** was a special delight to work with during her 12 years here. She was also a superb, extremely fast and accurate copy typist able to decipher the worst hand-writing, including mine!

Zoë left us on 14 April to work in the telecommunications manufacturing industry where her experience helping Radio Amateurs will greatly help! She was News & Production Editor on *Short Wave Magazine* before becoming Deputy Group Production Editor, which involved her working on *PW*, *SWM* and *Radio Active*. Zoë had much input on *PW* and I'll miss her very much indeed. Bon Voyage Zoë, our loss is your new employer's gain!

Rob G3XFD

amateur radio waves

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

More 'Different' Projects?

Dear Editor

As an avid home-brewer, I am always on the lookout for something new to build. Lately there has been included (as always) some excellent projects published in *PW*. But how many radios does a Radio Amateur need in his shack? Please no more antenna tuning units and power supplies.

What myself and, I suspect, many others would like is, as they say, 'now for something completely different' such as the excellent project 'The *PW* IBP monitoring receiver' in the March 2003 issue of *PW*.

So here's my request. How about a circuit for a weather satellite receiver? The Remote Imaging Group (RIG) used to sell a splendid kit, the RX2, but this no longer appears to be in production. A simple receiver shouldn't be difficult to design and the antennas used are also fairly simple affairs. I find this a fascinating subject and it would open up a whole new avenue to our already diverse hobby.

So how about it. Anybody out there who could rise to the challenge?

Mike Brett M3JTX
Wisbech
Cambridgshire

Editor's reply. You're a man after my own heart Mike! I'm always on the look-out for 'different projects' and ask all prospective authors to let me know what's out there. Oliver Tillet G3PCJ contacted me after my own IBP 'clock' ideas were published - so please, if you have a 'different' idea contact me immediately. Incidentally, the RIG receiver project is outside *PW*'s Amateur Radio project remit, and as it fits neatly into *Short Wave Magazine's* coverage I've passed your letter on to the Editor, Kevin Nice G3UNR, for his attention and interest.

Over Simplification

Dear Editor

There's an oversimplification in the letter by **Ian Philips** of Hertfordshire ('Worried About The Future?') letters, May 2005 page 9, rightmost column, penultimate paragraph). In fact, boat owners and light aircraft owners do need to sit exams in order to use their radios. I should know - I accomplished these exams and obtained both licences!

73, Godfrey Manning G4GLM
Edgware
Middlesex

More On Phonetics

Dear Editor

I'm writing regarding HF Highlights April 05. An awful lot can be said about phonetics. From the beginning of telegraphy there have been variations on a theme. However, one thing that can be said or rather heard and that is the cause for variations on the NATO phonetics - different languages have a different way of pronouncing consonants and vowels. For example, Juliet becomes Yuliett and Sierra can sound like something else in deep QSB. It should be remembered that the NATO phonetics are nearly all English words with an English alphabet! How do operators whose written language is pictographic see a "Papa Delta"?

It is so easy for us to criticise, but I have found that alternative phonetics do make for more "Rogers". At all times the success of phonetics is slow and clear pronunciation.

Incidentally, here is a question that may be answered by those whose native language is neither English, Germanic nor Latin based. The question is are local phonetics used for confirming information?

By the way the new print finish is easy on eye for the reading. Keep up the good work.

Paul Bradfield
Langford
Hertfordshire

Letter Or Article?

Dear Editor

I must say I thought the huge letter from **Ian Philips** (May *PW*) was an article. But on closely reading it, (ignoring the repetitions...) I gather his main points were; feeling rather peeved at the desertion of 934MHz by the CBers and therefore loss of band; the difficult noise problems on 27MHz CB; and the luke-warm Amateur interest in CB as an 'introduction to the hobby'.

Maybe the last observation has some merit and more Amateur Radio input to the CB movement might have helped a little life to survive in that area. A (former) CB operator said to me recently, "Yes, we used to have a club, 'eye balls' and so on, but it all became so boring! Besides, I have a mobile phone now, like everybody else..."

The Foundation Course helps a little in hobby radio. Yet in spite of that we must admit there is a recruitment and retention problem in our movement. The dearth of young people coming into Amateur Radio is even more noticeable. We had two youths come to a few of our club meetings. First one, then the other dropped off, in spite of being presented with a donated 144MHz hand-held as a 'prize' for passing the Foundation exam.

On the other hand, Amateur Radio is an experimental and practical hobby. It is a co-operative scientific activity, not just the sub-group that do it just for chatting; and that's the difference.

If we give up our shacks, workshops and labs together with the technical and scientific activities, we've had it. The CB service was for non-technical chat with a public radio band and I say the best of luck to that idea and I hope it thrives again.

One telling observation is that nearly all young people are wary - if not terrified - of making an approach to older people or forming any kind of friendly relationships with them, such is our fear-driven increasingly paranoid society.

I must admit there were some rather nasty responses to (mainly youths) in our local CB scene some time ago. A number of boys complained bitterly to me about it. One asked, "Are there many 'wierdos' in Amateur Radio like that?" And what do you say in reply?).

Our sister scientific hobby (the Amateur Astronomers) appears to be very healthy. One club had at least six boys and girls, not really showing the fear I've mentioned, in a meeting of 20 or so people. All members appeared to observe, draw and photograph various celestial objects on a fairly regular basis.

Some were building telescopes (i.e. 'home-brew') and members of the public flocked to their open meetings. What are we doing wrong?

Ken Smith G3JiX
Canterbury
Kent

Boat & Aircraft Radio

Dear Editor

Ian Philip's letter (May *PW*) contained several interesting points, I would like to clarify just one; "Bus drivers, boat owners, light aircraft owners; don't need to sit exams to use their radios".

As an instructor, assessor and examiner of people wishing to obtain their Marine VHF certificate of competence and authority to operate, I can assure Ian that boat owners are legally required to be assessed and examined prior to using any Marine Radio.

The course of instruction lasts about six hours and covers all the individual components required by international law for GMDSS compliance. Further to this there is a series of digital alerting and voice procedure assessments as well as a written examination.

Although I have no knowledge of the aeronautical radio regulations, I'm fairly certain that light aircraft pilots also have to undergo similar testing to use radios aboard an aircraft. Perhaps *PW*'s very own 'Biggles', **Carl Mason GW0VSW*** can clarify this point?

The principal difference between Radio Amateurs and other usrs is that we are permitted to build our own transmitting equipment. If the builder of such equipment doesn't have the technical knowledge to test for spurious emissions and cure the problem, it could cause havoc for the emergency services as well as causing TVI, etc. Here in Scotland for example, it's no secret that the input to the emergency services repeaters is between 146 and 148MHz!

Colin Topping GM6HGW
Newport on Tay
Scotland

***Colin is referring to the fact that Carl GW0VSW (a Television News Cameraman) is about to take his Private Pilot's Licence exam. Good luck Carl!**

Radio Basics & VHF Projects

Dear Rob
I enjoyed meeting you again and to chat about the Radio Basics column at the Junction 28 QRP rally held in South Normanton, North Derbyshire on Saturday 19 March. It was good to see that your usual helper **Ian Brothwell G4EAN** was there too although you both looked squashed as **Peak Electronics** were sharing half your stand.

One of the subjects we chatted about was the possibility of the long awaited Radio Basics reprints appearing. At the time you said it was planned, but you didn't know when. Have you got any news for the many Radio Basics fans? As you already know, I'm keen to get the book and there must surely be others who would also want them too.

I am also hoping to build the Radio Basics 70MHz transceiver. My problem is that although I have some crystals I don't have the necessary overtone type for 70.260MHz, the calling channel. (I hope to be on the air with my M3 call soon). Best wishes

John Taylor
Heanor
Derbyshire

Editor's reply: It was good to see you, and everyone else at the very busy rally again John! Please join me on the Topical Talk page where there's some really good news on the Radio Basics reprints, a solution to the crystal problems, and encouragement for anyone planning to build the 70MHz a.m. transmitter-receiver project.

Spanish Thank You

Dear Sir
I have been a Radio Amateur since I was 16 (now 61) and I've been a *Practical Wireless* and *Short Wave Magazine* subscriber for many years now. During these years I have bought parts and components from suppliers that were announced in both magazines.

Recently, I had a very good experience with **Waters & Stanton**, Southend. In a few words: I ordered some components from Waters & Stanton via their Internet sales service. When I received the parcel at home, I realised that the packaging was badly damaged and the components inside were broken. I E-mailed them explaining the situation. They gave me a rapid answer, and new replacement components were sent to me without any cost.

I'm very pleased to write these lines to put in general knowledge, by means of this magazine, the Waters & Stanton excellent business practice and customer service.

Related to your magazines, I will definitely continue with my subscription to both for a long time and I encourage you to keep doing this good work. Best regards,

Juan J. Zaera EA3SE
Valls
Spain
E-mail: jjzm@tinet.fut.es

Editor's reply: Thanks for the encouragement Juan, and it's always to hear good things about *PW* and its advertisers.

Operating 7MHz AM

Dear Sir
With reference to the letter in the April issue of *PW* from **Andy Foad G0FTD**, regarding operating on 7MHz a.m. I think that this is an excellent opportunity not to be missed. May I, through your magazine, suggest that a weekly net on a.m. would be a excellent way to achieve this, A regular day and time that the s.w.l. can get to know and tune to.

Topics of conversation could be anything that the stations participating care to talk about to keep the listener interest (as long as it was in the terms of their licence.) The net closing time could be open ended not restricted to an hour, perhaps on a Sunday afternoon. I will put my name forward as I live centrally in England.

Mike Coe M0DMD
Northampton

Editor's comment: It's great to hear good quality a.m. on h.f. again, and I'm pleased to hear it being used on both 70 and 144MHz. All operators seem to be using equipment they've built themselves too - so long live home-brewing!

Letters Received Via E-mail

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

Editor

amateur radio rallies

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

May 29
Mid-Ulster Amateur Radio Club
Contact: Ivan
Tel: (02838) 342501
The above club will be holding their Rally & Computer Fair in The Embankment, Derrymacash, near Lurgan, County Armagh, Northern Ireland. Doors open at 12 noon and there will be all the usual trade stands, Bring & Buy, pub grub and lunches, etc. Talk-in on S22.

June 5
The 9th Red Rose QRP Festival
Contact: Les Jackson G4HZJ
Tel: (01942) 870634
E-mail: g4hzj@ntlworld.com
To be held at the Formby Hall, Alder Street (off High Street), Atherton, Manchester. This is a friendly get-together, to promote low power Amateur Radio operating and home construction. There will be trade stands and individual stalls, sale of new and surplus equipment and components, club stands, low cost Bring & Buy, Morse receiving tests with certificates, all in large spacious halls at ground level, with a huge free car park and disabled facilities. Talk-in on S22 and admission is just £1 50.

June 5
Spalding Radio Rally
Contact: Ambrose M0DJA
Tel: (07989) 636520
Doors open at 1000 (0730 for traders). Talk-in on S22, admission just £2. There will be indoor traders and outdoor pitchers, plenty of free, tarmac parking on site.

June 19
The Annual Newbury & District Amateur Radio Society's Car Boot Sale
Website: www.ndars.org.uk
The Boot Sale is taking place at the Ackland Memorial Hall, near Thatcham, Berkshire. Directions and a map can be found on the club's website, see above.

June 19
Worthing & District Amateur Radio Club's Summer Rally
Contact: Jim G4XRU
Tel: (01273) 473505
Website: www.wadarc.org.uk
To be held at Newhaven Fort Museum from 1030 till 1430. A special entrance fee of £2.50 has been agreed, which will also give amateurs access to all other Fort facilities, including GB2NFM and the display of radio equipment from the past. Tables are provided at £15 for traders and £10 for private sellers and clubs. Tables must be booked in advance. Any profits from the rally will go towards enhancing the radio museum display at the Fort. Newhaven is in Sussex, midway between Brighton and Eastbourne, and the Fort is well signposted from the centre of the town. This date is also the date of the London to Brighton charity bike ride, so traffic may be heavier than normal. It is also Father's Day, so what better way than to spend it than with the family at the Fort Museum, taking in the rally and the spectacular views across the Channel? An impressive day out!

June 19:
East Suffolk Wireless Revival
Contact: John Quarmby G3XDY
Tel: (01473) 717830
The East Suffolk Wireless Revival takes place at 0930 at the Suffolk Showground, Felixstowe Road, Ipswich. There will be ample car parking and well signposted access. The main attraction will be the radio car boot sale. In addition, there will be a Bring & Buy, book stall, h.f. station and local club stalls, as well as food and refreshments.

***June 26**
The West of England Radio Rally
Contact: Shaun G8VPG
Tel: (01225) 873098
Website: www.westrally.org.uk
To be held in Frome, Somerset. Contact the above for more information.

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

Getting Wound Up!

Dust off that h.f. portable gear and enjoy some spring time operating with the aid of a Wire Winder.

When operating portable, perhaps from a caravan or exotic DX location how to wind-up your antennas often poses a problem. Wire antennas have a nasty habit of getting tangled, usually at just the wrong moment - but not any more!

The new Wire Winder from SOTA Beams aims to address the problem of tangled antenna wire. The Wire Winder is a cleverly designed plastic holder that wires may be wound on.

Using a figure of eight winding technique, deploying h.f. antennas is very fast and trouble-free. With the wire wound on, an elasticated toggle is supplied to keep it in place. Retailing at just £6.50 a pair including P&P the Wire Winder is sure to be a winner.

For more details on the Wire Winder and other SOTA Beam products and activities take a look at **www.sotabeams.co.uk**

SOTA Beams,
ECS Ltd,
89 Victoria Road,
Macclesfield
Cheshire,
SK10 3JA
Tel: (01625) 425700

Worthing Talks To The World

Members of the Worthing & District Amateur Radio Club recently took place in National Science Week and ended up with local children chatting world-wide.

In conjunction with National Science week - 11-19th March - the **Worthing & District Amateur Radio Club** (WADARC) was invited, together with the **Worthing Museum** and **Worthing Borough Council** to set up an active Amateur Radio station within the Worthing Museum. During Science week many visitors to the museum chatted to WADARC volunteers who gave a full explanation of the sciences behind radio communications, mobile telephone technologies with regular video presentations in the lecture theatre. The visitors were also told about the new licensing structure introduced by Ofcom and the Radio Society of Great Britain.

Excited pupils from Whytemead and Hawthorns First schools enjoyed learning how to send their own names using Morse code and with further practice learnt to tap out the SOS call used by the ill fated RMS *Titanic* ocean liner. Each pupil was awarded a certificate of achievement on completion of their Morse training.

The visiting pupils were also able to speak directly to over 30 other Amateur Radio stations locally and across the World. They were also told how their transmissions reached other parts of the World.

Stepping into the 21st Century the pupils were taught how and why the Amateur Radio community world-wide are the only Amateur body to be allowed to talk to the *International Space Station* as it travels around the globe at 17500 miles per hour and how radio waves are sent into space, bounced off the Moon, satellites, and the tails of Comets and the science behind these technologies.

The Worthing museum radio station managed to contact over 30 countries world-wide during science week, these included, Japan, Indonesia, Saudi Arabia and islands in the Pacific Ocean using the special callsign of **GX1WOR**.

Meanwhile, other members of WADARC were busy running the permanent radio station housed within the ramparts of the Newhaven Fort Museum using the special callsign of **GB2NFM**. The National Science Week activities mirrored those of Worthing Museum and contact was established between the two museum stations. Again another huge success both on the air and with visiting schools and the public. (Newhaven Fort Museum is open seven days a week and boasts a superb cafeteria and stunning views across the English Channel).

Worthing & District Amateur Radio Club would like to thank the superb staff at the museum and East Sussex and Lewis County and District Councils for their continued support. Thanks also go to Worthing Borough Council, Worthing Museum and its superb staff for making the Science Festival event a huge success, as well as Icom UK Ltd., who also supported the event with 'goodie' bags.

To Deregulate or Not?

Readers can't have failed to hear the 'news' of Ofcom's proposals to try and deregulate Amateur Radio, don't panic though....

Rob Mannion G3XFD talks about the subject of deregulation and the rumours, speculation and comments in this month's Keylines on page 8 but to help put you in the picture here's some useful information on the subject.

On 26 May Ofcom will publish new proposals to reduce the regulatory burden on the Amateur Radio community whilst retaining the necessary safeguards to ensure the integrity of this important use of the radio spectrum. The proposals will be published for public consultation; and Ofcom believes it is very important that as many Amateur Radio users as possible are willing and able to share their views on the different options presented.

To keep abreast of the situation and to

Rosie Gale talks to a German station from the Amateur Radio station that was set up at Worthing Museum during National Science Week.

receive updates on radio spectrum matters you can register on the Ofcom website at **www.ofcom.org.uk/static/subscribe/radiospectrum.htm** There is also information to be found on the Radio Society of Great Britain's website at **www.rsgb.org.uk**

Palstar Analyser

Nevada have recently added a new antenna analyser to their list of products, the Palstar ZM30.

Nevada state that the Palstar ZM30 h.f. antenna analyser uses a precision low power DDS signal generator to provide a stable signal source. This gives it greater accuracy and allows it's use as a stable stand-alone low power transmitter for remote antenna tests.

The s.w.r. analyser is powered by an 8-bit micro-controller with a self-calibrating reflectometer. The unit can also measure Impedance, Reactance, Inductance, Capacitance, Stubs, *Q* factor and resonant frequency.

Suitable for use from 1 to 30MHz, the ZM30 also boasts a serial port for field upgradable software. Power is derived from its own internal batteries.

Nevada have the Palstar ZM30 in stock now for £299.95. Look out for a review of the ZM30 coming soon in *PW*.

Nevada,
Fitzherbert Spur,
Farlington,
Portsmouth PO6 1TT
Tel: 0239-231 3090
FAX: 0239-231 3091
Website: www.nevada.co.uk

News from Plymouth

Plymouth Radio Club has been around for years and is still going strong, so if you're looking for a radio club in and around the Plymouth area, look no further...

After losing their wonderful venue at the Royal Fleet Club in Plymouth at the end of the last century, the club was offered temporary premises in the University of Plymouth by the Dean of faculty and **Alan Santillo** (senior lecturer). The venue allowed the club to carry on, although at a reduced level, for several years during which time **Bob Griffiths** and **Chris Wingate** were able to achieve wonders on the teaching front with many new callsigns being issued due to their work.

During the end of 2003 news was heard that the electronics department of the University of Plymouth was to be completely modernised and the club would again be homeless. A meeting was called by the steering committee during which it was decided to have a massive push by members to try and resurrect the club to it's former glory.

The interested parties in the area formed a new committee and located premises for a trial period. During the first year the club had three field days, a BBQ, took part in Lighthouses on the Air, helped out on the Plymouth Navy Days amongst a host of other events.

The club has 'hopefully' now settled at the Royal Air Force Association premises in Ermington Terrace. They meet on the second Tuesday of the month at 1900 for a 1930hours start.
A full programme of events is scheduled for this year and a few events are already planned for next year. One of the major events planned for this year is the Rally.

The Plymouth club has not been able to hold a rally for about eight years, and will be held at the Sparkwell Village Hall on **Sunday 5 June 2005** from 1000hours. There are still a few tables left and further information on the rally is available from **Peter Connor on (01752) 837319**. A full listing of events, directions and other information about the club is available at **www.parc.org.uk** or by contacting **Frank G7LUL** at **frank@foxonezero.fsnet.co.uk**

Power-up with MyDEL

Martin Lynch & Sons announce the addition of two more MyDEL own brand power supply products, in the shape of the MP-250A and the MP-4128.

The MP-250, so M L&S say, is a neat looking desk-top power supply ideal for powering any main rig requiring 13.8V d.c. at 22-25A. Despite the compact dimensions, 5 3/4W x 4 1/2 H x 6in D, the front panel is home to two huge back-lit meters showing Volts and Amps. The current RRP of the MP-250A is £89.95

The second new power supply is the MP-4128.This is a more usual 'slab' design without metering, retailing at £69.95. All MyDEL power supplies are offered with two years exchange or

Cheltenham Update

The Annual General Meeting of the Cheltenham Amateur Radio Association (CARA) was recently held, with some long serving stalwart members stepping down from the committee. Here's the latest news.

The new Chairman of the CARA is now **Pat Moore G3IKR**, with **Doug Fisher G4IGN** as Deputy. Secretary and Treasurer are **Alan Errock G3HCO** and **Tony Jay G8JAY** respectively, with committee members now **Roger Cole G3REB**, **David Abbott G4RFU**, **Max White 2E0RGO** and **Richard Stanway M3NSZ**. Richard is one of the club's youngest members, and is now the Newsletter Editor - with circulation now on both paper and via E-mail.

The Cheltenham club has an active membership of 80 and meets on the first Friday of the month at 1930hours at Prestbury Library in Cheltenham (near the racecourse). Visitors are always welcome.

Most meetings involve either a club based or visiting speaker. Forthcoming features are 'DXing Africa' by **G0MTN** in July, a visit by Cathy Clark, RAYNET National Chairman, for September's meetingm and 'Constructional Projects from the past' by **Mike G3TSO** in October.

The Prestbury Library location has recently been accepted as a designated examination centre, and the club are now looking to run Foundation licence courses later in the year. For details on this and all the other Cheltenham club activities contact **Pat G3IKR** (QTHR) or via the Website at **www.cara.cheltweb.co.uk**

Intermediate Licence - All Sewn Up!

Irvine James M3TFR and his Son Henry M3SIB owe a vote of thanks to wife and mum Lynn for well and truly stitching up their licence success.

After passing their Foundation exams Irvine and Harry began studying for the Intermediate level and before long wife and mum Lynn was giving a helping hand. Lynn, a keen cross stitcher, got busy stitching the cloth pictured here.

The design incorporates three important triangles, top of which is ohms law, the component colour values table, Morse code and the phonetic alphabet and international codes. It must have helped, as both Henry and Irvine passed the Intermediate exam and at the time of publication are eagerly awaiting their 2E0 callsigns.

Well done to all the James family for keeping with the true spirit of Amateur Radio and helping each other.

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

repair warranty and are available now.
Martin Lynch & Sons Ltd.,
Outline House,
73 Guildford Street,
Chertsey,
Surrey
KT16 9AS
Tel: (01932) 567 333
FAX: (01932) 567 222
E-mail: Martin@MLandS.co.uk
Website: www.HamRadio.co.uk

Mayoral Communications

The Deputy Mayor of the London Borough of Havering recently visited the Havering & District Amateur Radio Club during an evening all about RAYNET

On Wednesday 6 April, **Phil Williams G6AQH** the London Zone Co-ordinator for The Radio Amateurs Emergency Network (RAYNET), and **Paul Harrison G8MJH** the NE London Group Controller visited the Havering & District Amateur Radio Club as guest speakers on the subject of RAYNET. There was also a special guest in the audience, and that was Councillor **Jeff Stafford**, the Deputy Mayor of the London Borough of Havering. Councillor Stafford did have a communications background with BT so he was no stranger to the technical matters that were covered in the lecture.

During the presentation Phil outlined how RAYNET was formed back in 1953 when Radio Amateurs provided emergency communications following the East Coast Floods. He then went on to explain how the various RAYNET groups are organised throughout the country, into counties, regions, or areas. Phil also spoke about how the training is carried out at various functions, such as the London Marathon, and how important training it is to the groups, as it has to be to an agreed national standard..

Members of the Havering club also learnt that RAYNET provided communications at disasters, such as Zeebrugge, and Lockerbie, where a minimum of 80 RAYNET members were on duty each of the first 10 days, and nearly double that on busier days. Phil finished his lecture by telling the audience how RAYNET would be of great value if an evacuation was required from a large town or City (such as London) for various reasons, and how this scenario would be planned by officials..

Phil G6AQ's lecture was presented in a most professional fashion, and the Havering & District ARC would like to thank him and Paul G8MJH for their time, making the lecture possible. The club would also like to thank the Deputy Mayor, Councillor Jeff Stafford for attending the meeting to foster a closer liaison with the borough Council and the Amateur Radio movement..

In the Clear with Heil

Check out the Heil CLEAR-SPEECH d.s.p. speaker available now from Waters & Stanton PLC.

The Heil CLEAR-SPEECH is billed as a high quality d.s.p. speaker with easy-to-use controls. It has a front panel mounted five-step switch for selecting the depth of d.s.p. control for different noise sources.

It also has a separate volume and tone controls, as well as a bypass switch and it is fitted with an l.e.d. sensitivity input level monitor. The audio is further enhanced by an acoustically tuned enclosure for superb audio quality. There are separate sockets for an external speaker (if required) and headphones.

The CLEAR-SPEECH can be used for all communications - amateur or professional, fixed or mobile. Housed in a smart black case, the CLEAR SPEECH costs £169.95, is supplied with fixing bracket and is available now from Waters & Stanton PLC. Look out for a review of the CLEAR SPEECH in *PW* soon.
Waters & Stanton PLC,
22 Main Road,
Hockley,
Essex
SS5 4QS
Tel: (01702) 203353
FAX: (01702) 205843
E-mail: sales@wsplc.com
Website: www.wsplc.com

amateur radio clubs

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

BRISTOL

South Bristol ARC
Contact: Len Baker
Tel: (01275) 834282
Website: www.sbarc.co.uk
Meeting every Wednesday at 2000hours at the Whitchurch Folkhouse, East Dundry Road, Whitchurch, Bristol, the South Bristol ARC offer a varied programme of events for their members. Future events include: **18 May**: Annual Mantenance of Club Antennas with **Peter Hill**, the club Technical Officer and **25th**: On The Air Evening.

ESSEX

Chelmsford ARS
Contact: Martyn Medcalf. G1EFL
Tel: (01245) 469008
Website: www.g0mwt.org.uk
The Chelmsford Amateur Radio Society meet on the 1st Tuesday of each month at the Marconi Sports & Social Club, Beehive Lane, Chelmsford, Essex. Doors open at 1900hours and meetings run from 1930 to 2200 hours. A bar is available during the break at reduced prices.

NORTHERN IRELAND

Bangor & District ARS
Contact: Michael Stevenson GI4XSF
Tel: 0284-277 2383
Website: www.bdars.com
The Bangor & District Amateur Radio Society meet on the 1st Wednesday of the month at 'The Stables', Groomsport at 2000 hours. Meetings are open to all and new members are always welcomed. The meeting on **1 June** will be the club's annual BBQ, taking place at the Scout Camp in Crawfordsburn Country Park. This should be a great night with lots of fun and good food. For more details on the club's activities check out the website.

STAFFORD

Stafford & Districts ARS
Contact: Graeme Boull G4NVH
Tel: (01785) 604534
E-mail: graeme.boull@ntlworld.com
Website: www.g3sbl.org.uk/
Stafford & Districts Amateur Radio Society (previously St. Leonards Amateur Radio Society) meet on Thursdays at 2000hrs. The shack is located in the AREVA T&D UK Ltd. Factory in St. Leonards Avenue, Stafford. The Chairman is now **Graeme Boull G4NVH** as **Derek Southey G0EYX** has stepped down so that he can have the time to pursue Amateur Radio and other interests. Forthcoming events include **12 May**: Surplus Equipment Sale, **19th:** Shack Night & Committee Meeting, **26th:** Portable Operations at Glacial Boulder, Cannock Chase and **2 June**: Club Open Evening.

WORCESTERSHIRE

Bromsgrove & District ARC
Contact: Chris Margetts M0BQE
Tel: (01905) 776769
The Bromsgrove & District Amateur Radio Club meet at 1930 hours every Friday at the Avoncroft Arts Centre, Stoke Heath, Bromsgrove, Worcestershire. During June the club celebrates its 40th Anniversary and during hte month will be operating the special event callsign **GB4OBC** on the h.f. and v.h.f. bands. The celebrations will come to a close on 24 June and the club would like to extend an invitation to attend the BBQ to club members past and present. For more details contact M0BQE. Forthcoming events include: **1 July**: Radio Clubs in the West Midlands - a talk by **Bill Moorwood G3CAQ**, **8th**: 'Hills on the Air' and 15th July: **BBQ**. Why not go along and join in?

The Oscilloscope

Part 6 - Workshop and Radio Shack Applications

Gordon King G4VFV now guides you through the workshop use and applications of the oscilloscope.

If you've been following this series you should now have a basic idea of the working principles of the 'scope, how time and amplitude measurements are made and interpreted, rise time and bandwidth implications, the characteristics of sine and square waves, elementary applications and so forth, so now is the time to consider the use of the bargain 'scope in the workshop and shack. Actually being able to see the nature of the signals you are dealing with can be of immense help to the 'self training' philosophy of our hobby - and let's face it, that is a primary aspect of Amateur Radio.

Coupling the Y input of a 'scope to the test signal through an open length of wire is prone to 50Hz ripple and spurious signal pick-up and should generally be avoided. Using screened cable terminated by a couple of crocodile clips for ease of connection is satisfactory for relatively low-frequency signals, and for pulses of not too short rise time. However, there are occasions requiring a more specialised interface, such as when application is to a point of high impedance, or when the voltage or amplitude of the test signal is greater than the oscilloscope's Y input capability.

Compensated Probe

When a 'scope is connected directly to a radio frequency (r.f.) source of high impedance through screened cable, the total shunt capacitance of the cable and the Y input capacitance could well approach 100pF, which could adversely affect the circuit under test. This problem can be reduced by using a probe of suitable characteristics to interface the source to the 'scope.

The circuit of one example of a passive probe, known as a compensated voltage-divide probe, is shown in **Fig. 1**. When used with a 'scope whose Y input resistance is 1MΩ, which would apply to many practical 'scopes of the kind we are looking at, the resistance at the tip of the probe would rise by a factor of ten to 10MΩ, as established by the series resistor, but at the expense of a ten-to-one reduction in sensitivity.

Relative to the capacitance of the screened connecting cable and the Y input capacitance of the 'scope itself, the trimmer capacitor Cc is adjusted to divide down the capacitive reactance equally, thereby reducing the tip capacitance by a factor of ten. All frequencies are equally attenuated when the trimmer is adjusted for the least rounding or overshoot at the leading corner of a 1kHz squarewave applied to the probe tip. (A squarewave generator is usually built into the 'scope to cater for this and other requirements).

When assessing the amplitude of a signal picked up by a probe of this kind, account must be taken of the voltage-divide ratio in conjunction with the setting of the 'scopes volts/div control. However, there are active probes that provide a high tip impedance without impairing the input sensitivity.

Amplitude Modulation

A classic example of amplitude modulation (a.m.) is shown in the oscillogram in **Fig. 2**. Here a modulated r.f. signal, provided by a Marconi signal generator applied to the Y2 input, is shown by the lower trace, while the audio frequency (a.f.) sinewave responsible for the modulation, provided by a Radford low distortion oscillator coupled to the Y1 input, is shown by the upper trace.

The oscillogram (Fig. 2) nicely illustrates how a dual-trace 'scope makes it possible to display two related waveforms simultaneously. In this case, direct comparison between the modulation envelope of the lower display and the modulating sinewave of the upper display gives a basic indication of any modulation distortion. Hardly any in this example, though.

Because the timebase sweep needs to be set to suit the frequency of the modulating signal, the separate sinewaves of the higher frequency carrier wave, of course, are much too close together to be discernible. The modulation percentage can be determined from the lower display by dividing the difference between the maximum and minimum amplitudes within the envelope by their sum, and then multiplying the result by 100.

In the example given, the difference and sum respectively are about 2.2 and 6, signifying a modulation percentage close to 36.6% (2.2 divided by 6 times 100). Increasing the modulation to 100%, so that the minimum amplitude within the envelope just drops to zero, results in the peaks of the modulation envelope rising to twice that of the unmodulated carrier wave.

Oscilloscope Monitoring

The 'scope can also be arranged to monitor the signal radiated by your transmitter by connecting a short length of wire, acting as an 'antenna', to the Y input through a length of coaxial cable, and setting the Y sensitivity and timebase controls accordingly. Troublesome 50Hz mains ripple can be reduced, but at the expense of some r.f. amplitude, by connecting a 50Ω resistor between the inner conductor and outer screen of the coaxial (a radio-frequency choke could be a better alternative).

The Y bandwidth will need to embrace the frequency of the transmission, of course, but most practical 'scopes should be capable of responding to the signals of the lower frequency Amateur bands. Working 4W QRP on the 7MHz band into my roof-space trap dipole antenna, I get a display of around 0.6V peak-to-peak (p-p) when monitoring my transmission in this way.

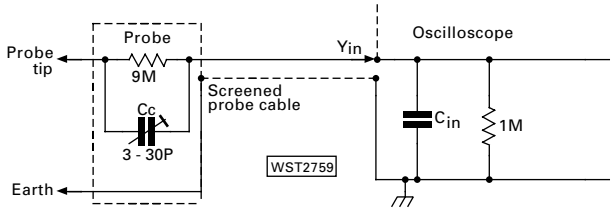


Fig. 1: This example circuit of a simple compensated voltage-divider probe increases the resistance and reduces the capacitance of the Y input, but at the expenses of a ten time reduction in sensitivity, as explained in the text.

By setting the timebase to the fastest sweep rate and activating the X10 facility, it should be possible to resolve the separate sinewaves of an unmodulated carrier. Under these conditions most rally-acquired 'scopes will achieve a maximum sweep rate of 0.05 microsecond/div. One complete sinewave of a 7MHz carrier would then occupy about 2.86 divisions on the graticule.

By noting the vertical amplitude of the display when the transmitter is sending a low-level c.w. signal, it becomes possible to determine the output at other amplitudes of deflection. For example, let's say that the amplitude of the display is 0.6V when the transmitter is sending 4W, then at an amplitude of 6V the output would have increased to 400W.

So, how do we know this? Well, the arithmetic is simple. We merely divide 6 by 0.6, square the result and multiply by 4; e.g., $(6/0.6)^2 x\ 4 = 400$. The deflections are squared because power is proportional to the square of the voltage (see below), while beam deflection is directly proportional to the voltage. I've used this method of 'scope monitoring to keep an eye on the p.e.p. while transmitting in s.s.b. mode. It's one way to avoid overdriving and inadvertently peaking above the 400W p.e.p. limit.

Clearly, care must be taken to avoid interference to other Amateurs and users of the band when running a transmitter while monitoring off-air for test purposes. Detailed tests and measurements using a 'scope require the transmitter to be driven into a dummy load with a means of measuring the power, and an arrangement for coupling a small sample of the signal across the load to the Y input.

When a 'scope is used to assess transmitter performance, a two-tone modulating signal of suitable level for applying to the microphone input can be useful. The two tones should be low distortion sinusoidal, equal in amplitude, non-harmonically related and, of course, within the rig's modulation bandwidth. (**Note**: The *PW* Two Tone Oscillator by **Tony Nailer G4CFY**, published in the February 2005 issue, would make a useful piece of kit to partner your 'scope. The article also describes how the oscillator can be used with a 'scope, along with details of test results. It also tells how an in-line sniffer unit can be constructed to yield a low-level r.f. Y input).

Power, Voltage and Resistance

Now let's look deeper into power, voltage and resistance. The r.f. voltage appearing across a non-reactive dummy load at the output of a transmitter is equal to the square root of the power in watts multiplied by the load resistance in Ohms. At 400W peak envelope power (p.e.p.), therefore, the amplitude of the r.f. would be quite substantial and beyond the Y input capability of a practical 'scope.

This is why it's necessary to attenuate the voltage by using a suitable probe, coupling circuit or ësnifferë. Moreover, when dealing with strong r.f. voltages extreme care is required to avoid r.f. burns to person and serious damage to test equipment.

On the audio side, though, it's generally less hazardous to connect the audio frequency (a.f.) voltage appearing across a resistive load at the output of an a.f. amplifier either directly to the Y input or through a simple attenuator. This is because a.f. power is often measured in tens rather than in hundreds of watts, while the load resistance is commonly in the order of four or eight Ohms rather than 50Ω. For example, the r.m.s. voltage across a 4Ω load connected to the output of an a.f. amplifier delivering a sinewave of, say, 25W average power would be 10V, corresponding to 14.14V peak and 28.28V peak-to-peak.

It's worth keeping in mind that average power, sometimes erroneously called r.m.s. power, is equal to the square of the r.m.s. value of the voltage (see Fig. 1 in Part 3 *PW* March) divided by the load resistance in ohms, or $W = V^2/R$ (or I^2xR; where I is the r.f. current), and that the p.e.p. is the average power in one r.f cycle at the highest crest of the modulation envelope delivered to the antenna (or load).

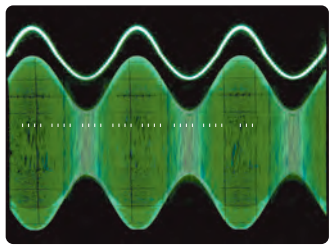


Fig. 2: The modulated carrier wave and the signal responsible for the modulation of this dual trace a.m. oscillogram are shown respectively on the lower and upper traces. Modulation percentage can be calculated from the ratio of the maximum and minimum amplitudes within the modulation envelope, as explained in the text.

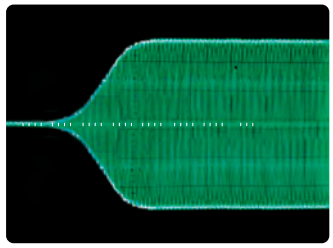


Fig. 3: An impression of the leading edge of a radiated keying waveform based on the oscilloscope's timebase running at 1mS/div.

Key Clicks

By keying a transmitter in A1A mode (c.w.), the keying display will give an idea of whether key clicks are likely to be troublesome. The basic keying waveform is tantamount to a squarewave that, as already told in Part 5, is derived from the fundamental (keying) frequency plus a wide range of essentially odd-order harmonics.

Harmonics from an untreated keying waveform yield multiple sidebands that can extend many kHz either side of the carrier frequency. It is the energy carried by these sidebands that is responsible for the annoying key clicks sometimes heard far removed from the operating frequency.

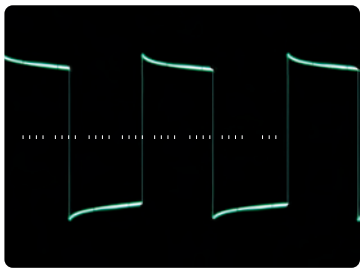
The trick is to limit the rise (and fall) time of the keying waveform. Most transmitters from commercial sources take care of this quite adequately, indicated by the controlled rise and fall times of the a keying waveform.

An impression of the leading part of a keying waveform of an early transceiver of mine, based on the oscilloscope's timebase running at 1mS/div, is given in **Fig. 3**. I think this is quite a fair result as witnessed over many years of working c.w. with the rig and not having had any complaints of key-click QRM.

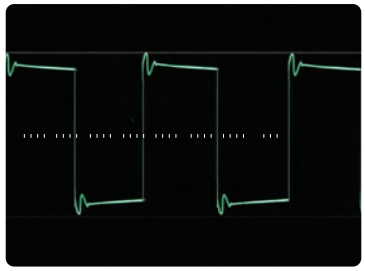
If the rise time is increased too much above about 5mS the keying will sound over 'soft' and the code more difficult to read. A rise time of 5mS relates to a bandwidth of between 70 and 100Hz (Part 5, *PW* May), depending on the nature of the click suppression treatment.

The power that exists at the peaks of the modulation envelope represents the p.e.p. This, of course, is also the case with a monitored single-sideband (s.s.b.) audio frequency display, but here the general nature of the display, and the rises and falls in amplitude, are related to the frequency, harmonic content and the loudness of the modulation.

With a little practice it becomes possible to glean a rough idea from a speech-derived s.s.b. display whether a rig is suffering from peak clipping, overload, instability or any other significant shortfall. More serious tests, of course, require the use of additional instruments, such as an accurate output power meter, two-tone oscillator, r.f. coupler, etc., as mentioned earlier.



(a)



(b)

Fig. 4: Example oscillograms. (a) Squarewave sag resulting from limited low-frequency response. (b) Squarewave with slight overshoot showing ringing in oscillatory circuit triggered by pulse. (c) Sinewave with clipped positive-going half cycles resulting from incorrect amplifier biasing. (d) Noise display heard as 'hiss' and sometimes referred to as 'white noise'. (e) Electrical interference on 50Hz mains waveform radiated from fluorescent light fitting. (f) Total harmonic distortion (lower trace) carried by the sinewave (upper-trace) remaining after removal of the fundamental frequency by a steep and narrow notch filter.

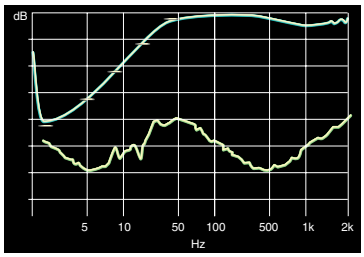


Fig. 5: Frequency response and stereo separation curves of gramophone pickup playing a special test record as displayed on a 'scope in conjunction with a swept function generator, where the vertical scale of the graticule is 5dB/div logarithmic and the horizontal scale Hz x 10 (also see Fig. 5 in Part 5).

Learning Curve

After first acquiring a 'scope, whether ancient or modern, new or second-hand, you will have triggered a very interesting continuing learning curve. I know, I started on my curve 60 years ago! Like **Rob G3XFD** said, his first introduction to the 'scope's usefulness was when it revealed to him a bias fault in a misbehaving tape recorder.

It's impossible, of course, within a few thousand words to delve deeply into the 'scope's myriad applications. But I think it would now be appropriate to round off this short series by highlighting a few of the more interesting oscillograms related to my own diagnostic and performance testing activities over many years, yet which still remain perfectly valid.

Looking At Oscillograms

The oscillograms are brought together in **Fig. 4**, where the first one at (a) depicts a low frequency squarewave with horizontal sag resulting from its passage through an amplifier or circuit that tends to attenuate (or roll-off) the lower frequencies slightly relative to the middle and higher frequencies. This is the converse of high-frequency roll-off which, as we saw in Part 5, impairs the rise time and rounds the leading corners of a squarewave.

The squarewave at (b) reveals a trace of overshoot at the upper leading corner, an indication of amplifier instability. 'Ringing', a diminishing amplitude oscillation, is likely to occur when a fast-rising pulse triggers an undamped, high *Q* oscillatory circuit. The clipped sinewave at (c) is a fairly typical display as might stem from the signal passing through an incorrectly biased a.f. amplifier.

Noise signal such as (d) is responsible for the gentle hiss behind a weak radio signal or from a poorly designed high-gain a.f. amplifier, sometimes, though not always correctly, referred to as 'white noise'. Interference generated by a poorly suppressed fluorescent light can be seen on the 50Hz mains waveform at (e), revealing the remarkable versatility of the workshop 'scope. Finally, the dual trace display at (f) shows a 'pure' sinewave on the upper trace, and the total harmonic distortion (THD) contained within the sinewave on the lower trace, obtained by 'notching out' the fundamental frequency.

Frequency Response Plots

The dual trace display in **Fig. 5** shows how I have also used a 'scope to plot a.f. response curves. Here the upper trace shows the frequency response of the speaking channel of a stereo gramophone pick-up playing a frequency response recording, and the lower trace the breakthrough signal in the non-speaking channel.

The graticule is scaled in 5dB/div vertically and Hz-times-ten horizontally, corresponding to vertical and horizontal ranges of 40dB and 20Hz to 20kHz respectively. I have also used this technique for checking the frequency response of stereo radio receivers and hi-fi tuners.

The idea is similar to that described for tuned circuit alignment (Part 5), but for these audio tests a swept functions generator was used in conjunction with a Telequipment dual beam 'scope. The Y deflection was made logarithmic by using a home-constructed a.c./d.c. converter with a logarithmic amplifier.

The Z Input

In addition to the X and Y inputs, most 'scopes are usually equipped with a Z input that links to the grid of the c.r.t. By coupling positive - or negative-going pulses to this input, which is often located at the rear of the instrument, the trace can be either intensified or darkened for the period of the pulse. In this way timing markers can be superimposed on the display by the application of suitable pulses from a calibrated generator, representing an alternative method of reading sweep time, for example.

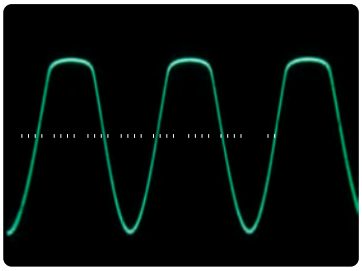
Having now arrived at Z my story too has virtually ended, but not before a few words of encouragement to newcomers. The oscilloscope has been of immense help to me during my life working with things electronic. We came together when I was young and repairing radios on the home front at the start of the war, and we became even more of a technical duo during my war time activities in the Royal Corps of Signals with Special Communication and Experimental Units in SE Asia.

The reintroduction of television and the revival of hi-fi sound in stereo not long after the war finished, rendered the 'scope an even more potent aid for procedures related to both design and servicing (**Fig. 6**). It also became a primary instrument during the time I was pioneering coaxial relay (cable TV) and developing electronic devices such as the King Telebooster, electronic car rev counter, automatic slide change unit, etc.

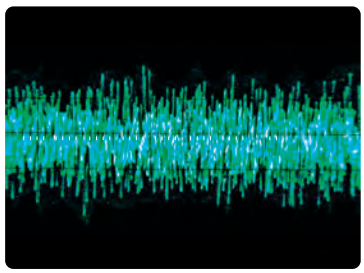
Fig. 6: Gordon G4VFV managing an electronics division not long after the end of the Second World War, showing an early Cossor 'scope along with a 'mini-scope' (on the side table). Despite its limited features, radio buffs and service departments in the 1950s often chose this relatively inexpensive mini-scope.

Fig. 7: G4VFV on the air in his lab/shack at Brixham, showing a Telequipment Oscilloscope, Marconi Signal Generator, HP Spectrum Analyser and other associated items used by Gordon for his design and magazine reviewing activities.

The 'scope continued to flourish in my domain during the happy years I subsequently spent testing and reviewing hi-fi equipment for the audio magazines, and writing many technical books and hundreds of articles for the technical press. Now, after more decades than I care to remember, the 'scope and I find it hard to be parted. Together, you will find us still in the radio shack one way or another (**Fig. 7**). Have fun becoming acquainted with your bargain 'scope! **PW**



(c)



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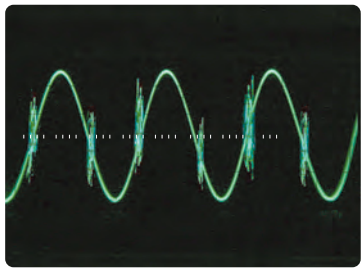

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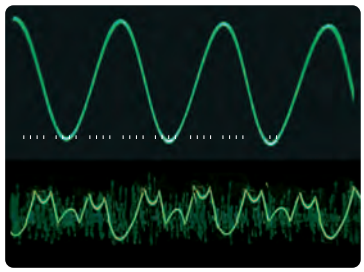

(f)

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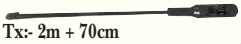

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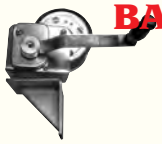

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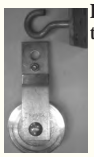

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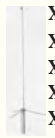

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6.1 Balun		1kw Handling	£25.00 P&P £4
40 mtrs	Traps	(a pair)	£25.00 P&P £4
80 mtrs	Traps	(a pair)	£25.00 P&P £4
20 mtrs	Traps	(a pair)	£25.00 P&P £4

TELESCOPIC MASTS

6 section telescopic masts. Starting at 2"/2" in diameter and finishing with a top section of 1"/4" diameter we offer a 8 metre and a 12 metre version. Each mast is supplied with guy rings and steel pins for locking the sections when erected. The closed height of the 8 metre mast is just 5 feet and the 12 metre version at 8 feet. All sections are extruded aluminium tube with a 16 gauge wall thickness.

8 mtrs **£109.95** 12 mtrs **£149.95** *Carriage £12.00.*

Tripod for telescopic masts..£89.95

REPLACEMENT POWER LEADS

DC-1 Standard 6-pin/20A fits most HF..£20.00
DC-2 Standard 2-pin/15A fits most VHF/UHF..£10.00

YAESU REPLACEMENT MICS

MH-IC8 8 pin Yaesu mic (8-pin round)..£22.50
MH-4 4 pin fits older HF, etc. (4-pin round)..£15.00

CAR BOOT MAST SET

Once they've gone, they've gone! 5 section (15') 4.5m 1¼" slot together mast set. Collapsed length 0.92m (3') makes this ideal for travelling.

£24.95 Del £10.00

2 for £39.99 del £12.00 — 3 for £50.00 del £12.50

NEW 20' SLEEVED MAST SET

A heavy duty-sleeved, mast set that will tightly slot together. 4 x 5' (2" dia) 16 guage heavy duty aluminuim tubes. (Dimensions approx).

£49.99 Del £10.00.

TWO FOR £90.00 DEL £12.50

ALUMINIUM POLE CLEARANCE

We have sets of 4 (2") poles (3 of which are swaged) that slot together to make a (approx) 20' pole. Each section is approx 5' long – some have small dents in – some have been swaged slightly off centre – hence the price.

2 FOR £35.00 DEL £12.50 — SCRAP PRICE **£19.95** Del £10.00

The 22nd Annual *Practical Wireless* 144 MH

Contest Time!

Once again it's time for Neill Taylor G4HLX - the originator and adjudicator of the 'friendly contest' to announce the rules for the 2005 event. "Let's hope for good weather" says he!

Editorial appreciation: Each year I have the pleasure of thanking Dr. Neill Taylor G4HLX publicly in the magazine, to acknowledge all his hard work in organising the contest so many of us enjoy. As usual Neill you do a great job and I thank you on behalf of everyone who takes part.

Rob Mannion G3XFD, Editor

Almost a whole year has passed since our last special day of low power v.h.f. activity, and it will soon be time to take to the 144MHz band again for the *PW* QRP Contest. Regular entrants will need no reminder of the pleasures of taking part in this event.

The 3W power limit allows everyone to compete effectively, and the high level of activity, particularly from stations in good hilltop locations, means that there are opportunities to work some long distances. Most operators taking part for the first time are delighted by what they can achieve, especially if venturing out to a hilltop portable location themselves. So if you've not tried v.h.f. contest operation before, why not give it a go?

Note: Some advice for newcomers is available on the contest website **www.contest.org.uk**

Rule Changes

The rules contain few changes of substance this year, but no matter how familiar you might think you are with this contest, please read them thoroughly! I suggest that you do so both before the contest and again just before sending your entry.

The main changes this year are to emphasise that by far the best method of sending your log is as a computer file by E-mail, and the best way of completing your entry with the covering information is using the on-line system on the website.

The process has been simplified this year to make it even easier for the entrant. And it certainly makes it easier for me, the adjudicator, as the information is automatically checked and entered directly into my database. Computer file logs are checked, the QSOs and multiplier squares counted, duplicate contacts identified, etc., speeding up my task very significantly, and reducing errors.

I don't intend to discourage those of you who aren't using a computer: hand-written logs on paper sent by post will continue to be welcome, provided they are clear and legible. But if you use a computer, whether its with a logging program or just using a text editor or spreadsheet to type up your log after the contest, please don't print the log and send it by post. Just attach the file to an E-mail as explained in the rules.

I should be able to decipher most formats, whether from a standard logging program, or from a word processor or spreadsheet: in truth, a plain text file is the simplest and best.

Many Rewards

There are many rewards for entering this contest. The most important, and I hope you'll agree, is just the fun of taking part!

However, to recognise the achievement of everyone who does so, a certificate is available free to every station sending an entry. These certificates are again sponsored by **Chris Rees G3TUX**. To claim yours you must send the corner flash on this page*, to the address given in the rules. Your certificate will state your position in the results table and also any other achievement, such as leading station in your locator square, if you manage that.

***Corner Flash:** This year's corner flash coupon carries space for the entrant's callsign to enable Neill to keep track of everything. Please ensure you enter your callsign! **Editor**.

Trophy Array

For stations that do particularly well, there's a fine array of trophies to be won. The outright winners will receive the ***PW* QRP Contest Winner's Cup**.

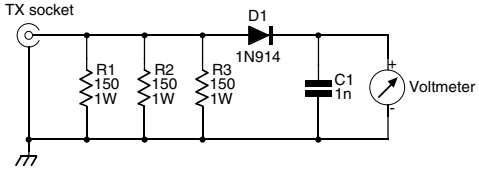


Fig. 1: A simple power measurement circuit (see text).

QRP Contest June 2005

Callsign .....

z QRP Contest. 0900-1600UTC, 12 June 2005

The leading **Scottish** station will be awarded the **Tennamast Trophy in Memoriam to Frank Hall GM8BZX,** and the leading station in **Eire or Northern Ireland** will win the ***PW* EI/GI Trophy Clock**.

Further trophies will be awarded at the discretion of the adjudicator: last year we awarded the **Sandpiper Trophy** to the overall runner-up, the **Nevada Trophy** to the leading single operator, and the ***PW* Foundation Trophy** to the leading Foundation class station.

So, don't delay, start planning your contest station straight away, get in touch with others who might join you in a group, choose your portable site, check out the equipment and antennas, and get ready! Lets hope for fine weather and some excellent v.h.f. propagation. I look forward to hearing and working you on the day, and then receiving your entry. Good luck!

Neill Taylor G4HLX

Contest Rules 2005

1. General: The contest is open to all licensed Radio Amateurs, fixed stations or portable, using s.s.b., c.w. or narrow band (n.b.f.m.). in the 144 MHz (2m) band. Entries may be from individuals or from groups, clubs, etc. The duration will be from **0900 to 1600 UTC on 12 June 2005**.

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

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

2: Contacts: Contacts will consist of the exchange of the following minimum information:
(i) callsigns of both stations
(ii) signal report, standard RS(T) system
(iii) serial number: a three digit number incremented by one for each contact, starting at 001 for the first
(iv) locator (i.e. full six character IARU Universal Locator for the location of the station).

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

If a non-competing station is worked and is unable to send his full universal locator, his location may be logged instead. However, for a square to count as a multiplier (**see rule 4**), a full six character IARU universal locator must have been received in at least one contact with a station in the square.

Contacts via repeaters or satellites are not permitted.

3. Power: The output power of the transmitter final stage shall not exceed 3W p.e.p. If the equipment in use is usually capable of a higher power, the power shall be reduced and measured by satisfactory means. The simplest way is often to apply a (variable) negative voltage to the transmitter a.l.c. line, reached via the accessory socket. The output power can be accurately measured using the simple circuit of **Fig. 1**. Connect this to the 50Ω output of the transmitter and adjust the power so that the voltmeter does not exceed 16.7V on a good whistle into the microphone.

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

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

Only one contact with a given station will count as a scoring contact, even if it has changed its location, e.g. gone /M or /P. If a duplicate contact is inadvertently made, it must still be recorded in the log, and clearly marked as a duplicate (not necessary in computer logs submitted by E-mail).

5: Logs: Logs may be submitted by E-mail or by post. In either case the log must contain the following information for each contact:
(i) time GMT
(ii) callsign of station worked
(iii) report and serial number sent
(iv) report and serial number received
(v) locator received (or location).

The preferred form of log is a computer file sent by E-mail. This may be a file generated by logging software, provided it contains all the information listed above, or a file in any other suitable format (plain text is fine). Preferably give the file a name including the station callsign (e.g. g4hlx.log), and send as a standard E-mail attachment to **entry@contest.org.uk**

Most formats of log are acceptable - if there's any problem with your entry you will be contacted by E-mail.

If a computer log file is not available, a paper log may be sent by post. This must be clearly written on one side only of A4 sized paper, ruled into columns for the each of the items listed above. Underline or highlight the first contact in each of the locator squares worked. At the top of each sheet, write:
(a) callsign of your station
(b) your locator as sent
(c) sheet number and total number of sheets (e.g. "sheet No. 3 of 5").

Log sheets and covering-information sheets which may be used for paper-based entries are available for downloading from the contest Web site www.contest.org.uk.

6. Entries: The covering information listed below must be provided with each entry. The preferred method of submitting this is by use of the on-line facility on the website

www.contest.org.uk. Alternatively, the information may be written in the E-mail message to which the log file is attached. For entries sent by post, it should be written on a separate sheet of A4-sized paper.

The required information for every entry is:
(a) name of entrant (or of club etc. in a group entry) as it is to appear in the results table and on the certificate
(b) callsign used during contest (including any suffix)
(c) name and address for correspondence
(d) location of station during contest
(e) locator as sent
(f) whether single- or multi-operator (a single-operator is an individual who received no assistance from any person in operating the station, which is either his/her permanent home station or a portable station established solely by him/her); if multi-operator, include a list of operators' names and callsigns
(g) total number of contacts and locator squares worked (not required for a log sent as a computer file)
(h) list of the locator squares worked (not required for a log sent as a computer file)
(i) a full description of the equipment used including transmit p.e.p. output power
(j) if the transmitting equipment is capable of more than 3W p.e.p. output, a description of the methods used (i) to reduce and (ii) to measure the output power
(k) antenna used and approximate station height a.s.l.

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

The following declaration must be included in the E-mail text or written and signed by the entrant: "I confirm that the station was operated within the rules and spirit of the event, and that the information provided is correct".

Entries by E-mail must be sent to entry@contest.org.uk and paper entries should be sent by post to: ***Practical Wireless* Contest, c/o Neill Taylor G4HLX, 46 Hunters Field, Stanford in the Vale, Faringdon, Oxfordshire SN7 8LX**. Entries must be sent by E-mail or postmarked no later than **27 June 2005**. Late entries will incur a heavy points penalty or may be disallowed.

Comments Welcomed

Any other general comments about the station, the contest and conditions during it are welcome, (written on a separate sheet of paper in the case of entries sent by post). Photographs of the station are also invited (but please note that these cannot be returned); if these are not available by the time the entry is submitted they may be sent later, by E-mail or post, to arrive by 13 August 2005.

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

A certificate will be sent to every entrant who submits the corner-flash coupon***(Page 22**) on this page (**photocopies will not be accepted**). Send the coupon, clearly marked with your station callsign (exactly as used in the contest), to the contest address given above. Unless you advise otherwise, your certificate will be posted to the address given in your contest entry. Coupons may be submitted at any time up to the publication of the results.

***Note:** The corner flash coupon is different this year as it includes a space for the entrant's callsign. This is to help Neill G4HLX keep track of everything. **Editor**.

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

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

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

Make sure your transmitter is properly adjusted and is not radiating a broad or poor-quality signal, e.g. by over-driving or excessive speech compression. On the other hand, be aware that your receiver may experience problems due to the numerous very strong signals it will have to handle, and that this may lead you to believe that another station is radiating a poor signal. Before reaching this conclusion, try heavy attenuation at the receiver input. The use of a high-gain r.f. pre-amplifier is likely to worsen strong-signal problems, so if you do use one, it's best to be able to switch it off when necessary.

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

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

PW

Technical FOR THE TERRIFIED!

Tony Nailer G4CFY invites you to share the latest article designed to help you enjoy the maths involved in radio. His main aim in *PW* is to help you understand and enjoy!

I hope that my previous work was accessible and acceptable to the majority of enthusiasts, I say this because when trying to learn algebra for the first time it's really daunting and not easy to understand! Clearly I have assumed that the majority or readers will have come into contact with it in school and never had to use it since.

The previous article, *PW* April 2005 issue, should have given the reader confidence with the use of formulas and even how to manipulate figures including powers of 10. This article aims to build on that work to enable the reader to use formulas involving capacitance, inductance and frequency.

Inductive Reactance

To begin with I'll show you how to use the formula for Inductive Reactance, see **Formula 1**.

Find the reactance of a coil of 5.5µH at 14MHz. (You may need to refer to the powers of 10 table in the February 2005 *PW* issue), see **Formula 2**.

Similarly If I wanted to find the inductive value of a choke with a certain value of reactance at a given frequency, see **Formula 3**.

Now if I want to find the nearest value of choke to be 20kΩ at 9MHz; see **Formula 4**.

Capacitive Reactance

I will now show you how to use the formula for capacitive reactance, see **Formula 5.**

Find the capacitive reactance of 100pF at 10.7MHz, see **Formula 6**. Similarly If I wanted to find the capacitive value with a certain value of reactance at a given frequency, see **Formula 7**. Swap the positions of the Xc with the C to get **Formula 7.**

Now I want to find the nearest capacitance value to give a reactance of 20kΩ at a frequency of 1kHz, see **Formula 8.**

Practical Application

Consider now the low-pass filter circuit, shown in **Fig. 1**, to be used following a demodulator down to audio from a 9MHz intermediate frequency (i.f.) amplifier. The reactance of the capacitors at 9MHz will be; see **Formula 9** (a similar calculation at 2kHz gave 16931Ω). The reactance of the 330µH choke at 9MHz and 2kHz is found by; see **Formula 10**

The diagrams, **Fig.s. 2** & **3**, now show how the filter looks at each frequency.

At 2kHz the input capacitor of 16931Ω is effectively in parallel with 16935Ω, an equivalent value of about 8466Ω. (This value will not significantly dampen the audio).

At 9MHz the input capacitor will look like 3.76Ω, almost shunting it completely to earth. Whatever 9MHz signal voltage remains across C1 will then pass through the choke of 18661Ω and then be shunted to ground again with another 3.76Ω.

The step down at the junction of the choke and C2 will be 3.76/(18661 + 3.76) = 0.0000535. Theoretically this is an attenuation of 85dB. In practice stray coupling is likely to allow some to pass on.

Practical Use Of Reactance

Hopefully this exercise has shown some practical use of reactance and being able to manipulate it. Maybe you can find some other example in your shack or while experimenting with circuits to apply these techniques yourself?

PW

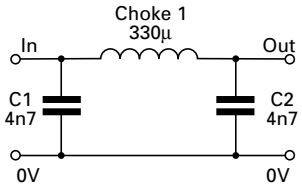


Fig. 1: The circuit values of the filter are calculated in this article.

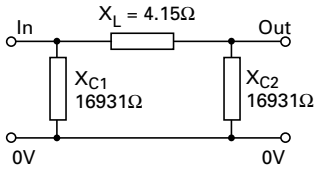


Fig. 2: The impedances of the components of Fig. 1, as they would be at 2kHz.

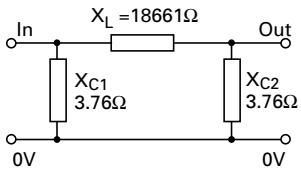


Fig. 3: The impedances of the components of Fig. 1, as they would appear at 9MHz.

Notice Board

We have taken the step of setting up a 'notice-board' called **pw-g4cfy** on the *PW* E-mail system. This list will allow us to share comments, further thoughts or ask questions about this or previous articles in the Technical For the Terrified series. Everyone who is on the list, will see both comments and answers from myself, members of the *PW* team, or other list members. To join the list in the first place, send an E-mail, with the word 'Subscribe' in the subject line to **pw-g4cfy-on@pwpublishing.ltd.uk**

On first joining the list, you will be sent further instructions about pw-g4cfy list and how it works. Or, if you have other questions about the list service please E-mail your query to **postmaster@pwpublishing.ltd.uk**

Tony G4CFY

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

Formula 1.

$$X_L = (2\times\pi\times 14\times 10^6\times 5.5\times 10^{-6})\Omega$$

Collect all the numbers and powers together

$$X_L = (2\times 14\times 5.5\times\pi\times 10^6\times 10^{-6})\Omega$$

$$X_L = (28\times 5.5\times\pi\times 10^{6-6})\Omega$$

Now $10^{6-6} = 10^0 = 1$

So, $X_L = 154\times\pi = 483.8\Omega$

Formula 2.

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

By changing side and sign for $2\times\pi\times f$ gives

$$\frac{X_L}{2\times\pi\times f} = L(\text{Henries})$$

Formula 3.

$$L = \frac{20\times 10^3}{2\times\pi\times 9\times 10^6} = \frac{20\times 10^3\times 10^{-6}}{2\times 9\times\pi} = \frac{20\times 10^{3-6}}{18\times\pi}$$

$$L = \frac{20\times 10^{-3}}{18\times\pi} = \frac{20}{18\times\pi}\,\text{mH} = \frac{20}{56.54}\,(\text{mH})$$

$L = 0.354(\text{mH}) = 354\mu\text{H}$. Use 330µH

Formula 4.

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

Formula 5.

$$X_C = \frac{1}{(2\times\pi\times 10.7\times 10^6\times 100\times 10^{-12})}\Omega$$

$$X_C = \frac{1}{(2\times 10.7\times 100\times\pi\times 10^6\times 10^{-12})}\Omega$$

$$X_C = \frac{1}{(2\times 10.7\times 100\times\pi\times 10^{6-12})}\Omega = \frac{1}{(2140\times\pi\times 10^{-6})}\Omega$$

$$X_C = \frac{1}{(21.4\times\pi\times 10^{-4})}\Omega = \frac{1}{(67.2\times 10^{-4})}\Omega = \frac{10^4}{(67.2)}\Omega$$

$$X_C = \frac{10000}{67.2}\ \Omega = 148.8\Omega$$

Formula 6.

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

Then swap the positions of C and X_C to give:

$$C = \frac{1}{(2\times\pi\times f\times X_C)}\,\text{F}$$

Formula 7.

$$C = \frac{1}{(2\times\pi\times 10^3\times 20\times 10^3)}\text{F} = \frac{1}{(2\times 20\times\pi\times 10^6)}\text{F}$$

$$C = \frac{10^{-6}}{(40\times\pi)}\text{F} = \frac{1}{(40\times\pi)}\mu\text{F} = \frac{1}{125.6}\mu\text{F}$$

Formula 8.

$$X_C = \frac{1}{(2\times\pi\times 9\times 10^6\times 4.7\times 10^{-9})}\Omega$$

$$X_C = \frac{1}{(18\times 4.7\times\pi\times 10^{-3})}\Omega = \frac{10^3}{(18\times 4.7\times\pi)}\ \Omega$$

$$X_C = \frac{1000}{(84.6\times\pi)}\Omega = \frac{1000}{266}\ \Omega = 3.76\Omega$$

Formula 9.

At 9MHz

$$X_L = (2\times\pi\times 9\times 10^6\times 330\times 10^{-6})\Omega$$

$$X_L = (18\times 330\times\pi)\Omega = 18661\Omega = 18.661\text{k}\Omega$$

At 2kHz

$$X_L = (2\times\pi\times 2\times 10^3\times 330\times 10^{-6})\Omega$$

$$X_L = (4\times 330\times\pi\times 10^{-3})\Omega = (4147\times 10^{-3})\Omega = 4.15\Omega$$

Formula 10.

Icom IC-756PROIII

Fig. 1: The IC-756PROIII with the matching (optional) SP-23 loudspeaker unit.

Regular *PW* author Roger Cooke G3LDI, living deep in the Norfolk countryside, has the ideal QTH for a DX hunter! With a large antenna farm he's been busy evaluating the latest version of the IC-756PRO.

You never normally get a second chance to make a first impression. This was in my mind when I set up the IC-756PROIII. I had already reviewed the IC-7800, and this looked like a cheaper imitation of that transceiver at first glance. (I was already comparing it to the 'Big Gun'!).

However, I was determined to approach the review without prejudice. It arrived with matching 12V PS125 power supply and speaker SP-23.

The power supply is very small, and obviously a switched mode type. I've always been averse to this type of power supply, although they're quite standard these days. I suppose I am looking back to my TV engineering experience, when we had numerous problems with switched mode supplies, not to mention the hash that these units can generate.

I thought the loudspeaker was very small too, and I expected a similar audio response. However, I was pleasantly surprised on both counts. The power supply performed flawlessly, although the fan did run for a large percentage of the time, and the 8Ω 4W speaker is more than adequate; in fact the audio response on s.s.b. is very good.

Manual & Microphone

I had to wait for the manual and a microphone to arrive before transmitting as they'd not arrived with the rig. As usual, I ran my sked with **Dick Bendicksen N7ZL** in Seattle USA, to whom I talk just about every day.

Dick has a '756PROII, the previous model. He told me how to get to the menu for audio set-up, as the default was not very good. Having set it up properly, with his report on how normal my voice sounded, I played with the rig for a while.

Having been spoilt by the Icom IC-7800, it took a while to accept the smaller TFT display on the '756PROIII, but this comparison soon passed and I was pleased to see some of the 7800 technology incorporated in the '756.

In fact the 756's display is very similar to the 7800's, with the exception of the two meters on the latter. The '756 has but one multimeter, and that is an analogue type. However, the functions and menu on the main TFT screen are more than adequate, with a very similar access to menu functions and set-up as the Big Gun IC-7800.

The main controls are set out in an ergonomically pleasant way on the front panel, with over 60 in total, some of which are dual purpose. However, with the ever-decreasing size of h.f. transceivers, it would be an advantage to have small fingers, and short fingernails!

When tuning for the first time, I noticed that the tuning was very rigid, and found that the knob itself had been pushed back hard and was grating on the back of the dial. (The tuning knob will just pull off and re-positioning it cured the problem. It could have been caused in transit).

The impressive looking Icom IC-756PROIII also impressed Roger Cooke G3LDI with its performance. He thoroughly enjoyed using it on s.s.b., c.w. and RTTY.

Screen Layout

The TFT screen layout on the '756 is again very similar to the '7800. Incidentally, I think the use of a TFT display will end up being the standard for all transceivers. It was so easy to read off any parameter with minimal use of switching or pushing buttons.

Obviously, menu selections, memory set-up, filter shape display and so on are selectable. But once some practice - with the manual on the desk on front of you - has been done, familiarity soon increased. The more I see of the IC-756PRO type of display, the more I like it!

The Spectrum Scope is again similar to the '7800, and at first sight of this feature I thought it somewhat of a gimmick, nice to see but not too useful. It seemed a bit like the Panadaptor that dates back to the 1960s. However, having now used the Spectrum Scope on two transceivers, I can appreciate the uses. (I'll come back to this subject later).

Frequency readout is very clear, and is slightly smaller for the **Sub VFO**. Instant change from one to the other is possible as is equalisation of the two, using the same button.

Fig. 2: Close up view of the main TFT screen (see text for G3LDI's comments).

Great Attraction

One great attraction of the IC-756PROIII is the filtering. It features 41 built-in, front panel selectable intermediate frequency (i.f.) bandwidths made possible by DSP filtering. (No additional filters or high stability crystal oscillators are available or needed).

The dynamic range of the 32-bit floating-point technology is 144dB. Comparing that to my FT-1000MP, with 108dB and old 16-bit technology, not to mention the fact that with the FT-1000MP there are six optional filters to buy, it makes the '756 a very attractive proposition!

With the IC-756PROIII, you may not get the full theoretical performance, but you do get amazingly clear, crisp reception with a very low background noise. This was quite noticeable when comparing the two side-by-side. Additionally, being able to produce shape factors on the screen is quite helpful, and the twin **Passband Tuning** controls are a treat in RTTY mode. (More of that later too).

General Operating

Let's now look at general operating, and I'll start with the triple band stacking register, providing three memories in each band selection. So, you could set one for c.w. with a narrow filter, one for normal s.s.b. operation with the 2.4kHz filtering, and the third for RTTY with 250Hz and the twin peak filters selected.

Then, you also have a fourth choice, with the memory to **VFO transfer**. This will bring the memory selection into the v.f.o. so you can set up for a fourth set of parameters, without affecting the three v.f.o. settings. I think this is a superb arrangement.

All Amateur bands are covered, including 50MHz. However, on the model I reviewed, although general coverage receive is fine, 'general coverage transmit' isn't. This unfortunately prohibits 5MHz use, unless the UK market is now being catered for in this regard.

In the handbook, it says that "5MHz operation is on the USA model only". However, I suspect it's only a simple matter to rectify this and a word in the ear of Icom UK might bring about a result! *

Note:* *Please see the information panel from Icom on this topic.* ***Editor**.*

All the usual set-up functions are available via the menu, tuning steps, audio frequency response tailoring, levels, memory programming, scanning and so on. I won't go into detail on these, as they're all present, and well documented in the manual.

The transceiver has an in-built c.w. keyer, fully adjustable, with serial number generation, an RTTY decoder, but no PSK decoder like its big brother! However, a fully automatic antenna tuning unit (a.a.t.u.) is standard, as is also a voice recorder.

There's also a timer, which can be programmed to switch on/off and again is fully programmable, although I can't think that I would ever use such a function myself. Additionally, if the transceiver is left switched on and not touched for a period, a screen- saver kicks in with a floating Icom '756 on the screen.

The noise blanker seems to work well, although I did not have any noise to check it with! The notch filter is also very good, both on manual and automatic operation. It does not work on RTTY however, understandably so I guess, but it's useful to stick a notch on 2210Hz, the centre of the two RTTY tones.

The receiver itself is general coverage, and with the a.m. and f.m. capabilities, it makes for a very versatile general coverage receiver. It's just a pity about the 5MHz transmit not being there, ready to go.

I was interested to try the IC-756PROIII on 50MHz. It works well and I had a couple of contacts on that band just to prove it, although I can't compare it to anything, as I don't have any other gear for that band. Incidentally, narrow band f.m. (n.b.f.m.) repeater operation on the 29MHz band is possible although, there was no activity to test it with.

Looking on the back panel, there are two SO239 antenna connectors, with provision for a general coverage antenna via an RCA connector. There's also a transverter jack, two accessory sockets, for TNC and external antenna tuner, a remote control jack for CI-V level converter (to enable a computer to be connected), automatic level control (a.l.c.), push to talk (p.t.t.) and so on.

Local Test

I carried out local tests on various modes on 28MHz, as my friends and I all have good signals to each other and the band is nice and quiet (unfortunately!). The stations helping in the tests were **Dave G3MPN** and **John G6ZQE**, both about 16km (10 miles) away. We started off on s.s.b. purely because we were already using this mode.

Audio tailoring is very important with any modern

Product
Icom IC-756PROIII h.f. and 50MHz transceiver.

Company
Icom UK Ltd.

Contact
Tel: (01227) 741741

Pros & Cons

Pros: The most delightful aspect of the RTTY mode on this transceiver is the **Twin Peak Filter** (**TPF**).....The received s.s.b. quality is superb, even with that small speaker! There is also a two position high pass filter (h.p.f.) and a two position low pass filter (l.p.f.) on the speaker itself that can be used to help with reception. The '756 is as good as the '7800 on c.w. in my opinion and is a pleasure to use.

Cons: I would have liked to have seen a DB-9 CAT connector on the rear panel, and not to have to obtain a CI-V converter in order to use a computer. Personally, I think that in this modern age, all transceivers should have that as standard. Next, I would really have preferred the transceiver to have been slightly larger in the first place, about the size of my FT-1000MP!

Summary: Although the speaker and power supply units are 'options' I would use my 30A d.c. supply anyway, but would probably get the matching speaker. No extra filters to buy, so I would say it was pretty good value for money.

Prices: Around £2090

Thanks: My thanks go to **Icom UK Ltd., Sea Street, Herne Bay, Kent CT6 8LD. Tel: (01227) 741741, FAX: (01227) 741742.**

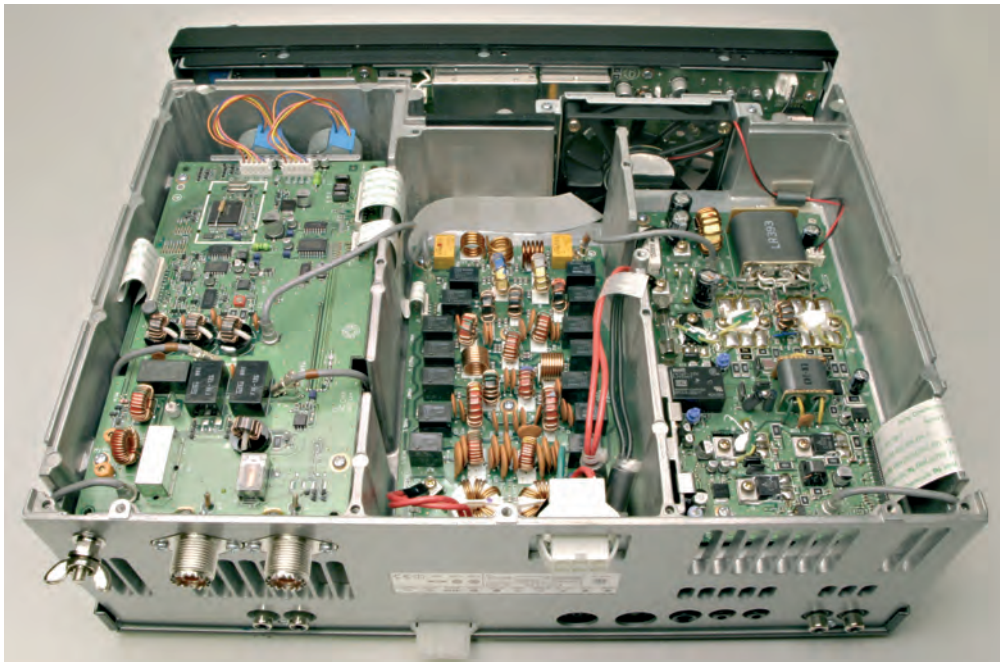


Fig. 3: Inside view of the IC-756PROIII transceiver.

transceiver - before operating it on the air. I re-adjusted the bass and treble responses to what I was told made my audio sound natural.

We then spent some time adjusting the various levels so that the a.l.c. did not exceed the maximum. With the suggested manual setting of 10-20dB of compression, the audio was, in our opinion, too harsh. (I would suggest that a maximum of 10db of compression is more than sufficient).

I then asked for a check on intermodulation distortion (IMD) and sideband suppression. Nothing at all was noticed on the opposite sideband at this range, and there were no discernible 'nasties' either side of the received frequency.

A check with the various compression bandwidths found that the middle filter was by far the most preferred. The 'narrow' setting produced dreadful comments and the wide setting proved more suitable for local contacts. I found that providing the a.l.c. is not allowed more than halfway up the scale, the speech on the s.s.b. mode is very good.

The same comments apply to the voice recorder. If the levels are not adjusted prior to use, the reproduction will be dreadful. Spending some time on the adjustments pay great dividends.

Fig. 4: The (optional) matching SP-23 loudspeaker unit (see text).

I was able to record a 15 second message of "CQ contest" and another with a "QRZ contest". There are four such memories altogether. It's also possible to record the same amount of time of received s.s.b. and play it back locally, but not over the air, back to the originator. (At least I didn't find it possible!).

The received s.s.b. quality is superb, even with that small speaker! There's also a two position high-pass filter (h.p.f.) and a two position low-pass filter (l.p.f.) on the speaker itself that can be used to help with reception.

The CW Mode

I was keen on trying the c.w. mode, following my disappointment with the FT-1000MP. Incidentally, I've now done the keying mod on the '1000MP, so hope I don't 'click' any more! I should not have done so in the first place in my opinion!

First checks with the IC-756PROIII on c.w. were very encouraging. The sidetone is very nice to listen to, and of course this is extremely important to any c.w. operator worth their salt.

The keying rise time is programmable, just like the '7800. And again, just like the '7800, on the air my freinds and I found that 4ms was about the best mark. This produced a very nice T9X note, not too hard and certainly not too soft.

It was a pleasure to send with the transceiver. The keying was good too, the keying relay is not noisy, semi-break-in was fine, and I even got along very well with full break-in, a mode I'm not very keen on. There are no clicks, no thumps, and the received c.w. reports from my two helpers were superb. What more can I say!

I was using my own keyer, a model MM3 from AEA in the USA, keying at around 30w.p.m. Thus tested, I then plugged the paddle into the front panel and tried the built-in keyer. This is a fully programmable keyer, with adjustable dot/dash ratio, rise-time selection and paddle polarity.

The keyer's four memories are programmable from the front panel, using the main tuning dial in **SET** mode. The operator can select a repeat for sending the 'CQ', adjustable in one-second steps up to 60 seconds. There's also the ability to set up automatic serial number, including Morse 'cut numbers' (abbreviated zeros, sending a dash for the zero rather than five dashes).

There's also a really nice feature provided by the c.w. pitch control. This is adjustable from 300 to 900Hz in 25Hz steps, without changing the transmitting frequency.

Using a transceiver like the IC-756PROIII is much like playing a concert grand piano. It brings out the best in the pianist, making the artist want to play well.

If the pianist has to play a pub piano that hasn't been tuned in years and has a few strings and notes missing, he will just be looking for closing time, and certainly not playing well; what's the point! The '756 is as good as the '7800 on c.w. in my opinion and is a pleasure to use.

Editorial note: *It's worth noting at this point readers - that Roger is a talented Jazz musician. Hence the musical analogy! Editor*

Operating Using RTTY

The RTTY mode is becoming more and more popular these days, despite the more modern error correcting data modes. The reason for this is that RTTY is most suited to DXpedition and contest operating. It's much faster in Q rate and in my opinion, much more enjoyable.

There are quite a large number of major contests in the year's calendar now and listening during one of these weekends will show just how populated the RTTY segments of the bands are. In fact, that segment does overflow purely because of the amount of stations active. To operate under these conditions, a transceiver has to perform extremely well, and has to have extremely tight filtering, pass band tuning, and so on. The IC-756PROIII serves this purpose admirably.

The '756 has its own built-in Baudot decoder, and I would think it's the same one that's in the '7800. It was tested again with G3MPN and performed flawlessly. I asked Dave to reduce signal strength. He then reduced it until there was no detectable power output and I was decoding the transmissions perfectly, with the signal only just audible.

Taking the power level down even further, until I couldn't hear anything, produced a few characters but not good copy. However, that was to be expected and I was very happy with the results.

In the RTTY mode there's a threshold lever setting and I set it to about 10, halfway on the scale. However, copying a signal only just above the noise will depend on the selectivity. (Remember that we did the test on the 28MHz band at a time when it was nearly dead).

The RTTY tuning indicator appears on the TFT screen when the mode is selected and is quite useful for tuning the signal correctly. Reverse keying is available should it be necessary. There are eight memory channels for this mode, with up to 70 characters in each. This makes the '756 well suited for those considering using RTTY on a DXpedition but there's no automatic serial number generation; so any contesting would be best on a computer using suitable software.

The most delightful aspect of the RTTY mode on this transceiver is the **Twin Peak Filter** (**TPF**). I always use the 250Hz filter in my FT-1000MP when on RTTY and I couldn't imagine running a RTTY contest with anything else.

Using the '756, with the RTTY **TPF** provides another dimension of RTTY reception. although the only problem is that it takes time to set it up properly.

Using the **TPF** provides more gain and therefore more noise, but by reducing the r.f. gain, a very happy compromise can be reached. Testing this out proved the point when a weak signal surrounded by others producing rough copy was heard. Switching in the **TPF** brought it up to good copy and it doesn't end there!

Having the TFT Spectrum display is a superb advantage to the RTTY operator. When tuning on 21 or 28MHz in a contest, constant flying up and down tuning the RTTY segment is necessary to catch the odd multiplier that might appear. But with the Spectrum display, the operator can see the whole of that segment and just watch the screen whilst drinking coffee!

Even on a busy band, it's possible to see where all the activity is before using the dial. It's only necessary to set the **Span** to the minimum, 12.5kHz, to see most of the RTTY segment. Another neat trick is to set the **TX Marker** on, which produces a red line down the display. Then, by Putting **SET-MAX_HOLD** to **On** and watch the screen. Wait a few seconds and then press **Hold**. You can then zip onto the peak that you wish to decode. Pressing **Hold** again reverts back to normal.

Finally, if there's a very close signal with overlap, one of his tones getting into your pass band, the **IF Shift** can move the i.f. sufficiently to remove the offender without affecting the received signal. (You can watch this on the screen).

Fig. 5: The (optional) switch mode power unit - the PS125, (See text for G3LDI's comments)

Slightly Frivolous?

I've only a few things I don't like on the IC-756PROIII and they really are slightly frivolous. First, I would have liked to have seen a DB-9 CAT connector on the rear panel, and not to have to obtain a CI-V converter in order to use a computer. Personally, I think that in this modern age, all transceivers should have that as standard.

Next, I would really have preferred the transceiver to have been slightly larger in the first place, about the size of my FT-1000MP. The buttons, plus some of the controls, are so small and although perfectly functional, I feel that with a slightly larger size, the band selection could have been placed alongside the main tuning instead of above it. After all, it is designed as a base station transceiver and not a mobile unit, so size reduction is not a pre-requisite.

The other thing I would have liked is that large white light emitting diode (l.e.d.) that the IC-7800 has for split operation. It would save a lot of 'Idiot' and "QSY QSY", and "Up Up Up" that is so often heard on a DX station!

However, I do like everything else on the '756PROIII very much indeed, but already have the FT-1000MP. However, if I win the *PW* raffle, or if it gets lost in the post, you might hear me on RTTY using the rig!

The price is being quoted at around £2099 although the speaker and power supply units are 'options'. I would use my 30A d.c. supply anyway, but would probably get the matching speaker. No extra filters to buy, so I would say it was pretty good value for money.

My thanks to Icom UK Ltd. for the loan, and also *PW* for the arrangements. **PW**

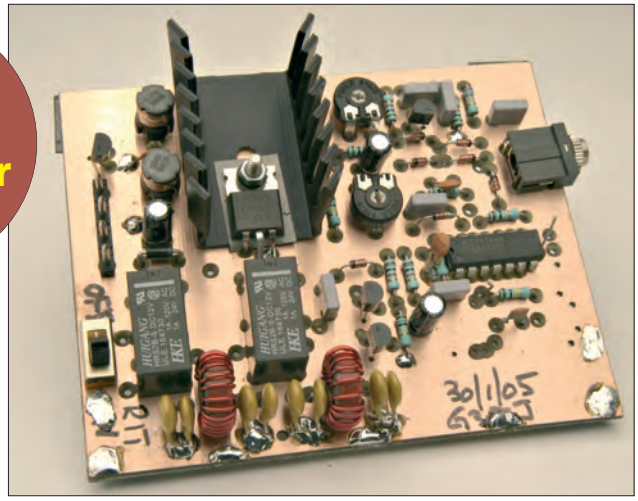
Using the IC-756PROIII on 5MHz

John Turner G0KFO from Icom UK Ltd., confirms that provided purchasers of the IC-756PROIII are in possession of the required Notice of Variation (NOV) for 5MHz operation, conversion of the transceiver by their Icom dealers is simple and straightforward. The transceiver cannot be supplied 'ready for use' on the band because of the NOV requirements. Please contact your Icom dealer regarding the conversion. **Editor**.

The Sutton Project

Part 2

The Mallet Transmitter



The Mallet transmitter.

In Part 2 of the Sutton project - the overall title linking the series of projects together - Tim Walford G3PCJ introduces the Mallet transmitter.

The Mallet is a nominal 1.5W c.w. transmitter that's designed specifically for the Sutton receiver so that together they become the Sutton Mallet. And this is, of course, the name of another village in Somerset!

The main printed circuit board (p.c.b.) includes all facilities for the 3.5MHz band. But its broadband design allows transceiver operation on all the main h.f. bands when used with the Sutton and its band cards.

The Mallet can alternatively be used as a stand alone c.w. 'crystal' controlled transmitter on 3.5MHz , or other bands with suitable crystals and amended filters. It has provision for amplitude modulation and can drive the 10W linear amplifier. (The many options are fully described in the kit instructions – see the side panel for prices, etc.).

The Circuit

By referring to the block diagrams, **Figs. 1 and 2**, and the circuit, **Fig. 3**, you'll see that the first radio frequency (r.f.) stage IC200B can act either as a buffer or as an oscillator. When used with an external local oscillator (l.o.) source, such as that from the Sutton, this is fed in at point C to produce a 5V square wave version of the l.o. at point O.

When used as an oscillator, the crystal or ceramic resonator is fitted at X270 and again produces a 5V square wave at point O. This first stage, which uses one section of a high speed quad 2 input NOR digital chip, drives the keying stage IC200A/D (actually two gates in parallel) which in turn drives the r.f. output stage Tr200 - an IRF510 m.o.s.f.e.t.

The digital chip and all of the control aspects use a stabilised 5V supply derived from the main diode protected incoming supply, which can range from 8.5 to 22V. The bias for the output stage can be varied with the preset RT200 as a form of drive control. **Note:** The optional 10W Linear amplifier can be connected immediately after the output stage so that it uses the rig's r.f. filtering and antenna relay.

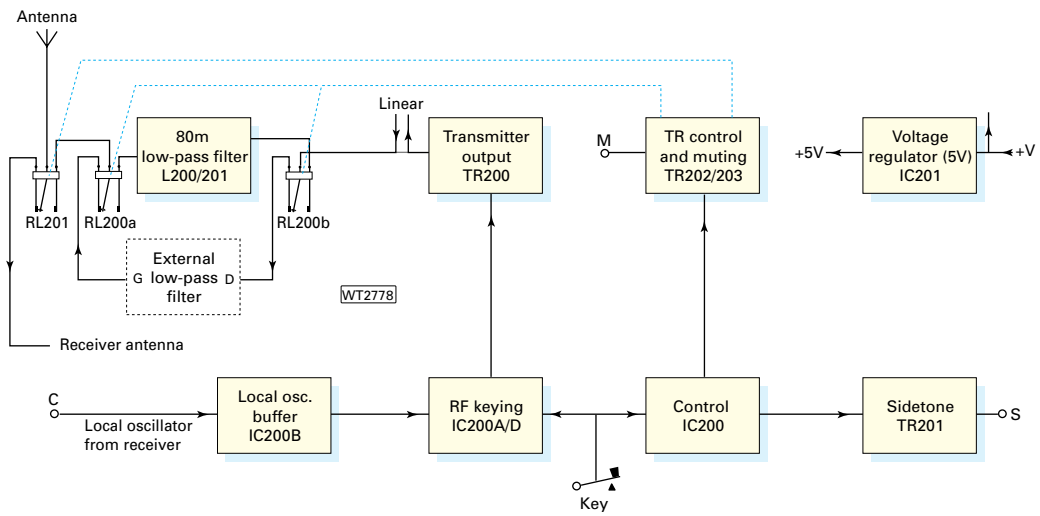
Filtering Essential

Filtering of the output is essential to remove the harmonics, so the p.c.b. has provision for two Pi section low-pass filters that are normally constructed for 3.5MHz. It's selected by the relay RL200 under control of the receiver's front panel band switch.

When the relay is off, external low-pass filters are connected instead (these would normally be those on the Sutton Receiver band cards). However, they can be others - such as the twin low-pass filter kit - which then allows three band crystal controlled operation.

The low-pass filter on the Mallet p.c.b. can be built for other bands by using alternative values for its inductors and the four main 'filter capacitors' – each a pair in the C200 to C207 set. Each of these capacitor pairs can be connected

Fig. 1: Block diagram of the Mallet (see text).



either in series or in parallel, or just one of them; this approach allows one set of filter parts to work on 3.5, 7, 10 or 14MHz when used as a stand-alone transmitter. Details of the filter components for use with the Sutton project are shown in the diagram Fig.3.

To keep the rig in transmit between characters, semi break-in transmit-receive control is provided for the antenna relay RL201. In this circuit the key input signal is inverted in gate IC200C; its output applies bias to the r.f. output stage and also turns on the muting and relay driving transistors Tr202/3.

Both the f.e.t.s stay on between characters owing to the long time constant of C218 with R213, that are isolated from the key up gaps by D206. The input key signal also allows the keying gates IC200A/D to pass the much amplified l.o. to the output stage after a small delay (due to R202/C211), so that the transmit-receive relay can change to transmit before output r.f. is produced.

The 725Hz sinusoidal side tone oscillator, Tr201, uses a 'twin T' circuit with further filtering and variable attenuation in the output path before injection into the receiver. This oscillator is only allowed to run when the key is down (and point U high at 5V) by the diodes D203/4/5. The three diodes are used to minimise the change in d.c. levels (as the oscillator stops/starts) that would otherwise cause bad audio thumps. Diodes D201/2 allow the transmitter to produce r.f. without sidetone when point P is grounded for amplitude modulation (a.m.).

For transceiver operation with the Sutton, the transmit/receive relay contacts RL201/B automatically 'centre' the receiver incremental tuning (RIT) control by applying a short circuit across the tuning pot. Note: This can also be done manually with S200 when setting the receiver's main tuning for zero-beat on the other station.

When used as a stand alone transmitter, the slide switch is mounted in an alternative position S270 that allows just the oscillator IC200B to be switched on for 'netting' purposes. Then D207 ensures that the oscillator runs during transmission.

The oscillator's 'crystal' can be installed at X270 or remotely via a switch if there's more than one. When a ceramic resonator is used for 3.5MHz, the trimmer fitted at CT270 provides a useful tuning range.

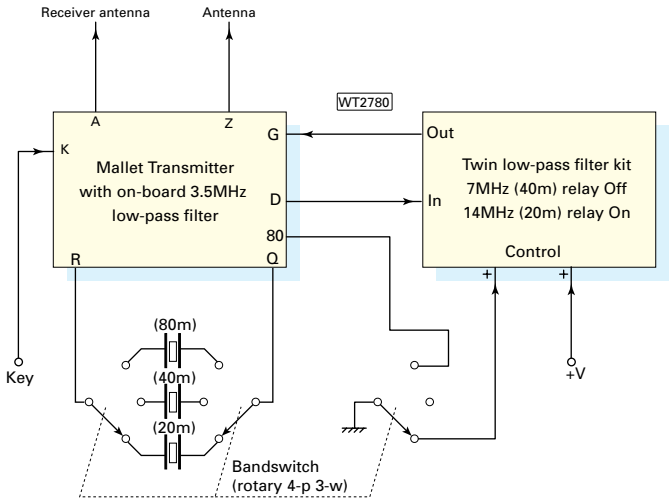


Fig. 2: How the Mallet is integrated with the Sutton receiver.

Amplitude Modulation

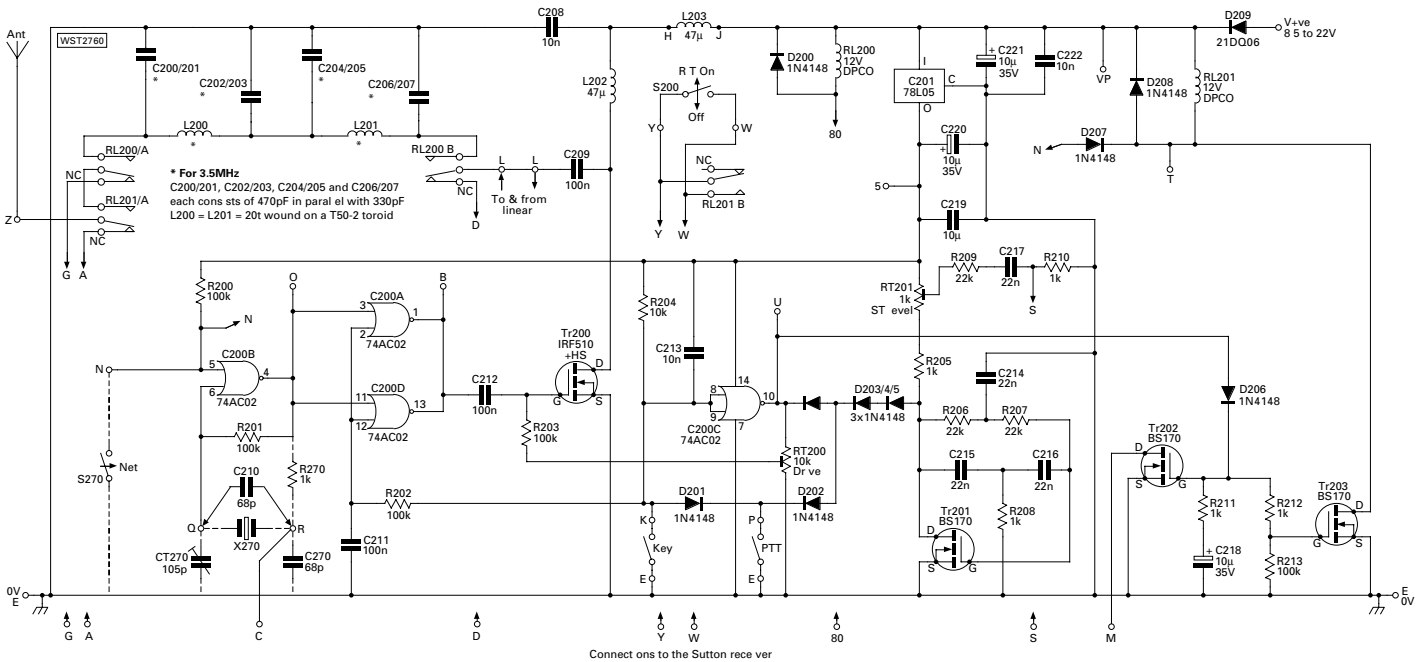
Amplitude modulation can be applied using a small transformer whose secondary winding is connected in place of the output stage supply choke L203 **Fig. 4.** It needs to create an audio voltage swing of up to plus or minus the supply voltage, so that the output stage actual supply varies between zero and twice the incoming value.

When an ordinary audio (speech) amplifier is used, with an output swing of only plus or minus half its supply voltage, the transformer needs to provide a 2:1 voltage step up.

The Mallet PCB

The Mallet's p.c.b. is shown in **Fig. 5**. Incidentally, this is typical of Somerset Range p.c.b.s that use medium sized tracks that are moderately robust! The r.f. circuits need a copper 0V ground plane, which is on the, top component side, with all tracks underneath. The ground plane connections are made by soldering selected suitable components on both sides of the p.c.b.

Fig. 3 Circuit Diagram of Mallet (see text).



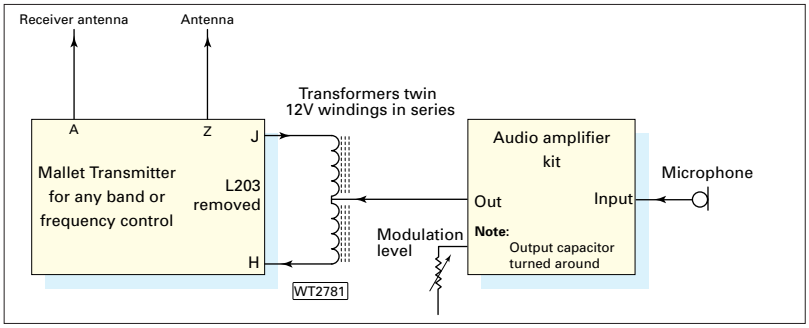


Fig. 4: Making the Sutton Mallet into an a.m. transmitter receiver requires the addition of a modulator.

To start assembling the project I suggest you begin by fitting the large obvious parts like relays and presets that can only be fitted in their intended places! Then add the voltage supply parts including the regulator IC201 whose 5V output can be checked.

The control parts and logic chip are fitted next. Add a temporary link between 0V and point Q to define the input voltages to IC200B in the absence of an l.o. input. With the key up, point U should be at 5V; closing the key should make it go to 0V. Then fit the transmit/receive (T/R) relay control parts associated with Tr202/3. When you switch on, neither relay should click; closing the key should make RL201 come on immediately and turn off about half a second after the key is released.

Next add the sidetone parts associated with Tr201 but without the diodes D203/4/5. Arrange to feed the signal from point S into an audio amplifier (use the Sutton receiver if necessary), or to series connected portable cassette player type headphones.

When you switch on, the tone should be continuous; but after fitting the three control diodes, D203/4/5/ it should only operate when the key is closed. After fitting D201/2, you can check that grounding point P puts the relay to Transmit but this time without sidetone.

The r.f. output stage comes next – and here you must take care to ensure that the insulating washer and bush are properly fitted so that the tab of Tr200 the IRF510, is isolated from the heat sink and 0 volts. The device's source lead is only soldered on the ground plane side so that it is easier to remove in the event of failure!

Before applying a local oscillator input, that the device should be tested at d.c. first by using the bias preset RT200. **Note:** Arrange to measure the supply current, set RT200 fully anti-clockwise and note what it draws with the key down, then gingerly advance RT200 for about an extra 50mA of current.

When you release the key, it should drop back down

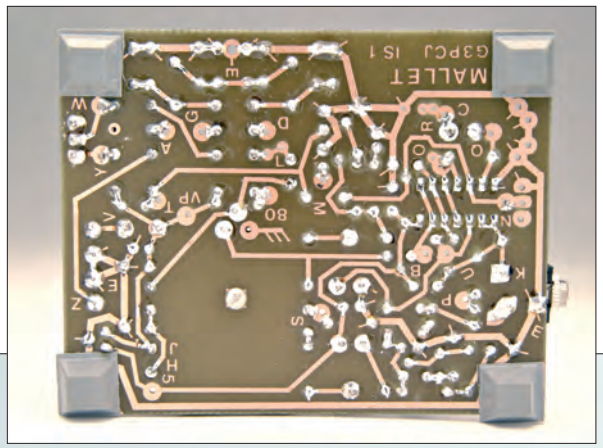


Fig. 5: The Mallet p.c.b. (see text).

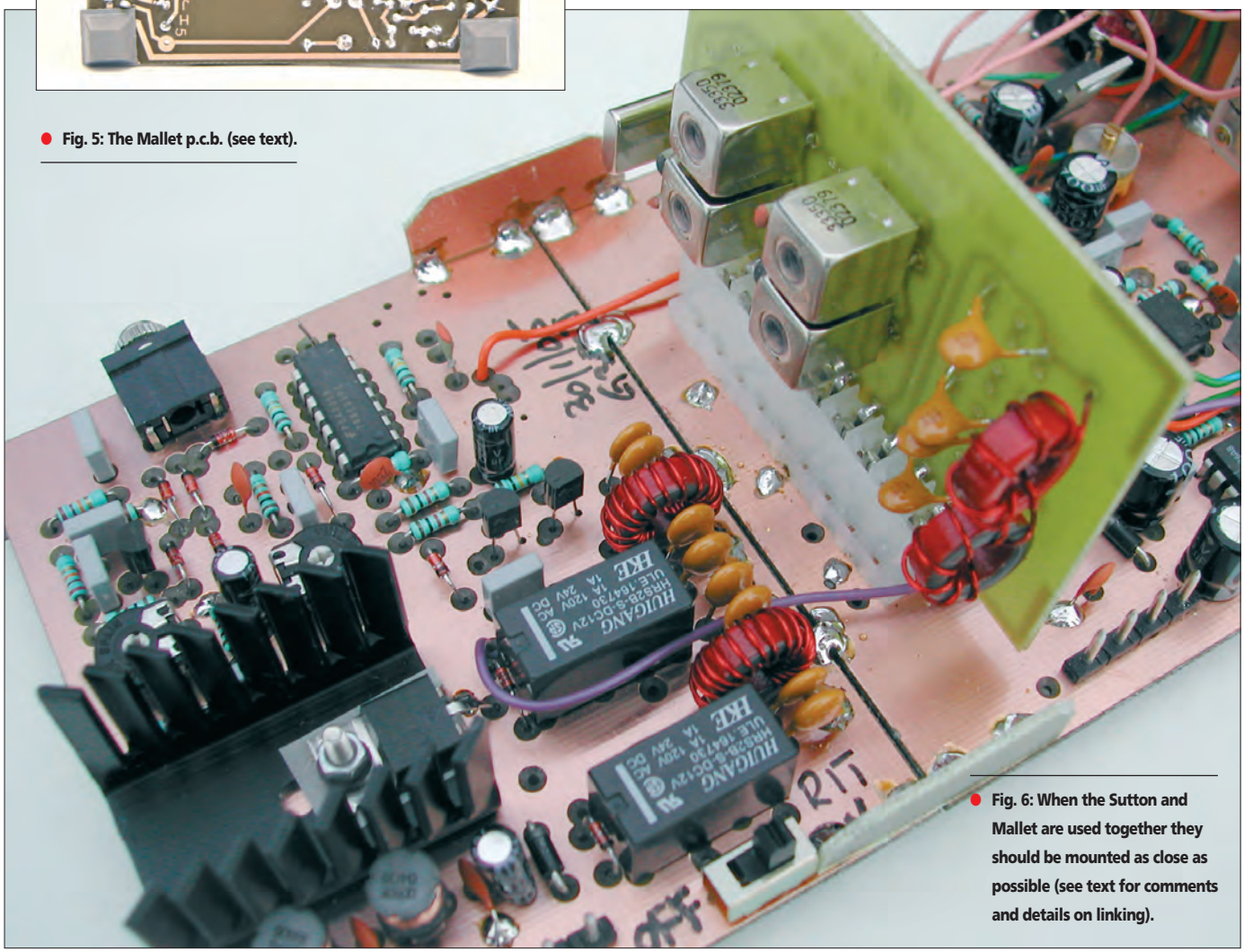


Fig. 6: When the Sutton and Mallet are used together they should be mounted as close as possible (see text for comments and details on linking).

immediately to the relay only figure and then revert to near zero as the relay releases to the off position. Take care adjusting RT200 because going too far can make it draw a few amps!

Low-pass Filter

The p.c.b. mounted low-pass filter is fitted next; (for use with the Sutton it's made for 3.5MHz). Start with the capacitors – these are installed in parallel pairs – C200 with C201, etc. to give four 'filter caps' of 800 pF.

Note: Examine the p.c.b. carefully to determine the correct holes to use because there is an extra linking track (not used for 3.5MHz/80m) used only when these capacitors are wired in series on 14MHz (20m).

The inductors L200/L201 are easily wound since they are single layer untapped windings on red T50-2 toroids. Remember that **each time the wire goes through the hole it counts as one turn**. The project will then be ready for r.f. testing.

Signal Generator

If you have a suitable 3.5MHz source, such as a signal generator or a dip oscillator, this can be applied the l.o. input through C270 shown at point R on the Malle, but coming from point C on the Sutton The temporary link to point Q is changed to point 80 to select the 3.5MHz (80m) low-pass filter. **Note:** Grounding point N, and measuring the voltage on point O, will check that your l.o. input signal is coming through IC200B.

Next, with a meter set to read d.c., it should show 2.5V (this being the average value of the 0 to 5V l.o. square wave that should be present on point O). Then, you should connect your dummy load to the output terminal Z and pressing the key should produce an r.f. output!

All being well you can then experiment cautiously with RT200 to see how that affects output - using the lowest setting that gives full output. The actual output is highly dependent on supply voltage – 1.5W on 13.8V being typical. There's nothing else to adjust - apart from the sidetone level! **Note:** If the Mallet is being used with the Sutton, they should be mounted close together, as in **Fig. 6**, and the 11 interconnections made. These are for supplies, l.o. signal, receiver antenna input, band card l.p.f., muting, band changing, etc.

Once the transmit low-pass filters have been added to the receiver band cards, providing that the receiver works on those bands, it should also transmit on them after satisfactory testing on 3.5MHz.

The r.f. output available from IRF510, falls off slowly above 14MHz but is usable to 28MHz. However, a small increase in output stage bias (RT200) may help lift the output on these bands without cooking the IRF510!

You can easily install the completed Mallet in a case but do make certain it has plenty of ventilation! I also recommend that you get used to it on 13.8V before trying higher supply voltages! And don't forget that for a.m., you'll need the audio amplifier and transformer (shown in **Fig. 7**).

Using The Sutton Mallet

For QRP work using the Sutton Mallet combination (or indeed any transmitting-receiving equipment for that matter!), a good antenna is almost essential. If possible, use a balanced resonant arrangement with uncluttered symetrical arms, and a resonant antenna matching unit (a.m.u.).

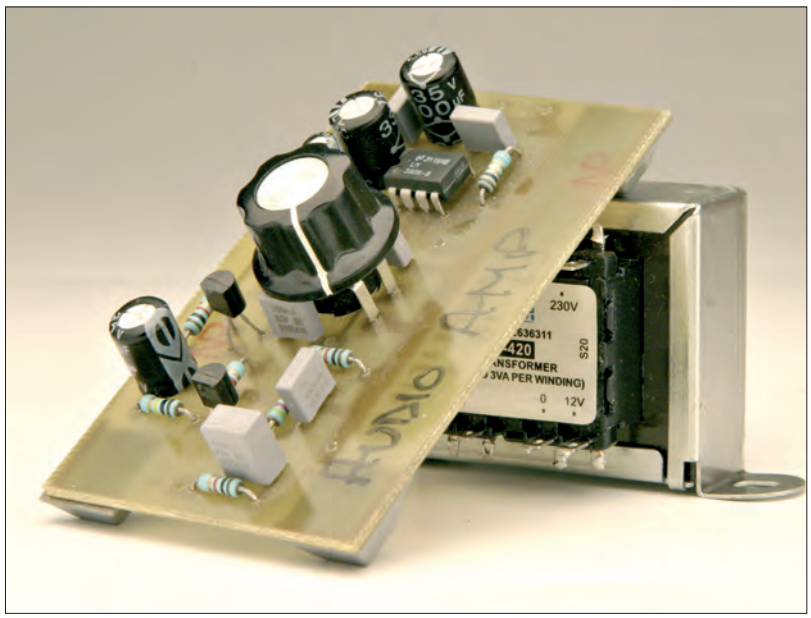


Fig. 7: For amplitude modulation the Mallet project constructors will need the separate audio amplifier and transformer

Random end-fed wires used against mains earth are best avoided! And please - always check for interference to your own TV, video recorders, and Band II f.m. broadcast receivers, etc.

Because the Sutton is a direct conversion (DC) receiver, either sideband can be used. The technique for working another station is to first switch off the **Fine/RIT** control with S200, and then tune the wanted station to zero beat with the main tuning CV100 on the Sutton. This puts the v.f.o. on the same frequency as the other station.

Then you should turn on the **RIT** with S200, and use the **Fine/RIT** control RV100 to slightly adjust the frequency in either direction to hear the other station (choose whichever sideband has least interference from unwanted signals).

After the RIT adjustment, when you press the key, the **RIT** offset will be automatically removed so you transmit on the other station's frequency. **Note:** When used 'separately', the local oscillator can be heard in the receiver by closing S270.

Next month I will describe the alternative Montis 'phone transmitter. Until then I hope you'll enjoy exploring the Sutton Mallet projects! **PW**

Buying Your Sutton Mallet Kit

Kits for the Sutton project are available from Tim Walford G3PCJ at Walford Electronics. They include all parts, including a drilled p.c.b. front panel, to build them 'open' style as shown in the accompanying photographs.

Prices are:-

Sutton 3.5MHz receiver	£49
Optional band cards 1.8, 7, 10, 14 or 21MHz	£15 each
Mallet 1.5W c.w. transmitter	£35
Ex Tras for amplitude modulation	£20
Montis double sideband (d.s.b.) phone 1.5W transmitter	£35

Note: If either transmitter is ordered with the receiver, there will be no post and packing charge, otherwise P&P is £2 extra. Please send your orders with a cheque direct to: **Walford Electronics**, **Upton Bridge Farm**, **Long Sutton**, **Langport**, **Somerset TA10 9NJ**. Further information is available at **www.users.globalnet.co.uk/~walfor**

Sandpiper 144MHz three-element 'Delta Quad'

Has Neill Taylor G4HLX found the ideal antenna for the annual *PW* QRP contest from hilltops? Read on to find out!

A light, collapsible, easily-transportable antenna for 144MHz with a useful amount of directivity and gain – this is the requirement for any hill-top v.h.f. enthusiast who likes to climb to the site on foot carrying the entire station, or 'backpacking' as it's known.

The Summits on the Air (SOTA) programme has also popularised this kind of mountain-top operation for which a truly lightweight radio station is needed. And this three-element 144MHz 'Delta Quad' from Sandpiper would appear to be a very interesting option for this type of operation.

Being very light and taking up very little space when collapsed, an antenna like the Sandpiper Delta could also be great for just putting in the suitcase when going away on a holiday or business trip where some radio operation is likely, but is not, perhaps, the dominant activity. I've always liked to bring some radio gear along on vacations, when I can get away with it! My XYL will not let me forget that I packed my home-brew HB9CV two-element beam into the suitcase for our honeymoon!

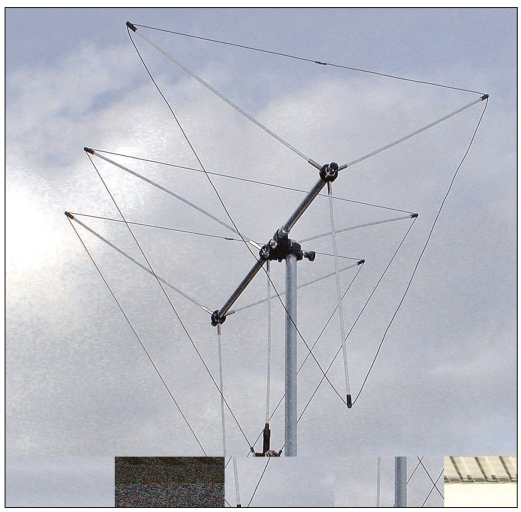


Fig. 1. The lightweight three-element Delta Quad , very fast to assemble and dismantle.

The three triangular-shaped, delta elements of the Sandpiper Delta Quad are made of thin pvc-covered stranded wire, and are kept rigid by tension in the fibreglass spreader 'arms', **Fig. 1**. The boom is an aluminium tube, just 660mm long, and only 19mm diameter, so that the entire antenna weighs less than 500g. The middle element, being the driven one, has the feeder connection at the end of one of the three arms, via a BNC socket in a robust moulded block. Optionally, either an SO239 or N-type socket is available as an alternative feed-point connector.

Straightforward Construction

Constructing the antenna from the parts provided is straightforward using the diagram and instructions provided. The photograph, **Fig. 2**, shows the parts as supplied. Since this photo was taken, the design of the boom clamp has been changed to that shown in Fig. 1, which permits an easy change from horizontal to vertical polarisation if desired.

The fittings of the spreader arms to the boom have been modified a little too. The wire elements need to be cut to length, fixed to the ends of the arms with the supplied caps, and soldered to form the loops. Heat-shrink sleeving is supplied to cover these joints.

For the driven element, ring tags are provided to be soldered to the ends of the wire, which are then bolted onto the feeder connector block. I followed the suggestion in the instructions of starting with the wire length slightly too long, then cutting down until a good match was obtained according to an s.w.r. meter. It was easy to obtain a perfect 1:1 match at 145MHz. Like cubical quad antennas, Sandpiper's Delta Quad antenna has a wide bandwidth,which I found an s.w.r. that was better than 1.2:1 across the range 144.0 – 145.8MHz.

The director and reflector delta dimensions are even less critical, and the nominal wire lengths given in the instructions proved to be fine. Getting the tension in the element wires just right to give rigidity seemed to be important, and I found that I improved this by sanding down the length of two of the fibreglass arms by just a little.

Once the antenna is constructed, it's simplicity itself to disassemble and re-assemble. The caps holding the wire elements to the arms can be slid off, the arms detached from the boom and the entire antenna stored in the polythene bag in which it was delivered. Care has to be taken to avoid tangling the wires, and you won't want to muddle up the director and reflector when re-assembling (although it will be immediately obvious if you get it wrong, the director being too small to fit on the reflector arms).

I timed myself, and found that I could assemble the antenna in just three minutes. My best time for disassembly was just 1 minute 40 seconds! So much for putting it together – now, how well does it work?

Not being in a position to do proper absolute antenna gain measurements, I decided to compare the performance of the Delta Quad with than of another antenna of similar size and weight – my trusty old HB9CV, now several years past its silver anniversary, by the way.

I mounted each antenna in turn at exactly the same location on a six metre aluminium pole, using the same feeder cable, and noted the strengths of the 144MHz beacons that I could hear, in horizontal polarisation, and a number of repeaters, in vertical polarisation. The results of this comparison were quite striking – the Delta Quad consistently gave signals significantly stronger than the HB9CV.

A Surprise

The Sandpiper antenna's performance was something of a surprise to me, but there was no doubt about it. I spent some time carefully assessing the signal strength of the GB3VHF beacon, about 130 km from my QTH. With the aid of a switched attenuator, I estimated the strength when using the three-element Delta Quad to be about 5dB higher than with the 2-element HB9CV. (That's very useful extra gain).

In fact the signal strength of GB3VHF using the Delta

Quad, was not far off that using my 9-element Yagi on another mast (and with a longer feeder, so it's not such a direct comparison). All very impressive for such a lightweight antenna, and tending to support Sandpiper's claimed gain figure of 10.5dBi (i.e. 8.4dB over a dipole), of which I have to admit I was initially sceptical.

Being so lightweight is also a real plus point! When it came to hoisting the antenna into the air, I found that it could easily be supported at a height of 5m on a telescopic fibreglass 'fishing pole' mast, of the type that has become popular for backpacking portable operation. This kind of pole is in itself very light. **Note:** I did carry out this trial in still weather conditions, but the wind loading of the Delta Quad must be very low, as the wire elements and spreader arms are so thin.

I started this review by stating the requirements of a backpacking v.h.f. operator for hill-top operation: an antenna that's lightweight, collapsible, easily-transportable with a useful amount of directivity and gain. Without doubt, the Sandpiper Delta Quad fulfils all of these, and its apparent forward gain exceeded my expectations. Because it is so easy to carry around, it will also appeal to anyone taking a small 144MHz station with them on holiday, or even for occasional use at home if you are really short of space for a permanent 144MHz antenna.

I'm sure that if an antenna like this had been available all those years ago, I might have got away with 'smuggling' it into the honeymoon luggage a little more successfully!

PW

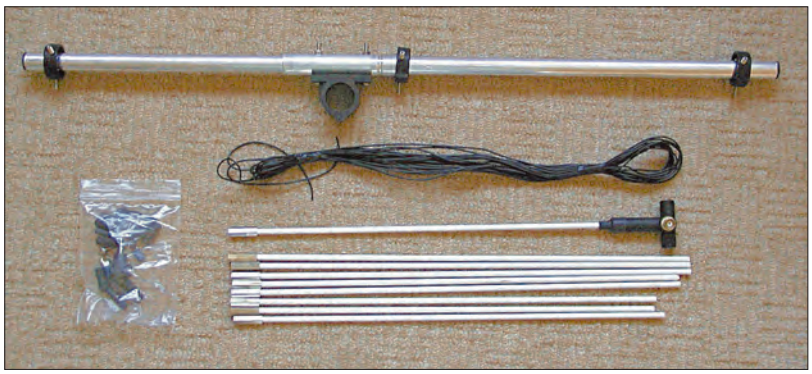
Product
Delta Quad antenna for 144MHz

Company
Sandpiper Aerial Technology

Contact
Unit 5, Enterprise House,
Cwmbach Industrial Estate, Aberdare, Mid-Glamorgan CF44 0AE
Tel: (01685) 87042
website: www.sandpiperaerials.co.uk

Pros & Cons
Sandpiper can supply versions for other bands, contact them for more details.

Prices £35+P&P



● Fig. 2. The parts of the antenna as supplied, before commencing initial assembly.

IT COULD BE YOU!

Club Spotlight Magazine Competition 2005

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

It's very simple to enter the Club Spotlight magazine competition. All you need to do is to send us the **three most recent paper copies (no E-mailed copies please)** of your magazine along with a covering letter. The covering letter should make it clear **which category of club you would like to enter your magazines into**. For example, the **Radio Officers' Association Radio Society**, winner of the 2003 national award - can only enter in the national club section, whereas the **The South Dorset Amateur Radio Society** - 2003 winners, have to specify that they are a local club.

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

National Or Local?

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

The judging panel comprises of **John Goodall G0SKR**, **David Barlow G3PLE**, **David Wilkins G5HY** and **Rob Mannion G3XFD**. Entry to the competition is open now and all entries should be at the *PW* offices in Broadstone no later than **Monday 8 August 2005**. This is so the presentations can be made at the Leicester Show at the end of September and members of the judging panel live in places as far apart as Cornwall, Dorset, and Greater London, so it will not be possible to consider late entries! So, make sure your club's entry reaches us in good time!

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

All entries should be sent to:
Donna Vincent G7TZB/M3TZB,
Club Spotlight Magazine Competition,
Arrowsmith Court,
Station Approach,
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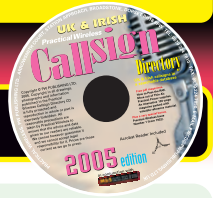

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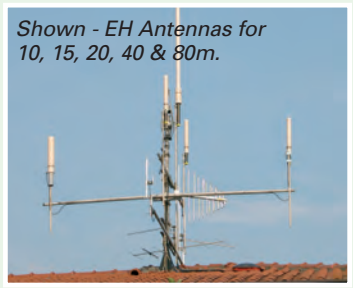

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PSQP-IC with Icom insert	£199.95
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FJ, Miracle Antenna, Oregon Scientic, Revex, Tokyo-Hypower, Watson, Diamond, Yaesu and many more!

Amateur Radio in Sweden

Henryk Kotowski SM0JHF gives an insight into Amateur Radio and some of the personalities involved in the hobby from his adopted home country of Sweden.

The undefeated DX hunter Leif SM0AJU with some of his plaques and awards.

Östen SM5DQC is one of two official DXCC Field Checkers in Sweden.

Morgan SM6ESG drives a vintage SAAB car equipped with a variety of 144MHz antennas and equipment. Morgan lives in Varberg on the West Coast of Sweden, close to the historical Grimeton v.l.f. transmitter that was put on the World Heritage list in July 2004.

A country off the beaten track, relatively calm and withdrawn, seldom mentioned in the newsreels, Sweden has a perfect foundation for Amateur Radio to thrive on. A sparsly populated outstretched land, industrious people with fondness for hi-tech, quality and a strong economy all promotes communications technology, and it blossoms here. Many Amateur Radio operators in Sweden are vanguards of Moonbounce, DX hunting, microwaves, digital techniques and other branches of our advanced hobby.

There are over 12 000 valid callsigns issued in Sweden and the total population is nine million. That gives 1333 Amateur Radio units parts per million (p.p.m.). As of April 2004 there is now only one class of Amateur Radio Service with no Morse code requirement for access to all generally available h.f. and v.h.f. bands, just like in a some other countries.

The administrative authority, Post-och Telestyrelsen, abbreviated PTS, has even abandoned, as of last year, the annual fee of £26 for each licence to remain valid. It might sound revolutionary but as of 1 October 2004 there is no need for a licence at all!

The national organisation, SSA, has been given an official right to conduct appropriate tests and issue Amateur Radio callsigns. There are no age or nationality limits anymore. This new generation of callsigns is distinguished by the SA prefix, one figure and three letters. It seems that all previously issued and the new Amateur Radio callsigns are valid for life.

Becoming A Radio Amateur

Today it's quite easy to become a legal Radio Amateur in Sweden. The initial fee is about £30 and for an extra £12 you can get membership to the SSA for the first year. Regular membership fee is £33 per year and includes a colour monthly magazine titled *QTC Amatörradio*. A substantial discount is given to those under 18 years of age - they pay only £12 per year.

More than 300 members of the total number of 5,500 have opted for 'life membership'. The outgoing QSL service is not included in these fees, it is optional and available on a pay-per-card basis. The incoming cards are distributed through a network of volunteers.

The SSA organisation deserves credit for much of its efforts to attract more people to this worthy hobby, including simplify the procedures, educating its members, fighting off the Power Line Communications and spreading the word. The new web editor of SSA's website **www.ssa.se Ingemar SM0AIG** keeps the site up-to-date, informative and attractive.

Sollentuna Headquarters

The office of SSA is located in Sollentuna, a suburb of Stockholm. There is no radio station here, though. The exhibition Amateur Radio station **SK0TM** at the Telemuseum (Museum of Telecommunications) in Stockholm has acted for decades as the Headquarters Station of the SSA.

Sadly though, the museum was closed down in January 2004 and the SK0TM station was disassembled and moved to the main building of the Science Museum early this year. This demonstration station served as a meeting point for visitors to Stockholm, both foreign and domestic. Today this station is not as well exposed as it had been at the Telemuseum but the tall antenna tower outside is a landmark indicating its presence in the Science Museum.

Licences Issued

Officially there are 2300 licences isssued in Stockholm province (figure 0 in the callsign) but the on-the-air activity is low. Several suburbian clubs have meetings and club radio stations, yet you will seldom hear them on the air.

Radio clubs used to have SK prefix, those within the armed forces and the paramilitary association were assigned SL prefix. Today new club callsigns consist of prefix SA, a figure and two letters.

The radio clubs that are really active are those located up the country - both north and south of Stockholm. Southern parts of Sweden usually enjoy better ionospheric propagation, the northern areas (SM2 and SM3) are frequently influenced by The Aurora Borealis. To overcome this nuisance, really huge antennas are constructed in the north and the most passionate contest operators are to be found here.

Rainer SM2DMU (contest callsign **7S2E**) has just completed a 4-element rotary Yagi antenna for 3.5MHz, for example. The short contest callsigns have always been administered by the SSA for a fee, £12 per year. from this year, and can be re-issued to other persons if not used for some time. The prefixes available for special event and contest callsigns include 8S, 7S, SA, SB, SC, SD, SF, SI, SJ.

Visitors to Sweden can enjoy being on the air without much fuss – either taking advantage of the CEPT agreement or applying for a licence using foreign callsign radio documents. Probably the most sought after area of Sweden is still the island of Gotland – SM1 – in spite of over 100 licenced residents there. During Summertime the island is invaded by tourists, which shows as well in the increased number of Swedish 'portable 1' stations on the air.

Swedish Contesting

There is one major international h.f. contest held in September called the Scandinavian Activity Contest, with separate weekends for telegraphy c.w. and phone, sponsored by four Scandinavian countries including Sweden. A number of local v.h.f./u.h.f. contests attract many participants.

The ever popular Nordic Activity Contests on Tuesday nights cater for fanatics of all v.h.f. and microwave bands. The 50MHz activity has been moved to the second Thursday of the month. It seems to me that the higher frequencies are favoured by SM operators as more technically challenging.

I think I have personally visited about five Moonbouncers in Sweden over the years. One of them is particularly interesting – **Leif SM5BSZ**. Applying software of own design and Digital Signal Processing for reception he explores new frontiers of v.h.f. radiocommunication.

A word of warning to any 'wallpaper' collector – the metallic *Diplom Sverige* for working Swedish parishes is due to fade out next year. The number of parishes is diminishing drastically so, this is the last chance to get this golden diploma.

Hobbyists Increasing

In spite of the average age of Radio Amateur operators still rising, there's a stream of young girls and boys who want to get their hands on these advanced gadgets called radios! They want to connect them to the Internet, find hidden transmitters, experiment with the antennas or simply talk with others.

The total number of qualified operators in Sweden is increasing. Some of them are returning to the hobby after many years but the majority are appling for first time. The future of Amateur Radio in Sweden is bright. **PW**

One of the most active clubs in Stockholm province is SL0ZG in Norrtälje.

Per SM0WRA returned to Amateur Radio after 25 years of being QRT.

Part of the antenna farm of Leif SM5CEU in Vikingstad.

Evert SM5BDY is the Manager of Diplom Sverige offered for working parishes in Sweden. A special callsign SD5DS (Diplom Sverige) was used to arouse the interest and attention.

The exh bit Amateur Radio station in Telemuseum in Stockholm introduced many visitors to the realm of thehobby. It closed down in 2004 and moved to the Science Museum nearby.

Christer SM5IOT with his EME antennas for 144 and 432MHz.

Valve & Vintage

This month Phil Cadman G4JCP's wearing the brown dust coat for his stint in the 'wireless shop' and he's tinkering with something that looks suspiciously like a valved transmitter. Over to you Phil....

Hello and welcome once again to the Valve and Vintage 'shop'. As promised last time, my next couple of sessions 'behind the counter' will be devoted to low power valved a.m. transmitters.

Personally, I'm very happy to see that 'ancient modulation' seems to be making a somewhat fragile comeback. After all, you can't beat the sound of a good quality a.m. transmission!

But first (as ever) there are a few points to tidy up from last time, beginning with my mention of the ORP12 light dependant resistor. A few memories were indeed stirred, including those of Editor **Rob G3XFD** who sent me a copy of a *PW* article from September 1972 page 402. It was a design for an automatic parking light using an ORP12, a 741 op. amp. and a switching transistor.

By coincidence, **Ant Astley GW0AJA** also contacted me about an automatic parking light he'd built in the early 1960s. However, Ant had taken the minimalist approach and simply wired an ORP12 in series with a 2000Ω, Post Office Type 3000 (remember those!) relay. The relay de-energised quite nicely at dusk and switched on a clip-on parking light.

Incidentally, younger readers may not be aware that there was once a time - in England at least - when vehicles parked on the public highway had to have parking lights illuminated after dark.

Scraping Paint Off!

Peter Hemsley wrote to me from North Derbyshire about scraping the paint off OC71 transistors. He reports that those with clear 'goo' inside definitely made better photo-detectors than the types filled with the 'milky' material. One such home-brew OCP71 was used by Peter in a moderately successful light beam telephone.

While the OCP71 is perfectly fast enough to cope with audio frequencies, incandescent lamps, which were often used in the transmitters, are not. The result is a very bass heavy characteristic. (No, we didn't have light-emitting diodes in those days!).

Now to the final word in the 'OA' and 'OC' saga. **Alex Blyth GM4TAL** sent me a copy of Mullard's type nomenclature for their old system semiconductors. Dated October 1963, it states that the first letter is always an 'O' (as we know), and valid combinations for the following letters are: 'A' for diode or rectifier, 'C' for transistor, 'AZ' for zener diode, 'AP' for photo diode, 'CP' for photo transistor and 'RP' for a photo-conductive cell.

The 7MHz Band

The expansion of the 7MHz Amateur band has had the auspicious effect of encouraging a few stations using amplitude modulation (a.m.) stations back onto the band. I've recently heard a couple of a.m. transmissions on 3.5MHz too. Keen to 'do my bit' to persuade still more amateurs to try the mode, I thought a simple a.m. transmitter for 7MHz might help.

While trawling through some old magazines for ideas, I came across an excellent example, albeit for 1.8MHz! Fortunately, the circuit is easy enough to modify for operation on 7MHz, or indeed, 3.5MHz. Called The Minitopper and built by **Walter Farrer G3ESP*** and **John Arundel G3HCX** (now a Silent Key), the design strikes an excellent balance between ease of construction and performance.

Anyone interested in the original article can find it in the August 1962 issue of *Short Wave Magazine*. For now, I'll be concentrating on the r.f. section of the transmitter. Next time I'll cover the modulator section and give some guidance on modifying it for other bands.

***Note:** Walter Farrer G3ESP, now well into his 80s, had his Microhenry Meter project published in the May issue of PW. He's still very active indeed! Editor.*

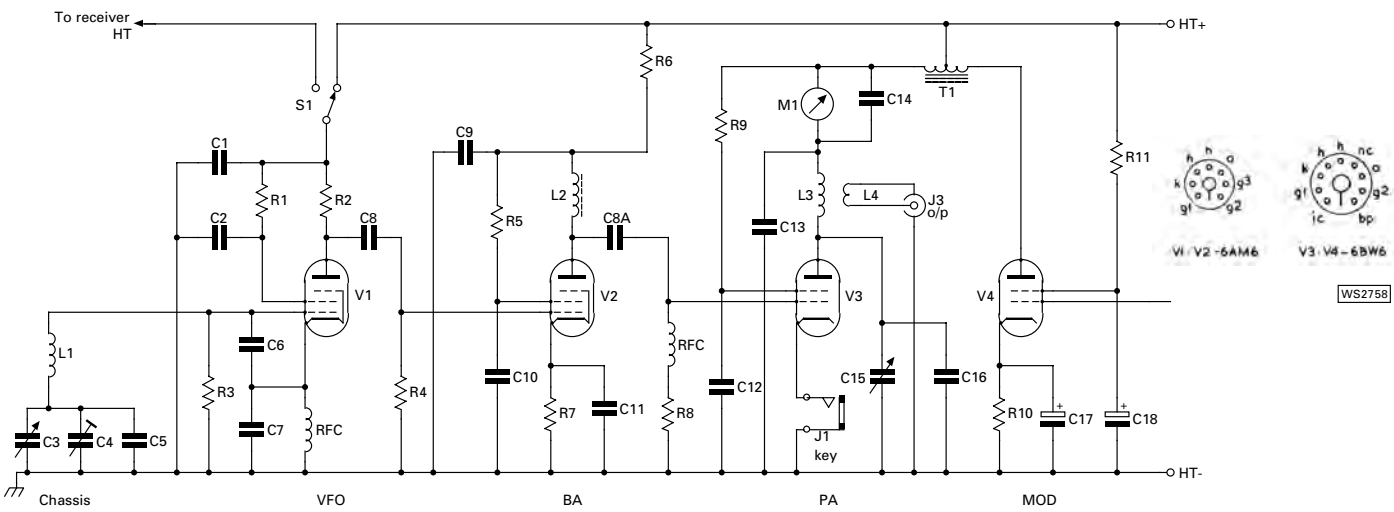


Fig. 1: The circuit from *Short Wave Magazine* in August 1962, outlining the transmitter's v.f.o., buffer amplifier and power amplifier, plus the output stage of the modulator section. Valve base connection are shown in the inset (see text).

The Circuit

The diagram, **Fig. 1**, shows the circuit, outlining the transmitter's v.f.o., buffer amplifier and power amplifier, plus the output stage of the modulator section. Valve base connections are shown as an inset to Fig. 1. The circuit of the complete modulator section will appear next time. Please note however, that the components list is for the entire transmitter, so not all the components listed are shown in Fig. 1.

The v.f.o. is an electron-coupled Clapp oscillator. In this arrangement, the screen grid behaves as the anode of what is, in effect, a triode oscillator. The screen, which is at zero r.f. potential because of C2, also serves to isolate the oscillator and its tuned circuit from the output load (R2, R4 and the grid of V2).

You'll notice the similarity to the Colpitts oscillator, but here the frequency-determining resonant circuit consists of two 'arms' in parallel. One arm consists of L1 in series with the parallel combination of C3, C4 and C5; the other arm consists of C6 and C7 in series.

Capacitors C6 and C7, which constitute the feedback system, are relatively large and tend to swamp any capacitance variations within the valve. The parallel combination of C3, C4 and C5 is made relatively small, necessitating a large inductance for L1 to achieve the desired operating frequency.

If you think of the equivalent circuit of a quartz crystal, there's a very large inductance in series with a very small capacitance in one arm, with a second arm comprising a relatively large capacitance in parallel with the first. The inductive reactance of the first arm in combination with the capacitive reactance of the second arm causes the circuit to oscillate in the parallel-resonant mode. Whew! I hope you managed to follow that.

It's similar with the Clapp oscillator. The series combination of a high-value inductor and low-value capacitor, plus the swamping effect of the large parallel capacitance, gives the oscillator very good stability. In fact, the Clapp oscillator was deservedly the popular choice of Radio Amateurs for many years.

While I've referred to the oscillator simply as the Clapp oscillator, it should really be called the Gouriet-Clapp (or Clapp-Gouriet) oscillator, as it seems to have been invented independently by two people. So far I've found reference to it being attributed to **J. K. Clapp** (invented in 1948 although it may not have been published until 1954), while the fourth edition of the **Radio Society of Great Britain's** (RSGB) *Radio Communication Handbook* states that the circuit was originally devised by **G. G. Gouriet** of the BBC. Does anyone know the full story behind the invention of the Gouriet-Clapp oscillator?

Moving on, R3 is simply a grid leak (sometimes this resistor is taken to the valve's cathode rather than to ground). R1 is a screen dropper, and C1 and C2 decouple r.f. currents to ground. In this design the output is developed across a resistor - R2 - but you'll often find a radio-frequency choke used here.

The v.f.o. is followed by an untuned buffer amplifier: V2. Its purpose is to both amplify the output of the oscillator and - just as importantly - isolate the v.f.o. from the p.a. valve. To minimise the loading, the grid of V2 presents to the v.f.o., the valve should operate in class A. However, this is not always desirable, as we'll see next time.

In an effort to keep the transmitter as simple as possible, the designers of The Minitopper originally connected the output of the v.f.o. directly to the p.a. valve. But they found this arrangement was not satisfactory. Despite the v.f.o. having good output isolation, the slightly varying load presented by the p.a. valve under modulation caused some minor - but noticeable - frequency variations. In other words, they got f.m. as well as the a.m. mode!

The inclusion of V2 completely solved the problem. And although a buffer does increase the complexity of a transmitter, the extra stage can be very useful for other reasons. Usually, the only time a buffer isn't necessary in a low power transmitter is when the v.f.o. isn't a v.f.o. at all, but a crystal oscillator.

To maximise the drive power available to V3, the output from V2 is developed across a radio frequency choke rather than a resistor; R6 and C9 are simply for decoupling. The p.a. itself operates in class C, not only to maximise power output but because high level amplitude modulation actually demands it. The correct grid bias for V3 is developed automatically by the grid current which flows through R8.

It's important that p.a. valves, which use grid current biasing never have h.t. applied unless there is sufficient r.f. drive to the control grid. Lack of drive can result in a dangerously high anode current flow (and a red hot anode!).

Large power amplifiers always have at least one additional form of protective bias or else have a mechanism to reduce the screen grid voltage should excitation be lost. Fortunately, low power transmitters seldom need this level of protection and a resistor in series with the screen grid is usually sufficient to protect the p.a. valve from short term overloads.

You may be surprised to find the aerial link coupled to the p.a. rather than matched by a Pi network coupler. While link coupling does not allow the p.a. to easily match into a wide range of impedances, in our case this is in no way a limitation, as I'll explain.

Simple transmitters seldom have sufficient harmonic suppression - in these EMC (electromagnetic compatiblity) conscious times - to be used without additional output filtering. Suitable low pass filters for QRP transmitters have been featured in *PW* quite recently.

For instance, see pages 36 to 39 (also page 43) of the February 2005 issue. (And there's more on page 35 of the January 2005 issue.) The important point to bear in mind is that these filters are designed to work with a fixed load (and source) impedance, so it's essential that any antenna matching unit be placed **after** the filter.

Therefore, when feeding such a filter, the p.a. should 'see' a constant load. And once correctly adjusted, the link coupling should not need further attention. Simply tuning C15 to maintain the p.a. tank at resonance is all that's needed when the v.f.o. frequency is changed.

One peculiarity I've noticed with this circuit concerns the suppressor grid (g3) of V1. When a pentode - like the suggested EF91/6AM6 - is used as electron coupled oscillator, it's customary to take g3 to ground/chassis, and **not** to the cathode (as is shown in Fig. 1). Although not as important, the same applies to V2, so I suggest that g3 be connected directly to chassis on both valves.

The End is Near

Ah, the end of the page is near so I'll have to continue the next time I'm in the Valve and Vintage 'shop'. Until then, please send your comments and letters to me, either via E-mail to: **phil@g4jcp.freeserve.co.uk**, or by mail to: **21 Scotts Green Close, Scotts Green, Dudley, West Midlands DY1 2DX**.

PW

Components List

Resistors

All resistors are 0.5W

R1, R5 = 47kΩ
R2 = 27kΩ
R3 = 62kΩ
R4 = 100kΩ
R6 = 3.3kΩ
R7 = 220Ω
R8 = 18kΩ
R9 = 10kΩ
R10 = 330Ω
R11 = 39kΩ

Capacitors

C1, C9, C13 = 3nF ceramic
C2, C14 = 10nF ceramic
C3 = 50pF variable
C4 = 50pF trimmer
C5 = 50pF silver mica
C6 = 2nF mica
C7, C12 = 1nF mica
C8, C8A = 100pF ceramic
C10, C11 = 5nF ceramic
C15 = 140pF variable
C16 = 200pF silver mica
C17 = 25µF 25V electrolytic
C18 = 8µF 350V electrolytic

Valves

V1, V2 = 6AM6, Z77 or EF91
V3, V4 = 6BW6

Miscellaneous

RFC = 2.5mH r.f. chokes
L1, L2 = broadcast receiver types - see text
L3 = 48 turns 28s.w.g. close-wound on 1in diameter former
L4 = Five turns coupling link over h.t. end of L3
M1 = 50mA or 100mA moving coil meter
Other components - see text

Antenna Workshop

Peter Dodd G3LDO, takes a look at a part of the antenna system that's often overlooked - the feeder. What type should you use to improve your station?

Any conductor carrying r.f. power will radiate. To convey r.f. from the transmitter to the antenna without radiation can be achieved using two conductors arranged so that the electromagnetic field from one is balanced everywhere by an equal and opposite field from the other. In such a case the resultant field is zero. In other words, there is no radiation. Such an arrangement is called a transmission line.

The transmission line shown in **Fig. 1** is known as twin-line feeder and can be constructed from two copper wires supported at a fixed distance apart using insulated spacers. This type of construction is often known as open-wire feeder. The spacers themselves may be made from insulating material such as Plexiglas, polyethylene or plastic.

A popular commercial twin-line feeder is 450Ω 'window-line', which is constructed by enclosing the conductors in two mouldings along the edges of a ribbon of polyethylene insulation. It has windows cut in the polythene insulation at regular intervals to reduce the weight of the line and breaks up the surface area where dirt and moisture could accumulate.

The main disadvantage of twin-line feeder is that the counteracting fields exist some small distance from the two conductors. Provided the line is installed clear of other objects, it works very well. However, any nearby metal objects will distort these fields, causing imbalance, radiation and lead to power loss in the feeder.

Coaxial Cable

The two conductors of a transmission line can also be arranged in a concentric manner, with the inner conductor supported within the tubular outer by means of a semi-solid low-loss dielectric. In this form the feeder is known as coaxial cable, a type that's so familiar to us all.

Coaxial cable was invented over a hundred years ago and was originally known as 'concentric line'. It didn't come into general use because twin-line feeder was simpler, less costly and easier to construct and connect. The main reason for the introduction of coaxial cable was the development of video transmission systems in the late 1920s. A television signal is broadband with its information content dependent on maintaining uniform amplitude and phase information over a wide range of frequencies. A coaxial cable has the necessary uniform frequency response.

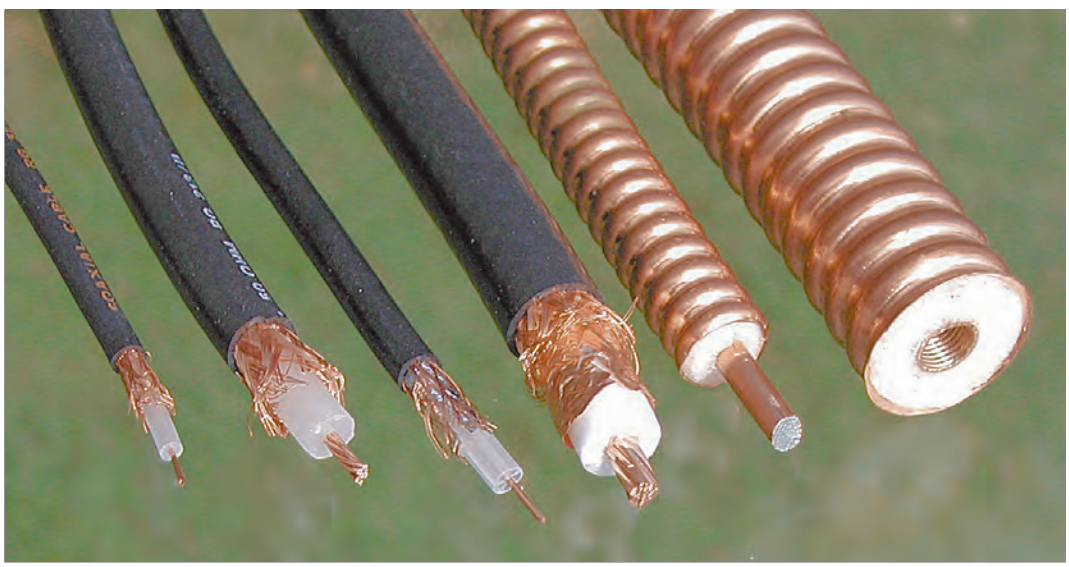
Coaxial cable also has advantages that make it very practical for efficient operation in the h.f. and v.h.f. bands. It is a shielded line and under ideal conditions has a minimum of radiation loss. Since the line has little radiation loss, nearby metallic objects have minimum effect on the line because the outer conductor serves as a shield for the inner conductor.

For these reasons coaxial cable transmission line is now used in most Amateur Radio installations and in order to preserve the characteristics of the flexible coaxial line special coaxial fittings are available. However, there are situations where twin-line feeder is useful such as tuned line multiband h.f. antennas.

Characteristic Impedance

Transmission line with both of its conductors in close proximity, can be thought of as a series of small inductors and capacitors distributed along its whole length. Each inductance limits the rate at which the immediately following capacitor can be charged when a pulse of electrical power is fed to one end of an infinitely long transmission line. The effect of the chain of Ls and Cs, is to establish a definite relationship between current and the voltage of the pulse.

Thus the line has an apparent resistance called its characteristic or surge impedance, whose conventional symbol is impedance, is Z_0. Transmission line characteristic impedance is unaffected by the line length. The characteristic impedance of most coaxial cable used in Amateur Radio installations is usually 50Ω.



Examples of coaxial cable. From left to right: RG58C/U; RG213U; 75Ω low-loss television cable; Ecoflex 15; Andrews LDF4-50 and LDF5-50 (with the vinyl outer cover removed to show the outer conductor construction).

Velocity Factor

With open wire air-spaced lines the velocity of an electromagnetic wave travelling along them is very close to that of light. In the presence of dielectrics other than air the velocity is reduced, since electromagnetic waves travel more slowly in dielectrics than they do in a vacuum. Because of this the signal frequency's

wavelength, as measured along the line, will depend on the velocity factor of the particular type of line in use. The wavelength in a practical line is always shorter than the wavelength in free space.

Transmission Losses

All transmission lines exhibit some degree of loss. Electromagnetic waves tend to propagate along the surface of conductors, rather than uniformly throughout the conductor, due to the phenomenon of skin effect. Coaxial cable performance depends upon the conductivity and size of the outer surface of the inside conductor and the inner surface of the outer conductor. In general the larger the cable the lower the loss.

The centre conductor of a coaxial cable may consist of either a single wire, of the desired outer diameter, or a bundle of smaller strands twisted together. Stranded centre conductors improve cable flexibility while solid centre conductors provide more stable electrical characteristics.

The outer conductor of low-loss coaxial cable should ideally be made from a solid conductive pipe. In practice the flexibility and bend radius of such cables can be improved by corrugating the outer conductor; examples are shown in the **photo** on page 42.

Nearly all of the popular flexible coaxial cables employ braided shields, such as RG58C/U, RG213U shown in the left-hand side of the photo. These are not as effective electrically as solid outer conductors because gaps in the woven outer conductor permit some signal leakage or radiation from the cable, increasing the attenuation at higher frequencies. This effect can be minimised by adding a layer of copper foil under the braid as is used in satellite TV cable and Ecoflex cables shown in the centre of the photo.

Common dielectric materials for coaxial cable include polyethylene, polystyrene and Teflon. An improvement can be achieved by mixing low-cost polyethylene with nitrogen to form a uniform sponge. This material is variously known as cellular polyethylene dielectric, foam dielectric, or poly-foam. It has half the dielectric losses of solid polyethylene at a modest increase in cost. This is used in the three cables shown to the right of the photograph.

The attenuation factors of various correctly terminated coaxial cables (low s.w.r.) are shown in **Fig. 2**. These attenuation figures are for 30m (100ft) lengths and indicate that for frequencies below 50MHz there is little to be gained by using expensive low-loss coaxial cable feeders.

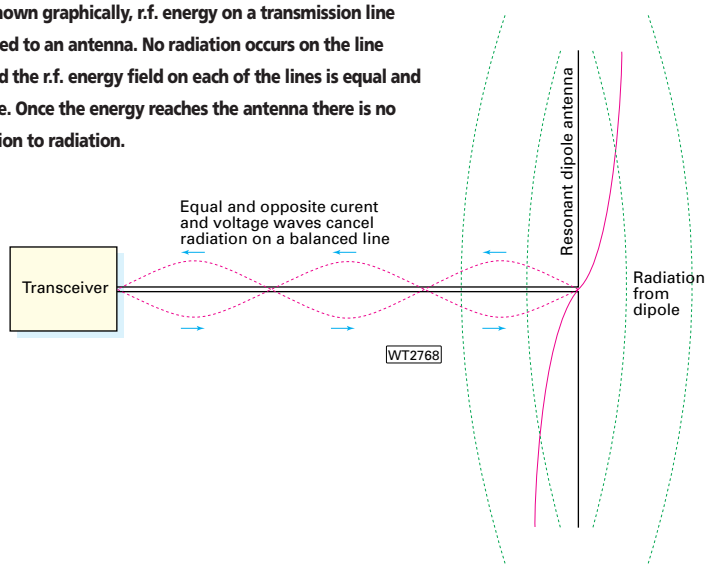
Low Loss Feeder

At v.h.f., and particularly at u.h.f. frequencies, feeder loss is a different matter altogether, we have to look for a low-loss feeder in these circumstances. Good quality coaxial cable can really enhance a station's performance. On a typical u.h.f. installation, a 3dB signal and transmitter power increase (at least) could be gained by replacing RG-213 with, say, LDF4-50 (second right in the photo).

If 3dB doesn't sound much, remember that generally the size of an antenna array has to be doubled to get 3dB gain. The same gain is equivalent to doubling the output power of your rig and you get a 3dB increase in your receiver's apparent sensitivity too. A useful upgrade!

Commercial organisations, such as cell-net telephone companies, tend to use this very expensive Andrews LDF4-50 cable. This material, is very low-loss, but is really too expensive for most Amateur applications being in the region of £8-10 per metre. Then the N-type connectors cost around £25 each. So, for most Amateurs a much cheaper option, for low-loss cable is to use Ecoflex15, a cable that has a similar characteristics to LDF4-50 (see Fig. 2), but costs only around a third of the price.

Fig 1: Shown graphically, r.f. energy on a transmission line connected to an antenna. No radiation occurs on the line provided the r.f. energy field on each of the lines is equal and opposite. Once the energy reaches the antenna there is no opposition to radiation.



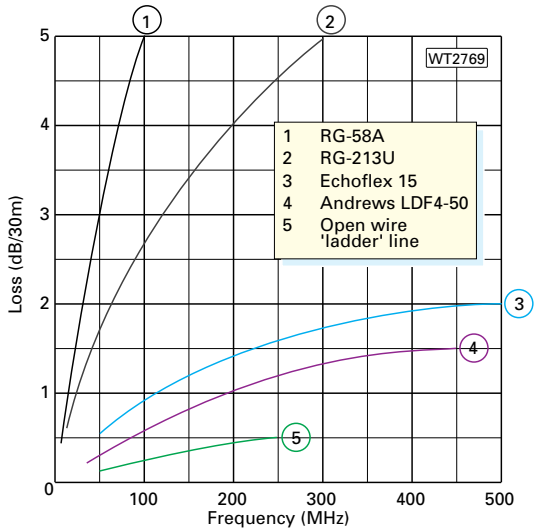


Fig 2: Matched feeder attenuation for various feeders discussed in the text. Note the similarity between Ecoflex 15 and Andrews LDF4-50.

You will have probably noticed in Fig. 2, the excellent low-loss characteristics of twin-line feeder. However, twin-line feeder has practical disadvantages, that has already been discussed. Additionally, the spacing between the wires must limited to a fraction of a wavelength for radiation cancellation to occur, which imposes an upper frequency limit.

Common Connectors

The most common type of coaxial connector found in Amateur Radio use is the PL-259/SO-239. The design of these connectors does not maintain a constant characteristic impedance throughout the length of the interconnect, which makes them unsuitable for frequencies above v.h.f. although not a problem at h.f.

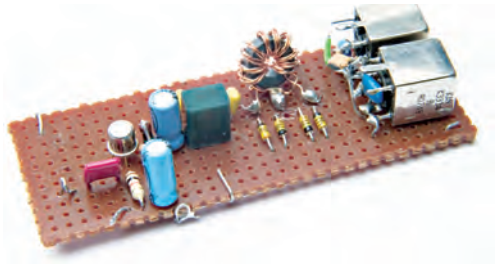
The N connector is now most commonly found on u.h.f. transceivers, amplifiers and antennas, has a constant impedance characteristic and is large enough handle the legal amateur power limit.

Interestingly, all connectors used on high-grade low-loss cable appear to be solderless. This applies to the N-type male and female connectors used with Ecoflex15. These connectors are very easy to fit, another reason to consider upgrading the feeder at your station!

PW

CARRYING ON THE...

Practical Way



The front-end and first audio amplifier of George's latest project using the RA3AAE mixer circuit.

This month the Rev. George Dobbs G3RJV discusses applying the finishing touches to a transceiver, by linking up the various projects he's featured recently. And as usual, there's an appropriate quotation to read first!

"When they want you to buy something they will call you. When they want you to die for profit they will let you know. So, friends, every day do something that won't compute".
Wendell Berry (Poet, Essayist and gentleman farmer living in Kentucky, (USA)

As most Carrying On The Practical Way (COTPW) readers will know, I edit *Sprat,* the journal of the G QRP Club and have done so for over 30 years. And like most long term commitments, sometimes it can be irksome but more often than not it's a real pleasure!

The pleasure comes my way because *Sprat* is made up from articles submitted by readers who share with others what they are doing on their Amateur Radio work benches. Over the years I've found the most delightful and ingenious articles have come from members who live in situations where amateur radio construction is difficult, in places where equipment and components are in short supply.

We often complain about having to search around for our required parts, although some *Sprat* authors are forced to make do with what is at hand. They employ ingenuity and imagination to produce successful Amateur Radio projects and in the past I've quoted many of their circuit ideas in the column. Oddly enough the articles have often been the most popular among *Sprat* readers.

I say "oddly" because most of the readers can get hold of the specialist parts to build more sophisticated projects. I suspect that the interest may be because there's something truly satisfying about using simple ideas and cheap parts to build Amateur Radio equipment. We don't have to do that but that's the magic of a hobby; we can do things whichever way we choose!

Wendell Berry (author of this month's appropriate quotation) speaks sense when he suggests; "every day do something that won't compute". I agree! We are weary of being told what we should do and how we should it. There's delight in stepping outside and being ourselves. I think it's called "thinking outside the box" - but only those inside the box would use that turn of phrase.

In the last edition of COTPW I described my 'Amateur Radio doodling', the happy evenings spent with a soldering iron, a few parts and some simple circuit ideas. In the February edition I also revived my interest in the **RA3AAE** sub-harmonic mixer circuit and described a simple 3.5MHz variable frequency crystal oscillator (VXO).

The RA3AAE mixer requires a local oscillator (l.o.) at half its operating frequency. A doubler circuit was added to the VXO so that a transmitter could be built for 7MHz.

In the last issue, I described a suitable transmitter circuit that could be driven by the 3.5MHz VXO and doubler to produce a useful QRP output on 7MHz. And this month I continue the thread of my circuit doodling to add the RA3AAE mixer as part of a receiver to turn that transmitter into a transceiver.

Local Oscillator

The 3.5MHz VXO featured in the February 2005 COTPW provides the local oscillator for the mixer, with the first version of the mixer shown in **Fig. 1**. (And yes, we have seen this before in *PW*).

Readers will know the effect of the two-diode arrangement from the full-wave rectifier circuit used in power supplies. Only positive peaks of the signal pass through the circuit giving a series of double peaks on the output, so the circuit doubles as well as mixes.

Although there are losses through the circuit the attenuation of the fundamental is relatively high. High speed silicon diodes work well in the circuit; I used a pair of 1N4148 diodes, although at higher frequencies hot carrier or Schottky diodes could be an advantage.

In the version featured here, to keep the circuit simple, a commercial 10µH axial moulded choke forms the input tuning circuit in parallel with a pair of series capacitors (68pF and 220pF). The series capacitors provide some impedance matching for the input. I also added a 1kΩ linear potentiometer as a simple r.f. attenuator on the antenna input.

A 1mH r.f. choke and a 47nF capacitor are used as r.f. decoupling on the audio output from the mixer. This is coupled to a stereo jack socket.

Warning: Take note of the wiring of the socket. It's designed to feed a pair of amplified loud speakers of the sort sold for use with a computer. The amplified speakers are turned up to full volume and the attenuator potentiometer at the antenna input is used as the receiver gain control.

The circuit in Fig. 1 worked surprisingly well as a 40metre receiver. The 7MHz band is of course notorious for cross modulation and break-through from the strong broadcast stations working in, and adjacent to the band.

The problems are eased by the use of the r.f. attenuator control and as the main gain control of the receiver. Since the only receiver gain is from the amplifier speakers, these are best left turned up to full volume.

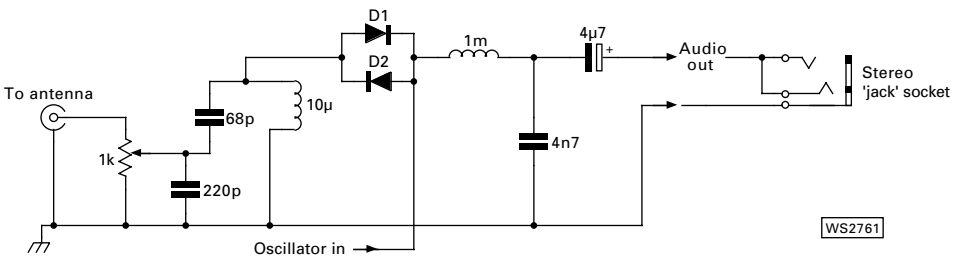


Fig. 1: The 3.5MHz VXO featured in the February 2005 COTPW provides the local oscillator for the mixer, with the first version of the mixer for the G3RJV transceiver project (see text).

Second Version

The diagram, **Fig. 2**, shows my second version of the receiver board with better input tuned filtering and matching. A single tuned circuit (L1 and C1) selects the frequency.

The input matching is via a tapping on L1.

Wind the first six turns of L1 then make a large loop by twisting the wire on the outside of the core. Continue the winding until the 40 turns are completed. Scrape off the enamel and tin the bare copper with solder at both ends. Do the same with the loop (L2 is wound over the centre portion of L1).

The tuned circuit is designed to make use of the cheaply available Polyvaricon variable capacitors of the type used in medium and long wave a.m. radios. These can have a maximum capacitance anywhere in the range 100-300pF.

The inductor L1 is about 8µH and will resonate on 7.030MHz (the QRP frequency) using around 65pF. This should enable any Polyvaricon capacitor to resonate L1 on the 40 metre band.

Rather than use an amplified speaker, this mixer feeds into its own audio stages. These are shown in **Fig. 3**. A bipolar transistor forms an audio pre-amplifier feeding an LM380N amplifier chip.

I used an existing LM380N module and added the pre-amplifier to the back of the mixer board. A whole variety of audio amplifiers could be used to complete the receiver. I'm sure you already have a suitable amplifier?

Jan-Martin Noeding LA8AK, has done a lot of work on the RA3AAE mixer. He recommends a variant of the circuit by RA3AAE, which uses two cubic elements (four diodes) in the mixer circuit. My version of this idea is shown in **Fig. 4**.

I used pairs of 1N4148 diodes and coupled the local oscillator VXO via a tri-filliar transformer. This enables a better impedance match and balance. An r.f. choke and a couple of capacitors decouple the output, this can then feed into the audio arrangement shown in Fig. 3.

Daunted by Tri-Filliar?

I know some readers are daunted by the thought of winding and using tri-filliar transformers. Please don't worry unduly, it's really very easy, in fact the chief problem is identifying the correct wires once the transformer is completed.

The core is a ferrite FT37-43, although probably other ferrite cores, including surplus items, would do the job. To wind the transformer cut three lengths (about 400mm each) of 0.35mm (28 or 30 s.w.g.) enamelled copper wire. Lay these alongside each other and tie a knot as near to each end as possible.

The three wires need to be twisted together to achieve about two or three turns per centimetre. **Note:** I do this by securing one end in a vice or clamp and inserting the shaft of a small screwdriver inside the knot at the other end. Rotating the screwdriver slowly will add a twist to the wires.

Next, you should carefully encourage the twist along the length of the wire to make it as even as possible. When the wires are twisted together, treat them as one wire and wind 10 turns on the core. Finally, you can bare and tin all six ends.

Now it's time for the tricky bit; getting the right ends of the six wires in the right place! To do this you should use an Ohms range on a multimeter to identify the three separate windings.

When one winding has been identified join one side to the ground and the other side to **VXO IN**. Next, you should find the other two windings with the help of the meter.

Then join one side of one winding to the opposite side of the other winding. This joined wire goes to the 1mH choke. The two remaining ends go to the two pairs of diodes. It's as simple as that!

Input Tuning

The mixer requires some form of input tuning. The input tuning circuit of Fig. 2. (C1 plus L2/L2) could be used and works quite well.

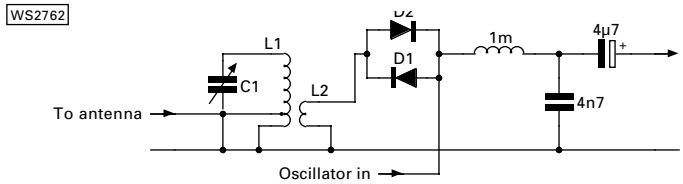


Fig. 2: The diagram shows G3RJV's second version of the receiver board with better input tuned filtering and matching. A single tuned circuit (L1 and C1) selects the frequency (see text).

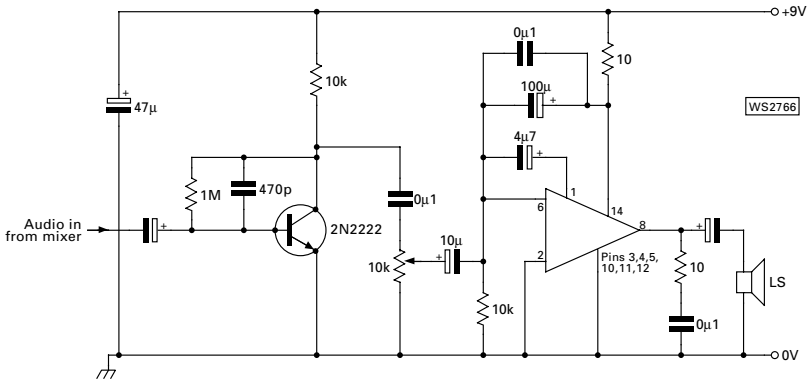


Fig. 3: This mixer feeds into its own audio stages. A bipolar transistor forms an audio pre-amplifier feeding an LM380N amplifier integrated circuit (see text).

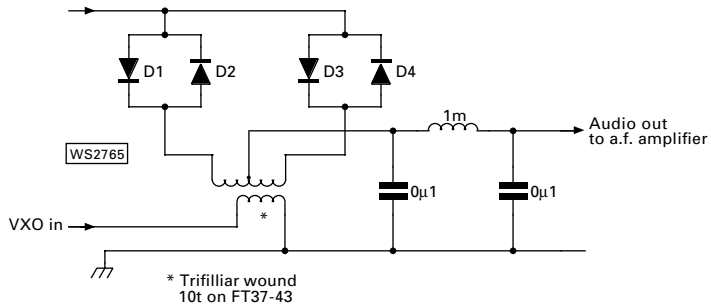


Fig. 4: Jan-Martin Noeding LA8AK, recommends a variant of the circuit by RA3AAE which uses two cubic elements (four diodes) in the mixer circuit, this is the G3RJV version (see text).

I already had a bandpass filter based on Toko inductors (**Fig. 5a**) and this does a good job. Unfortunately though, these inductors are no longer available.

However, in my inductor stock I had some 10.7MHz i.f. transformers without internal capacitors built into the base. The adjustable coil allowed an inductance range of around 2.2 to 4.8µH. The values in **Fig. 5b** work well as a bandpass filter for 40 metres. Incidentally, as the inductors I had, rather oddly, only had one winding I used a capacitive tap to match the input from the antenna.

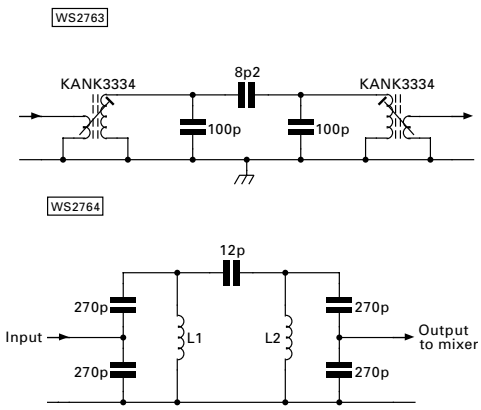


Fig. 5a and b: Bandpass filter circuits used by G3RJV (see text).

Although I used one-off inductors from my stock, readers may have surplus 10.7MHz i.f. transformers which could be used. These will probably have small capacitors built into the base. Break them with a small screwdriver to leave the inductor alone. Such inductors may do the job with the values shown in Fig. 5b.

Having following my little circuits over the last few issues, readers will now have enough to build up a relatively simple 7MHz transceiver. It will cover the whole c.w. portion of the band so you'll be able to enjoy yourself on the key! **PW**

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A-17-12 17&12 ad for HF6V	£49.95
A-6 6m ad for HF6V-X	£14.95
TBR-160S 160m HF2/6/9V	£114.95

Hustler Antennas

Hustler 5-BTV
5 Bands - 80-10m
Height 7.64m - Weight 7.7kg
SWR 1.15:1 - Power 1kW
£179.95

Hustler 4-BTV 4 Band Vert	£149.95
Hustler 6-BTV 6 Band Vert	£209.95

West Mountain Radio

RIGblaster Models

RIGblaster Pro	£209.95
RIGblaster Plus	£119.95
RIGblaster M8	£89.95
RIGblaster M4	£89.95
RIGblaster RJ	£89.95
Nomic 8P	£59.95
Nomic 4P	£59.95
Nomic RJ	£59.95

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23cms (1296 Mhz) 55 element 21.5 dbi gain "N" 4.64m long.

Tonna 20505 6m 5el	£89.95
Tonna 20809 2m 9el	£54.95
Tonna 20811 2m 11el	£79.95
Tonna 20817 2m 17el	£99.95
Tonna 20909 70cm 9el	£45.95
Tonna 20919 70cm 19el	£59.95
Tonna 20921 70cm 21el	£74.95
Tonna 20635 23cm 35el	£64.95
Tonna 20655 23cm 55el	£89.95
Tonna 20745 13cm 25el	£69.95

Diamond Antennas

HF10FX 10m Mobile	£39.95
HF15FX 15m Mobile	£39.95
HF20FX 20m Mobile	£39.95
HF40FX 40m Mobile	£39.95
HF80FX 80m Mobile	£42.95
CR8900 10/6/2/70	£72.95
CP6 Base 6m-80m	£239.95
X50 Base 2/70	£54.95
X200 Base 2/70	£84.95
X300 Base 2/70	£99.95
X510 Base 2/70	£124.95
X700 Base 2/70	£249.95

Cushcraft Antennas

X-7 - 20/15/10 7el Yagi	£669.95
A3S - 20/15/10 3el Yagi	£499.95
A4S - 20/15/10 Yagi	£569.95
A3WS - 12/17 3el Yagi	£379.95
ASL-2010 13-32MHz Log	£749.95
MA5B - Mini Beam	£369.95
D3 - 20/15/10 Dipole	£249.95
D3W - 30/17/12 Dipole	£249.95
D4 - 40m Rotary Dipole	£349.95

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** Call for prices on TGM upgrade kits.*

MQ-24SR 6-20m 2el	£329.95
MQ-34SR 6-20m 3el	£449.95
MQ-3 6-20m 3el	£379.95
MQ-26 6-20m 2el	£389.95
MQ-26SR 6-20m 2el + EH	£419.95
MQ-36SR 6-20m + Dir	£559.95

Radioworks Wire Ants

CW-160 160-10m (252ft)	£129.95
CWS-160 160-10m (133ft)	£114.95
CW-80 80-10m (133ft)	£89.95
CWS-80 80-10m (66ft)	£109.95
CW-40 40-10m (66ft)	£84.95
CW-20 20-10m (34ft)	£89.95
G5RV+ 80-10m	£59.95
Radioworld G5RV Fullsize	£29.95
Radioworld G5RV Halfsize	£27.95

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LDG Electronics

AT-1000

1KW Auto ATU - 1.8-54MHz - 1-8 secs Tune - Approx SWR Rating of 10:1

£499.95

LDG Z-100

100w Auto ATU - 1.8-54MHz - 0.5 - 6 secs

£129.95 ***BEST SELLER****

LDG AT-11MP

100w Auto ATU - Covers 1.8-54MHz
1-5 secs Tune - Cross needle meters

£199.95

LDG AT-100Pro *New*

100w Auto ATU - 1.8-54MHz
1-5 seconds Tune - 2 Pos Ant switch

£169.95 ***New****

LDG RBA 1:1 & 4:1

1:1 or 4:1 Balun - Covers 1.8 - 30Mhz
Power rating 200w

£29.95

LDG AT-897

100w Auto ATU for FT-897 - 1.8-54MHz

£199.95

Accessories:

K-OTT Kenwood Interface	£49.95
Y-OTT Yaesu Interface	£54.95
Icom-IC1 Icom Interface	£29.95
Alinco-IC1 Alinco Interface	£29.95
AC-1 Cable	£19.95

W4RT Electronics

One-Plug-Power

One-Plug Power is the internal FT-817 battery solution you have been waiting for until now.

OPP-817
£54.95
NEW! 2300 mAh Large Capacity FT-817 Internal Battery Solution
Still use Internal 817 Charger

OPP-897
£99.95
One Plug Power for the FT-897
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NEW!

One-Plug Power is the internal FT-817 battery solution you have been waiting for until now. One-Plug Power comprises a 1800 mAh NiMH battery pack, both over-temperature and over-current protection, connection to the FT-817 Molex connector, and a modified Yaesu battery cover door featuring a power jack that allows connection of a battery charger such as the Maha MH-C777 or MH-C888.

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.

One-Touch-Tune

At the touch of a button, you have the carrier needed for tuning. One-Touch Tune (OTT) is totally transparent to the FT-817 and to any external equipment that you have attached to the rig.

OTT-817
£54.95
It requires no external power and works with both manual and automatic tuners.

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W4RT FT817 One Fast Charger	£Call
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Adapter cables to fit Icom - Kenwood - Yaesu £22.95

ATX Walkabout

ATX Walk--about PL-259

£47.95

The ATX Walkabout covers all bands (including WARC bands) from 80-6m, 5W guaranteed, 25W max. When fully telescoped it is about 65 inches long. This makes it ideal for the FT-817 or any other portable HF radio.

ATX Walkabout BNC	£47.95
ATX Walkabout PL259	£47.95
ATX Walkabout Universal	£54.95

The Miracle Whip

RX - 0.6 to 460 Mhz
TX - 40,30,20,17,15,12, 10, 6, 2m & 70cm

Power Limits 25W PEP 10W Cont.

£127.95

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* The Miracle Whip will transmit on almost any frequency you are licensed to use including WARC, MARS/CAP, Alaska Emergency, Citizens Band, Marine, and most commercial HF SSB and VHF/UHF channels

** The Miracle Whip is optimized for for best receive rather than lowest swr on 80 and 160, as no short antenna will present good transmitting opportunities at these frequencies

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MAC-200	£339.95

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YAESU

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G-550C Rotator	£309.00
G-650C Rotator	£379.00
G-1000DXC Rotator	£429.00
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Yaesu FL-2025 Amplifier SH FL-2025 £90.00
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Yaesu FRG-100 HF Receiver SH FRG-100 £299.00
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Yaesu FT-736R 2-70 Base SH FT 736R2 £550.00
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Yaesu FT-790 SH FT-790R £159.00
Yaesu FT-840 SH FT-840 £299.00
Yaesu FT-847 SH FT-847 £849.00
Yaesu FT-847 HF-6-2-70 Base SH FT 847 £899.00
Yaesu FT-8900 SH FT-8900 £279.00
Yaesu FT-897 Portable SH FT 897 £549.00
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Yaesu MD-100 SH MD-100 £80.00
Yaesu MD-200 Desk Mic SH MD200 £175.00
Yaesu MW-1 Remote Control Mic SH MW1 £60.00
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REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

DAVID G4ASR TAKES A LOOK AT YOUR RECENT VHF REPORTS AND WONDERS WHETHER CONDITIONS ARE GETTING WORSE?

Your reports indicate that a number of propagation events occurred on the v.h.f. bands during March. Operators on 50MHz reported openings via auroral backscatter (Au), auroral-E (Au-Es), Sporadic-E (Sp-E) and trans-equatorial propagation (t.e.p.). Stations active on the 144MHz band also reported making contacts during March via aurora and tropospheric (tropo) propagation. On both bands contacts were additionally made via moonbounce (e.m.e.) and meteor scatter (m.s.). Indeed the use of digital modulation techniques is now so prolific that meteor scatter contacts were reported every day during the month on both the 50 and 144MHz bands.

Auroral backscatter openings were reported on March 6, 7, 8, 9 and 19 but most were rather weak and restricted to stations located in the north of the UK. The event on March 19 was a little stronger reaching the 144MHz band but nevertheless very little activity was reported apart from inter-UK traffic.

An auroral-E opening between 2050-2130UTC on March 7 was reported by stations in northern England and Scotland. Contacts were made with stations in Finland (OH) and Norway (LA), all exhibiting a pure T9 signal unlike the ghostly hissing sound displayed during auroral openings.

Jim GM8LFB reported s.s.b. contacts with the stations of OH8HTG (KP34) and LA7SP (JP99) but no other activity other than hearing the beacons of JW9SIX (Svalbard) and LA7SIX. Only two Sp-E openings were reported during the month, around 1545UTC on March 24 and between 1300-1330UTC on March 26. Uncharacteristically, both 50MHz openings were reported only by stations located in Scotland with contacts being made into Germany (DL), Slovenia (S5) and Spain (EH).

A reception report on March 15 of video signals on 48.250MHz was the prelude to a trans equitorial path (t.e.p.) opening into Africa. At 1215UTC the ZS6TWB beacon (50.045MHz) was heard by stations in south-east England over a 9000km path.

However, the best location to make t.e.p. contacts into Africa is in southern Europe and it was from this area that all two-way contacts were made during this opening. Amongst the stations worked on the 50MHz band were ZR6SW, ZS6BTE/P, ZS6DN, ZS6NK, ZS6OB, ZS6TJX, ZS6WB (South Africa), Z22JE (Zimbabwe) and V51LK (Namibia). At 1735UTC the station of G8BCG (Cornwall IO70) heard the Malawi beacon 7Q7SIX (50.004MHz) but unfortunately no other African signals.

The lack of any good ionospheric propagation during March was probably caused by a decline in solar activity. Solar physicist **David Hathaway** has been checking the Sun every day since 1998 and for the past six years there have been daily sunspots.

Even during the lowest ebb of solar activity it's usual to find one or two spots on the solar surface. But when David looked on January 28 2004 and again on October 11-12 there were no sunspots. That's a sign that solar minimum is coming and it's coming sooner than expected! He examined data from the last eight solar cycles and discovered that solar minimum follows the first spotless day after solar maximum by 34 months.

The most recent solar maximum was in late 2000. The first spotless day after that was January 28 2004. So, by using the simple rule solar minimum could arrive in late 2006 and that's about a year earlier than previously thought.

Solar minimum and solar maximum are two extremes of the Sun's 11-year activity cycle. At maximum the Sun is peppered with spots, solar flares erupt and the Sun hurls billion-ton clouds of electrified gas toward Earth. That's a very good period for auroral backscatter and also for F2-layer propagation that provides world-wide 50MHz openings.

Solar minimum is different. Sunspots are fewer, sometimes days or weeks go by without a spot. Solar flares subside, auroral openings reduce dramatically and the 50MHz band loses it's world-wide appeal.

It's widely believed that sunspots vanish and solar flares stop completely during solar minimum. However, this is not true as occasionally big sunspots will unleash flares and spark auroras even during 2005-2006 but just not so dramatically as in recent years. The next solar maximum might come early too.

Solar activity intensifies rapidly after solar minimum and in recent cycles solar maximum has followed solar minimum by just four years. If solar minimum occurs in 2006 then solar maximum could return as early as 2010.

DAILY DX CONTACTS

Although propagation conditions weren't particularly good during March many contacts up to 2000km could still be made via meteor scatter on a daily basis. Stations using JT6M digital modulation on the 50MHz band reported contacts with the stations of CT1FFU (Portugal), EH4EHI (Spain), HB9QQ (Switzerland), IK2GSO (Italy), LX2SM (Luxembourg), OE5MPL (Austria), OH6KTL (Finland), OK1KRY (Czech Republic), OZ1DJJ (Denmark), SM7FJE (Sweden), SP5MXL (Poland) and S59MA (Slovenia). On the 144MHz band contacts made using FSK441 modulation included the stations of DF5NK, EA2KP/7, HA5LV (Hungary), HB9QQ, IW0FFK, LA8G (Norway), OK1DFC, OZ1AGJ, SM7MXO, SP2JYR and S53J.

Activity using JT65 techniques via the Earth-Moon-Earth path enabled a few stations to make QSOs on a world-wide basis. Contacts around 50.190MHz were reported with the stations of WA4NJP, K5GW, K6MYC, K7BV/1 and W7GJ.

There's much more activity on and around 144.130MHz especially, so it seems, from the Soviet Union. Some of the e.m.e. contacts reported during March included the stations of RA3AQ, RA3IS, RK3FG, RN6BN, UA4AQL, UA9YLU, RV9JD, S52LM, W5UN and KB8RQ. Incidentally if you want to try listening for e.m.e. signals you'll find it very useful to know that certain days are designated activity weekends.

The dates are chosen by looking at a number of favourable lunar characteristics such as a positive declination (or northerly declination), a large angular offset from the Sun and the lowest Sky temperature. Try listening during the weekends of May 14/15, June 11/12, July 2/3 and July 30/31 as these have all been chosen for the best e.m.e. conditions.

Tropospheric conditions on the 144MHz and higher bands were rather poor with no really long distance contacts being reported. A two-band 144/430MHz contest held over the weekend of March 5-6 livened up activity with many contacts being made around the UK and

into Belgium (many using a special OO prefix), France (F), Germany (DL), Holland (PA) and Switzerland (HB9).

The maritime mobile station of G0KZG/MM was again operational on the 144MHz band making many tropo and meteor scatter contacts. He was active from locator squares IO50, IO51, IO60, IO61, IO69, IO70 and IO79 to the west and south-west of the UK.

● The impressive antennas at the QTH of Ray Johnson W9RAY.

ARE TROPO CONDITIONS DECLINING?

For many casual v.h.f. operators the predominant propagation mode is tropo enhancement. However, openings made via the troposphere depend entirely on the prevailing weather conditions. Recently some stations have started to question (on the 'vhf-dx-discuss' newsgroup) whether global-warming or maybe some other factor is affecting the intensity and duration of such tropospheric openings.

Stewart Cooper GM4AFF asks if propagation conditions on the v.h.f. bands have reached an all time low? In 1994 he was able to work as many as 18 stations during a short 70MHz cumulative contest session running just 7W output into a 7-element NBS Yagi.

Later in 1998 Stewart GM4AFF needed a 40W amplifier to achieve the same results. Nowadays he runs 70W output into an 8-element long Yagi and finds that working seven stations during similar contests is a struggle. Stewart thinks that it's due to higher noise levels and it's the same reason why he lost interest in the144MHz band, with apparently less and less stations hearing him. He recalls that many years ago he could work over 80 stations in an evening running only a Belcom Liner-2 transceiver (the first commercial s.s.b. radio running 8W output). If he now participates in a low-power 144MHz contest he would be lucky to work 10 stations during the event.

FASCINATING QUESTION

Dr Howard Oakley M1BWR comments that Stewart's is a fascinating question, with some fascinating possibilities. There could be fewer people active so maybe the percentage of those on the band that Stewart is working remains fairly constant. Maybe those active could be less interested in working the station of GM4AFF!

Stations could find it harder to hear Stewart perhaps because of an increase in their local noise or maybe because of poorer propagation. Howard mentions that there are plenty of things that are changing that could affect non-ducting tropo propagation. There is a significant quantity of water vapour and carbon dioxide being dumped just above the tropopause from jet aircraft. If tropo conditions depends on factors occurring around the tropopause (which would support the path from Scotland to southern England) then those changes could adversely affect or maybe even enhance propagation.

Dr Geoff Grayer G3NAQ is absolutely certain that there has been a deterioration in tropo conditions. This trend is even more evident on the 144 and 430MHz bands if you look at super-tropo ducting openings. In the years following his return to the UK in 1986 Geoff worked many stations in northern Italy on both 144 and 430MHz.

Geoff G3NAQ worked so many Italian stations that he was able to statistically analyse these contacts and write a paper on Trans-Alpine Ducting, which was examined by the ITU UK Study Group on Non-Ionospheric Propagation and eventually forwarded to the plenary session in Geneva. However, he can't remember the last time an Italian station was worked on 144MHz tropo. He thinks it was several years ago and a well-equipped e.m.e. station at that!

How much is this due to the decrease in activity, which has occurred on the v.h.f. bands? Certainly there has been a huge drop in activity over the years but when a sizeable opening occurs there seems no shortage of stations active.

NOISE LEVELS

With regard to noise levels, Geoff G3NAQ mentions that he lives in a sparsely inhabited part of the country in a hamlet of about eight houses. However, even in that location the rise in noise level has been very marked. It seems every house is now running a computer and computer based gadgets, heating, security, automatic garage doors running 24-hours a day. All of which of course are effectively connected to the antenna system formed by the overhead mains and telephone lines. Electric fences, broadcasting their pulses, also seem to be much more widely used than previously.

Geoff thinks that the subject of global warming is irrelevant to the issue. Nevertheless, he comments that there have always been changes in climate during recorded time, over periods varying from several decades to centuries. As **Dr Ian White G3SEK** points out, small changes can give rise to a pattern of cyclones or anticyclones, which has an enormous effect on the number of super-tropo openings. Whether the current change we see (or think we see) has anything to do with global warming or is just one of these periodic fluctuations, he doesn't think we are in a position to say.

There is no doubt about the thinning of the ozone layer, however. This of course allows more of the energetic ultra-violet part of the solar spectrum to heat the ground. There are also measurements, which suggest that the solar flux is variable. This is obviously a very complex situation, which is very difficult to judge.

It's very interesting to note that operators have divided into two categories, those who agree there has been a deterioration in propagation and those who blame it all on decreasing activity. So what do you think? A downturn in v.h.f. propagation, less active operators or maybe a combination of both. I'll be interested to hear your views.

DEADLINES

That's it again for another month. 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.

CARL GW0VSW ROUNDS UP THE LATEST NEWS AND CONTACTS MADE ON THE HF BANDS

Warren Hill ZR1HIL sent in some news of the new h.f. privileges available to Amateurs in South Africa. As of the 4 February this year operators with restricted licences using calls ZR1 to ZR6 can now operate on certain portions of the h.f. bands using a maximum power of 100W p.e.p.

The new regulations also affect the way ZS licences are issued and bring South Africa in line with many other countries around the world who no longer use Morse Code for granting access to h.f. Check out 1.810-1.850, 3.500-3.800, 7.000-7.100, 14.070-14.099 and 14.225-14.350, 21.080-21.120 and 21.300-21.450, 28.050-28.150 and 28.300-28.500MHz for new activity.

The h.f. frequency allocations for ZU licenses will also change so they are identical with the ZR allocations on the 1.8, 3.5, 7 and 28MHz bands using s.s.b. and the maximum permitted power remains 20W p.e.p. while all ZS licensees will retain all current frequency allocations and be able to use a maximum power of 400W p.e.p. The new regulations also introduce a new process for ZR and ZU license holders wishing to upgrade to a full ZS licence. These make interesting reading with a candidate having to pass any one of several assessments. To date these include:

1. Confirmed contacts with 100 different stations using any combination of bands or modes. Only simplex contacts, and contacts through earth-orbiting satellites, will count. Contacts through repeaters will not count.

2. The construction of a working direct-conversion or superheterodyne radio receiver, or a crystal-controlled radio transmitter with an output power of at least 1W.

3. The completion of at least 50 hours of public service or emergency communications in sports communications, disaster preparedness exercises, actual disasters and educational events.

4. Obtaining a professional tertiary qualification in electronics or radio.

5. Passing a Morse code test at 5w.p.m.

Now I wonder if we will ever see this happening in the UK? You will find lots more information on The South African Radio League, awards, events and of course these changes at **www.sarl.org.za/**

SPECIAL EVENT NEWS

During the Rotary's International Centennial Convention in June the Rotarians of Amateur Radio (ROAR) will operate a special event station, **W9R**, between the 18 and 22 June. This station will be based within the Lakefront parking area of Chicago's Soldier Field immediately adjacent to the McCormick Convention Centre.

The equipment that will be used is being loaned to ROAR by the Chicago Chapter of the American Red Cross. The station equipment is part of the Emergency Communications Response Vehicle, which will also be on display. Suggested frequencies are 3.955, 7.280, 14.293, 21.310 and 28.560MHz depending on the band conditions. You can visit **http://www.ifroar.org** for additional information and a full operating schedule.

YOUR REPORTS

On to your reports now and first is **Ted Trowell G2HKU** on the Isle of Sheppy, Kent who operated QRP on 3.5MHz finding OK1R (Czech Republic), DL4CF (Federal Republic of Germany) and LY2PX (Lithuania) around 2100UTC using an Icom IC-703, 4W and a G5RV.

Just after 2200UTC on 7MHz Ted found conditions "reasonable" and fired up his Ten-Tec Omni V at 70W to work P3J (Cyprus) AS-004, VE3ZI (Canada) in Sudbury, Ontario, K3FB (USA) in Warminster, Pennsylvania, ZA1FD (Albania), and C6AKQ (Bahamas) QSL via N4BP.

Welcome to new reporter **Gerard Lynch G0RTN** who was originally licensed as GI0RTN as a teenager back in 1992. Gerard say's "I was off the air for four years after coming to London after finishing my University course in 2000 and have been active since the end of August last year using an Icom IC-7400 plus a.t.u. and a trap dipole for 3.5/7MHz on the roof of a 10 storey block of flats in Central London".

Gerald continues: "Naturally it's a very electrically noisy location but since getting back on the air the DX bug has bitten very hard indeed. I operate mostly on the key with a bit of s.s.b. when the mood takes me and I offer my log extracts below in the hope that people can see what is possible on the mode with a very normal setup".

"Morse is still in my view the best mode for DX working. PSK31 might be great for very weak signals but the Morse operator with a modest signal can use skill to beat pile-ups in a way that is difficult in the digital modes. It really is worth learning the code and it does become second nature with practice. I'm now an 'old timer' of 27 and think the idea that Morse is an 'old man's' mode is rubbish".

Well, Gerard's log shows a considerable number of contacts on 7MHz and these include V31LZ (Belize) 0003, TT8AMO (Palau) OC-009 at 0033, VP2V/DF7DF (British Virgin Islands) NA-023 at 0040, TO7C (French Guiana) 0102, PJ4/K2NG (Netherlands Antilles) SA-006 at 0109, FS/KT8X (Saint Martin) NA-105 at 0145, 9J2BO (Zambia) 0431, VK9NS (Norfolk Island) OC-005 at 0655, 7X2AB (Morocco) 2016, VP9KK (Bermuda) NA-005 at 2056, HL2ADO (Republic of Korea) 2114, SU9HP (Egypt) 2241 and R1AN (Antarctica) AN-016 at 2246UTC so the trap dipole is working very well indeed!

THE 14 & 18MHz BANDS

On 14MHz **Owen Williams G0PHY**, Biggleswade, Bedfordshire contacted s.s.b. stations 9K44NLD (Kuwait) a special call for the Kuwait National Liberation Day at 1740 followed slightly later by AL9A (Alaska) at 1929 using a Yaesu FT-747 and 100W to a dipole antenna.

It's always good to hear from our readers abroad and one of these is **Okko De Jamaer ZR1HIL** in South Africa who enjoys working DX from his QTH in Houtbay. Using a Kenwood TS-520, tuner and G5RV fixed 10m above ground Okko made 80W s.s.b. contacts with V51AP (Namibia), IK2IQD (Italy), OH0R (Aland Island) EU-002 and YU1FW (Serbia & Montenegro).

In Newtonabbey, Northern Ireland **Peter Lowrie MI5JYK** "Threw up a dipole" barely

four feet above ground, fired up his MFJ-9420 transceiver and with an almost non existent noise level worked F4DSD (France) 1027, IK1CJO (Italy) 1055, 2E1MJH/M Mark in Suffolk at 1225, LA3ANA (Norway) 1248, T77EB (San Marino) 1327, HB9RDE (Switzerland) 1340 and DL5JMN (Federal Republic of Germany) at 1418UTZ with just 5W s.s.b.

In Middlesbrough **Keith Winward M3KWI** is enjoying his h.f. activities making many 10W s.s.b. QSOs this month**.** Countries making his logbook include S53O (Slovenia), ES1AJ (Estonia), HA1ZN (Hungary), OE6Z (Austria), EA8EW (Canary Islands) AF-004, RK1AM (European Russia), KQ2M (U.S.A.) in Newtown, Connecticut, YL2KO (Latvia), VE3DZ (Canada) in Etobicoke, Ontario, OH3MMM (Finland), SP9QMP (Poland) and J41V (Greece) between 1200 and 1740UTC using his new Yaesu FT-897 and half size inverted G5RV.

Mobile operator **Mark Taylor G0LGJ** continues to do well with his Kenwood TS-480 and new DK3 Screwdriver antenna making contacts with s.s.b. stations ZL2BCG (New Zealand) in Motueka 1024, J79XBI (Dominica) NA-101 1826 and FR1AN (Reunion Island) AF-016 at 1902UTC. Incidentally, the DK3 Screwdriver h.f. mobile antenna has been made and the design improved by **Mel Woody N7LYY** and will handle up to 500W. It tunes continuously from 1.8 to 28MHz by a remote switch you mount at your operating position. This system eliminates the need to have a tuner or the inconvenience of stopping your car to change bands. For more information on this antenna check out **www.qth.com/n7lyy/**
Moving up to 18MHz Mark found PZ5RA (Suriname) at 1427 followed by 5T1CW (Mauritania) at 1541 and CO8EJ (Cuba) NA-015 at 1948UTC.

In Chelmsford, Essex **Rob Hastings 2E0BOB** uses a Kenwood TS-50, MFJ-945E Tuner and inverted Carolina Windom special and made s.s.b. contacts with LZ2KV (Bulgaria), US7IGF (Ukraine), 9Y4DLH (Trinidad & Tobago) SA-009, CT/G4ZVD/P (Portugal) and LY2ZZ (Lithuania).

The c.w. of Ted G2HKU found German operator Dietrich Schroeckh operating as EA8/DL3KVR (Canary Islands) during a morning coffee break at 0900UTC.

THE 21 & 24MHz BANDS

On to 21MHz and the log of **Chris Colcough G1VDP**, Nuneaton who worked II7ANT (Italy) a special Antarctic callsign at 1003, EZ8BD (Turkmenistan) 1018, V5/SP7VC ((Namibia) 1028, 3V8SF (Tunisia) 1028, 9G5OO (Ghana) 1235, 9K44NLD (Kuwait) 1249, V31LZ (Belize) 1450, KP4BME (Puerto Rico) NA-099 at 1508, 9Y4/YL2GM (Trinidad & Tabago) 1824, WB2YL (USA) in New York at 1831 all made using his Yaesu FT-897 and Cushcraft MA5B beam.

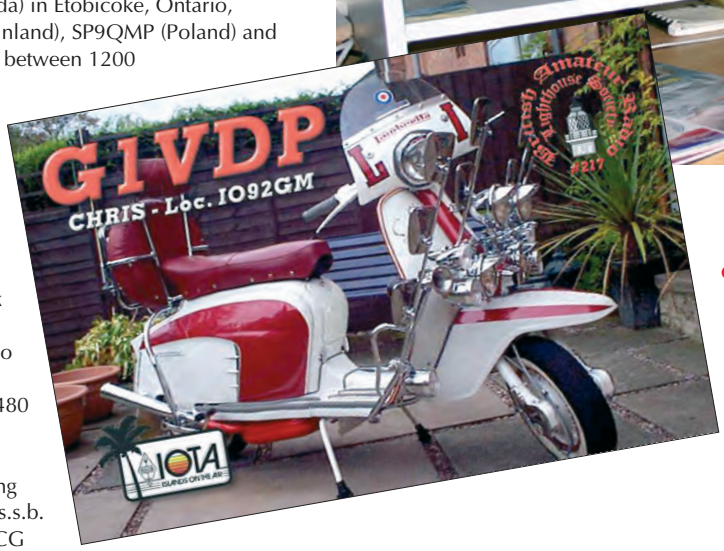
Also on the band was Owen G0PHY who managed just two contacts in what he describes as "rather poor band conditions", V5/SP6IXF (Namibia) at 0840 and A92GR (Bahrain) at 1537UTC.

Meanwhile, **Eric Masters G0KRT**, Worcester Park, Surrey used a Yaesu FT-817, MFJ-934 tuner and 20m end-fed wire to work c.w. stations N5JN (U.S.A.) in Odessa, Texas with 5W, W3BP in Warsaw, Virginia with 2.5W and dropping the power even further to 0.5W NY4A, the Potomac Valley Radio Club, Blounts Creek, North Carolina.

Martyn Medcalf M3VAM, Chelmsford, Essex used his Icom IC-746 and Hustler ground mounted vertical to log s.s.b. stations 9K44NLD (Kuwait) 1137, C93N (Mozambique) 1146, EC7ALW (Spain) 1216, RA1WP (European Russia) 1303, SV1FTY (Greece) 1335, IT9CCB (Italy) 1342 and N2RS (USA) in Weaverville, North Carolina at 1413UTC. A change to 24MHz found little activity but EA8AYV (Canary Islands and CU3GD (Azores) EU-003 made the log around 1220UTC.

The DX has been difficult to work on the higher bands for **Jim Pedley GM7TUD**, Dumfries as work has taken up a good deal of his time. However, he was pleased to get s.s.b. contacts with K6KS (USA) in Rancho Palos Verdes, California at 1620 whilst operating mobile using an old Kenwood TS-50 and Pro-AM whip antenna and from his home QTH ZP5MAL (Paraguay) 1214, CE8A (Chile) SA-094 at 1251 and 5T0CW (Mauritania) at 1341UTC.

● Warren Hill ZR1HL in his shack.



● Chris Colcough G1VDP's new QSL card.

THE 28MHz BAND

With a brief visit to the 28MHz band Jim GM7TUD logged V5/SP7VC (Namibia) at 1110UTC while Gerard G0RTN used the key to work 9J2BO (Zambia) 0911, 7Q7BP (Malawi) 1023, ZC4LI (UK Sovereign Bases on Cyprus) 1045 and J88DR (St. Vincent and the Grenadin) NA-109 at 1450UTC.

SIGNING OFF

Well that sums up quite a busy month despite the varying conditions to be found on the h.f. bands. The higher bands have shown some signs of life but this has been rather marginal at best! It's always nice to hear from new reporters and also from those whose stations are very modest but still manage to work some nice DX.

There was plenty to get through this time around and it's sometimes difficult to pick out the best from each report. However, I do hope I have managed to select a good cross section and give you a better idea of what is around even when conditions appear to be so poor. 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

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GRAHAM G8EMX LOOKS AT FORTHCOMING CHANGES TO AMATEUR & BROADCAST TV

Changes are accelerating within Amateur and broadcast television. The analogue switch-off has begun, High Definition is coming but I will begin with live ATV being delivered over the Internet. (There are numerous facilities that can be provided on an Amateur Televison Repeater).

In contrast to voice repeaters, which sit listening with their transmitters turned off when not accessed or giving brief idents, ATV units are usually always transmitting a modulated vision carrier, which is particularly useful for newcomers checking their receivers or looking for a repeater for the first time. This 'standby' vision can simply be a static test card, but many repeaters cycle an assortment of patterns plus news pages.

Further ideas have included switchable cameras, activity statistics and incoming signal reports. All of this could only be seen by receiving within the repeater's coverage area, but now the Home Counties Television Group is providing 'streamed' sound and vision over the Internet from its 24cm (1.3GHz) ATV repeater **GB3HV** (High Wycombe).

You will need a broadband Internet connection to see the streamed video from GB3HV. The Group's website at **www.gb3hv.com** recommends the Wednesday activity nights to view live ATV stations, but of course there could be stations using the repeater at any time and the 'HV information pages include an activity bar graph showing who has been using the repeater, and when. In addition, GB3HV transmits the GB2RS news in vision on Sunday mornings.

LATEST BATC NEWS

The British Amateur Television Club's (BATC) latest magazine *CQ-TV 210* has been electronically sent to the club's committee and includes the dates for two ATV contests later this year. The International from 1800UTC on September 10 to 1200 on the 11th is unchanged but the 'Summer Fun' contest in June has now been altered from a 1800 start to become a 24-hour event, beginning at 1200UTC on Saturday 11 June until the same time on the Sunday. My personal comment is: "About time too"!

With many ATV enthusiasts unable to operate appreciable distances from the home QTH because their location limits microwave transmissions, taking the station portable to a hilltop is often the only option for working any significant distance. The previous 1800 start for the Summer Fun meant either working through the night, quite impracticable unless camping gear was taken along, or only being able to operate in the contest during the Sunday morning.

● Live GB2RS news in vision streamed from GB3HV as seen in Birmingham.

Also in *CQ-TV 210* is a page headed 'The Future of Amateur Radio Licencing - The Facts' sent by **Colin Thomas G3PSM**, Spectrum Director and HF Manager for the RSGB. This expresses concerns that the Office of Communication (Ofcom) may be intending to de-regulate the hobby of Amateur Radio. The page gives some consequencies of such action and one is: 'De-regulation would mean the end of the repeater network', which I think would cause the substantial reduction of ATV activity and development. The paper adds: "The RSGB will do all in its power to prevent de-regulation".

Colin E-mailed the BATC committee: "Please feel free to use this document in whatever way you wish, preferably to spread the word". On Sunday 3 April the RSGB website stated that: "At a meeting between RSGB and Ofcom on 25 March Ofcom's Deputy Chairman, **Richard Hooper**, assured the RSGB that de-regulation of Amateur Radio was not an option that Ofcom was considering at this time. Despite this, the RSGB remains unconvinced..."

ANALOGUE SWITCH OFF

Shortly after Easter, the analogue television transmitter serving two villages in West Wales was permanently switched off. All the residents had been participating in a mass trial of digital television and the 98% positive replies to an approval survey in which 86% responded (figures from Radio 5) were decisive. Nationally, more than 60% of homes are now receiving digital TV so Ofcom has published a suggested timetable for countrywide analogue closedown to be completed, with government approval, by 2012.

Arriving in 2006 will be High Definition Television (HDTV) from Sky Digital. This substantially increases the number of picture lines, thus producing even better pictures than those which most of us already enjoy. The 'holy grail' for electronic systems is the definition achieved by the projected 35mm colour film slide and HDTV goes perhaps as near as we need to go in achieving this on a television screen. Internationally there are two line standards for HDTV, 720 lines with sequential scanning and 1080 lines interlaced (current TV uses 625 interlaced), but only the 1080 line format is recognised by the BBC as true HDTV. (ref. *Television* magazine, February 05)

The increased definition becoming significant as display devices become larger e.g. 42 inch plasma screens and the like. If you do buy a very large screen ready for HDTV, be aware that not all are HDTV compatible - confirm that a High Definition Multimedia Interface (HDMI) or Digital Video Interface (DVI) socket is fitted - these are in addition to the usual SCART sockets. In Vision will keep watching developments in digital and HDTV.

While High Definition is not yet a part of Amateur TV, ATV continues to make small-scale experiments with Digital ATV. Receivers are not a problem, it's the encoding and transmission to an acceptable Amateur budget and standard, which at the moment requires relatively expensive modules that have to be ordered from Germany. Some of these are, experimentally, used at a few repeaters to take analogue input and relay digitally.

Of course, ATV is not obliged to 'go digital' but is upholding the ethos, spirit and purpose of Amateur Radio by conducting these trials. It remains to be seen how widespread digital systems can become, technically and financially, within Amateur TV.

That's all for now, cheerio until next time.

Graham G8EMX

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RADIO BOOK STORE

Airband

	Pages	Price	Code
AIRWAVES 2005 (Photavia)	144	£10.95	AIR25
AIRBAND RADIO GUIDE (abc) 6th Edition		TBA	ABRG6
AIRBAND RADIO HANDBOOK (Sutton) David Smith	190	£12.95	ABRHB
AIR TRAFFIC CONTROL		£9.99	ATC9
AIRWAVES SELCAL CIVIL & MILITARY DIRECTORY (Photavia)	176	£11.95	AIRSEL
CALLSIGN 2005 (Photavia)	2005	£10.95	CAL25
CIVIL AIRCRAFT MARKINGS 2005 (abc) Alan Wright	TBA	TBA	CIVAIR
FLIGHT ROUTINGS 2004 Williams	180	£8.95	FR24
MILITARY AIRCRAFT MARKINGS 2005 (abc) March & Curtis	TBA	TBA	MILAIR
BRITISH ISLES ATLANTIC TRANSITION CHART (AERAD)	1020x520mm	£9.00	UKH6
BRITISH ISLES LOW ALTITUDE CHART (AERAD)	1020x520mm	£9.00	UKL2
NORTH ATLANTIC ROUTE CHART (AERAD)	1020x520mm	£9.00	NATHL1

Frequency Guides

FERRELL'S CONFIDENTIAL FREQUENCY LIST 13th Edition	540	£21.50	FERR13
KLINGENFUSS GUIDE TO UTILITY STATIONS 2005	552	£31.50	KFUTIL
KLINGENFUSS SHORTWAVE FREQUENCY GUIDE 2005	504	£24.50	KFSWFG
KLINGENFUSS SHORTWAVE FREQUENCIES CD 2005		£17.70	KFSWCD
PASSPORT TO WORLD BAND RADIO 2005 (IBS)	592	£17.50	PASS25
RADIO LISTENERS GUIDE 2005	160	£5.45	RLG25
WORLD RADIO TV HANDBOOK 2005 (WRTH)	688	£22.50	WRTH25

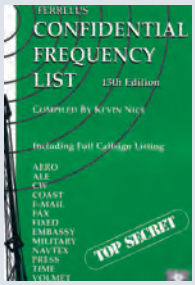
Scanning & Short Wave

BUYING A USED SHORT WAVE RECEIVER 4th Edition F. Osterman	78	£5.95	BUSWRX
RECEIVING (VALUE) STATION LOGBOOK (RSGB)	80	£4.95	RXLOG
SCANNER BUSTERS 3 D.C. Poole (Interproducts)	92	£5.00	SCANB3
SCANNERS 4 SCANNING INTO THE FUTURE Bill Robertson	245	£9.95	SCAN4
SHORT WAVE COMMUNICATIONS 1991. Peter Rouse (PWP) WSL	187	£4.50	SWCOM
SHORTWAVE RECEIVERS PAST & PRESENT 3rd Edition F. Osterman	450	£25.95	SWRXPP
THE SUPERHET RADIO HANDBOOK I.D. Poole (Babani)	104	£4.95	BP370
THE ESSENTIAL GUIDE TO SCANNING Martin Peters	108	£6.00	EGTS

Antennas/Transmission Lines/Propagation

25 SIMPLE INDOOR & WINDOW AERIALS E.M. Noll (Babani)	50	£1.75	BP136
25 SIMPLE TROPICAL & MW BAND AERIALS E.M. Noll (Babani)	54	£1.75	BP145
ANTENNA FILE (RSGB)	285	£18.99	ANTFIL
AN INTRODUCTION TO RADIO WAVE PROPAGATION J.G. Lee (Babani)	116	£3.95	BP293
ANTENNA TOOLKIT (inc. CD ROM) Joseph J. Carr	214	£25.00	ANTOOL
ARRL ANTENNA BOOK (inc. CD ROM) 20th Edition	944	£32.00	RRAB20
BACKYARD ANTENNAS Peter Dodd G3LDO (RSGB)	200	£18.95	BYANTS
BASIC RADIO PRINCIPLES & TECHNOLOGY Ian Poole G3YWX	262	£15.99	BRPRIN
EXPERIMENTAL ANTENNA TOPICS H.C. Wright	70	£3.50	BP278
HF ANTENNA COLLECTION Edited by Erwin David G4LQI (RSGB)	233	£19.95	HFANTC
MORE WIRE ANTENNA CLASSICS (ARRL)	200	£10.50	MWANTC
PHYSICAL DESIGN OF YAGI ANTENNAS (Hardback) David B. Leeson W6QHS (ARRL)	200	£15.50	PDYAGI
RADIO PROPAGATION PRINCIPLES & DESIGN Ian Poole G3YWX	102	£14.95	PROPPR
RECEIVING ANTENNA HANDBOOK Joe Carr (HighText)	189	£17.50	RXANHB
UNDERSTANDING,BUILDING & USING BALUNS (CQ Publications) Jerry Sevick	125	£18.95	BUBALS
VHF UHF ANTENNAS Ian Poole G3YWX (RSGB)	128	£13.99	VUANTS
WIRE ANTENNA CLASSICS (ARRL)	200	£10.50	WANTC

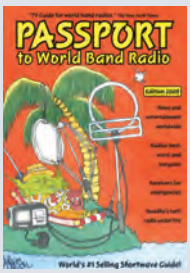
Ferrells Confidential Frequency List



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**

Klingenfuss 2005 Guide to Utility Radio Stations

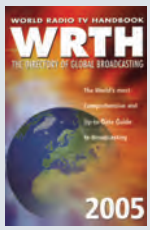
One of the most comprehensive, reliable and up-to-date manuals containing over 11,200 frequencies, 1900 stations, meteo radiofax, radiotelex and NAVTEX schedules, abbreviations, frequency allocations and radio regulations. **£31.50**



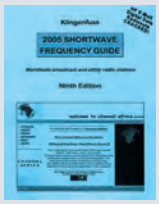
Passport to World Band Radio 2005

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**



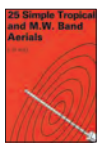
Klingenfuss Shortwave Frequency Guide

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**

Radio Listeners Guide

This handy annual publication contains radio product reviews and general information for listeners. Frequencies and locations of radio stations all over the UK and Ireland are given for BBC and commercial radio stations, as well as DAB services. All-in-all a very handy reference guide. **£5.45**

25 Simple Tropical & MW Band Aerials



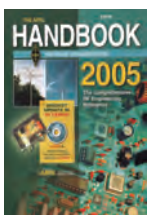
This concise book describes how to build 25 simple and inexpensive antennas for operation on the medium wave broadcast band (550 - 1600kHz) and on the 60, 75, 90 and 120 metre tropical bands. There are also designs for the 49m band. **£1.75**

An Introduction to Radio Wave Propagation

This book provides a broad, yet clear picture of radio wave propagation in a consise way without the use of too much technical language or mathematics. Included are explanations of the phenomena that is propagation dealing with everything from the Sun, through the ionosphere to noise. **£3.95**

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 formally published in RadCom. **£16.95**

Receiving Antenna Handbook

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**

The Amateur Radio Operating Manual

This new edition of the RSGB Operating Manual reflects the huge impact in the past few years of licensing changes and the ubiquity of PCs and the internet. To deal with these, the author has taken a completely new look at the content and approach. For example, some of the traditional demarcations between HF and VHF and between the various operating modes have been overturned, but new and comprehensive chapters on topics such as PCs in the shack and Operating Modes added. **£16.95**

VHF/UHF Antenna

With both the basic theory and constructional details for many antenna designs, the reader is taken through the essentials in an easy-to-understand way. All kinds of antennas are described from dipoles to Yagis and verticals to log periodic designs. **£13.99**

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

Beginners/Licence/Manuals

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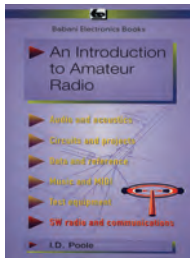

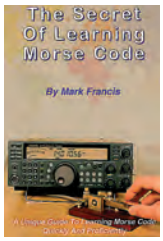

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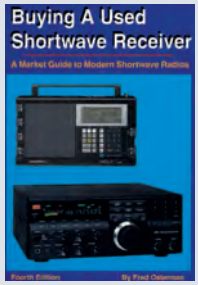

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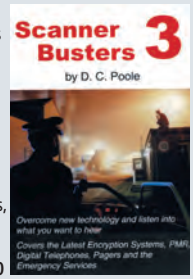

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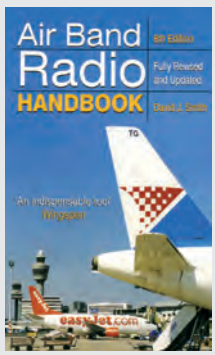

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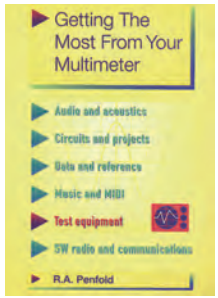

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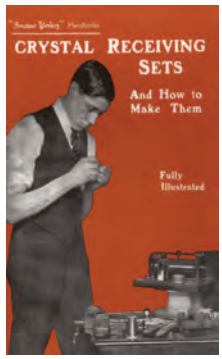

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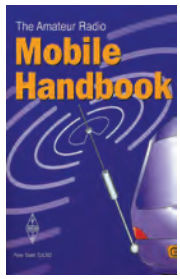

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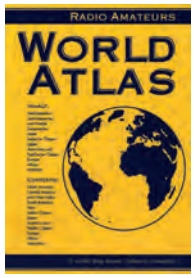

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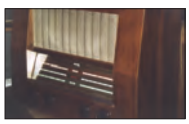

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rob mannion's topical talk

As usual Rob Mannion G3XFD has found something topical to discuss. This month he responds directly to the letter from John Taylor in Heanor, Derbyshire regarding the Radio Basics series, planned reprints and v.h.f. projects.

I've only missed one of the Junction 28 QRP Rallies, organised by the **South Normanton & District Amateur Radio Club** in North Derbyshire. I was there for the first event, but missed the second because of health problems. Since then however, I've made the trip to North Derbyshire a priority.

At this year's Junction 28 event on Saturday 19 March I had, as usual, the able assistance of **Ian Brothwell G4EAN** who lives in nearby Nottingham. Both Ian and I had the opportunity to talk to many readers, including **John Taylor** from Heanor in Derbyshire. Keen on v.h.f., John hopes to get his M3 soon, but with three youngsters (they've a set of twins!) under the age of seven, Amateur Radio and family life compete!

Radio Basics Reprints

Every time I meet John Taylor he reminds me of his interest in seeing the Radio Basics (RB) series reprinted in book form. My reply has always been that his suggestion is 'in the pipeline'. However, now I'm pleased to say that the RB reprint in book form plan has almost completed its journey through the pipeline.

The book, containing the first part of the series (covering the period from the start in 1997 until late in 2001) will be available later this year. So, to help me to plan exactly what's needed, and also to assist my publishers to estimate the size of the job we're undertaking, we'd like to hear from readers who would be interested.

Please respond as quickly as possible so that we can get on with the job! If you have E-mail, address your response to me with the subject line Radio Basics Book, and if you write in, please mark you postcard with **Radio Basics Book**. I'll acknowledge E-mails as they arrive, and postcards (although these won't be acknowledged) will be very helpful. I'll announce the publication date, price and other information as soon as possible.

Good News For VHF Projects!

On the whole, experience has shown me that feedback from readers is positive when we get several dozen letters on a particular topic, project or idea. But when we get approaching 150 requests for further information on projects - that's really good news! Such has been the feedback from many of you regarding the 70MHz amplitude modulated (a.m.) transmitter-receiver (taken from a 1968 project in our esteemed sister publication *Short Wave Magazine*) and featured in Radio Basics.

Indeed, such is the interest in the little project that **Tony Nailer G4CFY**, wearing his **Spectrum Communications** hat, has sourced the appropriate 3rd overtone crystals for 70.260MHz and one a.m. working channel on 70.280MHz, for the superb price of £5 for the pair plus 50p P&P. At one stroke Tony has solved one of the biggest problems for simple v.h.f. projects - the price of crystals.

Tony will also be offering a kit, complete with p.c.b. for the *SWM* 70MHz transmitter (with modern semiconductors and a ready made modulation transformer) featured in Radio Basics. A receiver kit won't be available as Tony considers that most readers will either use a converter with h.f. receiver, or build their own (Please see the Spectrum Communications advert in this issue, and contact Tony G4CFY directly to order your crystals and transmitter kit).

I'm truly delighted that Tony is supporting v.h.f. home-brewing and I hope many of you join in with the project and discover the joys of QRP on 70MHz. I look forward to working you on 70MHz a.m. very soon!

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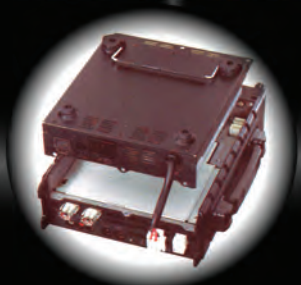

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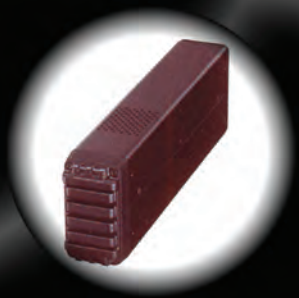

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